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AN ANALYSIS OF THE SERVICE SECTOR IN INDIA

by

Vishwapati Trivedi

M.Sc. Economics, London School of Economics, U.K., 1975

THESIS SUBMITTED IN PARTIAL FULFILLMENT OF

THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

in the Department

of

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## ABSTRACT

The purpose of this thesis is to analyze India's service sector in the light of some modern studies of service sector growth in the developed market economies. The conventional approaches to study the service sector are discussed and their inability to focus on the newer ideas is emphasized. A new classification, based on the sources-of-demand, is used to re-classify the Indian service sector. Of the three categories into which such a classification divides the services sector : consumer services, producer services and non-commercial government services, the first two are discussed in this study.

It is shown that a conventional econometric estimation of the demand function for consumer services is unlikely to yield acceptable results unless structural demand side variables are included. A model of an economy with rural and urban dualism is constructed, and differences in the behaviour of households in these two regions is emphasized to explain the growth in the demand for consumer services, as urbanization proceeds. Then, using urbanization as a structural demand side variable, the econometric estimation of the demand function for consumer services is shown to give statistically sound results. Besides allowing us to develop a thesis similar to that developed by Gershuny for the U.K., these estimates help us to quantify possible monetization resulting from urbanization, and also indicate that the

income elasticity of demand for consumer services may not be greater than one, as is commonly believed.

The thesis also analyzes the reasons for the growth of producer services, its implication for goods manufacturing and international trade. It is hypothesized that a growing producer service sector implies increasing inter-linkages between goods and the service sector, known as 'embodiment' of services into goods. A methodology developed by Harris and Cox is used to measure this growing embodiment. The Indian input-output data are used for the purpose.

The above estimates are then used to compute the export and import of 'embodied' services. These estimates besides indicating the extent of underestimation of the role of services in international trade, and the growing importance of the producer services in goods manufacturing, also show the impact of changing technology on international trade.

## DEDICATION

To Mona, for her support and encouragement.



## ACKNOWLEDGEMENTS

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## TABLE OF CONTENTS

|   |     |
|---|-----|
| Approval .....  | ii  |
| Abstract .....  | iii |
| Dedication .....  | v   |
| Acknowledgements .....  | vi  |
| List of Tables .....  | ix  |
| List of Figures .....   | x   |
| I. Introduction .....   | 1   |
| Current Views: .....  | 2   |
| The Present Research .....  | 5   |
| Outline of the Study .....  | 7   |
| II. Services: Theoretical Considerations .....  | 9   |
| Distinction between goods and services .....  | 9   |
| Typology of services .....  | 15  |
| Summary .....   | 26  |
| III. The Service Sector in India .....  | 27  |
| Composition of the Service Sector .....   | 28  |
| Sources-of-Demand Classification of the Service Sector .  | 33  |
| Summary .....   | 38  |
| IV. The Demand for Consumer Services .....  | 46  |
| Overview of the Existing Literature .....   | 48  |
| Female Labor Force Participation in India .....   | 59  |
| Urbanization and the Growth of Service Industry .....   | 60  |
| Estimation of a simple demand function for services ....  | 67  |
| Conceptual Background of the Model, the Taxonomy of<br>- Dualism and the Behavioural Pattern of Urban<br>Households. .... | 70  |

|   |     |
|---|-----|
| A Model of Demand for Marketed Consumer Services .....                              | 80  |
| Derivation of the Demand Equation .....   | 87  |
| Econometric Estimation .....  | 89  |
| Conclusion .....  | 94  |
| V. The Growth of Producer Services and Trade in Embodied Services .....             | 104 |
| Background .....  | 104 |
| Growth in Primary Factors, Comparative Advantage and the Leontief Paradox. ....     | 107 |
| Growth of the Service Sector and Comparative Advantage                              | 110 |
| Implications for Trade in Services .....  | 120 |
| A Survey of Literature on Trade in Services .....                                   | 121 |
| Embodiment of Services and International Trade .....                                | 124 |
| Empirical Estimation .....  | 125 |
| Summary .....   | 141 |
| VI. CONCLUSIONS .....   | 144 |
| An Alternative Methodology for Estimating the Embodiment of Services in Goods ..... | 158 |
| Bibliography .....  | 175 |
| Index .....   | 182 |

## LIST OF TABLES

| Table   | Page |
|---|------|
| 3.1 The Index of Growth of Sectoral GDP at 1970-71 prices ...   | 39   |
| 3.2 Gross Domestic Product of the service sector at factor cost .....                                 | 40   |
| 3.3 Index of Growth of sub-sectors of the Service Sector GDP at 1970-71 prices .....                  | 41   |
| 3.4 Computation of Consumer and Producer GDP .....  | 42   |
| 2.1 Index of Growth of Sectoral GDP at 1970-71 prices .....   | 158  |
| 2.2 Index of Growth of Sub-Sectoral GDP at 1970-71 prices of the Service sector .....                 | 158  |
| A.1 Alternative Measures of Embodied Service Content .....  | 168  |
| A.2 Estimates of Export and Import of Embodied Service Content .....                                  | 169  |
| A.3 Estimates of Export and Import of Embodied Content As Proportions of Gross National Product ..... | 170  |

LIST OF FIGURES

| Figure   | Page |
|--|------|
| Share of Total Expenditure on Market Prices<br>..... | 43   |
| Share of Services as a percentage of GDP<br>.....    | 44   |
| Consumer/Producer service GDP<br>.....               | 45   |
| The Demand Curve for Consumer Services<br>.....      | 82   |

**CHAPTER I**  
**INTRODUCTION**

The employment and the share of GNP contributed by the service sector, in both developed and the developing economies, has risen significantly in the past two decades. This has caused concern and at the same time generated interest in these countries. The total size and also the rate of increases in employment and output, arising from the service sector is, however, much more in the developed than in the developing countries.

One concern is whether the growth in the employment and output of service industry, at a rate higher than the rest of the economy, results from high income elasticities of demand for services as predicted in the seminal works of Clark, Fisher and Kuznets? Or are there some other significant differences in the economies that these older economists did not foresee, and hence, at least a part of, these changes in the service sector can be attributed to some other structural change in the economy?

Another related question concerns the composition of the service sector output. Here the relevant question is whether most of the growth has taken place in the output of the 'final-demand services' or the 'intermediate-demand producer services'. The older theories of the service sector growth not only make an inadequate distinction, but also by emphasizing the

primary role of high income elasticities of demand for services, suggest that most of the growth in services is due to 'final-demand services' demanded by consumers as their incomes grow over time.

The other concern pertains to rising/falling overall national productivity due to the growth of the service sector output and employment. Originally, some economists such as Fuchs(1961) had argued that the service sector was inherently less productive and more labor intensive than the manufacturing sector, leading to the current apprehensions about the growth of the service sector output leading to a loss in national productivity. Besides loss of production, it is sometimes also argued that a larger service sector will mean a falling goods production and a growing trade deficit, as imports rise to meet the national demand for goods. Some others, however suggest that the growth of the service sector in the developed economies reflects newly acquired comparative advantage, and therefore a world trade pattern based on this comparative advantage will not only mean relieving the trade deficit, but will also enhance world welfare, as resources are allocated to their most efficient use.

#### Current Views:

Some interesting contributions to the modern literature on service sector, mostly arising out of the above concerns, can be studied under two categories. One, which studies the growth in

the consumer's demand for services. And the other, which examines issues relating to productivity, comparative advantage and international trade in services.

Some important contributors in the first group are Bell (1974), Gershuny (1978) and Grubel (1986). Bell has argued that in a post-industrial economy most demands of the consumers will be increasingly met by immaterial, rather than material, services. Gershuny, disagreeing with Bell, uses the U.K. data to show that most growth in the service sector employment has been due to the growing demand for durable goods which need professionals to produce, deliver and maintain. And therefore, a growth in the demand for durable goods implies a growing service sector. Gershuny argues that Bell's hypothesis is flawed because of the confusion in the difference between service functions, product services and the demand for products. In a much more generalized explanation, Grubel considers structural changes in the economy important for estimating the importance of various factors responsible for the growth of the service sector output. Grubel divides the output of the entire service sector into three distinctly different parts, each pertaining to a different source of demand. These are consumer services, intermediate producer services and government services, demanded by households, firms and the government, respectively. Proceeding from this, Grubel (1986) finds the growth of female labor force participation an important factor in explaining the growth of service sector's share of GNP both in Canada and the U.S.A.



The other category of research on productivity, comparative advantage and international trade in services has generally been discussed in two parts. One, concerning productivity and the growth of the service sector, and the other concerning international trade in services. Only Grubel (1986a, 1986b and 1988) has integrated both to answer some of the concerns mentioned above.

Some researchers (Momigliani and Siniscalco; 1974, Tschetter; 1978, and Grubel; 1986, 1988), disagreeing with the view that the growth in the modern service sector necessarily implies a loss of productivity, argue that growth in technology has meant better integration of intermediate producer services in the goods production leading to a larger demand for these services by the goods producing firms. It is argued that, since most of the growth in the service sector output is due to the growth of these producer services, a rising output of producer services is a reflection of an economy which is more, rather than less, productive.

Another related literature concerns the theoretical models that have been developed to analyze various aspects of international trade in services. These models generally emphasize the difference between goods and services to explain some issues concerning international trade in services. Of these, Grubel's work is of direct relevance to the present research. Grubel suggests that in an economy with a growing producer service sector share of GNP we should expect an

increasing interlinkage, or dependence between the service sector and the goods sector. Grubel calls this process 'embodiment of services in goods', and the services thus embodied are called 'embodied services': Proceeding from this, Grubel suggests that the process of embodiment should be reflected in the country's international trade also.

### The Present Research

This thesis is also divided in two parts according to the preceding discussion. As noted above, the growth in the service sector has not been confined to the developed economies only. In India, the service sector's contribution to GNP has surpassed that of all other sectors of the economy. The increasing significance of the service sector in the Indian economy and the absence of any detailed modern research on the subject so far, makes this study not just interesting but also the only one of its kind. At the same time, it becomes necessary to utilize some of the concepts and methodology used for similar analyses and research in the developed economies.

The first part of this thesis considers the factors effecting the demand for services bought by the households in India. Following Gershuny and Grubel's hypotheses explained above, it is postulated that unless the relevant structural demand side variable is incorporated, any conventional time series estimation of the demand function for consumer services will not yield statistically acceptable results. In the case of

India, urbanization is considered to be the relevant structural variable which significantly effects the demand for consumer services in India. Not only does such an estimation help us understand the different forces affecting the demand for consumer services and develop a hypothesis for India similar to Gershuny's, it also enables quantification of monetization that results due to additional expenditure on services included in the national income accounts and the accompanying reduction in the household work being left out.

The second part of this thesis concerns the growing importance of intermediate producer services in the production of goods. Following Grubel (1987), it is postulated that this process of embodiment should increase as the output of the producer services increases in the economy and that this trend will also be reflected in the exports of the country. Proceeding from such an analysis, it is then suggested that the growth of the modern service sector does not imply a loss of productivity of a nation as the older theories of Fuchs et al. suggested. Instead, the growing embodiment of services is an indication of a growing technology and also increasing 'roundaboutness of production', to use a term from Austrian economic literature.

As far as the issues concerning trade in services are concerned, besides suggesting that increasing embodiment will be reflected in the export of merchandise, the analysis also suggests that the data on trade in services reported under the balance of payment statistics is likely to underestimate the

actual importance of trade in services unless the trade in 'embodied' services are also considered.

### Outline of the Study

Chapter II is a discussion of major problems encountered in defining services and making a theoretically meaningful distinction between goods and services. Some important classifications of the service sector suggested in economics are discussed to isolate the one most useful for the present study.

Chapter III reviews the growth of the service sector output in India. Those sub-sectors, such as business and finance, with the highest growth rates, have been examined in detail. Using the conventional system of national income accounts a statistically derived measure is estimated to quantify the growth of the consumer services, producer services and the government services.

Chapter IV concerns the demand for consumer services. A household production function approach (Becker, 1981) is used to emphasize the behavioural differences between rural and an urban households in India. This model is then used to explain the growth in the demand for consumer services bought by the urban households as a result of increasing urbanization. An econometric demand function of the services bought by the households is then estimated. The estimated demand function is also used to quantify monetization due to urbanization.

Chapter V explains the growth of 'embodiment' of services as the producer service output of an economy grows. A methodology developed by Harris and Cox (1988) is used to estimate the growing embodiment, and then the final export demand is used to compute the growth in the export of 'embodied' services per rupee of total exports. Two years, 1979/80 and 1984/85 are considered in the estimations.

Chapter VI presents a summary of the findings of this research.

## CHAPTER II

### SERVICES: THEORETICAL CONSIDERATIONS

This chapter first considers various problems raised by the researchers in making a theoretically meaningful distinction between goods and services. It is argued that even though there is no consensus among economists, a meaningful analysis of the service sector is still possible. Some classification schemes suggested in the literature on the service industry are considered and the one most suitable for the present research is highlighted.

#### Distinction between goods and services

The concept of services is old but the discussion of its theoretical foundations is quite recent. An interesting aspect of this discussion is the distinction between services and goods in a way that is significant for theoretical purposes. A few important contributions to this discussion are surveyed below.

Some authors deny significant difference between services and goods, they argue that if there is any fundamental difference between the two it does not imply that the theoretical models one would use to analyse them need differ. Hindley and Smith (1984) say:

.... the underlying premise is that services are different from goods, which may indeed be so. But a bunch of flowers and a ton of coal and a jet airliner are very different things also. (Hindley and Smith, 1984. p.33)

Hindley and Smith (1984) also argue that the fact that services have not been used to illustrate the important theoretical propositions of economic theory (e.g. the theory of comparative advantage) does not suggest that these propositions are invalid for the treatment of services.

To say that there is no difference between services and goods because the concerned literature has not so far discussed it, amounts to a tautology. Moreover, to say that services and goods are same in the sense that the final product of the economic system are all services confuses the concept of product services with service functions. The argument is that all goods and services purchased by consumers produce final service functions such as happiness, enjoyment, mobility, education and so forth. Indeed in this sense it may be difficult to distinguish between product service and service functions, but it does not mean a distinction either cannot be made or is not worth making. It may still be important to distinguish between product service and service function if the changes in the demand for the product reflects the shifts in demand for service function or vice-versa. For example, some functions, say laundry, may be performed by a service firm, i.e., a laundry firm, or by a machine. In the former, a demand for service function is affected and in the latter the demand for product service. As another example, demand for the services of motor vehicles may be due to the increasing dependence on motor vehicles as distances increase or as more people go out to work.

These changes in the demand can represent important trends in the structure of the economy, and for this reason it is not trivial to draw a distinction between product services and service functions.

Another difficulty in making a distinction between goods and services is pointed out by Stern (1986). According to Stern, the distinction between service and goods depends upon the level of aggregation and hence not too useful for any meaningful analysis:

Much will depend here on the nature of technological change and the ways in which the specialized activities of the firms, to use Bhagwati's (1984) terminology, are "splintered" off into services from goods and goods from services. Thus, depending on the level of aggregation for recording transactions and particularly the time span involved, it may be quite difficult to distinguish goods and services and vice-versa at the industry level. (Stern, 1986, p.3)

Stern (1986) feels that the difficulty referred will also become more pronounced if services that previously were purchased at arms length from another firm are subsumed within the firm. Moreover, it is also true that intra-firm transactions often cannot be measured accurately because there is no market analogue for them. Thus, according to him, the relative importance of interfirm and intrafirm transactions will have a major impact on the measurement of the values of goods and services. [1]

-----  
[1] Stern (1986) has also discussed the difficulties in valuation that will arise due to private-public composition of services in a nation, because the government services may have no market analogue. He also hints on the possibility of different regulatory regimes effecting the valuation and the significance of service among nations and over time.



Once again, to say that it is difficult to measure service sector output because it is a function of the level of aggregation does not mean that it cannot be done or that it does not serve any useful function. In chapter 3, some innovative statistical approaches to such a distinction will be discussed and it will be shown to provide a useful framework to study service sector output and employment. Here it will be sufficient to mention that some authors, such as Gershuny (1978), have overcome this problem by using the 'occupational' instead of 'industrial' distribution of the labor force to explain structural changes in the economy. Gershuny's argument is that the distribution of occupation between different industrial branches varies with changes in the relative output of these branches, and hence will also influence the occupational structure of employment within each branch.

In a different line of reasoning, Kravis et al. (1984) have discussed the characteristics of 'final product services'. According to them, it is difficult though not impossible, to distinguish service from goods and hence the distinction is still useful:

Final product services constitute a heterogenous collection of goods. They are alike in that the production of each is necessarily simultaneous with its consumption and consequently none of them can be stocked. In few other respects, however, do all final-product services share common characteristics... Final product services also may vary in the degree of unambiguity with which they can be differentiated from commodity production. Major final-product services such as health, education, and government have closely associated commodity flows, which may be regarded either as inputs (the doctors stethoscope) or as supplementary

or concomitant expenditures (drugs, textbooks). (Kravis, Heston and Summers, 1979, p. 189)

Hill (1977) also emphasizes the distinction between goods and services. Disagreeing with the view that services are just special kind of goods, Hill makes the following distinction between goods and services:

A good may be defined as a physical object which is appropriable and, therefore, transferable between economic units.

A service may be defined as a change in the conditions of a person, or of a good belonging to some economic unit, which is brought about as a result of the activity of some other economic unit. This definition... is consistent with the underlying idea which is inherent in the concept of a service, namely that one economic unit performs some activity for the benefit of another.... Whatever the producer of the service does must impinge directly on the consumer in such a way as to change the condition of the latter. Otherwise no service is actually provided. (Hill, 1977: pp.317-18)

Proceeding from such a framework, Melvin (1986) argues that it is more instructive for the purposes of theoretical analysis to investigate the question of why service industries arise. To explain the difficulty associated with identifying services in the context of their origin he defines three kinds of services[2]. Contact services, such as haircuts and appendectomies, which require the producer and consumer to be at

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[2]The Background Report of Government of Canada's Task Force on Service Industry (1982) has suggested following groupings:  
--services complementary to trade in goods (eg. transportation, insurance, banking and advertising).  
--services that substitute for trade in goods (eg. franchising, leasing and repairs)  
--services unrelated to goods (eg. banking, life insurance, professional services, real estate, telecommunications, data processing and information services and travel).

the same place at the same time, substitution services such as T.V. and radio, which allow essentially the same product to be consumed without the requirement of being at the performance, and intermediation services such as transportation, which allow the markets to clear by providing a means of getting a product from the producer to the consumer. Explaining the common features of these three types of services Melvin (1986) suggests the following:

....that while these three types of services are distinctly different they share at least one important feature. In particular they arise because of the constraints of distance and uncertainty associated with the time and space dimensions of economic analysis. The failure of most theoretical analysis to formally incorporate these dimensionality constraints may to some extent account for the difficulty economists have encountered in dealing with services. ( Melvin 1986, p.5 )

In sum the preceding discussion suggests that while it may be true that services have some distinct features and many attempts have been made to define them, it is clear that a consensus does not yet exist. At the same time attention also needs to be paid to the ambiguities encountered in trying to define and measure services and to distinguish services from goods. Some argue that this difficulty does not mean that a theoretically meaningful discussion of services is not possible. For example Melvin (1987) feels:

....nonetheless it is clear that economists and laymen have no difficulty in deciding which things are services and which things are goods even though problems may be encountered in providing general definitions. Therefore even without agreement on definition it is possible to analyse the specific role that services play in economic analysis.... (Melvin 1987, p. 3)

Although a major intellectual problem is posed by these issues, a relevant question that one needs to ask is: can we still discuss services as a totality that is different from goods? Let us consider some structures that have been proposed to answer such a question.

### Typology of services

Though the idea of the classification of industries into agriculture and manufacturing is old, it was not until the tripartite division of Fisher-Clark that 'tertiary' sector came to be known. Fisher (1935) first coined the term "tertiary production" as designating the service industries which rank last from the point of view of urgency of human wants since they satisfy those needs which are not necessities but luxuries.

The Fisher-Clark study shows that higher income countries have a bigger service sector:

Studying economic progress in relation to the economic structure of different countries, we find a very firmly established generalization that a high average level of real income per head is always associated with a high proportion of the working population engaged in tertiary industries. Primary industries are defined as agriculture, forestry and fishing, secondary industries as manufacturing, mining and building and tertiary industries include commerce, transport services and other economic activities.... the reason for this growth of the relative number of tertiary producers must largely be sought on the demand side. As incomes rise.... the demand for such services increases, and being non-transportable they must be supplied by workers within the country concerned (1940:p.7).

The two main tenets of Fisher-Clark classification were, the income elasticity of demand and substitutability of capital and labor. According to their thesis the tertiary sector is the highest among the three broad sectors in income elasticity of demand and lowest in substitutability of capital for labor.

Later, Bauer and Yamey (1951) disagreeing with the Fisher-Clark hypothesis, point out that the 'tertiary' sector is not homogenous. The main idea of Bauer and Yamey's criticism was that the concept of tertiary sector as defined by Fisher renders no help in studying the changes that accompany growth because it neglects change within the sector. Fisher agreed to the existence of heterogeneity of services sector and the emphasis of the literature on classifying industrial activity of a nation shifted to the analysis of the heterogeneity of the tertiary sector. Since then a number of classifications have been suggested.

The various explanations seeking to establish features common to services can be divided into two broad categories.

First, those attempts that have been made to identify such common features focus on the production process typical to these service industries. Fuch (1968), for example, includes transport, communications and public utilities on account of their heavy capital equipment and technological complexities.

G.Thomas (1967) drew attention to three features common to many services: their product is typically intermediate, and is

often continuously provided, personal and difficult to store; labor involved is professional; and the organizations supplying these services are small, self-employed and have a more labor intensive production.

In a similar way, Bhagwati (1984) argues that the service-from-good splintering process generally yields service activities which are technically progressive and possibly capital intensive, whereas the goods-from-services splintering process reflecting a disembodiment effect, generally leaves behind a residue of service activities which are technically unprogressive and labor intensive.

It can be argued that these are mere descriptions rather than definitional categories. For example Gershuny (1978) feels:

The problem with these explanations is that they characterize service industries at a particular point in time rather than define more enduring characteristics of service industries per se. (Gershuny, 1978; pg. 32)

Moreover, current patterns of technological progress leads one to believe that some services may become capital intensive in the future. Thus, definitions focusing only on the distinctive features of the production may not be too useful, they might be too "historically-specific" (Gershuny, 1978) and may not help discern a common pattern of service industry growth.

The second group of approaches focus on the characteristics of consumption of services. Such a distinction is useful because it integrates the economic features of different service activities and their consumption characteristics with national

activities. The distinction that is critical here is between the services meant for final consumption and those meant for intermediate consumption. Greenfield (1966) using such a distinction defined producer services as intermediate inputs into the final goods production process and consumer services as those sold directly to consumers for their personal use. A similar distinction has been recently drawn by Grubel (1986). Though easy in principle, such a distinction is not easy to make in practice. For example, it may be difficult to distinguish between the final and the intermediate components if an industrial activity e.g., transport, services both private individuals and professionals employed by the firm.

Many other more disaggregated and systematic typologies, based on consumption characteristics have been suggested in the existing literature. Some important ones are discussed below. While introducing some important typologies the following survey will also help in isolating the framework most suitable for the present research.

Acknowledging that an important criterion of the division of the services sector has to do with the two kinds of demands: one of the consumer and the other of the producer, Triantes (1953) suggested three broad categories in tertiary activities: those which produce services bought directly by the consumers; those which facilitate the movement of goods through time and space and the transfer of the factors of production; and the public services. The first category consisted of education, health,

banking, recreation etc., the second consisted of trade, transport, communication, finance and other similar or supporting activities, and the last category was simply government services.

Much in the same way, Greenfield (1966), as noted earlier, defines two categories within the services sector. Consumer services are those services at destination used by the households or individuals, whereas the producer services are those used by business firms and other productive firms.

As noted earlier, the Triantes and Greenfield classification provides a convenient framework to think about the categories of service industry arising out of their consumption characteristics. But in practice, it may be very difficult to estimate them as they often overlap and the national income account statistics is often not disaggregated enough to estimate the output of each of these categories individually.

Another classification by Katouzian (1970) uses the Fisher-Clark framework and divides the services sector into three parts; New services, comprising of medical and education facilities, complementary services, consisting of services that are needed or are complementary to production processes and old services comprising of domestic services which get substituted by durable goods and professional services. Using Kuznets findings, Katouzian demonstrates that the demand for the sub-categories of services increases in the order named above as



per capita income increases. This result has been shown to hold in developed countries at least, but its validity in other countries is not so readily evident. This limited scope of Katouzian's study makes it difficult in cross-country comparative studies where some developing countries are involved.

While agreeing with others that employment in the producer service industry will increase with income levels, Gershuny (1978), using U.K. data for 1954-74, shows that there is a tendency towards increasing use of durable goods by consumers as opposed to an increasing use of services consumption as predicted by established theories of Fisher (1935) and Clark (1940). According to Gershuny the overall employment level in the tertiary sector will go up because an increasing demand for durable consumer goods will need the services of more and more engineers, accountants and other such professionals

Gershuny (1978), therefore, divides the tertiary sector into goods related tertiary sector and services related tertiary sector. The former comprises distribution, financial, part of the professional and scientific services, plus half of public administration and the latter includes miscellaneous other services, part of the professional and scientific services plus half of public administration. Gershuny then concludes that we should expect different categories of services to contribute to employment opportunities at different stages of development:

.... as the economy shifts from goods producing industries to services, distributive and personal services initially provide the major share of employment opportunities. But in the course of that movement towards services, the tertiary sector undergoes an internal restructuring favouring social and producer services. (Gershuny, 1978 p.97)

Though Gershuny's argument is interesting, at least in the developed country context, his employment data for United Kingdom however, does not appear to support the implied hypothesis that the goods-related tertiary sector grows faster than the services related tertiary sector as income levels rise.[3]

Gershuny's thesis may not be suitable for the developing countries where the use of durable goods in households is still not very common and cheap migrant labor from rural areas is commonly used to complete the daily household chores.

In yet another scheme of classification, Stern (1986) has classified service industry in the context of international trade. Based upon the consideration of whether the movement of the provider and/or consumer of the services is required between the countries. He distinguishes four types of services, as noted below. Each type can be further divided by distinguishing services related to goods from services that are independent of goods. This typology is based on Economic Consulting Services, Inc. (1981), United States Trade Representative (1983), Bhagwati

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[3]For example, according to his own data (Table 6.6 on pg. 97), the proportion of the total U.K. employment in the goods-related tertiary sector rose from 20.5 percent in 1961 to 22.2 percent in 1971, while that related to services-related-tertiarysector rose from 19.8 percent to 23.2 percent.

(1984a, 1985), and Sampson and Snape (1985).

1. *No movement of providers or consumers: "separated" services*-This terminology of "separated" services is attributable to Sampson and Snape (1985) and it is analogous to what Bhagwati (1985) has called "disembodied" or "longdistance" services:

....These can be considered in a sense as "pure" or independent services insofar as they can in principle be traded just as goods, without there being any necessity of a foreign presence. we can think of these services as complementary to trade in goods. (Stern, 1986: pp. 4-5)

2. *No movement of providers or consumers: "separated" factors* - In this case physical proximity of providers and consumers is required, but neither has to move:

....the reason is that there can be an "absent" factor, say, management, which supplies its services "telematically" to augment foreign factors of production without the necessity of its moving physically. This is the case of separated factors... (Stern, 1986 : p. 5)

3. *Movement of providers only* - In this case, physical proximity is a necessary condition for the service, and capital and /or labor must move internationally to provide it:

....there may thus be foreign direct investment involving movement of physical/financial capital and movement of skilled/unskilled labor. These international factor movements may provide services in the foreign production of goods or of other services. (Stern, 1986 : p. 5)

4. *Movement of consumers only* - Here, the services are provided in the country in which the providers are located physically. Some examples would be tourism, education and

medical services.

5. *Movement of providers and consumers* - This case is included for logical completeness. It would correspond to a situation in which factors of production and consumers both moved to another country where some service was then performed/purchased.

Stern's classification is focussed on whether provider or the consumer of the service moves and the categories are more relevant for traded goods. This classification, however, is remiss in some other aspects. The classification, for example, does not explain the relationship of international trade in services to developments within the economy such as technical change, growth of new processes, increases in national income and changes in the pattern and composition of demand. These shortcomings make it unsuitable for the present research which proposes to look, not only at international trade in services but will also attempt to tie it up with changes in the service sector within the economy.

In sum, the above survey of various classification schemes shows that some are too focused on a particular problem and are almost tailor-made to explain only the issue in question (e.g., Stern), some are more relevant in the developed country context (e.g., Gershuny and Katouzian) and some others which may be relevant to the present study are not easy to work with, given the constraints of national income accounting systems (e.g.,

Greenfield).

One scheme of classification, however, that has proved useful for this research is Grubel (1986). Grubel presents a framework that is applicable across countries and encompasses not only the domestic growth of the services sector but also links it up with international economic trends. This system of classifying the service industry clarifies the point that the output and employment in the various categories of the service sector (defined below) has been driven by different motives and also points out that they have different growth prospects. By linking the domestic features of an economy with international ones, this classification also obviates the need for a different classification to study international trade in services as suggested by Stern (1986). The three different categories defined by Grubel (1986) are:

Consumer Services: This category includes all of the services that have historically been provided by "servants": personal care, restaurant meals, home services and laundry. It also contains services associated with leisure activities such as amusement and recreation. One of the single most important items in the category is the consumption of housing services, most notably imputed income from owner occupied housing....

Non Commercial Services: In this category we find education and health as the largest sources of employment. These services are provided by the state free of charge to the general public. Quantitatively of some smaller importance are general public administration and religious organisations.

Producer Services: Industries in this category produce services that are required by business firms in the production of intermediate and final goods, consumer

services and non-commercial services. The most important of these industries are services to Business Management and Finance, Insurance and Real Estate. (Grubel, 1986a : pp. 8-10)

Such an approach provides a framework that can be utilized for economic analysis and policy purposes by all countries with modern national income accounting systems. Grubel also shows how the lack of availability of sufficiently disaggregated data can be overcome using the taxonomy developed by him. A theory to explain the growth of consumer and producer services is presented and at the same time the relative importance of producer services in the economy is emphasized. By providing a link between the growth of producer services and the conventional theories of capital accumulation and specialization in production, Grubel shows that the growth of the service sector does not necessarily imply falling productivity in an economy. In addition, the growth of producer services is shown as part of the endowment that determines the comparative advantage of a nation. Through this latter hypothesis, the growth of service sector is linked to international trade and the world economy.

The present research draws upon these ideas to study the service sector in India.

## Summary

To recapitulate, this Chapter emphasizes that although there is a major conceptual problem in defining services (as distinct from goods) due to the confusion between the final use of goods and services and to undefined levels of aggregation, we can still produce a meaningful analysis of the service sector. Once this difficulty is overcome, there are many schemes of classification in the literature depending on income elasticity, factor substitutability, international trade and sources of demand. All these different schemes of classifying the activities of a nation have been devised to study some specific issues and a choice has to be made. From this array of studies available to us, the present research will use the framework developed by Grubel (1986) for a detailed investigation of the Indian service sector.

## CHAPTER III

### THE SERVICE SECTOR IN INDIA

Time series analysis of national gross domestic product (GDP) at factor cost is not only a conceptually simple and a satisfactory index of overall economic activity, but is also useful in representing the economic activity of individual sectors. These statistics, however, may not reveal relevant information for some kinds of analyses, either because it is too aggregated, or because the purpose of its collection was different. This chapter first examines the service sector and its sub-categories as defined in the conventional ISIC (International Standard Industrial Classification) and the United Nations System of National Accounts (UNSNA). Next, some of the categories in ISIC are regrouped and transformed into more useful categories for the present research.

In section 3.1 the aggregate GDP of the Indian economy and the service sector's contribution to GDP is examined. Both aggregated and disaggregated data are analyzed to examine important sub-sectors where maximum growth has occurred. Section 3.2 considers the division of the Indian service sector into three components, each corresponding to a distinctly different source of demand, based on Grubel (1986). An innovative method to disaggregate standard national account statistics is used to analyze trends in the growth of the different components.



## Composition of the Service Sector

Of the nine major divisions into which ISIC (International Standard Industrial Classification) divides all national economic activity, the following have traditionally comprised the 'service' sector [1].

The three major categories are:

- (1) Transport, communication and trade
- (2) Finance and real estate and,
- (3) Community and personal services.

Transport, communication and trade can be further sub-divided into:-

- (1) Railways
- (2) Transport by other means and storage
- (3) Communication
- (4) Trade, hotel and restaurants

On the other hand, Finance and real estate consists of :

- (1) Banking and insurance
- (2) Real estate

Community and personal services include:

- (1) Public administration
- (2) Other services

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[1]In 'National Account Statistics', a publication of the Central Statistical Organisation, Government of India, there is no specific mention of the 'service' sector. Even in the United Nations System of National Accounts the 'service' sector is not a separate category. In both these documents, however, 'Primary' and 'Manufacturing' are two categories. In the present study all sectors classified above comprise the 'service' sector.

## *An Inter-Sectoral Comparisons of Economic Growth*

This section will present statistical facts about the growth of different economic sectors of the Indian economy in relation to the service sector. An index of GDP levels is constructed to represent growth. 1950 has been chosen as the base year. [2] Table 3.1 presents the details. Between 1950-51 and 1980-81 the index of growth in the agriculture sector has risen by only 101 percent in contrast to 334 percent and 310 percent in the manufacturing and service sectors respectively.

It is also interesting to examine changes over the decades. In the 1950's and 1960's the service sector grew more slowly than the manufacturing sector but faster than the agricultural sector. But during the 1970's the service sector has grown the fastest. It has grown at a higher rate than the aggregate growth of GDP over all decades. Table 3.2 and figure 3.1 presents the level and share of the service sector GDP at factor cost, in both current and constant (1970=100) prices.

The tendency of the service sector to dominate growth in the last decade (1970-82) could either mean a changing structure of demand and consumption patterns or, a changing structure of production in the Indian economy. The present research will delineate some factors that may have contributed to this trend in the service sector output. An analysis of its sub-sectors will make it possible to isolate those sectors with the highest

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[2]The choice of the base year is due to the availability of data and also because it covers the entire span of the lifetime of independent India.

contribution to the growth of the total service sector output.

*Sub-Sectoral growth in the service sector*

This section presents the trends in the growth of sub-sectors of the service sector based on their contributions to the gross domestic product at factor cost. The details are in Table 2.3.

Banking and insurance show the largest growth after 1970. [3] Public Administration and defence, communication, transport, trade, hotels and restaurants, railways, real estate and other services follow in that order. The fast growing importance of banking, insurance, communication and transport reflect modernization of the Indian economy. A description of some major sectors of growth will help us delineate the reasons for a relative rise in the output of the service sector over the last two decades. Banking, financial services, insurance and non-banking financial institutions have provided the basic thrust to service sector growth. Some aspects of these important sub-sectors are discussed below.

There are 29 Indian commercial banks in the public sector. Of these, the State Bank of India, along with its 8 associated Banks, is the biggest in the country and ranks 84 in the top 500 banks of the world. Six other commercial banks also figure in the top 500. The banking industry in India has dramatically changed in the last two decades. The number of branches

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[3] This was perhaps influenced most by the decision of the Government of India to nationalize all the major banks in the country in 1970 and also a policy to proliferate the bank's branches to the country-side.

increased from 11,184 in 1970 to 52,936 in 1985. Bank deposits increased from Rs.56.99 billion at the end of December 1970 to Rs.852.88 billion in 1986. As a proportion of GNP, bank deposits in India grew from 18 percent in 1970 to 40 percent in 1985. In addition to this, merchant banking has become an important activity for the commercial banks. Merchant banking has taken on a host of financial functions such as the preparation of feasibility studies, assistance in company formation, syndication of project finance, issue management, working capital management, tax consultancy, mergers and acquisitions. These features of growth in the service sector indicate a trend towards modernization of the financial services associated with production processes of the firms.

Besides commercial banks, the cooperative banks and other financial institutions have also increased their business very significantly. For example, the state (provincial) cooperative banks credit rose from Rs. 4.13 billion in 1970 to Rs. 16.67 billion in 1985. Many other banks with specialized functions such as agriculture financing, import/ export financing have also developed. As a result, the capital market has expanded from a mere Rs. 1.3 billion in 1970 to Rs. 15 billion in 1985. This has in turn sparked off a large number of small merchant banks, consultancy organizations and other similar business ventures. Leasing companies are another noteworthy development in the Indian financial system. That the non-banking financial institution have emerged as serious competitors to the banking

sector is reflected in their deposit growth. In 1985 the total deposits of the non-banking institutions stood at Rs. 161.4 billion. This was equivalent to 22.2 percent of total deposits held by the commercial banks. The insurance industry, transacted wholly by two public sector organizations, has also grown at a very rapid pace.

Though a large part of this growth in the financial and non-financial services have supported the non-urban and rural activities, it nevertheless reflects the process of modernization and a growing use of modern financial techniques to run business. The estimated annual growth rate of this new service sector is about 20.6 percent and this rate is likely to continue in the future as it integrates better into the world economy and financial markets.

In sum, the fastest growth has taken place in those areas of the service sector which correspond closely to the production process of the firm. This pattern not only indicates modernization of the Indian economy, but also points to the possible source of demand i.e., the firms, due to which the growth has occurred. As noted earlier, however, the current system of national accounts does not allow us to examine the growth of service sector from a source-of-demand point of view. Without such an analysis the possible sources of demand which are behind the major part of growth of the service sector will remain unexamined. The next section examines this point in detail.

## Sources-of-Demand Classification of the Service Sector

The preceding section presented growth of various divisions and sub-divisions of GDP based on economic activity. It was argued that such an approach, based on conventional national income accounting methodology, is not completely satisfactory for a sources-of-demand type classification of the service sector.

This is because even if we know which sub-sector/activity contributed most to the growth of the service sector, the basic impulse behind the growth of the sub-sector/activity output would remain unknown. For example, even if we know that 'banking and insurance' was the fastest growing sub-sector, the classification scheme does not indicate the sources of its demand, the sub-sectors that are complementary to it and those sub-sector where future growth can be expected. Another problem associated with such an "activity-based" classification is the difficulty of differentiating among the contribution of different economic entities such as households or firms. For example, transport as an activity, can result from either the demand of households or firms. It is important in many policy related analyses to know whether the source of demand is households or the firms. The conventional activity based classification scheme in the system of national income accounts does not allow us such an analysis.

An alternative approach that helps us to focus on such issues is more useful. As noted earlier, one such approach is

the sources-of-demand classification suggested by Grubel (1986). Proceeding from above, output of the service sector is divided into three parts, each pertaining to a distinctly different source of demand[4]. It is postulated that the three sources of demand for services emanate from consumers, firms and the government. The scope of this research has been confined to studying some aspects of consumer and producer services only. There will be no separate analysis of the government services except when needed to compare with other subsectors of the service industry.

The next section examines the underlying taxonomy of consumer and producer services and then presents the trends in these sectors of the Indian economy.

#### *Households Demand for Consumer Services*

As noted earlier consumer services are the services bought by household in the market. Marketed consumer services are provided by restaurants, hotels, retail outlets, amusement and recreation facilities, personal services for hair, shoes, clothing automobiles and transportation etc. A statistical measure of household demand for services is available from the series 'private final consumption expenditure classified by the type of goods' reported in the United Nations system of national

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[4] Although conceptualized earlier by Greenfield (1978) and Triantes (1953), the source-of-demand approach to classifying the service sector of a country has been used by Grubel (1986) to study some aspects of the services industries in Canada.

accounts[5].

Figure 3.2 presents the trends in the demand for consumer services in India. Both, the nominal and the real demand trends are upward. The present research will build a model to explain these trends and then estimate the effect of prices, incomes and other structural change variables on this demand for marketed consumer services.

#### *Firms Demand for Producer Services*

Producer services are services used by firms in the production process. Essentially, the services that form a major component of producer services are termed 'business services' in national account statistics. A broader definition is, however, possible. This will include finance, insurance, real estate, transportation, engineering, legal, storage, communication, electricity etc. A problem with this definition is that many sectors such as transportation, legal, storage and communication, conceptually and statistically overlap with the definition of consumer services. As noted earlier, one problem with the national account statistics is that the data available is not detailed enough to allow allocation of expenditures to different sub-sectors. Furthermore, the data is not sufficiently detailed to allow measurement of producer services. These difficulties mean that the data available in the national account statistics has to be manipulated to extract information

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[5]The exact statistical coverage of the term consumer services will be explained in Appendix II.



necessary for examining our new scheme of classification of GDP based on sources-of-demand criteria.

### *Estimation*

Since a statistical measure of the producer services is not readily available from the conventional national account statistics, an estimate of its size and growth will be obtained by following a technique based on Grubel (1988) explained below.

The contribution of the service sectors (defined in 3.0.1) to the gross domestic product at factor cost was reduced by government's contribution to GDP[6]. The residual amount is called 'private service sector gross domestic product'(PSSGDP). By definition, PSSGDP arises from demand by firms and households.

In other words, PSSGDP is the value-added in an economy as a result of firms and household demand for services[7]. As noted earlier, of these two sources of demand, household demand for services is statistically measurable from the series in national account statistics called 'private final household expenditures'. This however, is not the correct figure for estimating the value added due to household demand, because of

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[6]The ISIC classification has a category termed 'public administration and defence'. This item was used as a proxy for the government's contribution to GDP. In Grubel (1988), however, the government's transfer payments, termed 'government's exhaustive expenditure' has been used. Ideally, Grubel's methodology should be used, but since it is difficult to obtain these figures for India an approximation has been made.

[7] The demand by households is for final consumer services whereas that of the firms is for intermediate producer services.

double counting. Therefore, to compute the value-added from this estimate of household expenditure on consumer services, we have to deflate it by a measure of the inputs used. Grubel (1988) suggests that a ratio of value-added to gross output of the broad categories of consumption expenditure can serve as a suitable deflator. Using such a deflator, a statistical measure of consumer service GDP is computed. Next, reducing PSSGDP by the consumer service GDP will leave producer service GDP as a residual. A step-by-step explanation is given below, and actual computations are presented in Table 3.3.

Step 1:

Gross Domestic Product due to the service sector(A)

Minus

Government generated GDP (B)

Equals

GDP due to the private service sector.(C)

Step 2:

Compute a ratio of value added to gross output of the broad categories of consumer expenditures such as (trade, hotels, restaurants, transport, communications and other services.)(D)

Step 3:

Input figures for household expenditure on from United Nations Standard National Accounts.(E)

Step 4:

Multiply D and E to obtain estimates of value added as a result of consumer service expenditures.(F)

Step 5:

Reduce C by F to obtain estimates of producer service GDP.

The producer service GDP for 1970-1983, as well as the consumer service GDP and the government GDP have been plotted in Figure 3.3. Table 3.3 presents the estimates of producer service GDP, together with consumer service GDP.

### Summary

A measure of economic growth termed 'index of growth' shows that the growth in the service sector of India has been faster than that of the economy as a whole. Of the various sub-sectors of the Indian service industry, those that pertain to business and industry have grown, fastest.

The source-of-demand classification shows that percapita expenditure by the households on 'consumer services' has risen between 1970 and 1982. The 'producer services' output in constant prices has risen at a much greater rate in the same period, implying modernization and technical progress of the Indian service sector related to the firms production. The GDP at factor cost due to the government has also risen substantially during this period but not as much as producer service GDP.

Table 3.1: The Index of Growth of Sectoral GDP at 1970-71 prices.

| Year/Sector | Agri   | Manu   | Serv   | Total  |
|-------------|--------|--------|--------|--------|
| 50-51       | 100.00 | 100.00 | 100.00 | 100.00 |
| 51-52       | 101.78 | 99.05  | 104.07 | 101.98 |
| 52-53       | 106.98 | 99.30  | 105.02 | 105.59 |
| 53-54       | 115.25 | 105.36 | 109.28 | 112.27 |
| 54-55       | 115.81 | 114.74 | 114.74 | 115.38 |
| 55-56       | 115.08 | 127.23 | 121.41 | 110.01 |
| 56-57       | 121.70 | 138.57 | 126.84 | 125.53 |
| 57-58       | 116.10 | 138.22 | 131.73 | 123.35 |
| 58-59       | 128.60 | 146.97 | 138.44 | 133.81 |
| 59-60       | 126.86 | 157.45 | 146.03 | 136.26 |
| 60-61       | 134.68 | 173.88 | 154.96 | 145.61 |
| 61-62       | 136.01 | 188.10 | 163.89 | 150.78 |
| 62-63       | 133.13 | 203.90 | 174.08 | 153.99 |
| 63-64       | 136.76 | 223.30 | 185.10 | 161.84 |
| 64-65       | 148.04 | 241.13 | 196.44 | 174.60 |
| 65-66       | 129.71 | 248.11 | 201.69 | 165.51 |
| 66-67       | 128.49 | 251.85 | 208.67 | 167.12 |
| 67-68       | 147.37 | 261.07 | 216.44 | 181.73 |
| 68-69       | 148.34 | 273.21 | 226.20 | 186.62 |
| 69-70       | 157.58 | 296.61 | 237.67 | 198.46 |
| 70-71       | 170.30 | 299.21 | 249.50 | 209.49 |
| 71-72       | 169.78 | 310.68 | 260.40 | 213.65 |
| 72-73       | 159.87 | 320.72 | 268.49 | 211.30 |
| 73-74       | 171.10 | 322.50 | 276.48 | 220.38 |
| 74-75       | 168.35 | 326.12 | 288.29 | 222.28 |
| 75-76       | 189.70 | 344.05 | 310.25 | 243.28 |
| 76-77       | 178.20 | 378.13 | 329.48 | 246.40 |
| 77-78       | 199.83 | 405.44 | 346.97 | 267.72 |
| 78-79       | 203.40 | 439.99 | 473.49 | 281.72 |
| 79-80       | 178.65 | 420.20 | 382.40 | 267.72 |
| 80-81       | 200.89 | 435.58 | 400.86 | 289.02 |

Source: Bhattacharya, B.N. (1983)

Table 3.2: Gross Domestic Product of service sector at factor cost

| Year | Service sector GDP at factor cost |                               |        |                                 |
|------|-----------------------------------|-------------------------------|--------|---------------------------------|
|      | Value                             | <u>current price</u><br>Share | Value  | <u>constant prices</u><br>Share |
| 1970 | 113.40                            | 30.79                         | 113.40 | 30.79                           |
| 1977 | 283                               | 35.02                         | 157.70 | 33.59                           |
| 1978 | 313                               | 35.85                         | 169.75 | 34.36                           |
| 1979 | 356                               | 37.31                         | 173.80 | 37.01                           |
| 1980 | 420                               | 36.84                         | 186.28 | 36.75                           |
| 1981 | 506                               | 38.77                         | 200.16 | 37.43                           |
| 1982 | 575                               | 39.51                         | 215.86 | 39.22                           |
| 1983 | 666                               | 38.69                         | 231.05 | 38.95                           |

Notes: Service sector includes; transport, communication, trade, finance, real estate, community and personal services. Share represents proportion of total GDP and value is the level of contribution to GDP in absolute amounts.

Source: National Account Statistics 1970-71 to 1982-83, published by Central Statistical Organisation, New Delhi, January 1986.

**Table 3.3: Index of Growth of Sub-sectors of the Service Sector  
GDP at 1970-71 prices.**

| <b>Sector/Year</b>                     | <b>1950-51</b> | <b>1960-61</b> | <b>1970-71</b> | <b>1980-81</b> |
|--|----------------|----------------|----------------|----------------|
| Railways                               | 100.00         | 161.72         | 233.20         | 328.91         |
| Transport<br>Storage<br>Communications | 100.00         | 173.70         | 294.33         | 534.17         |
| Trade<br>Hotel<br>Restaurant           | 100.00         | 166.90         | 278.83         | 426.28         |
| Banking and<br>Insurance               | 100.0          | 208.75         | 410.0          | 807.50         |
| Real Estate                            | 100.0          | 126.2          | 192.09         | 254.28         |
| Public<br>Admin                        | 100.00         | 161.89         | 344.21         | 756.63         |
| Other<br>Services                      | 100.0          | 136.87         | 157.5          | 210.04         |

Source: Bhattacharya, B.N. (1983).

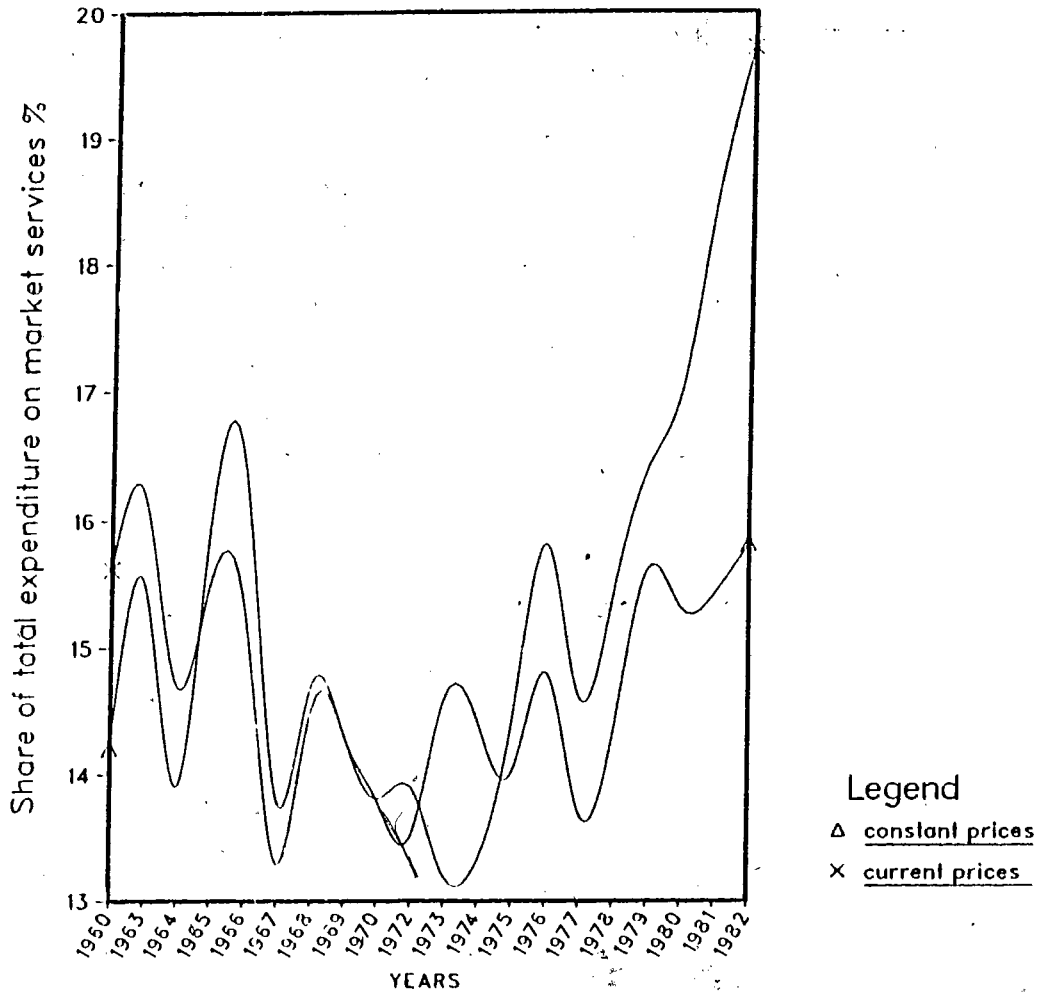
Table 3.4: Computation of Consumer and Producer GDP

| Year | A      | B     | (A-B=C) | D    | E     | (D*E=F) | (C-F=G) |
|------|--------|-------|---------|------|-------|---------|---------|
| 1970 | 113.40 | 16.35 | 97.05   | .078 | 41.10 | 3.2     | 93.85   |
| 1977 | 157.70 | 25.35 | 132.35  | .085 | 50.55 | 4.3     | 128.05  |
| 1978 | 169.75 | 28.19 | 141.56  | .088 | 54.18 | 4.8     | 136.76  |
| 1979 | 173.80 | 31.43 | 142.37  | .091 | 56.54 | 5.1     | 137.27  |
| 1980 | 186.28 | 34.96 | 151.32  | .089 | 60.20 | 5.3     | 146.02  |
| 1981 | 200.16 | 39.05 | 161.11  | .091 | 62.58 | 5.7     | 155.41  |
| 1982 | 215.86 | 43.75 | 172.11  | .092 | 65.72 | 6.04    | 166.07  |
| 1983 | 231.05 | 49.21 | 181.84  | .092 | 68.72 | 6.32    | 175.52  |

Source: National Account Statistics 1970-71 to 1983-83, published by Central Statistical Organisation, New Delhi, January 1986.

# Figure 3.1

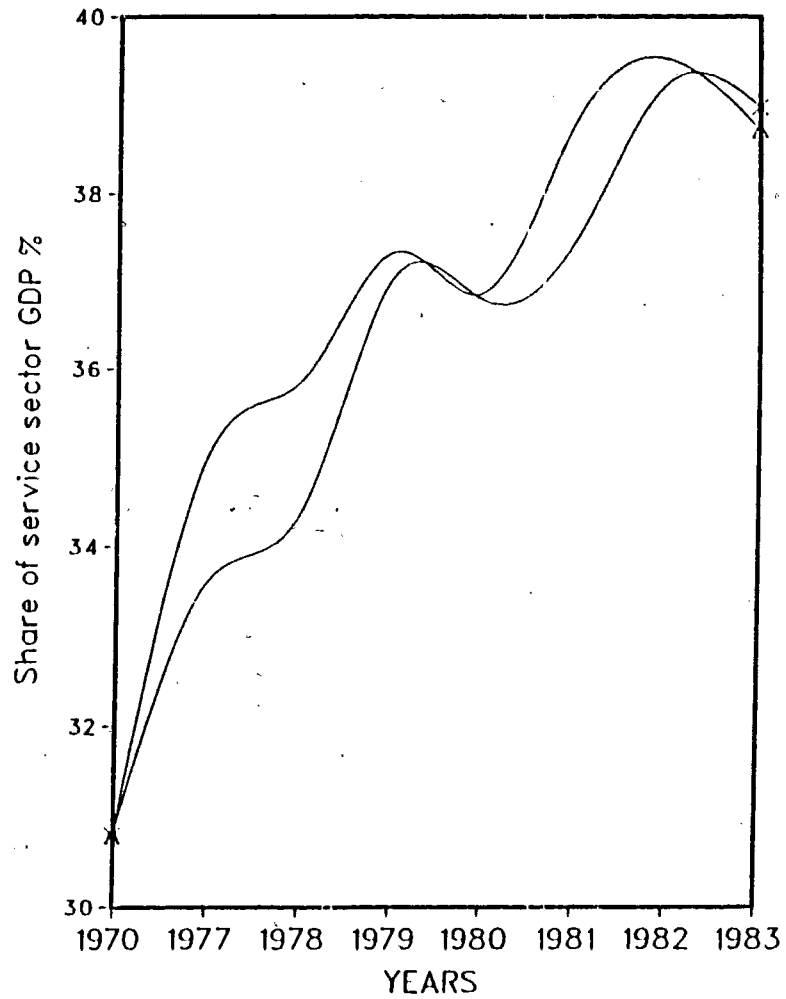
Share of Total Expenditure on Market Services  
at  
constant 1970=100 and current prices





# Figure 3.2

Share of service sector as a percentage of total Gross Domestic Product at factor cost

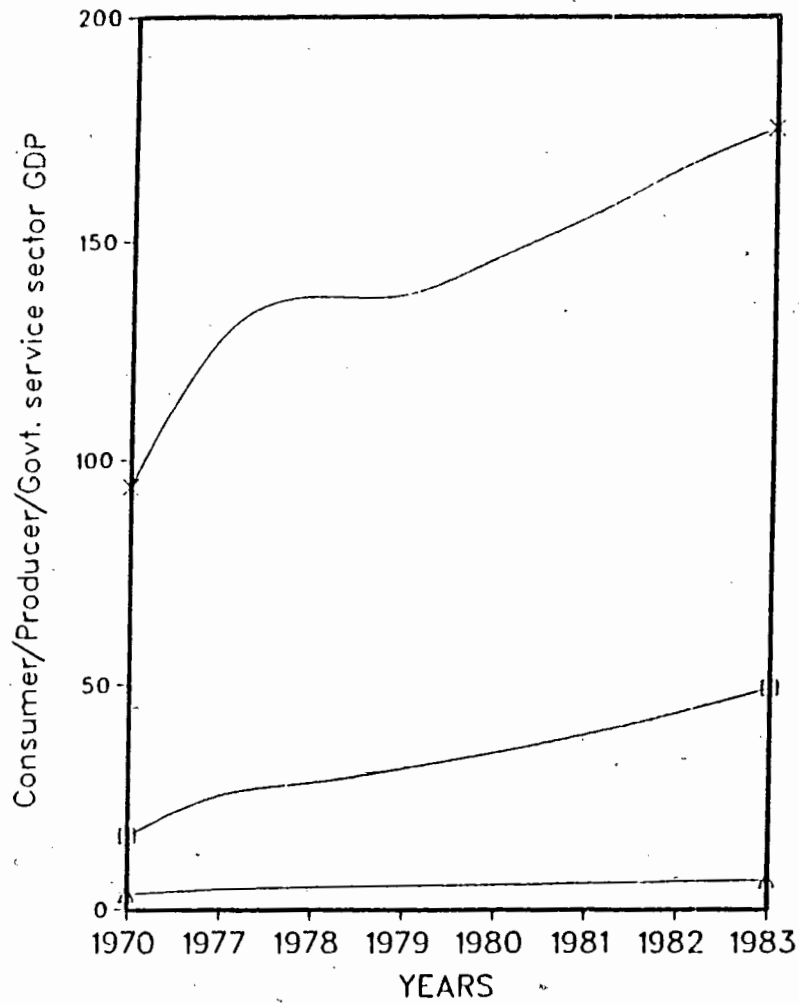


### Legend

- △ Share of service sector GDP in current prices
- x Share of service sector GDP in 1970 prices

# Figure 3.3

Consumer/Producer service GDP at factor cost  
in constant prices of 1970 in billion rupees



### Legend

- Δ Consumer service GDP in 1970 prices
- x Producer service GDP in 1970 prices
- Government generated GDP

## CHAPTER IV

### THE DEMAND FOR CONSUMER SERVICES

In the preceding chapters some approaches suggested by the researchers to analyse the service sector of a country were discussed. Of these, Grubel's (1986) framework of analysis was considered particularly useful. To recapitulate, according to this approach the entire service sector of an economy can be seen as arising out of three distinct sources of demand: households, firms and the government. These sources of demand give rise to three distinctly different kinds of services: consumer services, producer services and the non-commercial government services, respectively. In this chapter factors affecting the demand for consumer services are examined, and then a demand function for these services is estimated.

The conventional estimations of consumer demand functions use the traditional theory of demand based on the Engel's law. It says, that we have a hierarchy of needs, and that as the most pressing are satisfied, so our increasing means are devoted to the less pressing; that is, that our proportionate marginal expenditure on necessities decreases as our income increases. The consumer demand functions arising out of this thesis have also been used in the seminal studies of consumption demand in the U.S.A. by Houthakker and Taylor (1960), and Houthakker and Prais (1971) [1].

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[1]The model used in these studies has been explained in Appendix I.

In this chapter it is shown that the conventional estimation of the demand functions for 'consumer services' based only on Engel's law is incorrect: Instead, if structural changes are incorporated in to the formulation of such a conventional demand function, the results will not only be statistically sound, but also more realistic in so far as they incorporate the affect of changing parameters in the long time span normally considered in time series analyses of this kind. The structural change parameter considered in the present research is urbanization. Besides statistically improving the estimates of the demand for consumer services, the results also have interesting implications for the monetization of household services and the conventional rural-urban migration theories in the developing countries.

Even though the econometric exploration of consumer demand, at different levels of aggregation, ranging from the households to the whole economy, have been widely attempted both in the developed and developing economies, only a very few have estimated the demand function for consumer services, per se. In fact, there are no such studies for the developing economies. For this reason, and to fill this research gap, the present research will draw upon some studies from the developed economies. A survey of some available important studies concerning consumer demand for services will therefore, be an appropriate point of departure.

## Overview of the Existing Literature

An important modern thesis on the growth of consumer demand for services is by Bell (1974). An earlier argument of Clark (1940) is behind Bell's thesis, it says that the needs in a developed society will move from material goods to immaterial services.

Explaining this Bell writes:

...if an industrial society is defined by the quantity of goods as marking a standard of living, the post-industrial society is marked by the quality of life as measured by the services and amenities - health, education, recreation and the arts - which are now deemed desirable and possible for everyone. (Bell, 1974, pg.127)

Essentially Bell's thesis implies that as the society gets richer the new needs can somehow only be satisfied by more personal services. Without making a distinction among various sectors of service activity catering to different sources of demand, as discussed in Grubel (1986) above, Bell uses the total size of service sector employment to demonstrate the validity of his hypothesis.

In and of itself, Bell's contribution is significant for our understanding of how the service industry can be expected to develop in the post-industrial state of the economies. The thesis however, is indirectly useful in the present research, because it concerns the post-industrial state of the economy only, and does not explore changes in the service sector of an economy in the earlier stages, for example from a pre-industrial to the industrial state. Bell is also aware of this limitation and points out that the scope of his study is much more less

universal than Rostow's "stages-of-growth" thesis. Also, Bell's assertion of an identity between the growth in service employment and the growth in demand for services by consumers due to a higher income society, is questionable. This is because it attributes more to Engel's law than may actually be the case, and does not consider other factors that may be typical in a modern economy such as the increasing complexity of the methods of production and the emergence of a new informatics technology. The importance of these factors will be evident at a later point in this study.

Gershuny (1978) provides a more detailed analysis of consumer demand for services in U.K. between 1960 and 1974 and shows, in contrast to Bell, that while new categories of demand have come with increasing income and wealth, they have been satisfied more by goods than by services. According to Gershuny, household expenditure pattern in the U.K. do not show a post-industrial growth in the consumption of services. Households in 1974, though they were nearly 50 percent richer than 1960, still spend the same proportion of their budget on items in this category such as cinemas, theatres, sport and entertainment, radio and television, domestic help and all other things that were expected to grow faster than other categories of expenditure.

Given the above changes in the expenditures, Gershuny argues that Engel's law still explains consumer behaviour for the cross-section of the population, but not the time series

behaviour, and suggests that the proportion spent on durables has increased over time. He also presents data to show that there is a steep drop in expenditure on entertainment outside the home, the rise in the proportionate expenditure on renting and licensing televisions, and also a decline in domestic help. These items in the list, with most 'person-to-person' contact, show a decline, and those mediated by machines increase.

Having made the above point, Gershuny does not explain the causes of demand growth for goods in contrast to the increase in the demand for consumer services as predicted by Bell. Gershuny's thesis is just one answer to the question: why the cross-section data of U.K. supports Engel's law and the time series data does not? While it is a significant contribution in that it questions the validity of Bell's hypothesis and total dependence on the Engel's law to explain the growth of consumer demand for services, Gershuny's answer is very specific and does not explain the complete process. A growth in the demand for durable goods is clearly one part of such a process.

It is possible that the growth in the demand for durable goods emphasized in Gershuny's thesis is part of a more general process in the economy such as increasing urbanization, which may make a 'self-service' economy (using durables) imperative, especially in a labor-short developed industrial economy. In labor-surplus developing economies, however, the importance of self-service activities is less as cheap services are available to substitute for the functions that durable goods perform.

Urbanization, which results from an increasing migration of rural labor force, may be a more relevant explanatory factor in the latter situation. The present research will try to answer these questions by including the effects of structural changes such as urbanization in the demand function for consumer services in India.

One study that considers structural changes to explain the demand for consumer services is by Grubel and Hammes (1986), henceforth G-H. The present research also draws upon the G-H model.

As noted earlier, G-H have divided the output of service industry on the basis of three different sources of demand, the consumer, government and the producers. They estimate Canadian and U.S. households demand function for consumer services using the methodologies developed by Prais and Houthakker (1955, 1971) and Houthakker and Taylor (1960). Prais and Houthakker (1955, 1970) use a double-logarithmic demand function for individual commodities in a household budget and some groups of commodities, proxying per-capita disposable income by total expenditure. Choice of specification was based on the goodness of fit[2]. G-H find that Houthakker and Taylor (1960) is too disaggregated for the purposes of analysing the demand for 'consumer services' as a whole. Also the econometric results, from a simple study along the lines of Houthakker and Taylor

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[2]In a later paper Houthakker (1960a, b) confirms that the double-logarithmic form does correspond to an 'addilog' utility function and also satisfies the adding-up restriction.



(1960), are flawed. In a modified version, G-H incorporate a structural change variable in the Houthakker specification and then show that it is possible to obtain statistically and theoretically acceptable results. In G-H the structural change variable is increases in the female labor force participation rates [3]. The principal idea in G-H model is that increasing female labor force participation generates a demand for market services (e.g. child care, restaurant meals, laundry etc.) as they find it increasingly difficult to undertake the same activities as part of their household work. Since the rise in female labor force participation in both United States and in Canada has been significant (58.5 percent between 1952 and 1982 in the United States and 63 percent between 1961 and 1985 in Canada), it provides a justification for including this as a variable in the demand function for 'consumer services'.

G-H have also provided insight into the monetization of the household sector. According to G-H, on the one hand, the national income accounting system measures the entry of women into the labor force because they earn money incomes. On the other hand, the national accounting system does not take account of the reduction in the home production of services which accompanies it. This phenomenon is nothing but 'taking in each

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[3]G-H also draw attention to an article written by Browne (1986). Browne has used a broader concept to show how the producers of services live off the rest of the economy rather than contribute to it. She has also used the term 'taking in each others laundry' to describe the popular attitude towards service industry. Similar ideas have also been explored in the works of Inman (1985), McKenzie and Smith (1986) and Grubel (1986).

others laundry' (Browne, 1986). The econometric estimates of the effects of female labor force participation on the demand for consumer service also permits quantification of this monetization.

As far as the Indian economic literature is concerned, there is no parallel to G-H ideas. In fact, we cannot find any analysis on similar lines for any developing country.

Some econometric estimates of demand/consumption function of different commodities and commodity groups are however available. Also available are some World Bank and OECD studies of the service sector of developing countries. I will summarize their intent, coverage and relevance to my study. This review will bring out the importance of the present research in so far as it reveals the paucity of any direct time series study of consumer services. It also highlights the difficulty of using existing studies to derive meaningful implications for the important determinants of demand for consumer services, monetization and policy purposes.

One of the earliest studies of the consumption behaviour in India is done by Sinha (1966) (subsequently reviewed in Kaul and Foster, 1977). Sinha studied the various expenditure elasticities based on the National Sample Surveys[4]. Sinha makes no direct reference to 'consumer services' as his purpose was to estimate the expenditure elasticities of the various

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[4]National Sample Surveys are crosssection studies done by the National Sample Survey Organisation in India.

items in the consumption basket of a typical Indian household. But, nevertheless, his estimations are relevant to my study. If we interpret the expenditure elasticities of meat, fish and poultry (all purchased by relatively higher income groups) as derived demand for services of the butchers and meat vendors, some of Sinhas estimates become relevant for my study. According to Sinha, these items have an expenditure elasticity of greater than one.

In another study, Kadekodi, Pearson and Sinha (1979) have estimated expenditure elasticities of selected items for an array of income groups. These authors try to focus on the importance of various kinds of policies for their likely effects on the pattern of income distribution. In particular, they were exploring the potential of various income distribution programs. Their expenditure elasticity estimates are for individual goods and services in a typical consumption basket. The item that comes closest to our concept of 'consumer services' and hence relevant to my study are medical and educational expenses. For both these items the expenditure elasticities estimated for a majority of income groups is significantly greater than one. The highest being 3.47.

Kravis, Heston and Summers (1979), in their cross national estimates of income elasticity based on the data for 34 ICP (Income Comparison Project) countries, of which India is one, have estimated the income elasticity of demand for services of 1.001, and price elasticity of -0.1491.

The Kravis et al. study concludes:

The driving force behind (the) expansion of service employment associated with higher per-capita incomes in both cross-sectional and inter-temporal data is the evolution of technology rather than the change in wants associated with rising income. This inference rests on the absence of any clear evidence that the income elasticity of demand is consistently (or even on the average) higher for final-product services than for final-product commodities, and the tendency for services prices to rise relative to commodity prices as incomes rise. We ascribe this tendency to differential productivity ratios. ( Kravis, Heston and Summers, 1979, pg.52)

T.Mammon (1981) estimated a consumption function for India to test the macro-economic theories of consumption. He has neither estimated the consumption function for services, nor has he calculated any elasticities. The overall marginal propensities to consume for all goods and services estimated by his simple regression model are 0.65 in the short run and 0.84 in the long run. These are estimates of aggregate marginal propensities and hence of limited use to the present research.

An important study (also relevant for the present research) by the Planning Commission (Government of India, 1979), to help the formulation of Seventh Five Year Plan in India, estimated the effective demand in two stages for both rural and urban areas, as well as for persons above and below the poverty line in these areas. Both estimates were based on a cross-section data. In the first stage all commodities and services have been grouped into 13 categories and the demand of these 13 groups have been estimated by considering Linear Expenditure System (LES). Linear Expenditure Systems estimate demand function of

the type:

$$C_i = a_i p_i + b_i (c - \sum a_i p_i)$$

Where  $c_i$  is the yearly/monthly per capita expenditure on the  $i$ th commodity and  $p_i$  is the price of the  $i$ th commodity or equivalently index number for the  $i$ th commodity group.  $c$  is yearly/monthly per-capita total expenditure incurred on various commodities (or commodity groups).  $a_i p_i$  represents some committed expenditure, while  $b_i$  is the proportion of  $i$ th group in the remaining aggregate consumption.

In the second stage Engel Demand curves have been considered for estimating a demand function for different commodities and services included in each LES group. These LES and Engel curves or demand functions have been separately estimated for people below poverty line and those above it.

The estimated income elasticity of demand for a group of commodities termed 'other services' (for persons above the poverty line in urban areas) is 1.72 in the Engel curve type specification. The LES study based on cross-section data however, has omitted the service category altogether, and discusses only the goods.

The Planning Commission study, as Houthakker's (1970) study, is too disaggregated and does not consider an aggregated demand function for consumer services, which will be the focus of

present research.

Even if this shortcoming is overcome, the cross-section nature of the Planning Commission study implies that no structural demand side parameters that may affect the demand function over time can be incorporated, and its authors are aware of this:

Leaving aside the limitations of the LES to satisfactorily handle price effects - cross as well as own - pragmatic considerations suggest that certain modifications could be introduced in it while largely retaining its original structure and simplicity to allow greater sophistication in income response. The simplest way to achieve it is ... to introduce time trends ... to allow for steady changes in tastes and preferences. (Government of India, 1979, pg. 15)

The Planning Commission estimates are important for the present research because it will allow us to develop a hypothesis for the Indian economy and then compare it with Gershuny's thesis explained above.

In sum, while the early modern literature in the developed economies drew upon past trends and predicted the future growth in the consumer expenditure along the pattern suggested by Engel's law, the later developments have questioned it. Some (e.g., Gershuny, 1978) have contrasted the conformity of cross-section data in the U.K. with the non-conformity between the time series data of growth of demand and the the Engel's law type of pattern of growth, by suggesting certain specific changes in the household budget such as an increase in the proportion of household expenditures on durables goods.

Gershuny's explanation, however, relies too much on the increasing trend of durable goods consumption. Grubel (1986) has suggested a broader structural change variable, such as changes in the female labor force participation rates, as an important explanatory variable. By not relying on very specific trends (as in Gershuny) Grubel's approach becomes more relevant for the purposes of the present research.

Some other studies of the consumer demand function in India consider intra-national characteristics such as commodity groups, income differences, rural-urban residence, size of the family, as well as other international characteristics. Of these, the Planning Commission study based on a cross-section data is most relevant to the present research. It provides a springboard for testing a hypothesis similar to Gershuny's in India.

Also, Kravis et al. and G-H studies explained above provide a framework to proceed in order to develop a hypothesis comparable to that of Gershuny's.

The principal conclusion of the preceding discussion is as follows: the doubts about a long-run highly income elastic demand for consumer services raised in the modern literature may have some relevance for the developing countries also. In India, there are detailed studies estimating high income elasticities of demand for consumer services from cross section data that support the Engel's law, and there is a belief that this would

be the case for time-series data also. The latter is based on the conventional theories of Colin-Clark and Fisher type hypotheses. In this Chapter a method drawing on G-H ideas will be developed to estimate a demand function for consumer services in India. This will be based on the time-series data from India and will include a structural demand side parameter. Besides some policy implications and allowing us to compute an estimate of monetization, the time series estimate of the income elasticity along with the cross-section estimate available from the Planning Commission studies, will also allow us to develop an Indian counterpart of Gershuny's thesis.

In the following section it is shown that unlike G-H, female labor force participation cannot be an important structural variable affecting the demand for consumer services in India, instead some other relevant demand side variable will have to be found.

#### Female Labor Force Participation in India

In India, whereas the rate of increase of female labor force participation, as measured by paid employment in non-agricultural activities, was 2.5 percent annually, between 1975 and 1984, there were only 2.5 million females employed in 1984. This is a negligible proportion of the total economically active population of 244 million[5].

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[5]The estimates are from the International Labor Office Yearbook 1986 Table 2A, page 76 and Table 4, page 407.



In contrast to India, there were 4.5 million females in paid employment in non-agricultural activities, out of a total economically active population of 12.5 million in Canada in 1984. This is roughly 33 percent of the total population. Also, between 1976 and 1984 the rate of growth of female labor force participation measured by rates of increase of females in paid non-agricultural activities, was 3 percent per annum[6].

The above statistics show a relatively unimportant role of female labor force participation in the Indian economy, especially when compared to the industrial countries (e.g. Canada). We must therefore search for other structural variables that may significantly effect the demand for consumer services. As mentioned earlier, urbanization may be one such variable. The next section surveys the relationship between urbanization and the growth of the service sector postulated in the current economic literature.

#### Urbanization and the Growth of Service Industry

The developing countries generally, and India in particular,

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[6]The Estimates are from the International Labor Office Yearbook 1986, Table 4, page 404, and Table 2A, page 54.

have exhibited phenomenal growth of urbanization. Nath (1986) writes:

The World Development Report 1984 projects an annual growth rate of 4.2 percent for the urban population of India during 1980-2000, significantly higher than the growth rate of 3.5 percent experienced during 1961-81. The acceleration is projected along with projection of slower growth of total population—from an average of 2.3 percent per annum during 1961-81 to 1.9 percent per annum during 1980-2000. The growth rate of the rural population is projected to be reduced accordingly, from 1.8 percent per annum to 1.1 percent. The proportion to the total population, which had increased slowly from 16.8 percent in 1951 to 22.3 percent by 1981 is projected to go up rapidly to 35.5 percent by the year 2000: more than one third of our population would be urban by the end of the century. On the basis of the median projection of 994 million for the total population in the year 2000, the urban population would exceed 350 million, more than double the figure of 156 million for 1981. (Nath, 1986, pg.340)

The following studies have also identified a close relationship between urbanization and the growth of the service sector; Galenson (1963), Bhalla (1970, 1973), Udall (1976), Cheetham (1970), Kelley and Williamson (1984), Papola (1980), Gemell (1982), Fiala (1983), Kannapan (1985) and Mohan (1984).

A study of the service sector in the developing countries by Blades, Johnston and Marszczewski (1979), henceforth (B-J-M), for the O.E.C.D., presents evidence of a positive correlation between the level of urbanization and the growth of output of employment in the service industry. According to B-J-M:

There are several possible explanations for the high level of service output in urban areas. Certain type of services probably require a minimum catchment area, and banks, cinemas, or supermarkets will only become profitable in fairly large conurbations. Again, most "modern" high wage activities tend to be located in

towns, and so there are large numbers with relatively high incomes who can afford personal services such as hair cuts, shoe shines or laundry services. At the same time, modern industrial and commercial enterprises will stimulate the growth of transport, financial, communications and business services. Rapid urban growth increases the need for social services such as education and health. Finally, peripheral own-account services, such as car washing, shoe shining and selling newspapers provide a means of subsistence to urban immigrants who fail to secure employment in better paid industrial activities. (B-J-M, 1974, pg.142)

B-J-M also estimate the correlation between urbanization (U), percentage share of services in GDP (So) and percentage share of services in total employment (Se). An "urbanization" index available for 54 developing countries was regressed on the shares of services in output and employment. The estimated equations are as follows:

$$So = 36.4 + .213U, R^2 \text{ is } .205$$

$$Se = 6.7 + .479U, R^2 \text{ is } .746$$

The regression and correlation coefficients are significantly different from zero in all cases indicating a positive correlation between the level of urbanization and both output and employment in the service industry [7].

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[7]Some recent studies have emphasized the difficulty in interpreting results at such an aggregate level due to non-homogeneity of the urban service sector. (Kannapan, 1985; Moir, 1985). I will, however, assume away any such problem.

## *Urbanisation and the Demand for Consumer Services*

In explaining the link between urbanization and the growth of the service sector employment and output, the emphasis of the above literature has either been on the high income elasticity of demand for services, or supply side factors like possibilities of increasing efficiency in production, inappropriate choice of techniques, and to the rate of population growth. On the supply side it is usually assumed that Says Law holds in developing countries, that is, whatever is supplied will be consumed and that important constraints concern supply. On the demand side, too much reliance is often placed on high income elasticity of demand for services in explaining the growth of service sector as urbanization raises income levels. The present study tries to improve the situation. A discussion of another approach to correct this situation by some other researchers will provide a convenient point of departure.\*

The growing dissatisfaction with pure supply side explanations and the limited perspective on the demand side explanations is reflected in the growth of literature that allows for a change in tastes, particularly in long-span time series studies, see Stone and Brown (1965), Kaneda (1968), Parks (1969), Yoshihara (1969), Kelley, Williamson and Cheetham (1972) and Mohan (1984).

Of the above studies, Mohan's work concerns India. In his analysis, a non-linear, three sector, two region wage and price endogenous dynamic general equilibrium model is used to study

the effects of population growth, the pattern of demand and technological change on urbanization. The model represents a closed economy and is therefore more suited to a large than a small country. It covers a time period of 30 years from 1950 to present. The sectors modelled are agriculture, industry and services with the latter two being located exclusively in urban areas.

The three sectors are linked with an input-output matrix and there are no transportation costs between urban and rural areas. The model is designed to investigate long-term changes, and therefore assumes factor mobility is "almost perfect".

Through simulations Mohan's model demonstrates rapid agricultural productivity growth, high rates of investment, and Engel demand effects combine to produce a continuing increase of urbanization as development occurs in the economy. The rate of urbanization is not dependent on high overall population growth: indeed, under certain conditions, a lowering of overall population growth might speed up the rate of urbanization.

In Mohan's model, the pattern of demand and changes in the pattern can affect the rate of urbanization significantly. Two sets of experiments are reported. One set reports the effects associated with changes in marginal budget shares. The other reports those associated with changes in the perception of subsistence requirements.

The effects discussed in Mohan's study are to be distinguished from Engel effects which are only due to different income elasticities of demand for urban goods[8], and agricultural goods. The increased "preference" for urban goods stimulates a further structural change which could appear with rising income causing a shift away from rural goods. The results indicate that the effects of such a structural change would be to reinforce Engel effects and to induce a progressively higher rate of growth of income and urbanization.

Mohan's model is premised on the literature developed by Kelley and Williamson (Kelley, Williamson and Cheetham, 1972: Kelley and Williamson, 1984) on the dualistic economic development model. These authors have used a general equilibrium model of dualistic development and shown the implications of changing structural parameters.

Kelley and Williamson model explores the sensitivity of key variables such as output growth, capital accumulation, urbanization and industrialization to alternative parameter values concerning population growth, technical progress, savings rates and demand parameters. This exercise permits them to evaluate the relative importance of the parameter values in the system. Kelley and Williamson (1984) comments on the importance of consumer demand:

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[8]The urban goods, referred earlier too, are manufactuerd goods and services. This is because Mohan's model assumes, for the sake of simplicity, that manufacturing and services are located in urban areas and agricultural goods in rural areas.

Finally, demand also plays an important role in the model through changes in consumer tastes. Indeed, the sensitivity of the economy to shifts in tastes towards urban goods may be as stimulating to structural change in the long run as alterations in the savings parameters, the variable of traditional focus in the development literature. (Kelley and Williamson, 1984. p.209)

Besides the literature developed by Kelley, Williamson, Cheetham and Mohan, there are other empirical studies which have found an important influence of shifts in tastes on growth and structural change.

Using a linear expenditure system, Stone and Brown (1965) have identified substantial changes in tastes between 1900 and 1960 in England. Parks (1969), has found similar results from Sweden between 1861 and 1955. Moreover systematic tastes changes were also typical of Japan between 1878 and 1964 according to Kaneda (1968).

While the literature above explains the importance of incorporating taste changes in household demand functions, it provides no price-theoretic explanation for taste changes. Tastes are always exogenously determined in these models. This is not in accordance with standard neo-classical household decision models where tastes/preferences are fixed for the entire period of analysis and the household behaviour can be predicted through income and price effects. The present research tries to correct this methodological shortcoming.

A formal model to explain the relationship between changes in consumer preferences, urbanization and the growth of the

services sector output is developed in a later section. In the next section an estimate of a simple demand function for consumer services is presented to demonstrate that the results of a simple formulation (without the incorporation of structural demand side variable) will most likely be unacceptable.

#### Estimation of a simple demand function for services

A simple demand function (excluding any structural change variable) for consumer services is estimated using the conventional models of demand function found in the the studies of Houthakker (1957,1960), Houthakker and Taylor (1970) and Philips (1974).

Houthakker (1960) has two different estimations, one on 82 expenditure categories and the other on 11 expenditure categories. The present study will however consider the entire expenditure on services by households as one category [9]. It postulates that the consumption of services is an increasing function of total expenditures, both expressed in real terms and per capita, and a decreasing function of the price of services relative to non-services in the consumer basket.

Accordingly, a log linear demand function with log of service expenditure per-capita (LNSERV) as a dependent variable was estimated. The first experiment used the log of total

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[9]See Appendix II for a detailed explanation of Houthakker's approach and also the possible shortcomings. The rationale for using the Houthakker approach in the present study is also explained there.



expenditure per-capita (LNTEX) and the log of relative prices (LNRP) as independent variables. The estimated equation was as follows:[10].

$$\text{LNSERV} = 1.57 + .45 \text{ LNTEX} + .21 \text{ LNRP} \quad (4.1)$$

(.88)      (1.65)      (1.60)

R square = .24 and Durbin-Watson statistic = 1.55

The numbers in the parentheses are t-values. They show that the coefficients are not statistically significant at 95 percent level of confidence. Even the sign of LNRP, the relative price variable, is not as theoretically expected. F-statistics also suggested joint insignificance of the independent variable in explaining variation of the dependent variable LNSERV.

As a result of the appearance of theoretically wrong signs of the estimated coefficients in the regression equation above, equation 4.1 cannot be interpreted as a demand curve for consumer services. Such a situation could result from a mis-specification of the functional form, structural break, a dynamic mis-representation or an omitted variable. Tests were conducted in alternative estimations to detect the possible source of problem.

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[10]For the details of years covered, deflators used and definition of variables, see Appendix III.

Besides the double log functional form, a semi log, a log inverse and a hyperbola type functional forms were also used in alternative estimations. The estimated regression coefficients did not have the theoretically expected signs.

To correct for any possible mis-specification of the variables or any dynamic mis-representation, some proxies of income such as the per capita gross national product, the first order differences in the per capita disposable income, log of the proportion of income spent on services were also tried in alternative estimations. The estimated equations were not able to improve the situation. In some cases even the estimated coefficients became highly insignificant and consequently that specification was not considered a good candidate for the demand function of the consumer services.

A diagnostic test called the 'reset' test (Kennedy, 1985), was also used to assess a possible specification error. In this test a variable Z is added to the set of regressors as a proxy for the possibly omitted variable, and then the Z's set of coefficient estimates are tested for their significance using a traditional F-test. The results of such a test on the above simple regression indicated the possibility of an omitted variable.

The above regression estimate was also corrected for possible serial correlation. Though the Durbin-Watson statistic improved, the signs were still not as theoretically expected.

The preceding discussion of the empirical estimations suggests the need to look for additional independent variables in the demand function for services. This procedure is suggested also by the results of G-H and Gershuny, which found incomplete specification to be a major weakness of the conventional approach for estimating the consumer service demand function. As noted earlier, increasing urbanization may be a relevant consideration. Accordingly, a model is developed below to explain the changes in consumer demand for services implicit in recent high rates of urbanization in the developing countries.

Conceptual Background of the Model, the Taxonomy of Dualism and the Behavioural Pattern of Urban Households.

In developing a formal model of the dualistic economy, the criterion employed in bisecting the economy into analytical and empirical meaningful units is very important. In the existing literature there are many views of dualism ranging from vaguely stated hypotheses regarding sectoral differences in social, political and economic behaviour to formal statements implying well defined predictions about the course of economic development and structural change. Models emphasizing technological parameter differences among sectors appear to constitute the predominant interpretation of dualism. In fact the notion is typically based on the differences in production conditions, with little or no hypothesized variation in demand or demographic parameters.

Jorgenson's (1961, 1966 and 1967) pioneering model of economic dualism, for example, contrasts two sectors with different production conditions but with identical demand and demographic parameters.

The present research takes a different approach and develops a model of dualist economy with a rural and an urban region. The behavioural difference among households in these two regions is emphasized to explain the urban household demand for consumer services.

#### *Economic dualism in the model*

It is assumed that the economy consists of three sectors and two regions. The three sectors are agriculture, industrial (goods) and service. The two regions are rural and urban.

It is also assumed that agriculture is in the rural area and industry and services are entirely in the urban area. The conditions of the Indian economy justify such an assumption. Over 80% of the rural labor force in India works in agriculture, hence the economic characteristics of the rural areas is dominated by agricultural activities. While it is true that a significant proportion (between a third and a half) of the industrial labor is in the rural areas, almost all are employed in the household industries[11], and hence rural industrial output is small as a proportion of the total industrial

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[11] These are traditional industries like weaving, making jaggery, blacksmithy, making bullock-cart and their parts, clay utensils and toys and other such labor-intensive products with low commercial value.

production. Therefore, in a model with three sectors: agriculture, industry and services, it will not be unreasonable to assume agriculture being based exclusively in the rural areas and the other two exclusively in the urban areas.[12]

It follows that in this economy the demand for consumer services will be in the urban areas only.[13] According to the available statistics also, a small proportion of rural household budget is spent on services as compared to the urban household[14]. There are many reasons for this. Among others, the prevalence of the joint-family system as a common mode of household organisation in the rural areas is an important factor. Under this system a household is organised in such a way that married brothers and their families live together or closely enough to share the common pool of household labor supply. This implies that the help for household chores is available within the joint-family, thereby reducing the need to buy services from the marketplace. Short distances and 'kinship' also reduce the need for transportation, child care etc.

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[12]An administrative unit with a resident population over 10,000 or any significant economic activity such as a factory or an army contonment is defined as an urban area.

[13]Until 1967 the United National System of National Accounts used to report the "final consumption expenditures of private households" in both rural and urban areas separately. But now one estimate is reported. To overcome this and for the reasons explained in the following footnote, such an assumption was necessary.

[14]According to the Technical Note to the Seventh Five Year Plan issued by the Planning Commission in India, on the average, less than ten percent of the total expenditure is spent on services by rural households and more than fifteen percent by the urban households.

Non-availability or close proximity to schools and other services also mean little or no expenditure on these activities.

Becker (1981) explains such a family structure as a mechanism of insurance:

.... kinship is less important in modern than traditional societies because market insurance is used instead of kin insurance, market schools instead of family schools .... (Becker, G.S., 1981, pg. 243)

Another feature of the rural households service consumption is a relatively small demand for restaurants, movies or theatres etc. The small demand for such an activity in the rural areas can be explained by two related reasons. Either, the relative price is not right, or in other words, is very high to choke off the demand, or the low cash income in rural areas produces a very low "effective" demand that does not elicit a profitable supply.

Against this background, a model of urban household behaviour is developed to explain the demand for consumer services. The following section will explain some behavioural differences that distinguish rural household (explained above) from an urban household, to develop a model of demand for consumer services in India.

#### *A Theory of Urban Household Behaviour*

Following the household production function approach developed in Becker (1965, 1981)[15], it is postulated that time and goods

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[15] See Appendix III

do not directly provide utility, but instead are inputs into the production of "commodities" which directly provide utility. Further, it is also postulated that an urban household produces (as well as consumes) three "commodities"; household services (HS), market services (MS) and 'new activities' (NA), as explained below.

Unlike Becker's (1981) single person household, the present model assumes a two person household[16]. The division of labor within this two person household, is such that the household services production is the primary responsibility of the married woman but the new activities are jointly produced and consumed by both members of the households. The importance of this assumption will be evident later.

The price of household service (HS) is the opportunity cost in terms of the wages, which is the market value of wages lost in terms of other goods.[17]

The price of market service is determined in the market place. In practice, for econometric estimation a statistically derived measure will be developed later. Besides the decision to produce and consume household service and the decision to buy market services, an urban household also has to decide on the

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[16] This is because the opportunity cost for men is postulated differently than that of women.

[17] Since housewives are primarily responsible for household service production the opportunity cost of household services is equal to the lost wages due to non-participation in the labor force.

production and consumption of, what is termed 'new activities'. These activities are typical of an urban household in contrast to a traditional household of the rural areas (explained above) and distinctly different from the traditional household chores like cooking, dishwashing, cleaning and so on.

The new activities are typically undertaken in urban settings and changed life-styles. These consist of, among numerous others, more time spent on entertainment indoors or outdoors, by both children and parents, devotion of more time to children in helping them prepare and getting to school and helping in their studies and other extra-curricular activities. The new activities also include more social interaction, taking more vacations, and more outdoor activities like shopping, attending neighborhood clubs, going to theatres, movies and restaurants.

In terms of time usage, the new activities are substitutes for household services and a complement to the market service. If households devote more time to household services production they have less time for new activities. But if household use more market services they are left with extra time, which in turn can be used for the production and consumption of 'new activities'.

Since the household services and the new services are substitutes, their relative prices influence their respective quantities demanded. Unfortunately, there is no observable



market price for these new activities. Moreover, the concept of new activities involves a diverse group of activities some of which (e.g. helping children get ready to go to school) only have an implicit value, whereas the others (e.g. taking children to school or theatres etc.) may have an explicit value. To overcome this problem a 'shadow price' can be defined for the new activities. This shadow price is based on a broader concept of availability, accessibility and approachability of the "new" activity. In other words, as the taking of children to school, going to theatres etc. becomes possible due to the availability of schools and theatres in urban areas, and accessibility to these activities increases due to the modern means of transport and roads, the cost of these new urban activities, or in other words, the shadow price of these new activities, would be reckoned to have gone down. Such a relationship implies that the shadow price of new activities and urbanization are closely and inversely related.

Another way to explain this process is to note that the cost of school or college education or a restaurant meal is so "high" in a rural area that no demand or supply are forthcoming. As urbanization increases, the economies of scale and the generation of money incomes, and other such economic and non-economic factors make it possible to provide these goods and services at a lesser cost. This leads to a tangible demand and a provision of the good or service in question.

*Determinants of secular changes in consumer preferences*

In the preceding section the concept of new activities and their prices measured in terms of availability and accessibility was explained. It was also argued that there exists an inverse relationship between 'urbanization' and the prices of new activities.

In this section, the possible link between 'urbanization' and the new activities of the urban households explained earlier is developed further. Due to the paucity of studies concerning the time-usage behaviour of Indian urban households, no estimates are quoted, instead, some circumstantial evidence is cited.

Urbanization in the developing countries is typically accompanied by industrialization with capital-intensive technology and forward and backward linkages leading to higher productivity and a higher human-capital. A concomitant of this process is the growth of infrastructural facilities like roads and transport systems and changing demographic characteristics of the population like family-size and structure. All these impinge not just on the demand for services but also provide means for satisfying these demands. The present study emphasizes the effects of urbanization on the choices facing an urban household.

The urban household, in contrast to its rural counterpart, has a higher cash income, smaller autonomous family size and a

better organised infrastructural environment. While higher income leads to a larger demand for services, the other two factors imply reallocation of available time and resources for a cost-effective use of the newly available urban technology.

The new pattern of time-usage by the urban Indian households involves spending more time in the production and consumption of new activities, implying a reduction of the traditional household service by the housewives and in turn an increased dependence on market services to complete the daily household chores.

This process can be explained by drawing upon the distinction between traditional and new activities of the households noted earlier.

That these new activities of the urban household have been made largely possible by high rates of urbanization is evident from the pattern of emerging new activities. Only some are discussed below.

First, the increasing demand for television entertainment, reflected in a booming urban market for television sets is a result of changed life-styles of urban households [18]. More time is increasingly devoted to these 'new' activities.

Second, the increasing television broadcast time and its contents are another indicator of this demand. Not only has the

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[18]See The Economist "A Survey of the Indian Economy" May 1987.

broadcast time been increased from only morning and evening broadcast to mid-day broadcasting, but also the daytime broadcasting now includes more and more programs suited for entertainment of the housewives. This reflects the changing time-usage by households and is another outcome of the changed life-styles of the households as urbanization proceeds.

Third, the cities, big and small both, with a rising number of restaurants, shopping centers, movie theatres and other centres of entertainment is also an evidence of a rising demand for entertainment of the urban households.

Fourth, the changing concepts of social interaction in the new urban setting are evident from households exchanging social visits, more outdoor family visits/vacations and spending increased time on similar other social activities.

Fifth, there is a new pattern in the allocation, content and intensity of time and resources to children. The change in this form of activity has been made possible, in part, by a greater access to schools in the urban areas and also better means of transportation. It has also been encouraged partly by the increasing competition for employment, changed concepts of family, and erosion of the joint-family system.

In sum, with urbanization comes increased specialization, higher human capital, social overhead and industrialization. All these lead to, on the one hand, changed life-styles, increased cash-incomes and a modern atomistic family structure. On the

other hand, these features of urbanization also provide the means by which the demand for services can be realized.

### A Model of Demand for Marketed Consumer Services

#### *Relative Prices and The Demand for Consumer Services*

Suppose that the real expenditure on consumer services is a function of real income ( $Y$ ), price of consumer services  $P_m$ , shadow price of new activities  $P_n$ , price of household services  $P_h$ , and tastes.

The general form of such a the demand function is;

$$D_s = f (Y, P_m, P_n, P_h, \text{tastes})$$

Keeping in mind the urban household behaviour explained above, we can now formally interpret the relationship between the different arguments of the demand function.

Ceteris paribus, an increase in real income, or shift of tastes in favor of consumer services should lead to a higher demand for consumer services. In terms of the demand curve for marketed consumer services, both these changes imply a shift of the demand function.

The interrelationship between the price variables is more interesting. This can be explained with the help of two relative price ratios:  $P_n/P_h$  and  $P_m/P_h$ . These two ratios can explain the

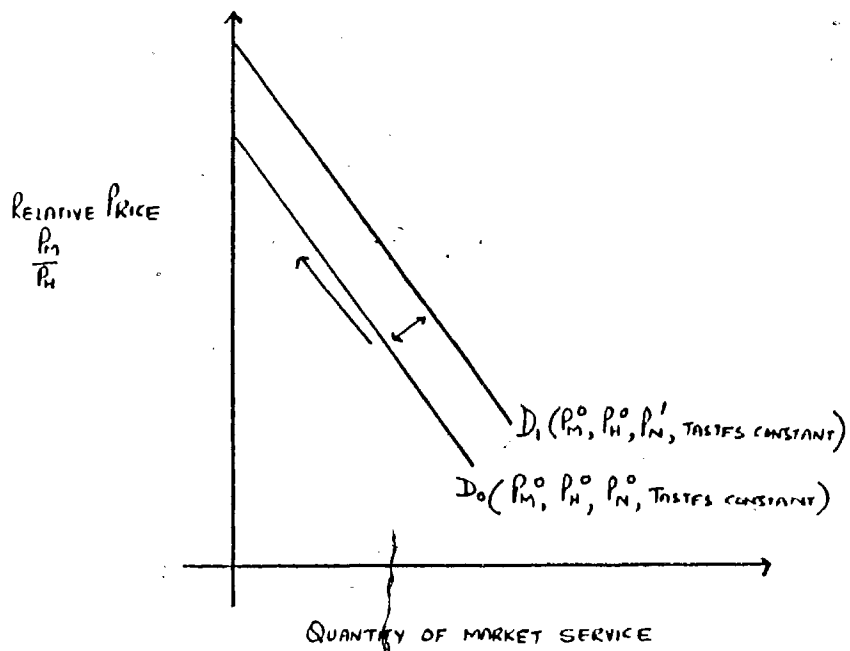
substitution between new activities and household activities on the one hand, and market services and household activities on the other. As far as the relationship between new activities and market services is concerned it is not important in this model as it always has to operate through its effect on the quantity demanded of household service[19].

Ceteris paribus, if  $P_m/P_h$  goes up, that is, the relative price of marketed consumer services increases, we should expect the quantity demanded of market service to decrease as a result of the substitution effect (assuming normality). In terms of Figure 4A, which shows the demand curve for market service, we should expect a movement along the demand curve (as shown by the arrows).

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[19]This follows from the division of labor assumption in the urban household noted earlier.

Figure 4A



On the other hand, if  $P_n/P_h$  went up or down, ceteris paribus, holding  $P_h$  fixed[20], we should expect a shift in the demand curve (as shown by the two headed arrows). This happens because a rise or a fall in the the price of new activities elicits a substitution in or out respectively, in household service production, and this means a corresponding adjustment in the consumption of the marketed consumer services to perform the household chores[21]. Technically, this is the cross price effect of a change in the shadow price of the new activity on the quantity demanded of the marketed consumer services.

It is clear now that  $P_m$  and  $P_n$  both affect the quantity of household services produced in the above model. It is an empirical question whether  $P_m$  and  $P_n$  both move together and at what rate. Together these two prices will determine the final production of the household services.

#### *Extent of Substitution*

In the preceding paragraphs it was argued that if the prices of market services rise and the price of new activities falls, they will have opposite influences on the quantity of household services consumed. The prices of household services were held constant. The extent of substitutions between the two activities

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[20], As noted earlier,  $P_h$  is defined as the opportunity cost of women not participating in the labor force. In India, the level of  $P_h$  is either not high or not rising fast enough to elicit substantial work-response from women. Therefore it is not unrealistic to assume  $P_h$  constant.

[21]This is because we are assuming that there is a fixed set of 'daily household activities' which have to be performed.



will be a function not only of the numerical magnitude of the different substitution elasticities but will also depend on the circumstances that may effect the elasticities. Holding real income constant (compensating for the change of price), the elasticity of substitution between H (household service) and N (new activities) ( $\sigma_{hn}$ ), and between household services and market services (M) ( $\sigma_{hm}$ ), can be defined as:

$$\sigma_{hn} = \frac{\text{Relative change in } (H/N)}{\text{Relative change in } (P_n/P_h)} \quad (4.2)$$

$$\sigma_{hm} = \frac{\text{Relative change in } (H/M)}{\text{Relative change in } (P_m/P_h)}$$

After expanding the above expressions and then simplifying them, the following can be written:[22]

$$\sigma_{hn} = (\eta_{hpn} - \eta_{nnpn}) \quad (4.3)$$

$$\sigma_{hm} = (\eta_{hpm} - \eta_{mpm})$$

$\eta_{hpn}$  and  $\eta_{hpm}$  are the cross price elasticities of H with respect to  $P_n$  and  $P_m$  respectively.  $\eta_{nnpn}$  and  $\eta_{mpm}$  are the own price elasticities of N and M respectively.

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[22]The proof of the following is in Appendix VI.

We should expect an increase in the quantity demanded of M if :

$$(\eta_{hpn} - \eta_{nnpn}) > (\eta_{hpm} - \eta_{mpm}) \quad (4.4)$$

The magnitudes of the differences in elasticities will indicate whether consumption of market service increases or decreases for an equiproportional but opposite change in the prices of new activities and market services. If we allow the prices to change at different rates the differences will be greater or smaller for the common span of time and from this we can infer the rates of change in the demand of market service. If we can estimate the magnitudes of elasticities and their rates of change of prices, it will be possible to estimate a rise or fall in the quantity of market service demanded.

It is not the objective of this research to compute the numerical values of these elasticities, instead, the factors that may influence their values are discussed[23].

#### *Determinants of Elasticities*

The two most important factors that are likely to effect the magnitudes of various elasticities are : the proportion of the budget spent on the respective commodity, and the degree of substitutability between two goods.

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[23]Though the own price elasticity of market service will be calculated as part of the main estimations.

In the early stages of urbanization we should expect low substitutability between market service and household service, and therefore the cross-price elasticities between the two will also be low. This is because the households gradually adapt to a new system where market activities substitute for the household activities. The own price elasticities of market service will be very low as it occupies a very small portion of the consumers budget. The degree of substitutability between new activities and household services will also be low in the initial periods of urbanization. This is because of the slow adaptation to the new environment of cities. Consequently, the cross price elasticity will be low between these two. Since N occupies a relatively small place in the consumer budget in early periods of urbanizations, its own price elasticity will be low.

If these conjectures are correct we should expect to see very little change in the quantity demanded of M in the initial periods of urbanization as the elasticities of substitution between the two pairs of commodities i.e., new activities and household services and market services and household services will be marginally different. In other words, the LHS of expression (4.14) will be marginally greater than RHS.

In the later stages of urbanization if the magnitudes of cross and own price elasticities change due to institutional factors[24] the quantity demanded of M will also be different.

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[24]Such as the use of durable goods, female labor force participation rates.

In sum, the above model suggests that the extent of rise in the quantity demanded of market service will depend on the relative strength of the two elasticities of substitution between new activities and household activities, and market services and household services.

### Derivation of the Demand Equation

The discussions in the preceding sections have indicated the direction of influence  $P_n$ ,  $P_m$  and changes in the budget  $B$ , are likely to have under the assumptions of the model. If all factors in the model that influence the quantity demanded of  $M$  are considered we may be able to derive a demand equation for the purposes of estimation.

In the present model, besides income, the exogenous factors that influence the quantity demanded of market service are the two prices  $P_n$ ,  $P_m$ . The total effect of all these exogenous factors can be estimated by adding up the various components of these exogenous changes.

If we write a general demand equation as:

$$Q_m = \alpha_0 + \alpha_1 \text{PRICE } (P_m) + \alpha_2 \text{INCOME} + \alpha_3 \text{PRICE OF OTHER GOODS } (P_n).$$

Where  $Q_m$  is the quantity demanded of  $M$ . Adding a stochastic error term will give us the regression equation of an uncompensated demand curve for market services.

### *Specification of the demand function*

In conformity with the estimations in (4.1), a log linear functional form is used to estimate the demand function for services.

The log of per capita expenditure on marketed consumer services is LNSERV, the log of relative prices of marketed consumer services with respect to non-services is LNRP, the log of per-capita real expenditure is LNTEX. The price of the 'other' good is O. Introducing a stochastic term, we obtain a regression equation:

$$\text{LNSERV} = \alpha_0 + \alpha_1 \text{LNTEX} + \alpha_2 \text{LNRP} + \alpha_3 \text{O} + u$$

All that is necessary for the statistical estimation of the parameters is to specify the method by which O can be dealt with.

As noted earlier, urbanization and the cost of new activities are closely and inversely related. This means that the cross price effects on the quantity demanded of marketed consumer services can be proxied by a "measure" of urbanization. Accordingly, the index of urbanization (defined as the ratio of urban population to total population) will be used as a proxy for the variable 'O' in the regression equation above.

To summarize, this section explained the demand function for the consumer services, its parameters and the technique used in measuring the effect of exogenous structural changes. This is the basic demand function. The next section presents the results

of an econometric estimation of this demand function.

### Econometric Estimation

Proceeding from the discussion in the preceding sections, urbanization was used as an additional independent variable in the regression equation 4.1, reported above. The above demand function was then estimated and the results are presented below. All values are in 1970 rupees. The number of observations is 23, from 1960-1982. [25]

In the regression equation the log of percapita household service expenditure in constant prices (LNSERV) was the dependent variable, and the log of total percapita household expenditure (LNTEX), the log of relative prices (LNRP) and the log of urbanization index (LNURB) were the independent variables.

The estimated equation using OLS technique is presented below.

$$\begin{aligned} \text{LNSERV} = & 2.51 + .085\text{LNTEX} + .0827\text{LNRP} + .45\text{LNURB} & (4.5) \\ & (1.84) \quad (.315) \quad (.695) \quad (2.48) \end{aligned}$$

The adjusted R square of the regression was 0.48 and the Durbin-Watson statistic was 0.99.

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[25]Sources of data, and definition of the variables is explained in Appendix IV

The correlation matrix of coefficients exhibited a high correlation of 0.729 between the log of urbanization (LNURB) and the log of total expenditure (LNTEX).

As is evident, there are still many weaknesses in the estimated regression equation. Not only is the sign of the estimated coefficient of the price variable incorrect, the coefficient of determination (R square) and the Durbin-Watson statistics are small and there is evidence of multicollinearity between the two independent variables LNTEX and LNURB.

Of the many available options to deal with these problems, some important ones were tried to improve the results in alternative estimations

Some other functional forms such as the inverse of the log of urbanization, a semi log functional form and a hyperbolic functional form were also used on the same data set in alternative regressions. The results were not acceptable both on grounds of theory and the significance of the estimated coefficients.

A suggested solution for avoiding multicollinearity is to drop one of the correlated variables. In the present study it was not possible to drop any one of the independent variables since the resulting equation will then not be able to explain the preceding model where it has been postulated that the demand for consumer services is a function not only of relative prices but also income and urbanization.

The other option was to improve the efficiency of the estimates, in other words try to reduce the high variance resulting from multicollinearity. This can be achieved by the introduction of some extraneous information in the estimation procedure (Kennedy, 1985: pp. 157-175).

One convenient technique to achieve this is to use information from some earlier study. Such a technique known as mixed estimation was not possible in this study since the variances of the other estimates were not available.

Because none of these alternatives were suitable, a correction for serial autocorrelation, in the light of a significant Durbin-Watson statistic, was undertaken. This yielded the regression equation presented below. The number of observations is 23, from 1960-82.

$$\text{LNSERV} = 3.31 - 0.243 \text{ LNTEX} - .10 \text{ LNRP} + .88 \text{ LNURB} \quad (4.6)$$

(2.34)    (-1.08)            (-0.640)    (3.3)

The numbers in the parenthesis are t-values. R square is .67 and Durbin-Watson statistic is 2.10.  $\hat{\rho} = .77371$

The correction for autocorrelation improved the Durbin-Watson statistic but was not able to produce a regression equation that could be used as a demand function for consumer services as the sign on LNTEX is incorrect. To address this problem, a Bayesian procedure described in Geweke (1986) was undertaken to impose the appropriate inequality restrictions



from economic theory. This method takes a set of coefficients and a covariance matrix from a previous estimation, and generates a large number of replications using a Monte Carlo Integration with a randomized distribution of coefficients (Geweke, 1986). The resulting coefficient estimates satisfy the inequality constraints specified and the results yield a (Bayesian) probability of the restrictions being true.

In the context of this problem the estimation procedure needed to be modified to allow incorporation of the required correction for autocorrelated errors. The raw data used in the regression equation 4.5 above was transformed (dropping the first observation) to correct for autocorrelation using the estimated value of the first order autocorrelation coefficient ( $\hat{\rho}=.773731$ ) estimated in equation 4.6.

Applying the Geweke procedure produced the following equation.

$$\text{LNSERV} = -0.0293 + 0.158\text{LNTEX} - 0.326\text{LNRP} + 1.177\text{LNURB} \quad (4.7)$$

(0.957)      (1.414)      (2.14)      (4.68)

The t-ratios are in the parentheses. The probability that the restriction are true is .11 in this case.

Because the Geweke procedure incorporated the relevant restrictions from economic theory, this equation was adopted as the estimated demand function for consumer services.

The expenditure elasticity estimated above was far less than one and insignificantly different from zero. This is an interesting result and a significant departure from the traditional theories that explain the structural change as a result of the operation of the Engel's law.

The other two variables, LNRP and LNURB are significantly different than zero and influence the demand for consumer service. [26]

#### *Discussion of the Econometric Results*

The above estimation of the demand function for services suggests that the inclusion of urbanization as a structural change variable to capture the secular and exogenous changes in the consumer's preferences improves the estimates. The estimated equation now has theoretically expected signs and two of its estimated coefficients are significantly different from zero at one percent confidence level.

The estimated coefficient of the relative price variable is significant and is an indication of the influence of relative price on the substitution between services and non-services in the Indian economy.

The estimated income elasticity of demand is less than one, but statistically significant and different from zero only at a lower level of confidence. The estimate however is interesting as

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[26]Appendix VII discusses another estimation technique that gives correct signs and significant coefficients but the estimates of expenditure elasticities are biased.

explained earlier.

This result is also a departure from the conventional estimates of income elasticity of demand for services which are greater than one. The results also imply that the conventional distinction between goods and services arising primarily out of the view that the latter have higher income elasticities of demand, may not be valid in all cases. This is also a significant result for the theories of income and employment growth (Clark, 1940 and Kuznets, 1960) in which the shifting occupational structures in economies depends on a highly income elastic demand for services.

### Conclusion

#### *The present model and the Gershuny hypothesis*

As noted earlier, Gershuny (1978) has argued that the cross-section U.K. data confirms Engel's law but the time-series data does not. He explains that, in the period under consideration, the demand for services in the U.K. did not rise in accordance with the Engel's Law because the expenditures were diverted to durable goods. The present thesis points to a possibly similar situation in India. On the one hand, the Planning Commission study of the cross-section data in India confirms the high income elasticities for services in the urban areas, but on the other hand, the time series estimates of the present research does not. However, the reasons for possible low income elasticities for services in the long-run are different

than either Gershuny's or Grubel's. The present research relies on a changing household behaviour, as urbanization proceeds, to explain the growing demand for consumer services.

*An explanation of monetization*

It was mentioned earlier that G-H in their study of the United States and Canada have shown the monetization of household activities as a result of rising female labor force participation rates. The present research shows that in India urbanization may be an important variable in the demand function rather than the female labor force participation rates. This also has implications for monetization.

Besides introducing an upward bias in the estimates of national income, the phenomenon of monetization has important implications for policy formulation and the interpretation of economic development.

The main idea is that an increase in the share of marketed services in the household budgets is monetization in so far as it produces a fall in the household work that the women were doing earlier. In the framework of the dualistic economy assumed in this study, workers from the rural pool, who migrate to the urban areas, provide household services which were being performed by the household women earlier[27]. As a result, the household production of these services goes down and are

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[27]Monetization does not have to be due to the migrants new activity only. In fact any market service that acts as a substitute for the household services will have a similar effect.

replaced by the marketed services.

The national income accounts will register an increase in the GDP due to increased expenditure on market service activity, but will not take account of a resulting reduction of household work by the housewives, or diversion of their time to the 'new' activities. This provision of the marketed consumer services is nothing but a monetization of the household services.

A quantification of monetization is possible from the econometric estimates. The estimates from equation (4.5) above show that a one percent increase in urbanization will imply a 0.158 percent increase in the demand for consumer services. That is, the elasticity of demand of consumer services with respect to urbanization is 0.158. In India, the urbanization index rose from 18 percent to 23.3 percent between 1960-82. This implies a 30.5 percent increase. Given the elasticity ( $=0.158$ ) of demand for consumer services with respect to urbanization, a 30.5 percent increase in urbanization index implies an increase in the demand for market service of approximately 5 percent.

In India the per capita expenditure on consumer services by the households increased by 33.25 percent in the twenty three years under consideration, as shown in figure 4.1. Of this 5 percent was due to "demand driven monetization"[28].

The proportion of GNP due to services has been an average of

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[28]This is a term used by G-H (1986).

16.9 percent[29]. This implies that 0.8 percent increase in the GNP was due to monetization of the household sector. In other words, roughly one percent increase in GNP is due to urbanization. This is not a very considerable, especially if the estimate is considered an overestimate to the extent the proportion of the GNP due to expenditure on services computed above is seen to be inflated due to double counting.

#### *Implications for Growth*

Economists have long emphasized the role of consumption demand in industrial revolutions and its importance to growth and structural change, but theoretical analysis of this role has been limited. There appear to be two conflicting views concerning the nature and extent of its influence. Challenges to the prime role of demand have developed on two fronts. First, empirical studies (Chenery, 1966) have concluded that supply factors occupy the central role in explaining industrial patterns since changes in the relative factor supplies associated with growth cause systematic shifts in the comparative advantage as per capita income rises.

Second, many theoretical formulations of the growth process have suppressed or omitted a consideration of the role of consumption demand, focussing almost exclusively on supply

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[29]This figure is derived by adding the percentage of GDP accounted by two broad categories "trade, hotels and restaurants" and "other services" for two terminal years 1970 and 1980. The average of the two was then taken. The source is National Account Statistics 1986, published by the Central Statistical Organisation, India.

conditions. In the literature dealing with two sector growth models, for example, the approaches range from those which are not designed to confront the issues of demand, since only one consumption goods sector is postulated (Uzawa, 1961), to those in which demand influences are suppressed through simplifying assumptions (Jorgenson, 1961).

Support for the view that consumption demand plays an important role in the process of growth and structural change has come mainly from empirical studies establishing the existence of different expenditure and income elasticities for food and non-food goods. It has been argued that Engel effects not only cause a shift in the industrial origin of production, but also induce higher levels of productivity and output (Houthakker, 1960; S. Kuznets, 1960).

There have, however, been few attempts to explore in a theoretical way the influence of Engel effects within a model framework designed to investigate the relationship between growth and structural change over extended periods of time (K-W, 1984; Mohan, 1984). The role of demand and the existence of different income elasticities has, of course, been explicitly recognised in these models.

In view of the importance attached to Engel effects as an explanation for the historically observed patterns of industrialization, it is useful to begin by reviewing the role of income elasticity of demand in the present study.

The conventional notion of high income elasticities for services comes from the popular belief that services are a 'luxury' [30]. In the present study, it should be first noted, that elasticities are institutionally determined. Indeed, the value for each elasticity is determined (hopefully uniquely) for any set of values for exogenously determined parameters like urbanization. In other words, by themselves the income elasticities may have almost nothing in terms of explaining or even being the cause of shifting employment and output patterns.

By modelling it in this fashion, not only does the present model find an important role for income elasticities of demand, but also find that exogenous changes in household behaviour (or shifts in individual parameters of the system) exert an important influence on growth and structural change.

The model presented here offers an explanation for increase in the levels of urbanization, because of additional labor required to produce the newly demanded urban consumer services. The structural elasticities of the present model show that the shifting preferences in favor of urban consumer services may stimulate the levels of urbanization above the first-order impact stressed in the development literature. Kelley (1969) uses the Phillipine data to estimate some expenditure elasticities for the food and non-food categories. Kelley has

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[30]Grubel (1986) attributes this popular impression to the root of the word 'services' in the word 'servants'. And since servants were supposed to be a luxury the popular interpretation of services was also of luxury.



used cross-section data to estimate these elasticities and his estimates are greater than one for non-food items. The elasticities being estimated in this study are long-run and time series data based, and hence cannot be compared to the ones estimated by Kelley. In fact, it was argued earlier that according to the Gershuny hypothesis the cross section elasticities seem to validate the popular belief that elasticities of non-food items are typically greater than one, but the time series estimates do not appear to support similar hypotheses. Kelley (1969) has also found that in Phillipines the expenditure elasticities of urban population for non-food items was 1.25. This estimate for Phillipines is in conformity with the Indian Planning Commission study (1979) which estimated the cross-section elasticity of urban households for consumer services to be 1.72.

Due to the difficulty in defining urbanization it is not possible to specify the effect of some interesting variables such as the savings rate on the demand for consumer services. For the same reason there will be a simultaneous equation bias in the model. It was considered that the loss in efficiency in using the instrumental variable technique to overcome simultaneous bias will in the context of the present model where defining a simultaneous equation system is very difficult, more than offset any potential gains in terms of reduced bias.[31]

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[31]Kelley (1969) has attempted to solve the problem of simultaneous equation bias in a similar situation by using the data on rural and urban, food and non-food demand patterns sorted with respect to family size. In the present study,

### *Implications for Urban Wage Policy*

The Harris-Todaro model has enjoyed considerable popularity since it was introduced. I will not discuss the H-T model here again, but it will be useful to reproduce some implications of the model relevant to the topic under discussion. The rapid urban growth and its accompanying expansion in urban service sector has been explained by Todaro by developing a simple search model of spatial migration. The migrant has an expected wage which is determined by the wage gap between the modern and the traditional urban sectors. The bigger the gap, the higher the migration and higher the levels of urbanization.

This model implies that if due to Government or union intervention the wage in the modern sector is pegged at a higher level, there will be bigger migration and bigger cities. This implication has been criticized by Kelley, Williamson and others (Op cit.). According to them, the H-T model assumes that the wages in the traditional sector are zero or near to zero, and hence does not allow any possibility of a further fall of wages in the urban traditional sector. The traditional sector passively accepts all workers who wish to wait there for employment selection by the modern sector. They (Kelley-Williamson) think that the traditional sector employment is determined by supply and demand forces, just as any other market that escapes formal government and union restrictions. According to them, the problem of labor absorption is serious in

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[32](cont'd) however, the unavailability of detailed data prevents such an attempt.

the urban traditional sector. In contrast with Todaro's model, K-W models show that a pegging of wages at a higher level in the modern wage sector due government or union intervention will choke off employment there, these displaced workers glut the traditional urban labor market, wages fall there, employment rises but the expected urban wage facing the in-migrants falls. In-migration falls and urbanization levels should fall.

The present model offers a more complete explanation of the sources of absorption of workers in the urban traditional sector. The model explains it in terms of shifting consumer preferences for market services provided by the in-migrants. In fact the model finds the price elasticity of demand for these services statistically insignificant. In terms of my model, if the absorptive capacity of the urban service sector has a secular growth pattern as shown by the estimated demand functions, the levels of urbanization may not be choked off as predicted by K-W.

In fact, proceeding from the conclusions of the G-H model, the rising female labor force participation in India in future may even enhance the absorptive capacity of the urban service sector. We can, in this case, observe, higher levels of urbanization. This would be consistent with the observed and predicted levels of urbanization in India[33].

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[33]Refer to World Development Report in footnote 1.

In sum, the above discussion suggests that pegging of wages due to union or government action in the modern sector at higher than present levels may seem to be the reason for higher levels of urbanization if we accept Todaro's reasoning. While it may seem validated by the trend of urbanization and rising wages in the modern sector, the causes may be totally different than Todaro's.

*Growth of the Service Sector as a Whole*

The overall growth of service sector, viewed as the sum of all sources of demand: firms, government and consumers, must be viewed with caution. While the growth of employment and output of some sub-sectors of service industry may be considered 'good', it should also be kept in mind, during policy formulation, that the value added in the "consumer service" industry has an element of implicit monetization.

## CHAPTER V

### THE GROWTH OF PRODUCER SERVICES AND TRADE IN EMBODIED SERVICES

#### Background

As explained in Chapter I, the recent growth of service sector output and employment, in both developed and developing economies, has been a cause of concern. One concern was about the growth of the consumer service sector and the factors contributing to its growth. This was discussed in Chapter 4. The other, subject matter of the present Chapter, considers the loss of productivity and its implications for international trade as a result of growth in the service sector. The latter concern has two parts, as explained below.

First, arising mainly out of the conventional theories that stress inherently low productivity of the service sector (Fuchs, 1961), considers the shift of employment from the manufacturing sector to services as contributing to a loss in productivity growth for the economy as a whole. Recent analyses (e.g., Gershuny and Miles, 1983) however, have called this theory into question. These studies show that increased demand for professional, technical, clerical and other specialized service occupations relative to other employees within each sector accounted for much more of the increase of employment in these types of occupations than the increase of the demand for the products of service industries.

Other studies (Cohen, 1979; Momigliani and Siniscalco, 1981; Grubel, 1986; and Tschetter, 1987) have emphasized the growth of producer services. It has been observed, for example, that firms have recently been undergoing a process of reorganisation in terms of adjustment not only to changing economic conditions but also, and more importantly, to technological innovations in the informatics area. The process involves, both, the firms divesting themselves of non-productive "in-house" services in favor of relying on outside contracts and, incorporating new, information-based services within their own structures, either by hiring personnel or contracting out, and also diversifying services they could provide their customers. The latter has also found strong support in many empirical studies. For example, Brender (1980) has shown that the "efficiency" of an economy depends increasingly upon the interlinkages which are established among the different productive activities, and not only on the productive conditions in the activities themselves.

The second concern arises due to a faster growth of service sector relative to the goods producing sector. This is interpreted both as a source of increasing comparative advantage in the production of services and also a rising trade deficit as imports rise to meet the excess demand created by falling goods output. One outcome of this apprehension has been a demand to encourage international trade in services. The issue has also been discussed at the recent meetings of the General Agreement on Trade and Tariffs. The principal argument is that greater

world efficiency will result if the international trade pattern reflects this newly acquired comparative advantage of the developed economies. [1]

Grubel (1986) argues differently and suggests that a more important source of the new comparative advantage is the rising interlinkage of the goods producing sector with service sector, resulting into what is termed 'embodiment' of services in goods. Grubel also believes that a measure of embodiment will allow us to evaluate the importance of trade in 'embodied services' in contrast to direct trade in services, and argues that by emphasizing 'direct' trade in services only, as recorded in the balance of payment statistics, and not considering the rising 'embodiment' of services in goods production we are likely to underestimate the contribution of embodied services to world trade and economy. The link that such an argument establishes between services, goods and trade has attracted considerable attention in both developed and developing countries.

For example, stressing the role of technology and ever-increasing extent of inter-linkages among the different productive activities, an UNCTAD Report concludes:

Although a great deal of empirical work still remains to be done, the newer theories with regard to the link between services and growth and efficiency can provide a point of departure to help to identify key issues relating to developmental strategies. It is necessary to recognise that the importance of services goes beyond

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[1] Sylvia Ostry (1987) summarises the view of the spokesmen of the Group of Ten developed countries. In her view, however, the argument of free flow of services among nations must also be viewed in the framework of growth-with-adjustment debt strategy.

what can be captured by measures of labor productivity. In many cases development of tertiary production may not be a result of growth but rather one of its pre-conditions. For example, an efficient and a well-run banking system, transportation sector, insurance industry, telecommunications network and public administration are all indispensable for growth and development. The technological revolution especially in the case of telematics and the resulting increased tradeability and internationalization of services has ....(important) economic implications.(Services and the Development Process, UNCTAD 1985, pg. vi)

Proceeding from above, the present research first reviews the theoretical framework for a discussion of interlinkages between service sector, goods sector and international trade in goods, and then designs a methodology to measure the 'embodiment' of services in the goods sector and also estimates trade in 'embodied' services. The actual estimates are based on the Indian input/output tables.

Growth in Primary Factors, Comparative Advantage and the Leontief Paradox.

While newer theories (e.g., Deardorff, 1985; and Melvin, 1986; Grubel, 1986) establishing a link between the growth of services, growth, efficiency, comparative advantage and international trade provide a theoretical framework, only Harris and Cox (1988) have conducted an empirical enquiry along these lines. Consequently, a great deal of empirical work still remains to be done.

A possible approach to such a task might be to identify and measure the 'interlinkages' between services and the production



of goods. The input-output tables of an economy are a useful starting point for investigating the role of intermediate inputs. Such tables make possible an estimation of the importance of the input in question and hence would permit a first approach to the question of how a change in the conditions of its supply might affect comparative advantage and structural change in the economy.

This approach, however, is not new. Leontief (1956) was one of the first to use the input-output analysis to study the United States economy. He proceeded from there to use this analysis to demonstrate his famous empirical contradiction of the Heckscher-Ohlin theory, known as the 'Leontief Paradox'. Leontief based his analysis on the American input-output tables for the years 1947 and 1951. Using given labor and capital coefficients Leontief calculated the total direct and indirect requirements of labor and capital per dollar of final output. Given the total labor and capital inputs per dollars worth of each kind of final output, the total quantity of either factor absorbed in the production of a million dollars worth of a composite commodity defined as 'U.S. 1947 exports' was obtained. A similar computation was made for 'U.S. Competitive Imports'. This pioneering application of input output tables has since been utilized in many studies.

A recent and relevant application of input output framework to estimate international trade in 'embodied' services has been made by Harris and Cox (1988), henceforth H-C. H-C evaluate the

interaction between trade and services sectors for the Canadian economy based on the input-output data for the year 1981. The interaction between the goods sector and the intermediate service inputs is conceptualized in several ways. First, drawing upon the theory of factor content of trade, they measure the 'embodied' value of services for each dollar of export for each export commodity. This is done by estimating the vector of total outputs in the service sector which are derived demands, direct and indirect from that portion of final demand which is exports. In other words, this measure of embodied services in the exports of a particular commodity is simply the total value of service sector output which is directly or indirectly embodied in a dollar worth of exports of a commodity.

The second approach asks how the demand will change given an increase in exports. This approach, actually, estimates the partial elasticities of service demand with respect to total exports.

The present research, while broadly following H-C (1988) approach, analyzes the interlinkages between goods and services overtime. Instead of estimating the embodiment of primary factors, labor and capital, to show changes in the comparative advantage as in Leontief (1956), the present study will estimate the 'embodiment of services' in goods (explained below) to show the rising importance of service input per unit value output leading to a new comparative advantage. Indian input-output tables will be used for this purpose. The rationale of this

approach, however, is the same as Leontief's, although in a slightly different context:

....such analysis...(can) be used consistently for the explanation of the foreign trade transactions of a growing economy. Although, as time goes on, its total stock of capital increases, so does, as a rule its labor force. The allocation of this stock at any given time between alternative productive uses must still be expected to follow the principle of comparative advantage. (Leontief, Wassily, 1956, pg. -)

While the link between growth of primary factors and the changing comparative advantage stressed by Leontief has been discussed widely in the literature on international economics, the implications of the growth of the 'producer services' for a changing comparative advantage is a relatively newer idea. The following section elaborates the latter relationship.

### Growth of the Service Sector and Comparative Advantage

#### *Taxonomy of the Service Sector*

In Chapter II it was explained that the three categories of demand arising from households, firms and government result in three types of services in the economy; consumer services, producer services and non-commercial services respectively. Of these, producer services are relevant in the present context as they provide a convenient point of departure for establishing a link between the growth of service sector, goods production, comparative advantage and international trade, in an economy. This section will explain the nature of these producer services and also explain why growth of producer services in the modern

world implies a higher value added content for the goods that use these producer services as inputs. This process, known as embodiment of services in goods, points out the importance of producer services in goods production and also focuses on the relationship of the demand for producer services to exports of goods.

### *Nature of Producer Service*

According to Grubel and Walker (1988)

.... (in) neoclassical economic theory, growth in output per capita is an increasing function of society's ratio of capital to labor, where the former consists of real, human and knowledge capital. One of the ideas of Austrian School of Economics expressed in the writings of Bohm-Bawerk (1884) and found in Wicksell (1901) is that this capital deepening involves increases in the "roundaboutness" and specialization of the entire production process.

Robinson Crosoe increased the 'roundaboutness' of fish production when he constructed a fishing net. He did so because it enabled him, over the technical life of the net, to catch more fish than he could have through the use of the labour spent in making the net and the use of the same fishing effort without the net.

In a more complex society, fishing nets are produced by specialists who use machinery, human skills and scientific knowledge in their own production process. In turn, the machinery skills and scientific knowledge are produced by further specialists. All of these production processes increase roundaboutness and the distance between ultimate consumer of final output such as fish and the activities of these producers of intermediate inputs. The prices of these intermediate inputs must be high enough to earn producers at least normal returns. At the same time, these intermediate inputs must yield a positive net return to their users otherwise there is no market for them.

We think that it is useful to consider the providers of producer service to be one important set of specialists in this process which generates ever increasing roundaboutness, specialization in production, capital deepening and increases in labor and other

factor productivity. It is difficult to generalize about the factor inputs and other technical characteristics of producer service industries. (Grubel and Walker, 1988.)

The concepts in the preceding paragraphs explain the nature of producer service in a modern economy. The next section presents different processes that may contribute to the growth of 'new' producer services in an economy and also some studies that estimate the contribution of new producer services to the growth in output and employment in the service sector of an economy.

#### *Growth of producer services*

One obvious explanation for the growth of producer services is the growth of the economy. According to this explanation, as the economy grows, the demand for final goods and services will grow also. This will imply an increase in the 'derived' demand for inputs of the firms, and producer service is one of them.

If, however, the level of final demand in the economy and hence the 'derived' demand for producer service, was held constant, how much growth would there be? Holding total demand constant the growth in output and employment of producer service could be for two further reasons. Either, it is increased amount of 'unbundling'[2]. That is, the firms are buying from outside those services that they were producing in-house earlier. Or, there is growth of 'new' producer services that the firms are purchasing from outside. To take an extreme case, if unbundling

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[2]Unbundling is a term used by Tschetter (1987).

accounts for all the growth of producer service output and employment, then the growth of producer services is a mere statistical illusion. It has not led to any real growth in national income, but instead, has resulted in a mere shift of one activity from the manufacturing or goods sector to the services sector[3].

On the other hand, growth of 'new' services is an indication of increasing 'roundaboutness' of production and implies a growing cost-effective technology as explained by Grubel and Walker (1988) above.

Only a few studies have estimated the relative importance of unbundling and growth of 'new' services, in explaining the growth in the total output of producer services. These estimates are, however, only available for some of the developed market economies and there are none for the developing countries. Therefore, the present research draws upon available studies in the developed market economies to make inferences for India.

One such estimate for U.S.A. is by Tschetter (1986). Tschetter has reviewed the contribution of three possible explanations for the growth of producer services in the U.S.A. between 1972 and 1985. First possible explanation for the growth of producer services is growth of the economy or growth in GNP.

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[3] A transaction cost approach to this issue will imply an increase in total welfare or a 'pareto improvement' as the firms voluntarily decide to contract out. Besides appearing as a trivial problem, such an approach also makes estimation extremely difficult.

For these thirteen years, according to Tschetter (1986) the growth in GNP explains 40 percent of producer service industry growth over this period. The second explanation for the growth of producer services industries could be a shift in the composition of demand or GNP that have occurred over time. The question that he is trying to answer is of the following type. Does an economy which consumes more personal and medical services and less cars and food generate more employment among lawyers, guards and computer programmers and less employment among farmers and assembly line workers? According to Tschetter's estimates the changes in final demand composition alone increased the demand for producer services by only 0.1 percent per year for the 1972-85 period. The small effect of changing final demand composition of producer services, according to Tschetter, is because these industries usually sell their outputs to many other industries and because the distribution of their sales parallels for the most part the size of the purchasing industry, with the exception of the purchases of engineering and architectural services by construction industry and the legal services to consumers. And also, the purchased producer service activities usually account for only 3 to 7 percent of the total costs of producing goods and services in other industries.

The third possible explanation for the growth of producer service industries is the changes over time in business practices. Business practices concerns the inputs that companies

require to produce their products. According to Tshetter, the business practices changed over time due to, new technologies and innovations (e.g., computer hardware and software, composite materials, plastics etc.), relative price changes such as rising and falling energy prices, and changes in other social phenomenon like deregulation and industrial relation practices. Another potential factor is 'unbundling' under this category. Tschetter estimates that changes in business practices added about 3.3 percentage points per year to the output growth in the 1972 to 1985 period. This represented about 55 percent of the output of producer services.

The next obvious question is: how much of this was due to unbundling? This estimate is also relevant to the present research. According to Tschetter, unbundling was responsible for some part of the growth of clerical and other service type activities, but is not even a potential explanation for the trends of managerial, professional and technical occupations within producer service industries, for changes in staffing patterns alone caused employment in these occupations to increase within manufacturing industries.

Another estimate by McFetridge and Smith (1988) has used models of the firm constructed by Coase(1937), Williamson (1979) and Casson (1987) to analyse the determinants of such 'unbundling'. Empirical tests based on this analysis were limited by the lack of data but suggested tentatively that the phenomenon has not been a significant contributor to service



sector growth.

A third estimate by Momigliani and Siniscalco (1982), henceforth M-S, tries to study the effect of increasing embodiment or integration of the producers service in the goods production in Italy during 1965-75.

M-S suggest that the traditional theories of the growth (e.g., Clark, 1940; Fuch, 1965, 1968), of service employment or 'deindustrialization' ascribe the process of change to something (e.g., technical progress or productivity, consumption patterns etc.) that is different from and extraneous to the modifications taking place in the structure of the productive system. In other words, something that is extraneous to the modification of the relations of interdependence and integration between phases of activity which, though classified as industry and service, jointly contribute to the production of specific commodities called for by final demand. M-S then explain that the relative and absolute growth in service employment largely derives from a growing use of activities classified in the branches of the service sector, but integrated into the productive system and into industry in particular; the phenomenon thus is, according to them, an effect of the structural change in the productive system, and in particular that part of the system that produces the industrial goods.

Proceeding from such a framework, M-S lay down two hypotheses. One, the relative and absolute growth of the service

sector employment is due in great part to an increase in the integration of services in the productive system. And two, the greater degree of intergration is to be specifically ascribed to the growth of services for industry, and, more generally, for the production of goods.

These hypotheses are then tested on Italian input-output data for the years 1965-75. Though M-S do not clearly distinguish the effect of unbundling from that of the new producer service on the total generation of employment, their analysis shows that, in Italy, the relative and absolute growth of service employment during 1965-75 is largely explained by the growing integration of services into the industrial system. M-S further argue that integration also increased during a phase of falling final demand, hence establishing that all the increase is not due to final demand and that there is an independent process of integration at work.

In sum, the studies explained above emphasize the contribution of new services to the total growth in output and employment of producer services. Some other studies by Cohen (1979), Brender (1980), Wayne (1984) and Nusbaumer (1984) arrive at similar conclusions.

## *Possible Explanations of Growth of Producer Services*

Some possible reasons for the growth of the producer service sector were explained in the preceding paragraphs. There are, however, many other reasons. I review some important ones in the following section.

### 1. Information.

The employment growth of producer services may be a response to increasing demands for information. The computer and data processing services industry has spread the costs of the computer related technologies over many users. Management and business consulting services, engineering and architectural services and other producer services have spread the costs of acquiring technical knowledge in demography, economics, marketing, engineering and other fields over many users. The reduced cost to the user implies a higher quantity demanded.

### 2. Increasing complexity of business.

The bigger companies with more complex operations within the company and its subsidiaries need business management and consulting firms to ensure efficient operation.

### 3. Increasing governmental control.

The growth of government laws and regulations at federal, provincial, municipal and city levels have made it necessary to obtain more help from lawyers, accountants and other technical experts. These regulations and laws deal with banking, transportation, and other fields.

### 4. International trade.

Kierzcowsky (1986) has argued that the durable goods supplied across nations also need maintenance and services. This can also contribute to the overall growth of the output and employment in the producer services industry.

5. Schumpeterian process.

As noted earlier, Grubel (1986) argues that the relative growth of the producer service sector can continue for as long as technological innovations maintain a marginal rate of return to capital ~~greater~~ than the interest rate. In a market economy this innovation is generated to a significant degree by Schumpeterian entrepreneurs. Some studies support such a viewpoint. Baumol (1984), for example, has shown that some service industries have high capital-labor ratios, for example the telecommunications industries and utilities. On the other hand, many firms providing producer services use workers with high levels of training, only employ sophisticated techniques but have low levels of physical capital.

6. Structural change.

Momigliani and Siniscalco (1982) have clarified the role of structural change in the growth of producer services as follows.

... According to our hypotheses, the relative and absolute growth in the service employment largely derives from a growing use of activities classified in the branches of the tertiary sector, but integrated into the productive system and into industry in particular: the phenomenon under review is thus an effect of the structural change in the productive system, and in particular in that part of the system which produces industrial goods.

.... The result(s)... bring out the considerable and growing importance of producer services, which is used as evidence to show the marked integration between the production of goods and the production of services, and hence to contradict the explanation of the growth of service sector and de-industrialization based on the theory of stages. (Momigliani and Siniscalco, 1982, pg.276)

### Implications for Trade in Services

In the preceding paragraphs, it was shown that the growing service sector is not merely a process of contracting out, by firms, of their old "in-house" activities, for this would imply that growth of the service sector is merely a statistical illusion. Instead, the growth of the service can be attributed to the growth of 'new' producer services, due to a growing and improving technology. In terms of the theories of comparative advantage this means that the growing embodiment of services will play a significant role in the determination of comparative advantage.

In other words, this implies that the growth in domestic producer service industry plays a significant role in determining the comparative advantage of a nation in the international exchange of goods. And also, if the process of embodiment is significant, it would mean that the standard theoretical treatment of services as non-tradeables deserves to be retained, and can be utilized to explain the trends in international trade of goods and services.

Nonetheless, the arguments in the preceding paragraphs need to be established by working out a methodology for the measurement of embodied service trade. The present research tries to do this. It is a significant contribution because no earlier research work, except for Harris and Cox (1988), has attempted similar estimation, even though this idea and its variants have been discussed theoretically in the literature. The following survey of literature on the trade in services also makes this clear.

Another significance of the methodology developed in this research is that it is completely general in nature and applicable across countries irrespective of their stages of development. Although the present work is on the Indian input-output tables, a similar exercise can be undertaken for any country.

#### A Survey of Literature on Trade in Services

One of the earlier works on the specific role of services in economic analysis is by Bhagwati (1984). Bhagwati has used the standard trade model to address the question of why services would be cheaper in developing than in the developed countries. In another paper Bhagwati (1984) discusses the factors that make services technically progressive and labor/capital intensive. Bhagwati says

.... given the (appropriate) way in which we distinguish goods from services, technical and structural change defines a continuous process during which services

splinter off from goods and goods, in turn, splinter off from services. Furthermore, this 'splintering process' insofar as goods emerge from services, is associated with a 'disembodiment effect' such that the services, initially embodied in the person providing them (for example Placido Domingo at the Metropolitan), and requiring the physical presence of the provider of the services at the time of use, are disembodied as a result of technical change and encapsulated into what we call goods (such as the invention that brings Placido Domingo into our homes vis records). I shall further argue that the services-from-goods splintering process generally yields service activities which are technically progressive and possibly capital intensive, whereas the goods-from-services splintering process, reflecting the disembodiment effect, generally leaves behind a residue of service activities which are technically unprogressive and labor intensive. (Bhagwati, 1984.p134)

The problem with such a view is that it is an 'expost' explanation of the evolution of services. It is difficult to understand if a service is technically progressive and capital intensive unless we know how it emerged. Such a theory does not give us a reliable basis for a predictive model.

Djajic and Kierzkowsky (1986) have used the standard Heckscher-Ohlin model to investigate the consequences for trading partners of explicit inclusion of the need to maintain durable goods in order to ensure their continued productivity. This model is constructed under certain specific conditions and hence is not of help to the present research.

Deardorff (1985) has investigated, in terms of the standard trade model, the question of whether trade in services can be explained by the principle of comparative advantage. This is also a theoretical exercise and of not much relevance to the present work.

Melvin (1986) has shown that the inclusion of services does provide difficulties and results in an analysis that differs substantially from the traditional model. In Melvin's work it is shown that under some circumstances the law of comparative advantage need not apply to service trade. Melvin goes further to show that the commercial policy and domestic tax policy may have quite different effects in a world in which services are traded than they do in a standard Heckscher-Ohlin model. Melvin's theoretical model demonstrates how services are different from goods and that they need a different framework. Beyond this, the model is of limited relevance to this research.

Grubel (1986), as noted earlier, has addressed the question of trade from a different and a more general perspective. According to Grubel, a large proportion of trade in services takes through 'embodiment' of services in goods that are exchanged internationally. The growing services sector in the Western industrial nations and the consequent claim of newly acquired comparative advantage of these countries should, according to Grubel, be evident in an increased exchange of services through their 'embodiment' in goods.

The redeeming point of Grubel's analysis is its completely general nature. The theory does not rely upon any specific conditions of a country or region. The present research will draw upon Grubel (1986) and develop a methodology to empirically test it using the Indian data. This is explained in the following section.



## Embodiment of Services and International Trade

Given the growth and embodiment of intermediate producer services in goods, we should expect a larger export of embodied services as embodiment increases. At the same time the imports of goods will bring in some embodied services from foreign countries. From these figures we can find the net export/import of services. The following section presents a method to accomplish the task. The Indian input-output tables are used to estimate the deficit/surplus of the 'embodied' service trade.

Notwithstanding the problems of data and some methodological concerns, the estimates presented here are of considerable importance. A comparison of the estimates of 'embodied' service exports or imports with actual 'traded' service sector exports and imports in the balance of payments [4] statistics indicates the under-estimation of the role of services in the current methodology of compiling the national balance of payments statistics. Also, the estimates of embodied service trade may reflect a changing structure of the economy, at least as far as the 'interlinkage' of the service sector to the goods producing sector is concerned.

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[4]According to the International Monetary Fund the 'traded' services include shipment (freight plus insurance), other transportation (port services plus passenger services), travel, official services, and other private services. This last catch-all category includes diverse activities such as non-merchandise insurance, communication, advertising, brokerage, management, subscriptions to periodicals, processing and repair, merchanting and professional and technical services.

## Empirical Estimation

*Measurement of embodiment of intermediate producer services:*

### *Theoretical Framework*

This section discusses a technique to measure embodiment of services in the goods sector used by Harris and Cox (1988) for estimating embodiment of services in goods manufacturing in the Canadian economy. This measure of embodiment will then be used to estimate the export of embodied services. An alternative method of estimating the export of embodied services based on a methodology of Miyazawa (1972) is also discussed in the Appendix. The latter is another possible way of measuring the embodiment of services in goods, but for some reasons explained in the Appendix was not found to explain the process of embodiment and its relationship with international trade as well as the H-C method.

### *The Harris-Cox Method*

H-C start with a Leontief identity, where  $X$  is the vector of gross outputs,  $A$  the input output coefficient matrix and  $F$  the vector of final demand:

$$AX + F = X$$

If  $B$  is the inverse of  $(I-A)^{-1}$ ,

then;

$$X = BF \quad (5.1)$$

H-C then disaggregate the final demand vector into gross export demand and domestic demand and i.e.,  $F' = [(F_N^E, F_S^D), (F_S^E, F_S^D)]$

The gross export demand vector is then used to compute the export of embodied service per dollar of total commodity export, as explained below. A vector of total output of all the service sectors originating from export demand is defined as

$$X_S^E = B^S E \quad (5.2)$$

where  $B' = (B_n, B^S)$

and  $E$  is the export demand vector.

The arithmetic mean of the columns of  $B_S$  matrix will indicate the service sector output due to one dollar of final demand for commodities. If an average of this figure is taken a number indicating an average measurement of service embodiment in goods can be obtained. This will be termed

$$AVSREM \quad (5.3)$$

For any particular commodity  $i$ , the total vector of services which is derived from export demand of commodities  $i$  is computed as

$$X_S^E(i) = B_1^S \quad (5.4)$$

$B_1^S$  is the  $i$ th column of the  $B^S$  corresponding to the exported commodity  $i$ .

The total value of services sector output due to exports of commodity  $i$  are defined as  $SUM(X_S^E(i))$  or the embodied services in the exports of commodity  $i$  are defined as

$$ESX_i = SUM(B_1^S E_i) \quad (5.5)$$

where  $E_i' = (F_n^E, F_s^E)$

### *Discussion of Results*

The method explained above is applied to the inter-industry technical coefficients data of the Indian economy published by the Planning Commission, Government of India (1986). There are two such input/output use matrices, one for 1979/80 and the other for 1984/85. The 1979/80 input output coefficients matrix has 14 industries of which 7 are classified as service sectors, the 1984/85 input-output coefficients matrix has 50 industries with 6 service sectors and 44 goods producing sectors.

Table 5.1 presents the estimates of embodied service exports per rupee of total exports. The same table also presents estimates of AVSREMs defined in 5.3 above.

Table 5.2 presents the results of computation of embodied service exports and imports. This table also presents the figures for direct exports and imports of services as reported in the balance of payment statistics. All these are also presented as a proportion of GNP in Table 5.3. Table 5.4 is a list of the estimates of embodied service content sorted by industries for the year 1984/85.

These results also suggest the underlying argument in this chapter: that is, with the growth of intermediate producer services in India, the embodiment of services has increased as shown by AVSREMs and consequently the exports of embodied

services per rupee of total exports has also risen.

Some general comments about these results can also be made. One, the time period covered is only from 1979/80 to 1984/85 because the input-output coefficient tables for India were available just for these two years. For this reason, the results are also indicative only of two points in a possible trend in the growth of embodiment and of embodied service export.[5]

Two, the process of aggregation used throughout both the methods is that of simple arithmetic means. Some other methods of weighting and triangularization have been suggested to overcome this shortcoming by Haji(1987) and Simpson and Tsukui (1965). In the present research none were however used.

Next, Table 5.2 shows an increasing export of embodied services from India. The embodied exports went up from Rs. 1301.31 million in 1979/80 to Rs.5855.2 in 1984/85. This is a reflection of both, an increase in the embodiment and an increase in the value of total exports. Moreover, this estimate is also sensitive to the composition of exports because an increased export of commodities with less embodiment of services or vice-versa can change the overall export of embodied service exports. An increase in AVSREM's (defined in equations 5.3 and estimates presented in Table 5.1) from .02 to .05, implies that a part of this increase is due to increasing embodiment of

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[5]Another estimate, not reported in this study, based on the projected input-output tables of India for the years 1989/90, confirmed the upward trend.

services into goods sector.

The estimates of embodied service as a proportion of the actual direct exports rose from 4.12 percent in 1980 to 13.87 percent in 1984/85. This is a substantial increase and indicates a growing role of embodied services in exports. This comparison also draws attention to the possible underestimation of the role of producer services in international trade if only the published balance of payments statistics are considered.

An extension of above computations to imports is also possible. Table 5.2 presents the results. In the absence of country coefficients of all the trading partners of India, the coefficients given by Harris and Cox (1988) for Canada have been chosen as a proxy. Such estimates are available only for 1981. Also the classifications used by the Canadian input/output tables is different than the ones used in the Indian input/output tables. A reclassification of the two Indian input/output table used in this study and the Canadian input/output table available from Harris and Cox (1988) is presented in Table 5.6. According to this re-classification the estimates of embodiment given by the Canadian input/output study were then used to assess the embodied service content of the imports. The total imports of the embodied services in the two years under consideration have been reported in table 5.2.

These figures show an increasing import of embodied service imports over the time period under consideration. For ready

comparison, the actual direct imports, as reported in the balance of payments statistics is also presented in Table 5.2.

The net deficit/surplus column in Table 5.2 shows that although the actual balance of payments figures for direct trade in services indicates a surplus in 1980, the 'embodied service trade balance' does not. Also the embodied service trade balance shows an increase in the deficit. It is another pointer to the limited information that the reported trade figures communicate. Due to many approximations in the above computations, they can only be used as possible indications of an increasing trend in exports of embodied services and an underestimation of the role of services in international trade.

The Table 5.3 presents the absolute figures of Table 5.2 as proportions of GNP. Trends similar to the one explained above are evident from here also.

Table 5.1  
: Estimates of Embodied Service Content

|         | Embodied<br>service<br>exports<br>per Rupee<br>of<br>total<br>exports<br>H-C Method |
|---------|---|
| 1979/80 | .013  |
| 1984/85 | .036  |
|         | AVSREM<br>H-C Method  |
| 1979/80 | .02   |
| 1984/85 | .05   |

Source: Computed from the Technical Note to Seventh Five Year Plan published by the Government of India. (1979 and 1984)



**Table 5.2**  
**: Estimates of Export and Import of Embodied Service Content**  
**(Harris and Cox Method)**

|                          | Embodied<br>service<br>exports | Embodied<br>service<br>imports | Def/Sur<br>-/+ |
|--------------------------|--------------------------------|--------------------------------|----------------|
| 1979/80<br>I/O<br>Tables | 1301.31                        | 19373.16                       | -18071.85      |
| 1984/85<br>I/O<br>tables | 5855.2                         | 322977.7                       | -317122.5      |
|                          | Direct<br>service<br>export    | Direct<br>service<br>import    |                |
| 1980<br>trade            | 31569                          | 27468.6                        | +4100.4        |
| 1984<br>trade            | 42189.2                        | 54531.6                        | -12342.4       |

Source: Computed from the Technical Note to Seventh Five Year Plan published by the Government of India.(1979) And from The Technical Note to the Sixth Five Year Plan.  
The actual trade figures are from International Monetary Fund Balance of Payments Statistics, Vol.39, 1988, Pg.16

Notes: The SDR figures have been converted into rupee amounts using Rs.10.2 and Rs. 11.6 as the Indian Rupees Per SDR conversion rate for 1980 and 1984, respectively. All figures in millions of rupees. The embodied service trade was calculated from trade figures deflated for price rise at 1980=100. The actual trade figures have, however, not been deflated and are

reported as it is. The deflated figure would show a smaller difference in the value of trade in embodied services relative to actual trade.

**Table 5.3**  
**: Estimates of Export and Import of Embodied Service Content As Proportions of Gross National Product**

|                          | Embodied<br>service<br>exports<br>(%GNP) | Embodied<br>service<br>imports<br>(%GNP) |
|--------------------------|--|--|
| 1979/80<br>I/O<br>Tables | .0012                                    | .016                                     |
| 1984/85<br>I/O<br>tables | .0043                                    | .23                                      |

|               | Direct<br>service<br>export | Direct<br>service<br>import |
|---------------|-----------------------------|-----------------------------|
| 1980<br>trade | .029                        | .025                        |
| 1984<br>trade | .031                        | .040                        |

Source: Computed from the Technical Note to Seventh Five Year Plan published by the Government of India.(1979) And from The Technical Note to the Sixth Five Year Plan. The actual trade figures are from International Monetary Fund Balance of Payments Statistics, Vol.39, 1988, Pg.16

Notes: The SDR figures have been converted into rupee amounts using Rs.10.2 and Rs. 11.6 as the Indian Rupees Per SDR conversion rate for 1980 and 1984, respectively. All figures in millions of rupees. The embodied service trade was calculated from trade figures deflated for price rise at 1980=100. The

actual trade figures have, however, not been deflated and are reported as it is. The deflated figure would show the a smaller difference in the value of trade in embodied services relative to actual trade. GNP at 1980 prices computed from National Account Statistics Statement 4 (pg.12) and Statement 3 (pg 10), published in January 1986. The GNP computed for these years is Rs. 1075970 million and Rs. 1351075.3 millions in 1980 and 1984, respectively.

Table 5.4  
: Estimates of Embodied Service Content by industries for year  
1984/85

|                         | Embodied<br>service<br>content<br>per Rupee<br>of total<br>output<br>H-C Method |
|-------------------------|---|
| Paddy                   | .037  |
| Wheat                   | .035  |
| Other cereals           | .020  |
| Pulses                  | .012  |
| Fibre crops             | .025  |
| Tea & coffee            | .0357   |
| Other crop              | .00799  |
| Animal husbandry        | .022  |
| Forestry                | .015  |
| Fishing                 | .0049   |
| Coal and lignite        | .028  |
| Crude petroleum         | .0066   |
| Iron ore                | .013  |
| Other metals            | .022  |
| Non-metals              | .0099   |
| Sugar                   | .050  |
| Khandsari               | .044  |
| Other food and beverage | .0503   |
| Cotton textile          | .0583   |
| Art silk                | .0919   |
| Woollen textile         | .087  |
| Other textile           | .051  |
| Wood based industry     | .087  |
| Paper industry          | .119  |
| Leather ind             | .057  |
| Rubber products         | .0637   |
| Plastics                | .0687   |
| Petroleum products      | .013  |
| Coal tar prod           | .0922   |
| Fertilisers             | .058  |
| Pesticides              | .0133   |
| Synthetic fibre         | .087  |
| Other chemical          | .088  |
| Cement                  | .089  |
| Other nonmetal          | .085  |
| Iron and steel          | .109  |
| Non-ferrous             | .122  |

|                      |       |
|----------------------|-------|
| Non-electrical mach  | .086  |
| Electrical machinery | .087  |
| Rail equipment       | .0922 |
| Motor vehicles       | .0808 |
| Other trasport equip | .0817 |
| Electronic equip     | .0855 |
| Other manu           | .0621 |

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Source: Computed from the Technical Note to Seventh Five Year Plan published by the Government of India.(1984)

Table 5.5  
: Service Content of Individual Commodity Sectors for Canada,  
1981

|                              | Embodied<br>service<br>content<br>per dollar<br>of total<br>output<br>H-C Method |
|------------------------------|--|
| Meat products                | .2428  |
| Poultry products             | .2245  |
| Fish products                | .1769  |
| Dairy products               | .2542  |
| Fruit and vegetable products | .2527  |
| Grain products               | .3199  |
| Confectionary products       | .2182  |
| Misc. food product           | .2453  |
| Distilleries                 | .2364  |
| Wineries                     | .2706  |
| Tobacco                      | .2238  |
| Rubber                       | .2280  |
| Leather                      | .1988  |
| Yarn                         | .2806  |
| Synthetic textile            | .1761  |
| Other textile                | .2269  |
| Knitting Mills               | .2088  |
| Clothing                     | .1988  |
| Sawmills                     | .1685  |
| Veneer and plywood           | .3220  |
| Other Wood products          | .2819  |
| Furniture                    | .3288  |
| Pulp and paper               | .2283  |
| Other paper products         | .2870  |
| Printing and publishing      | .2525  |
| Engraving                    | .2286  |
| Iron and steel               | .1539  |
| Steel pipe                   | .2718  |
| Smelting                     | .2477  |
| Aluminum                     | .2188  |
| Other metals                 | .2202  |
| Boiler and plate             | .2634  |
| Fabricated steel             | .1882  |
| Metal stamping               | .1791  |
| Wire products                | .2062  |
| Hardware                     | .1997  |
| Other Metal                  | .1997  |

|                          |       |
|--------------------------|-------|
| Agriculture machines     | .2060 |
| Industrial machinery     | .2182 |
| Commercial refrigeration | .1703 |
| Aircraft parts           | .1622 |
| Motor vehicle            | .1577 |
| Shipbuilding             | .2066 |
| Other trans              | .1721 |
| Small appliances         | .1562 |
| Large appliances         | .1853 |
| Communication equip      | .1970 |
| Electrical Equipment     | .1919 |
| Other electrical         | .1428 |
| Cement                   | .1931 |
| Glass                    | .2149 |
| Non metal mineral        | .2869 |
| Petroleum refinery       | .2283 |
| Other petroleum          | .2833 |
| Mixed fertilizer         | .2828 |
| Plastic                  | .3357 |
| Pharmaceutical           | .2809 |
| Household chemicals      | .3207 |
| Industrial chemical      | .2985 |
| Scientific equipment     | .2931 |
| Misc manufacturing       | .3139 |
| Agriculture              | .2409 |
| Forestry                 | .2380 |
| Fishing                  | .2194 |
| Metal mining             | .3967 |
| Petroleum and gas wells  | .4295 |
| Other Mining             | .2780 |

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Source: Harris and Cox (1988)



Table 5.6

: Correspondence between the 69 sectors of the Canadian input output table for 1981 and the sectors of the Indian input output tables for 1984/85 and 1979/80

| Canadian sectors<br>1981 I/O tables | Indian sectors, 1984<br>1984 I/O tables | Indian sectors, 1979<br>1979 I/O tables |
|-------------------------------------|---|---|
| 65+11                               | 1+2+3+4+5+6+7+8                         | 64                                      |
| 65                                  | 9                                       | 65                                      |
| 66                                  | 10                                      | 66                                      |
| 54                                  | 11+15                                   | 67+68+69                                |
| 56+68                               | 12+28+29                                | All other<br>manufacturing              |
| 67                                  | 13                                      |   |
| 69                                  | 14                                      |   |
| 1+2+3+4+5+6+<br>7+8+9+10            | 16+17+18                                |   |
| 15+16+17+18+19                      | 19+20+21+<br>22+23+32                   |   |
| 20+21+22+23                         | 23                                      |   |
| 24+25+26                            | 24                                      |   |
| 13+14                               | 25                                      |   |
| 12                                  | 26                                      |   |
| 59                                  | 27                                      |   |
| 57                                  | 30                                      |   |
| 60                                  | 31                                      |   |
| 61                                  | 33                                      |   |
| 52                                  | 34                                      |   |
| 54                                  | 35                                      |   |
| 28+29+30                            | 36                                      |   |
| 31+32                               | 37                                      |   |
| 33+34+35                            |   |   |
| 36+37+38                            |   |   |
| 39+40+41                            | 38                                      |   |
| 50+51+49                            |   |   |
| 48+47                               | 39                                      |   |
| 46                                  | 40                                      |   |
| 43+44                               | 41                                      |   |
| 45+42                               | 42                                      |   |
| 62                                  | 43                                      |   |
| 63+53                               | 44                                      |   |

Source: Computed from the Technical Note to Seventh Five Year Plan published by the Government of India. (1979 and 1984) and Harris and Cox (1988).

## Summary

In this chapter I have argued that an increased output of producer services which serve as intermediate inputs in the goods production process, implies an increasing 'embodiment' of these intermediate producer services in goods.

On the basis of the estimates from some developed economies it was hypothesized that a growing producer service sector implies a rising interlinkage due to the growth of informatics technology, new regulations, new processes and technology. This was also likened to the concept of 'increased roundaboutness' used in Austrian economics to explain the impact of newer technology on the production processes of an economy.

Moreover, it was also postulated that such a trend in the growth of interlinkages between production of goods and services may also reflect in the growth of a comparative advantage in the production of goods with different levels of services embodied in it and hence will also show a growing export of embodied services.

To measure this embodiment a methodology developed by Harris and Cox was used. The Indian input-output matrices were used for computations. Some policy related issues arising out of this analysis are discussed below.

First, the estimates from India show that a growing producer service sector output does not necessarily imply a loss of

overall productivity in the economy. It may, instead be a reflection of the rising embodiment of these intermediate services in goods production.

Second, the above analysis has important implication for trade policy. While it will be beneficial for the community of trading nations to reduce trade barriers faced by services, the overall international climate is not very conducive to liberalization, especially as it often involves politically sensitive issue concerning national sovereignty. The analysis above shows that such a resistance to liberalisation of international trade barriers for direct service trade does not imply pessimism for trade in services. Since the international trade in embodied services is so significant and rising over time, a continued emphasis on reducing trade barriers to goods in international trade negotiations at G.A.T.T. may still help the international allocation of resources along the lines of newly emerging comparative advantage in the production of service in some industrial countries.

Third, the above results show that over the years under consideration (1979/80 to 1984/85) the export of embodied services may have increased substantially to make India a net exporter of embodied services. Also the import of embodied services has risen over the period under consideration. In such a case the policy makers can see a possibility for import substitution. The important point is that a reallocation of resources from import substitution in goods only to both goods

and services may be of help in not only import substituting but also help boost the exports of embodied services.

Although these are important issues, the present research does not purport to go into any more details. These issues do indicate the direction of possible future research in this area. The present study, by analyzing some important issues, has however tried to indicate the paucity of policy oriented empirical research in the field of trade in services for all countries generally and for the developing countries specifically.

## CHAPTER VI

### CONCLUSIONS

The growth in the service sector output and employment has been a cause of concern in both developed and the developing countries. The two major concerns are; whether this growth has resulted from a high income elasticity of demand for services or as a result of some other structural change in the economy, and whether it implies a loss in the overall national productivity.

The present study began with an overview of the major problems encountered in making any meaningful distinction between services and goods. It was suggested that even though there may not be a total agreement among economists on this issue, there are enough differences to allow a differential treatment. Some classification schemes of the service sector were then examined and the one suggested by Grubel, and arising from sources-of-demand, was found most useful for the present research. The Indian service sector was then classified on the basis of the sources-of-demand classification. An analysis of the various categories then suggested that the producer service output has grown relatively much faster than consumer services and government services in India in the last two decades.

The main emphasis of this study was to examine the factors effecting the growth of demand for consumer services and to develop a methodology to show that a growing producer services sector in an economy implies rising embodiment of services in

goods, which in turn is also reflected in a higher export of 'embodied' services.

To explain the factors responsible for the growth in the demand for consumer services, first a simple demand function based on conventional estimation techniques was estimated. It was found unsatisfactory by standard statistical rules. Following Grubel (1986), it was then suggested that perhaps the inclusion of a structural demand side variable will correct this position and improve the econometric estimates. A model of urban household production, based on Becker (1981) was used to explain the inclusion of urbanization. The estimated demand function was then found acceptable. The coefficients of the estimated demand function had some important implications:

First, not only did the estimated demand function show very low own price elasticity of the demand for consumer services but also the income elasticity of demand for consumer services was less than one. The latter was a surprising result as most conventional economic theory will inform us of a higher than one, or an elastic demand, for services. Also the older theories of income and growth developed by Clark, Fisher and Kuznets have based their major conclusions about growth and change in the national economic structures on an elastic demand for services. These older economists do not distinguish among various service industries and to that extent may not have considered parameters similar to the present research. But some newer economists, such as Bell (1974), had analyzed consumer services similar to the

one under consideration in the present research.

Second, the estimated demand function also makes it possible to quantify the extent of monetization resulting from urbanization. In the period under study, roughly 5 percent growth in real GNP was due to monetization. Not only is this significant by itself, it also indicates the possibilities of further monetization as some other structural changes like increase in the rate of female labor force participation, as was also found in the Canadian economy by Grubel (1986).

The other part of this thesis analyzed issues concerning growth of producer services, embodiment of services and international trade in services. Two different methodologies were used to estimate the growth in embodiment and the export of 'embodied' services per unit of total exports. The analysis was also extended to estimating import of 'embodied' services by proxying the production coefficients of imported goods with domestic production coefficients. Some important conclusions of this research are noted below.

First, the hypothesis of growth in the embodiment of services in goods production, as the output of producer services rises, is supported by the Indian data. The data supports the hypothesis that the above process is also accompanied by a growth in the export of 'embodied' services. The important point here is that the growth of producer services output indicates the changing production structure of the economy and this will

be reflected in the pattern of trade of the economy. Though only approximately, this process of embodiment may also help identify an emerging pattern of comparative advantage among nations. The data and estimates in the present research are however, too aggregate to enable a more reliable conclusion.

Second, the estimates of exports of embodied services, when compared to the actual published export figures for services, are very significant, both in absolute and in proportionate amounts. This discrepancy not only indicates the underestimation of embodied services but also points out the likely underestimation of the role of domestic producer service sector in the exports of a country.

It will be appropriate, at this juncture, to indicate a major shortcoming in this research. The data used in the estimation of the demand function for consumer services and the producer services is from published sources only. It leaves out those areas of the economy with a large informal sector. Under normal circumstances, this lacuna is too insignificant to be of any major concern. But in India, the unaccounted economic activity is almost one third of the economy.



## APPENDIX I

Houthakker and Taylor (1960), henceforth H-T, take a standard approach followed in the earlier studies of Wold and Jureen (1953), Stone (1954), Ferber and Verdoorn (1962), with minor modifications.

Their approach involves the estimation of the following demand equation;

$$q_{it} = f_i(x_t, p_{it}, z_{1t}, z_{2t}, \dots, z_{nt}, u_{it})$$

where  $q_{it}$  is per capita consumption of the  $i$ th commodity in the year  $t$ ,  $f_i$  is a function whose mathematical form can be of any of the different types; double log, semi log, etc. (H-T also find the double log functional form best suited for the purposes of empirical work in terms of the goodness of fit).  $x_t$  is a measure of per capita real disposable income,  $p_{it}$  is the deflated price of the  $i$ th commodity,  $z_{1t}$  etc. are any other explanatory variables, and  $u_{it}$  is a disturbance term representing both the effect of variables that are not explicitly introduced into the equation and errors of measurement.

While H-T's approach is determined by "practical considerations", they point some difficulties associated with this approach.

(a) The explanatory variables  $X_t$  and  $p_{it}$  (and possibly some  $z$ 's) are jointly determined with  $q_{it}$ . H-T realize:

It is necessary in principle to specify for each commodity not only a demand equation but a supply equation as well, and to estimate them simultaneously. Unfortunately simultaneous equation techniques have so far only rarely led to convincing results in demand analysis. This appears to be in large part to the failure of economic theory to formulate an adequate supply equation. In the absence of such an equation, simultaneous estimation is virtually impossible, and the use of single-equation estimation is unavoidable in demand analysis .... (H-T, 1970, pg.7)

(b) The mathematical form of the demand equation cannot be specified a priori in the present state of the art. It is therefore advisable to try different forms, especially those obtainable by logarithmic transformations of one or more of the variables. H-T specify that experience with the static model suggested that non-linear equations fit better than the linear one, but the difference in fit (as measured by the correlation between actual and calculated values of the observations in arithmetic units) was relatively minor. This is probably explained by the fact that in a time-series (as opposed to the cross-section data) the explanatory variables do not vary over a wide range, so that a linear approximation is usually quite satisfactory. Following similar reasoning the present research also uses a log linear functional form.

(c) Another serious problem with the standard approach discussed by H-T is its static character, which is not essentially changed with the inclusion of the lagged income or prices as predictors. H-T overcome this problem by constructing a model with "state adjustment" where the effect of past behaviour is assumed

represented entirely by the current values of certain state variables through a stock adjustment mechanism. In the present study no such attempt is made for two reasons; first, to keep the analysis simple, and second, the nature of the commodity "consumer services" is by and large produced and consumed at the same instant.

(d) An allied issue of identification is also important. In a supply-demand framework, if one curve is stable, while the other is subject to shifts, the former can be identified. Shifts are due to the presence, in the equation, of exogenous or 'predetermined' variables such as time, or weather conditions or more generally any variable not explained in the model. From a technical point of view, the problem therefore boils down to determining whether predetermined variables, that appear elsewhere in the model, are eliminated from the equation to be identified.

In my research, this problem will be overcome by estimating 'ceteris paribus' demand functions. Philips (1974) believes that not much is lost in this approach:

A number of econometric considerations also indicate that the gain to be expected from work on identification front is often negligible. See (also) Stone (1953, pp 248-249). For a contrary view, see Summers (1959) and Williams (1978); Philips, 1974, pg. 95, fn.3)

## APPENDIX II

The traditional economic theory of the household behaviour assumes a single-person household. This theory focuses on the allocation of changes in money income and prices on the allocation of income among market goods. This single-person household spends its given income to maximise his utility function  $U$  of goods and services purchased in the market. That is, maximises the function

$$U = U(x_1, \dots, x_n)$$

subject to the budget constraint  $\sum p_i x_i = I$ , where  $p_i$  is the price of the  $i$ th good  $x_i$ , and  $I$  is his money income.

The utility function then is extended to

$$U = U(x_1, \dots, x_i, t_{h1}, \dots, t_{hr})$$

where  $t_{hj}$  is the time spent at the  $j$ th activity. A time budget constraint joins the money budget constraint.

A major problem with this approach is explained by Becker(1981):

(It)....does not provide insight into special substitution or complementarity relations between goods and time. We cannot even rule out a compensated increase in the wage rate that would increase the time spent at most household activities. The household production approach, on the other hand, implies a special relation between goods and time used to produce the same commodity (Becker, 1981, pg. 9)

To overcome this problem, the production approach uses the following type of utility function

$$U=U(Z_1, \dots, Z_m),$$

where  $Z_1, \dots, Z_m$  are the various "commodities" consumed. Each is self-produced according to;

$$Z_i = f_i(x_i, t_{hi}; E_i), \quad i=1, \dots, m.$$

where  $x_i$  and  $t_{hi}$  represent the possibly many goods and types of time used to produce the  $i$ th commodity, and  $E_i$  represents the ability, human capital, social and physical climate and other environmental variables. The present research adopts the production approach.

### Appendix III

The statistical coverage of the variables used in the regression analysis of Chapter 4 is as follows.

(A) Expenditure of households on final goods and services:

The data on the expenditure of private households was obtained from various volumes of the U.N. Yearbook of National Accounts. The category of transactor 'household and private unincorporated enterprises' concerns all private unincorporated enterprises not classed as quasi-corporations. The UNSNA (System of National Accounts), which forms the conceptual base of these classifications, also includes in this sector private non-profit institutions serving households that employ less than the equivalent of two full-time persons. The classification is based on the most important source of household income, taking all household members into account. It is considered that this criterion more accurately reflects both changing social views and changing labor force participation practices: it also responds to recent directives relating to the elimination of sex-based stereotypes.

The private non-profit institutions serving households includes institutions, not merely financed and controlled by general governments and employing the equivalent of two or less persons, that furnish educational, health, cultural, recreational and other social and community services to

households free of charge or at prices that do not fully cover their costs of production. While private non-profit institutions with less than two or equivalent workers was included in the definition of 'household and private unincorporated enterprises', those with two or more was a separate category.

The transactions termed 'private final consumption expenditure' measures the final consumption expenditure of all resident non-governmental units. Thus it is the sum of final consumption expenditure of households and that of private non-profit institutions serving households.

In a study of households expenditure, the inclusion of the expenditure of private non-profit institutions serving households may look questionable. Curiously enough, this category was not reported for India over the years of study, therefore such a definition does not pose a problem here.

Households final consumption expenditure includes outlays on non-durable and durable goods and services, less sale of second hand goods and of scraps and wastes. In addition to market purchases, household final consumption expenditure includes the imputed gross rent of owner-occupied dwellings, food and other items produced on own account and consumed, and items provided as wages and salaries in kind by an employer, such as food, shelter or clothing, and other fringe benefits included in compensation of employees, except those considered to add to household saving. The imputed gross rent of owner-occupied

dwellings should, in principle, be valued at the rent of similar facilities on the market but has been approximated by cost, including operating maintenance and repair charges, depreciation, mortgage interest, and interest on owner's equity. Other non-marketed output included in final consumption is valued at producer's prices.

(B) Expenditure on 'services':

The data on 'expenditure on services' are based on the United Nations system of National Accounts, U.N. (1968)[1]. The new system has a series of data on 'expenditure on services' by object starting from 1970. An adjustment in the figures of 1960-70 was made to make it as close to the new definition as possible. The entire series of 1960-82 was readjusted at 1970 prices. All the expenditures are in Rupees.

The new SNA classifies the following outlays of households in the domestic markets as 'expenditures on services'.

1. Gross rents and water charges: All gross rents in respect of dwellings and actual and imputed in the case of owner-occupied houses including ground rents and taxes.

2. Household services excluding domestic services: Cleaning, dyeing and laundering; hire of furniture, furnishings and household equipment.

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[1] The new system is a revision and extension of the SNA which was formulated in 1952.



3. Domestic Services: Remuneration in cash and in kind of domestic servants, cleaners, cooks, etc. Includes payments in cash and in kind to baby-sitters, chauffeurs, gardeners etc.

4. Services of physicians, nurses and related practitioners.

5. Operation of personal transport equipment, payment for parking etc.

6. Purchased transport: fares, baggage fees etc.

7. Communications: Postal, telephone and other services.

8. Education: Fees to school etc.

9. Personal care:

10. Expenditure on restaurants and cafes and hotels.

11. Miscellaneous Services: package tours, financial services, legal services etc.

(C) Relative prices of services:

The relative price of services variable is defined as the price of services relative to the prices of 'other goods'. The relative price series was calculated by dividing the nominal dollar expenditures on services from UN (1973, 1979, 1982) by real expenditure on services and by dividing this ratio by the implicit price deflator for consumer "non-services", i.e. non-durables, semi-durables and durables (i.e. goods).

The implicit price deflator for goods is found by subtracting the expenditures on nominal services from total nominal personal expenditures on goods and services and dividing this difference by the difference between real expenditures on services subtracted from total real expenditure on goods and services. The ratio of nominal expenditures on goods to real expenditure on goods yields the implicit price deflator for goods. The price series is in terms of 1970 rupees. (1970=100).

(D) Population: The population figures are taken from the decennial Census of India (1971, 1981).

(E) Energy consumption : This has been defined as the electricity sold to ultimate consumers in urban areas measured in k.w.h. The source is C.S.O. (1982).

(F) The figures of urban population are from the Pocket Book of Statistics (1982).

## APPENDIX IV

### An Alternative Methodology for Estimating the Embodiment of Services in Goods

The approach presented in this Appendix has not been directly used in the relevant literature to estimate embodiment and the trade in embodied services. Some parts of the methodology used here were initially developed by Miyazawa (1972) to study the dependence of service sector on the goods sector. It was further developed in the present research and adapted to construct a measure of the embodiment of services in goods. The results were substantially different than those estimated by H-C method. Also the interaction of the goods and the service sector was explained with relative ease by Harris and Cox than the one devised in this Appendix. It was therefore decided to mention the present method and report its result, but nonetheless warn the reader of the intricate logic that the method uses to explain a process that Harris and Cox explain much simply. The method of estimating exports of embodied services used by Harris and Cox, henceforth H-C, for the Canadian economy has already been discussed above.

The following work is based on Miyazawa (1972) and uses the n-industry input-output matrices to trace the interaction among the various industries or group of industries.

The method is to partition off the original Leontief inverse in terms of the combined effects of "internal multipliers", "external multipliers", and their "induced sub-matrix multipliers". The advantage of such an "internal and external multiplier model" is that it can be applied to many situations where the Leontief inverse cannot be. This is because the Leontief inverse conveys only the ultimate total effects of inter-industry propagation but not the disjointed effects separating into partial multiplier. The model outlined below will enable us to do the latter. The following two sections discuss some theoretical considerations implied in this partitioning and the computational methodology.

*Internal and external matrix multipliers in the input-output model: Some theoretical considerations in partitioning the matrix*

The n-industries of the usual input-output table are divided into sub-groups, designated P-sector which consists of l industries, and S sector which consists of m industries. Then, the nxn matrix of input coefficients is:

$$A = \begin{bmatrix} P & P_1 \\ S_1 & S \end{bmatrix} \quad l+m = n \quad (0.1)$$

Where P and P<sub>1</sub> are submatrices of the coefficients showing the input of P sector's products in the P and S sectors

respectively. The matrices P and S are square of dimension  $l \times l$  and  $m \times m$  respectively, and  $P_1$  and  $S_1$  are rectangular having the order  $l \times m$  and  $m \times l$  respectively.

Lets denote the Leontief inverse as:

$$B^* = (I-A)^{-1} \quad (0.2)$$

This inverse informs us of the total ultimate effects but not the disjoint interdependence of the above two activities. To do the latter the partitioned matrices are created. The first step in this direction is to decompose the elements of the Leontief inverse into three aspects of propagation consisting of the following:

(i) Internal propagation activities inside the P sectors industries: This aspect will be shown as the "internal matrix multiplier" of the P sector (having order  $l \times l$ ):

$$B = (I-P)^{-1} \quad (0.3)$$

(ii) Internal propagation activities inside the S sector's industries: This is also shown as the "internal matrix multiplier" of the S sector (having dimension  $m \times m$ ):

$$T = (I-S)^{-1} \quad (0.4)$$

Each internal matrix multiplier operates under the impetus generated by other sectors industrial activity.

(iii) Intersectoral propagation activities between the P and S

sectors' industries: This aspect will be shown as four rectangular sub-matrix multipliers which naturally follow from the operation of internal multipliers B and T :

- $B_1 = S_1 B \dots$  S-goods input in P sector  
induced by internal propagation in  
P sector's industries (m x 1)
- $B_2 = B P_1 \dots$  internal propagation in P  
sector's industries induced by P-goods  
input in S sector (1 x m)
- $T_1 = P_1 T \dots$  P-goods input in S sector  
induced by internal propagation in  
S sector's industries (1 x m).
- $T_2 = T S_1 \dots$  internal propagation in S  
sector's industries induced by S-goods  
input in P sector (m x 1).

These four sub-multipliers reveal the coefficients of induced effects on output activities in the cases of  $B_2$  and  $T_2$  or input activities between two sectors in the cases of  $B_1$  and  $T_1$ , and are called the "production generating process in succession".

(iv) The above three aspects of the interaction process naturally lead to another intersectoral multiplier that we could call the "external matrix multipliers" of the P and S sectors according to their economic meanings. If we select the coefficients of the induced effects on production (i.e.,  $B_2$  and  $T_2$  as the base, then they will take the form

$$L = (I - B_2 T_2)^{-1} \quad (0.5)$$

or alternatively

$$K = (I - T_2 B_2)^{-1} \quad (0.6)$$

Of course L, the external matrix multiplier of the P sector, has the order  $l \times 1$ , and K, the external matrix multiplier of the S sector, has the order  $m \times m$ , because multiplication of rectangular matrices form new square matrices.

(v) Now then, we have arrived at the fact that the total of the propagation effects in the P and S sectors' industries each generated by its own sector's activities, are expected to take the values LB and KT respectively, i.e., "the internal matrix multiplier" premultiplied by the "external matrix multiplier". So if we assume

$$KT = M$$

$$LB = N$$

Then we can prove the following formula:

$$B_p = (I - A)^{-1} = \begin{bmatrix} B + B_2 M B_1 & B_2 M \\ M B_1 & M \end{bmatrix} \quad (0.7)$$

OR

$$= \begin{bmatrix} N & NT_1 \\ T_2N & T+T_2NT_1 \end{bmatrix} \quad (0.8)$$

In other words, we can break down the original Leontief inverse  $B^* = (I - A)^{-1}$  in terms of the combined effects of internal and external matrix multipliers and their induced sub-matrix-multipliers.

#### *Computation of Embodied Service Export*

The above partitioning of the Leontief inverse enables us to construct a measure of the dependence of goods sector on the service sector. This is done as follows.

We first estimate  $B = (I-P)^{-1}$ , or the internal propagation activities inside the P sector industries, defined as internal matrix multiplier of the P sector having the order  $l \times l$  (explained earlier in equation 1). Then the relevant  $l \times l$  part of the leontief inverse which is also  $B + B_2MB_1$  (as shown in 7 above) in the present analysis is used to construct the inside propagation ratio of the goods producing sector;

$$R = B / B+B_2MB_1 \quad (0.9)$$

This matrix R will now have ratios for all its components and will inform us of the internal propagation in P sector due to its own activities relative to combined total direct and indirect effect in the p sector.



Any one component of this matrix, say  $a_{ij}$  can assume a value from zero to one. If it is zero, it implies that the dependence of industry  $i$  on its own input is zero. And if we go down the column for industry  $i$ , the other components will inform us of the dependence of this industry on other industries in the P sector. It follows that theoretically there are two possible extremes for the entire R matrix of ratios. Either all its components are one or they are almost zero. In the former case, the numerator and the denominator of all the components of R matrix will be equal, implying that in the ratio  $B/B+B_2MB_1$ ,  $B_2MB_1$  is almost zero, and there is no dependence of the P sector on the service sector. The latter, that is a R matrix with negligibly small ratio components will inform us of almost total dependence on the service sector. More realistically, these ratios will be different for different goods and will lie between 0 and 1. The closer is the ratio to 1, the less it is dependent on the other sector, i.e., S. Now then, if these ratios are subtracted from 1, the resultant numbers instead of indicating independence as clarified above, will indicate the dependence of goods sector on the service sector. The higher this ratio for a specific good, the higher its dependence on the service sector:

$$SDEP = (O-R) \quad (0.10)$$

where O is a matrix with all components equal to 1.

If an arithmetic mean of all the components of the  $i$  th column of SDEP matrix is computed, the resultant number will be

a measure of average embodiment of services in the  $i$ th goods production. This is denoted as :

$$\text{AVSREM}_i = \Sigma S_i / 1 \quad (0.11)$$

where  $i=1 \dots 1$ .

An arithmetic average of all the  $\text{AVSREM}_i$ 's will give us an average embodiment of services  $i$  goods. This is termed:

$$\text{AVSREM}_1 \quad (0.12)$$

The advantage of this approach is that besides providing a measurement of embodied services, it also explains the interlinkages between goods and the service sectors. The difference between the numerator and the denominator of the inside propagation ratio of the goods producing sector is  $B_2MB_1$ . The relative values of  $B_1$ ,  $B_2$ , and  $M$  in an economy will, therefore, explain the goods sector's relationship with the service sector. Though the present research does not propose to go so much in detail in explaining the relationship between various sectors of an economy, this approach lays down a methodology for use in any such future research.

The  $\text{AVSREM}_i$  computed above is defined as the average service embodied in good  $i$ 's industry. The next step is to divide the final demand into domestic and export demands for each good  $i$ , i.e.,

$$F' = (F_i^D + F_i^E)$$

where  $F'$  is the transpose of the final demand vector divided in

domestic demand for goods  $F_i^D$ , and export demand for the goods  $F_i^E$ .

The total embodied service exports are then computed by finding

$$ESX = \Sigma(AVSREM_i \cdot F_i^E)$$

Though the H-C method explained in Chapter 5 does not emphasize the interaction between goods and service sector in so much detail, it does provide a more convenient and a simpler framework to look at the issue in question.

From this point of view the H-C method is preferable than the one explained above. Also the above method gave results that are different than the H-C method. For the convenience of comparison, the method in this Appendix is termed method1 and H-C method is termed method2.

Table A.1 presents the estimates of embodied service exports per rupee of total exports, for both method1 and method2. The same table also presents estimates of AVSREMs.

Table A.2 presents the results of computation of embodied service exports and imports using method 1. This table also presents the figures for direct exports and imports of services as reported in the balance of payment statistics. All these are also presented as a proportion of GNP in Table A.3.

The alternative indicators of increasing export of embodied services are used to compare the results obtained by using two alternative explained above.

The difference in the estimates of AVSREMs and the export of embodied services per dollar of total exports presented in Table A.1 arises because the two methodologies are based on different concepts of embodiment. This difference is evident if we look at (A.5.7) above. In terms of the internal and external matrix multipliers defined above, Method 1 defines embodiment as  $1 - (B/B + B_2MB_1)$ , whereas Method 2 (followed by Harris and Cox) define embodiment as  $MB_1$ . Therefore the estimates of AVSREM yielded by these two methodologies are also different. Both however reveal a rising trend, as is evident from Table A.1, though of a different magnitude. The difference in the estimates is also an indication of the different meanings that can be attached to the concept of embodiment.

Next, Table A.2 shows an increasing export of embodied services from India.

The Table 5.3 presents the absolute figures of Table 5.2 as proportions of GNP. Trends similar to the one explained above are evident from here also.

Table A.1  
: Alternative Measures of Embodied Service Content

|         | Embodied<br>service<br>exports<br>per Rupee<br>of<br>total<br>exports<br>Method1 | Embodied<br>service<br>exports<br>per Rupee<br>of<br>total<br>exports<br>Method2 |
|---------|--|--|
| 1979/80 | .18  | .013   |
| 1984/85 | .29  | .036   |

|         | AVSREM<br>Method1 | AVSREM<br>Method2 |
|---------|-------------------|-------------------|
| 1979/80 | .27               | .02               |
| 1984/85 | .40               | .05               |

Source: Calculated from the Technical Note to Seventh Five Year Plan published by the Government of India. (1979 and 1984)

Table A.2  
: Estimates of Export and Import of Embodied Service Content

|                          | Embodied<br>service<br>exports | Embodied<br>service<br>imports | Def/Sur<br>-/+ |
|--------------------------|--------------------------------|--------------------------------|----------------|
| 1979/80<br>I/O<br>Tables | 17567.7                        | 29511.8                        | -11944.1       |
| 1984/85<br>I/O<br>tables | 46841.6                        | 74622.3                        | -27780.68      |
|                          | Direct<br>service<br>export    | Direct<br>service<br>import    |                |
| 1980<br>trade            | 31569                          | 27468.6                        | +4100.4        |
| 1984<br>trade            | 42189.2                        | 54531.6                        | -12342.4       |

Source: Computed from the Technical Note to Seventh Five Year Plan published by the Government of India.(1979) And from The Technical Note to the Sixth Five Year Plan.  
The actual trade figures are from International Monetary Fund Balance of Payments Statistics, Vol.39, 1988, Pg.16

Notes: The SDR figures have been converted into rupee amounts using Rs.10.2 and Rs. 11.6 as the Indian Rupèes Per SDR conversion rate for 1980 and 1984, respectively. All figures in millions of rupees. The embodied service trade was calculated from trade figures deflated for price rise at 1980=100. The actual trade figures have, however, not been deflated and are reported as it is.

Table A.3  
: Estimates of Export and Import of Embodied Service Content As Proportions of Gross National Product

|                          | Embodied<br>service<br>exports<br>(%GNP) | Embodied<br>service<br>imports<br>(%GNP) |
|--------------------------|--|--|
| 1979/80<br>I/O<br>Tables | .016                                     | .027                                     |
| 1984/85<br>I/O<br>tables | .034                                     | .055                                     |

|               | Direct<br>service<br>export | Direct<br>service<br>import |
|---------------|-----------------------------|-----------------------------|
| 1980<br>trade | .029                        | .025                        |
| 1984<br>trade | .031                        | .040                        |

Source: Computed from the Technical Note to Seventh Five Year Plan published by the Government of India.(1979) And from The Technical Note to the Sixth Five Year Plan.  
The actual trade figures are from International Monetary Fund Balance of Payments Statistics, Vol.39, 1988, Pg.16

Notes: The SDR figures have been converted into rupee amounts using Rs.10.2 and Rs. 11.6 as the Indian Rupees Per SDR conversion rate for 1980 and 1984, respectively. All figures in millions of rupees. The embodied service trade was calculated from trade figures deflated for price rise at 1980=100. The

actual trade figures have, however, not been deflated and are reported as it is. GNP at 1980 prices computed from National Account Statistics Statement 4 (pg.12) and Statement 3 (pg 10), published in January 1986. The GNP computed for these years is Rs. 1075970 million and Rs. 1351075.3 millions in 1980 and 1984, respectively.



## APPENDIX VI

Writing the elasticities of substitution between H and N in a notational form :  $\sigma_{hn} = (d(H/N)/(H/N)) / (d(P_n/P_h)/(P_n/P_h))$

Applying the quotient rule of differentiation and simplifying:

$$= (dH/H - dN/N) / (dP_n/P_n) - (dP_h/P_h)$$

By our assumption  $dP_h/P_h$  is equal to zero. Therefore,  $\sigma_{hn} = \eta_n P_n$

$\eta_n P_n$ .

## APPENDIX VII

As a last resort, a technique used by Maki(1983) to rid multicollinearity was used. Here an ordinary regression is first run between the two suspected collinear right hand side variables. In the present case LNTEX (the log of per capita total expenditure) was regressed on LNURB (the log of urbanization). Then the residuals of LNURB, termed LOGRES, were used in the original regression instead of LNURB. The estimated equation (corrected for autocorrelation) is presented below.

$$\begin{array}{ccccccc} \text{LNSERV} = & -0.786 & + & 0.82\text{LNTEX} & - & 0.10\text{LNRP} & + & .88\text{LOGRES} \\ & (-.36) & & (2.44) & & (-.64) & & (3.3) & & (0.13) \end{array}$$

The adjusted r square is .67 and the Durbin-Watson statistics is 2.10.

The estimated equation explains the model well and results in the correct signs of the variables. Two of the three independent variables also have coefficients significantly different than zero. The problem however with such a technique is that the coefficient of the expenditure variable (LNTEX) is biased[2] is biased and hence the estimate of the income elasticity of demand for services is untrustworthy.

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[2]This is because in the above procedure the variable LNTEX may have been allotted more explanatory power on LNSERV that might belong to it.

Two related estimations based on Monte Carlo procedure were attempted to find the nature of the bias and its possible direction.

In the first instance, using the estimated coefficients of LNTEX as the true value, Monte Carlo procedure was used to generate a mean of the estimated coefficient in 500 replications. The average of the estimated coefficients of LNTEX in these 500 experiments was estimated as less than 0.82. This indicated that the bias could be upwards, implying that the estimated elasticity of demand for services of 0.82 in equation 4.8 may have a true value smaller than 0.82.

In another estimation based on the Geweke inequality constrained procedure, the raw data was first transformed to correct for autocorrelation, and then OLS estimation was performed on it. The 2000 replications under this procedure indicated a zero probability of the estimates of income elasticity of demand or the coefficient of LNTEX as greater than one. The probability of this coefficient's value lying between zero and one was indicated to be largest.

In sum, though the estimated coefficient of LNTEX in the equation 0.13 are biased, the probability is high that they are still close to the true value. And also the direction of the bias is upwards, hence the true value can be expected to be smaller than 0.82, if the bias is removed.

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## INDEX

- A Model of Demand for Marketed Consumer Services, 80  
A Survey of Literature on Trade in Services, 121  
A Theory of Urban Household Behaviour, 73  
Abstract, iii  
Acknowledgements, vi  
An Alternative Methodology for Estimating the Embodiment of Services in Goods, 158  
An explanation of monetization, 95  
An Inter-Sectoral Comparisons of Economic Growth, 29  
Background, 104  
Bibliography, 175  
Composition of the Service Sector, 28  
Computation of Embodied Service Export, 163  
Conceptual Background of the Model, the Taxonomy of Dualism and the Behavioural Pattern of Urban Households., 70  
Conclusion, 94  
CONCLUSIONS, 144  
Current Views:, 2  
Dedication, v  
Derivation of the Demand Equation, 87  
Determinants of Elasticities, 85  
Determinants of secular changes in consumer preferences, 77  
Discussion of Results, 127  
Discussion of the Econometric Results, 93  
Distinction between goods and services, 9  
Econometric Estimation, 89  
Economic dualism in the model, 71  
Embodiment of Services and International Trade, 124  
Empirical Estimation, 125  
Estimation, 36  
Estimation of a simple demand function for services, 67  
Extent of Substitution, 83  
Female Labor Force Participation in India, 59  
Firms Demand for Producer Services, 35  
Growth in Primary Factors, Comparative Advantage and the Leontief Paradox., 107  
Growth of producer services, 112  
Growth of the Service Sector and Comparative Advantage, 110  
Growth of the Service Sector as a Whole, 103  
Households Demand for Consumer Services, 34  
Implications for Growth, 97  
Implications for Trade in Services, 120  
Implications for Urban Wage Policy, 101  
Internal and external matrix multipliers in the input-output model: Some theoretical considerations in partitioning the matrix, 159  
Introduction, 1  
Measurement of embodiment of intermediate producer services: Theoretical Framework, 125

Nature of Producer Service, 111  
Outline of the Study, 7  
Overview of the Existing Literature, 48  
Possible Explanations of Growth of Producer Services, 118  
Relative Prices and The Demand for Consumer Services, 80  
Services: Theoretical Considerations, 9  
Sources-of-Demand Classification of the Service Sector, 33  
Specification of the demand function, 88  
Sub-Sectoral growth in the service sector, 30  
Summary, 26, 38, 141  
Taxonomy of the Service Sector, 110  
The Demand for Consumer Services, 46  
The Growth of Producer Services and Trade in Embodied Services,  
104  
The Harris-Cox Method, 125  
The present model and the Gershuny hypothesis, 94  
The Present Research, 5  
The Service Sector in India, 27  
Typology of services, 15  
Urbanisation and the Demand for Consumer Services, 63  
Urbanization and the Growth of Service Industry, 60