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THE DEMAND FOR SERVICES IN INDIA
A MIRROR IMAGE OF ENGEL'S LAW FOR FOOD?

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The Demand for Services in India

A Mirror Image of Engel's Law for Food?[1]

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Abstract

India's development experience over the past fifty years suggests that the increasing importance of the services sector deserves analysis. The literature on structural change has emphasised changing patterns of demand has as an explanation for the increasing importance of the services sector. In order to establish the significance of private final demand as an explanation for the increasing importance of the services sector in India, this paper estimates Engel curve-type relationships for six categories of services: education, health, entertainment, personal, communication and transport. In doing so, it uses Tobit and censored quantile regressions to analyse household survey data in 1993-94 and 2004-05. We find upward sloping Engel curves which implies that there is a consistent increase in the household budget share allocated to services in the aggregate and to each individual services category as total household expenditure increases. This is a powerful explanation for the increasing share of the services sector.

JEL Classification: C01, C21, C24, D12, O12

Keywords: Services, India, Demand, Engel curves, Luxuries, Household survey data

1. Introduction

India has become one of the fastest-growing economies in the world over the last 25 years. A striking aspect of the country's recent growth has been the dynamism of its services sector, which accounted for 52 per cent of the country's GDP in 2005 [Rakshit, 2007; Banga, 2005; Gordon and Gupta, 2004].

Table 1 shows that during the period from 1980-81 and 2004-05, the share of the agricultural sector in GDP declined by almost 18 percentage points. During the same period, the increase in the share of the industrial sector in GDP was, at best, modest, while the increase in the share of the services sector in GDP was substantial so much so that it picked up more than 80 per cent of the decline in the share of the agricultural sector in GDP. In fact, during the period from 1990-91 to 2004-05, the share of the industrial sector in GDP remained more or less unchanged, while that of the services increased by 10 percentage points. These facts do not conform to the conventional wisdom about structural change and are striking for two reasons. First, the expansion of the services sector in India has been very rapid during the past 15 to 25 years. Second, the services sector now appears to dominate economic activity in India. This increasing importance of the services sector in India is also visible in a global context. Using data for various countries, Figure 1 shows that for its level of GDP per capita, the size of the services sector in India was somewhat higher than the average in 2005. In fact, it was significantly higher than the average of lower middle income (LMI) countries, which is the group that India is classified in.

There is a wide consensus in the literature that, as an economy grows, both demand side and supply side factors lead to an increasing share of the services sector in output and employment. These factors comprise the following: high-income elasticity of demand for final product services, slower relative productivity growth in services or increasing relative prices of services, structural changes within the manufacturing sector which make contracting out services more efficient than producing them in the firm or household, and increased international trade in services.

In the literature, changing patterns of demand as an explanation for the increasing importance of the services sector have received special emphasis. The early writings of Fisher (1935) and Clark (1940) argue that the income elasticity of demand for industrial goods is higher that that for agricultural goods, while that for services is even higher than that for industrial goods. Hence, with rising levels of income, the demand for agricultural goods increases at a proportionally lower rate than income due to their low income elasticity of demand. On the other hand, the demand for industrial goods grows at a proportionately higher rate than income due to their higher income elasticity of demand. This leads to the growth of the industrial sector. However, after an economy reaches a sufficiently high level of income, the rate of increase in demand for services increases sharply as they have an even higher income elasticity of demand. Fisher (1935) refers to this transformation as a "hierarchy of needs", where the growth of the services sector is defined by saturation of demand for manufactured goods and high-income elasticity of demand for services.

At a glance, the high income elasticity argument appears to have some merit in explaining the rapid growth of the services sector in India. This is reflected in the data at the macroeconomic level, which are summarized in Tables 2 and Table 3.

Table 2 indicates that the share of services in private final consumption expenditure has almost tripled during the period from 1950-51 to 2003-04. Table 3 shows that during the 1980s and 1990s, which were periods of rapid growth of the services sector in India, as also during the 1970s, private final consumption of services grew at almost the same rate as value added in services. Hence, these data at the macroeconomic level suggest that increasing final demand for services was largely responsible for the increasing share of the services sector in total output.

In order to establish the significance of private final demand as an explanation for the increasing importance of the services sector, it is necessary to analyse patterns of expenditure at the level of the household. Hence, the objective of this paper is to estimate demand-side relationships for different consumer services in India. In doing so, it estimates Engel curve-type relationships for services in the aggregate and for six categories of services. It is important to emphasize the fact that such an exercise has not been attempted in the literature on India. There are a couple of studies which estimate Engel curves for expenditure on education and medicines in India while analyzing the presence of gender bias in household expenditure patterns [Kingdon, 2005; Lancaster, Maitra and Ray, 2008]. However, their definition of education includes expenditure on both goods and services, while medicines are simply a good. There are similar studies in the literature on the subject for other countries and regions. They estimate Engel curve-type relationships for expenditure on education and health (goods and services) as a part of larger

exercise which also includes analysis for food items and manufactured goods. For services alone, there is one cross-country study by Falvey and Gemmell (1996) that uses data at the level of countries to analyse income elasticities of demand. There is no systematic analysis establishing Engel-curve type relationships for different services at the level of the household.

The scope of the paper is limited to a cross-sectional analysis of household survey data from India for two points in time: 1993-94 and 2004-05. Importantly, the use of cross-section data at the household level circumvents the statistical difficulties associated with using National Accounts data to analyse the services sector, i.e. defining services output and adjusting for price change over a period of time. The choice of years is determined by the fact that the period from 1990-91 to 2004-05 saw the most dramatic increase in the output share of the services sector. The structure of the paper is as follows. Section 2 provides an overview on the concept of an Engel curve and the classification of commodities based on income elasticities of demand. Section 3 reviews the importance of rising final demand as an explanation for a growing services sector. Section 4 discusses the econometric methodology for estimating Engel curves. It reviews functional forms used in the literature, the problem of zero expenditure in consumption data, and methods employed in the literature to address these problems. Section 5 provides a discussion of the data under consideration. Sections 6 and 7 specify different model specifications and discuss results. Section 8 presents conclusions.

2. Engel Curves

2.1 Definition

In a seminal article, using cross-section data from household surveys of working class families in Belgium, Ernst Engel (1857) found that the proportion of expenditure spent on food decreases with income. This relationship of food budget shares and income, known as Engel's law, has since been found to hold in most economies and time periods. Given that Engel's Law relates to cross-section analysis, it assumes that all households face the same commodity prices at any one point in time. Hence, in general, an Engel curve may be defined as a function that describes the relationship between a consumer's expenditure on some particular good or service and the consumer's total resources, holding prices fixed. Resources, in turn, refer to income, wealth, or total expenditure on goods and services.[3] The goods are typically aggregate commodities such as food, clothing, or transportation, consumed over some weeks or months, rather than discrete purchases.

2.2. Points of Caution

The level of aggregation across goods may affect Engel curve estimates. For instance, while food in the aggregate is a necessity, it could include inferior goods like cabbage and luxuries like caviar. Other empirical Engel curve complications include unobserved variations in the quality and price of goods purchased, which may be correlated with total income or expenditure. For

[3] Most often, total expenditure serves as a measure for total resources. This serves to separate the problem of allocating total consumption to various goods from the decision of how much to save or dissave out of current income.

example, the wealthy may systematically favour higher quality goods or the poor may face higher prices than other consumers because they cannot afford to buy in bulk or travel to discount stores [Lewbel, 2008].

2.3 Luxuries versus Necessities

Engel curves (Engel, 1857) are most often specified as the relationship between the budget share allocated to a particular good or service and total income or expenditure. Under this specification, luxuries are goods that take up a larger share of the budget for better-off households while necessities are goods that take up a smaller share of the budget for better-off households. The literature distinguishes between luxury and necessity goods using income or expenditure elasticities of demand as well (Hicks, 1939). Goods with income or expenditure elasticities of demand below zero, between zero and one, and above one are called 'inferior goods', 'necessities', and 'luxury goods' respectively. Of course, elasticities can themselves vary with income [Newbel, 2008]. For example, a good that is a necessity for the rich can be a luxury for the poor.

3. Growth of the Services Sector: Importance of Consumer Demand

In economic theory, it is widely believed that services are characterized by relatively high income elasticities of demand. This is based on the notion that while goods fulfil the need of basic necessities, services fulfil the desire for luxuries (Fisher, 1935). However, such generalizations do not provide unambiguous conclusions about shifts in the relative importance of services and goods in consumer expenditure. This is because even a broad category of wants

can be satisfied in a variety of ways, some involving a service and others involving a good. For instance, higher incomes may lead to the substitution of a good for a good (meat for bread), of a service for a service (an expensive restaurant meal for a cheap one), of a service for a good (restaurant food for home-cooked food), or of a good for a service (ready-to-serve food for domestic cooks).

Of the above, the last example is particularly interesting as it highlights the fact that as incomes rise, consumers may substitute a service they previously hired for a good to satisfy the same want. In this context, consumer durables are an obvious case in point as they provide a flow of services over the duration of their life. For instance, as incomes rise, individuals may substitute the use of bus or auto-rickshaw[4] services with a motorcycle or car they buy in the market. Similarly, as incomes rise, individuals may substitute going to the cinema by purchasing goods such as television sets. According to Kravis et al. (1982), when goods and services are close substitutes in satisfying the same wants, technology and relative prices also play an important role in determining whether the expansion path goes towards services or goods.

4. Estimation of Engel Curves: Econometric Analysis

4.1 Functional Forms Used in the Literature

In the literature, Engel curves are close to linear for some goods, and highly non-linear for others. For instance, Engel (1857, 1895) found that budget share devoted to food was close to linear in the logarithm of total expenditure or income. More recent work, however, highlights

[4] A rickshaw powered by an engine.

considerable non-linearity in Engel curves, especially for several manufactured goods [Bierens and Pott-Buter, 1990; Lewbel, 1991; Hardle and Jerison, 1991; Hausman, Newey and Powell, 1995; Banks, Blundell, and Lewbel, 1997]. A section of the empirical literature also argues that in addition to total household income, other variables may help explain cross-section variation in demand [Lewbel, 2008]. For example, Engel's (1857) original work highlighted the relevance of household size. More recent studies control for other covariates such as age, gender, location, race, and ethnicity [Hausman, Newey and Powell, 1995; Banks, Blundell, and Lewbel, 1997].

4.2 The Problem of Zero Expenditure

In many household expenditure surveys, respondents report zero expenditure on certain goods and services. There are two frequently cited reasons for this: non-consumption and infrequency of purchase [Beatty, 2006].[5] Importantly, if a large number of households report zero expenditure, the estimation of a model by OLS results in biased and inconsistent parameter estimates [Wooldridge, 2002]. In the literature, two non-linear estimators are used to address this issue: Tobit and censored quantile regressions.

4.3 Addressing the Problem of Zero Expenditure: Methods Used in the Literature

The standard censored Tobit model (Tobin, 1956) is most appropriate to analyse variables which take on the value zero with positive probability but are a continuous random variables over

[5] The case of non-consumption represents a utility-maximising solution to an expenditure choice problem. The case of infrequency of purchase occurs when the survey period is not long enough to capture expenditures on goods.

strictly positive values. It is a well-established solution to the problem of zero expenditure because values of the relevant variable are truncated at zero and only positive values are assumed [Wooldridge, 2002]. Deaton and Irish (1984) were amongst the first to use the Tobit model to analyse the demand for commodities.

Unfortunately, however, Tobit models do not give consistent parameter estimates if the error term is heteroscedastic or non-normally distributed [Wooldridge, 2002]. Moreover, in the context of analysing consumption expenditure data, it is likely that the effect of a rise in total income or expenditure on the expenditure on a particular good or service is likely to be different for low-consuming households and high-consuming households. Tobit models, like OLS, base inferences on mean expenditure and hence do not capture this difference in expenditure patterns. Given the above, an alternative method used by studies in the literature to overcome the zero expenditures problem is censored quantile regressions [Gustavsen and Rickertsen, 2004; Gustavsen, Jolliffe and Rickertsen, 2008; Muller, 1999]. While the process of censoring follows Tobit, these models capture differences in expenditure patterns as quantiles of the conditional distribution of the dependent variable, budget shares for example, are expressed in terms of observed covariates [Koenker and Basset, 1978]. Quantile regressions are well suited to the analysis of household survey data also for the reason that they are robust to outliers [Deaton, 1997].

5. Data

5.1 Sample: Source and Size

In order to analyze patterns of expenditure for different consumer services at the level of the household in India, we use pan-India surveys on consumer expenditure, conducted regularly by India's National Sample Survey Organisation (NSSO). Such micro-level data provides the opportunity to carry out empirical research hitherto not done. For the present exercise, the data are taken from two of the seven comprehensive quinquennial[6] surveys on consumer expenditure conducted in independent India: the 50th round conducted during the period from July 1993 to June 1994 and the 61st round during the period from July 2004 to June 2005. The choice of years is determined by the fact that the period from 1990-91 to 2004-05 saw the most dramatic increase in the output share of the services sector. The former has a sample size of 115,354 households, while the latter has a sample size of 124,644 households [Table 4.3]. These large sample sizes are a strength of the econometric analysis to follow. In both surveys, 60 per cent of the households in the sample are located in rural areas while 40 per cent of the households are located in urban areas.

5.2. Types of Services

A household's consumer expenditure comprises the total monetary value of consumption of all goods and services. In order to facilitate a meaningful analysis, we aggregate items to form six distinct categories of services: education, health, entertainment, personal, communication and transport services. Usually, this total consumer expenditure is expressed on a 30 day basis. For

[6] once in five years

education and institutional health care, however, we use information on expenditure in the "last 365 days"[7] (scaled down to a per month basis) [NSSO, 1996b; NSSO, 2006b].

Education services primarily consist of expenditure on tuition fees, boarding costs and other compulsory payments[8] at schools, colleges and training institutes. Donations to schools made voluntarily on account of charities are not included because they are regarded as transfer payments. Education services also comprise expenses incurred in hiring private tutors, joining coaching centres, library charges, and expenditure on securing internet connectivity for the purposes of education. This category, however, does not include expenditure on goods purchased for the purpose of education, i.e. uniforms, books, journals, newspapers and stationery. Transport costs such as expenditure on school buses is also not included.

Health services consist of two categories: institutional and non-institutional. Medical institutions include private as well as government hospitals and nursing homes. The distinction between institutional and non-institutional medical expenses lies in whether the expenses were incurred on medical treatment as an in-patient of a medical institution, or otherwise. The former comprise expenditure on doctor's fees, hospital or nursing home charges, medical tests such as X-rays, ECG and pathological tests. The latter comprise expenditure on all of the above except hospital

[7] For clothing, footwear, education, institutional health care and durable goods, there are two estimates for household consumption: expenditure in the "last 30 days" and expenditure in the "last 365 days" [NSSO, 1996b; NSSO, 2006b].

[8] Even if termed "donations" by institutions collecting them.

or nursing home charges. It also includes expenditure on family planning. Health Insurance premiums are not included as they are not covered in the questionnaire. Importantly, this category does not include expenditure incurred by individuals on purchasing medicine.

Entertainment services include expenditure on cinema, theatre, fairs, picnics, and processing of photographic film. This category also consists of charges paid for hiring video cassette recorders (VCRs), video cassettes and video CDs, and expenses incurred on subscription to cable television facilities. Membership fees for clubs offering facilities for sports and recreational activities are also included here. Expenditure on consumer durables, however, is not included in this category.

Personal services entail expenditure on domestic servants, cooks, laundry services, ironing services, sweepers, barbers and beauticians. It also includes expenditure on services rendered by tailors, priests, and individuals who repair non-durables. Expenditure on legal services is not included in our analysis as it has negligible non-zero entries.

Communication services consist of expenditure on postage (letters and telegrams), telephone charges, and internet connectivity charges. Expenditure on computers is not included here, but falls under the category of consumer durables.

Transport services primarily consist of expenditure on journeys undertaken and transportation of goods made by any of the following means of conveyance: airlines, the railways, buses, trams,

taxis, auto-rickshaws[9], cycle rickshaws, steamers, boats, and horse carts. Transport services also consist of porter charges. The cost of fuel for owner-used conveyance is not included.

5.3. Problem of Zero Expenditure: Summary Statistics

The econometric analysis to follow will establish Engel curve-type relationships for six categories of services and for services in the aggregate. The appropriateness of using ordinary least squares, however, depends upon the number of households in the sample that report zero expenditure on the different services. A general rule of thumb is that if the dependent variable in a regression model has zero entries which amount to more than 10 per cent of the sample, OLS yields inconsistent parameter estimates [Wooldridge, 2002]. Table 4 shows that in both the surveys under consideration, the percentage of households that report zero expenditure on the different services is greater than ten for each of the six categories of services. The one exception is personal services for the survey of 2004-05. Moreover, it can be seen from the Table 4 that the percentage of households that report zero expenditure in each of the six categories of services is lower for the survey of 2004-05 relative to the survey of 1993-94. This may reflect a rise in living standards for lower income groups during this period.

6. Model Specifications and Results: Tobit

Table 6 explains the notation used for variables that are used in the equations to follow.

[9] Rickshaws powered by an engine

6.1 Results

We estimate Engel curve-type relationships for services in the aggregate and for six categories of services using a Tobit model**.** The linear budget share equations specified below have been used consistently in the literature on Engel curve analysis. First proposed by Working (1943), it is known as the Working-Leser model as Leser (1963) found that this functional form fits better than the alternatives. A recent application of this specification is a study by Beatty (2006) which analyses Engel curves for food items in Canada.

$$SERVICESPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma X + \varepsilon_i \quad (1)$$
$$EDUPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma X + \varepsilon_i \quad (2)$$
$$HEALTHPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma X + \varepsilon_i \quad (3)$$
$$ENTPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma X + \varepsilon_i \quad (4)$$
$$PERSONALPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma X + \varepsilon_i \quad (5)$$
$$COMMPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma X + \varepsilon_i \quad (6)$$
$$TRANSPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma X + \varepsilon \quad (7)$$

All the above regression equations (excluding *'X'*, the vector of control variables) are estimated at the all-India level, for rural areas, and for urban areas. And given our linear budget share specification, a particular service may be classified as a luxury good if $\hat{\beta} > 0$.

Table 7 shows that in 2004-05, the estimated $\hat{\beta} s$ for services in the aggregate are 0.072, 0.056 and 0.086 for the all-India sample, rural areas and urban areas respectively, each being significant at the 1 per cent level. Similarly, in 1993-94, the corresponding are 0.037, 0.028 and 0.037, each again significant at the 1 per cent level. Similarly, both for 2004-05 and 1993-94, the

estimated $\hat{\beta}s$ for each of the six specific service categories are positive and significant at the 1 per cent level of significance (estimates available with the author). This holds true for the all-India sample, rural areas and urban areas. Hence, we find upward sloping Engel curves (specified here as the relationship between the household budget share spent on a particular service and total expenditure), thereby implying that services in the aggregate and each of the six types of services represent luxury goods. This is in contrast to the findings of Falvey and Gemmell (1996) that, using macroeconomic data in a cross-country study, reject the hypothesis that the demand for services is income-elastic. Figures 2 and 3 provide a graphical representation of our estimates for services in the aggregate.

Figures 2 and 3 contrast Engel curves estimated by OLS and Tobit. It can be seen that the curve estimated using Tobit is steeper than the curve estimated by OLS, and starts at a point farther towards the right on the horizontal axis. This highlights two important analytical insights. First, the OLS estimates which are inconsistent, underestimate the effect of a unit increase in total expenditure on the proportion of expenditure spent on services. Second, households with relatively low levels of income may spend nothing on the different services. The difference between the two curves, however, is not that significant because the number of households with zero expenditure on any service is less than 10 in a sample of 124,644. The case of transport services provides a better contrast (see Figures 4 and 5 for the sample of 2004-05 and 1993-94 respectively). It must be noted that the fitted lines do not appear to be the most appropriate fit for the data, especially at the two ends of the distribution, because the scatter points shown in these figures represent only one-fifth of the total sample (this holds true for all the figures to follow).

6.2 Robustness Checks

We test the robustness of our Engel curve estimates in two ways. First, we re-estimate the equations specified above by including a vector of control variables (defined earlier in Table 6)[10] along with state dummy variables.

Table 8 shows that the inclusion of these variables makes little difference to the magnitude or statistical significance of coefficients on the level of total household expenditure in the Engel curve for services in the aggregate. The estimated $\hat{\beta}s$ remain positive and significant at the 1 per cent level for the all-India sample, rural areas and urban areas. The same holds true for each of the six specific services categories (estimates available with the author). The fact that the above results hold true for the sample of 2004-05 and that of 1993-94 further ensures the robustness of our estimates.

Second, we re-estimate the equations augmented by the vector of control variables, using instrumental variable estimation. This aims to address any potential bias induced by unobservables [Wooldridge, 2002] that may affect both the level of total household expenditure and the budget share allocated to a particular service. Total household expenditure, the potentially endogenous variable, is a proxy for permanent income of the household. Hence, a valid instrumental variable is one that is significantly correlated with permanent income but one that does not affect the budget share allocated to a particular service in any way except through

[10] The variables included in the vector of control variables for 2004-05 and 1993-94 are reported in Appendix B, Table B.1 and Table B.8 respectively.

its effect on permanent income. According to economic theory, permanent income of a household is a function of physical capital, labour and human capital. Unfortunately, the dataset does not provide information on the number of workers within a household and the level of education of the household head is already included as a control variable in our regression model. Given this, we use land owned by the household and a dummy variable which equals one if any member of the household is a regular salary earner, as instruments for the level of total household expenditure. Owing to data constraints, the instrumental variable estimation is limited to the sample of 2004-05.

Table 9 shows that the Engel curve estimated for aggregate services using the instrumental variable method does not make any difference to the sign or statistical significance of the coefficient on the level of total household expenditure. This also holds true for each of the six service categories (estimates available with the author). In fact, in some cases, the size of the coefficients on the level of total household expenditure increases for each of the seven equations relative to the standard Tobit model. This implies that measurement error in the endogenous variable outweighs any potential upward bias caused by unobservables. Importantly, our chosen instrumental variables meet the instrument relevance and exogeneity criteria (see Table 9 for the first-stage F-statistic and the test of over identifying restrictions).[11]

6.3 Marginal Effects

[11] The instrument exogeneity condition is not met in the case of entertainment and communication services.

In regressing the household budget share allocated to each type of service and services in the aggregate on the total expenditure of the household and set of control variables, we found that the coefficient on the former, $\hat{\beta}$, is greater than zero. However, because the Tobit model involves a non-linear transformation of the dependent variable, coefficients cannot be viewed as the true estimates of the marginal effect of an explanatory variable on the dependent variable [Wooldridge, 2002]. Hence, a $\hat{\beta}$ that is close to zero may actually result in a marginal effect which is less than zero. And this could alter the classification of a service category from being a luxury to being a necessity.

Given the above, we compute marginal effects which represent the true effect of total expenditure or income of the household on the budget share allocated to each type of service. We consider two estimates of marginal effect. First, there is the expected value of the dependent variable, conditional on it being censored at a lower bound zero. Second, there is the unconditional expected value of the dependent variable, which equals its expected value when it is greater than zero multiplied by the probability of it being greater than zero. Hence, the second marginal effect takes into account people who initially spend nothing on a particular service as well those are initially spending something on that service. Tables 10 and 11 show that the marginal effect of the level of total expenditure of the household on the budget share allocated to services in the aggregate is positive for the sample of 2004-05 and 1993-94 respectively. The result holds true for the all-India sample, rural areas and urban areas. Moreover, the marginal effects (both conditional and unconditional) are positive for each category of services as well

(estimates available with author). This validates our earlier finding that services in the aggregate and each category of services under consideration can be classified as luxury goods.

The results also show that for each service category, the marginal effect of an increase in total expenditure on the household budget share allocated to a particular service is higher for urban areas relative to rural areas. This may be attributable to the following. First, due to better education and awareness, households in urban areas may have a stronger preference for buying different services, all of which are luxury goods. Second, households in urban areas may have better access to several services such as education, health and transport due to greater availability. Moreover, within the three samples (all-India, rural and urban), marginal effects of an increase in total household expenditure on the budget share allocated to personal services and entertainment services are small. Once again, this may be attributable to individual preferences whereby as incomes increase, households begin to purchase certain consumer durables that substitute for services they earlier purchased in the market. For example, washing machines may reduce the demand for *dhobis* (individuals who provide laundry services), ready-made garments may reduce the demand for tailors, and home theatre systems may reduce the demand for cinema tickets.

6.4 Changes over Time

In estimating Engel curve-type relationships for services in India, we used cross-sectional surveys at two points in time: 1993-94 and 2004-05. Unfortunately, we cannot carry out panel data analysis as the two surveys do not cover the same households. However, we undertake a Blinder-Oaxaca decomposition exercise to decompose the change in household budget share

allocated to aggregate services between 1993-94 and 2004-05 into a part that is 'explained' by changes in a vector of explanatory variables and a part that cannot be 'explained' by these changes. The vector of explanatory variables includes total household expenditure, household size, age, sex and education level of household head, proportion of household members in different age-sex categories and dummy variables for household caste and religion.

Over the eleven year period from 1993-94 to 2004-05, mean proportion of household expenditure on aggregate services increased from 10.5 per cent to 12.7 per cent. Table 12 presents a decomposition of this growth in proportion of household expenditure on services for the all-India sample, using two alternative decomposition formulae. When the coefficients of either 1993-94 or 2004-05 are used, the effect of a change in mean characteristics of households accounts for about 77 per cent of the increase in budget share allocated to services. This constitutes the 'explained' part of the decomposition. In fact, it is the difference in mean real[12] household expenditure that accounts for about 67 per cent of the increase in household budget share allocated to services. This implies that income effects are paramount, while other control variable effects are relatively unimportant. The results for rural areas and urban areas are broadly similar, but not reported for reasons of space.

Importantly, the 'unexplained' part of the decomposition (changes in the coefficients of mean characteristics and the intercept), which accounts for only 23 per cent of the increase budget share allocated to services may reflect relative price changes. This is because, changes in relative

[12] Deflated using the Consumer Price Index for Agricultural Labourers for rural areas and the Consumer Price Index for Urban Non-Manual Employees for Urban areas.

prices may affect the quantity demanded of a particular good or service, which, in turn, may affect the household budget share allocated to that particular good or service. Of course, this does not affect our Engel curve estimates which are restricted to cross-sectional analysis where we assume prices to be given. Computing implicit GDP price deflators, and assuming certain arbitrary weights for the agricultural and industrial sectors, Table 13 shows that during the period from 1993-94 to 2004-05, the price of services have increased by about 5 per cent relative to the price of non-services (assuming arbitrary weights for agriculture and industry). This is not a significant increase, thereby implying that increasing relative prices of services is not an important explanation for the increasing share of the services sector in total output.

6.5 Non-Linearities

To capture any non-linear impact of total expenditure on the household budget share allocated to different services, we augment our previous equations by adding a squared term.

$$SERVICESPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma \left[\log\left(TOTALEXP_i\right)\right]^2 + \gamma X + \varepsilon \quad (8)$$

$$EDUPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma \left[\log\left(TOTALEXP_i\right)\right]^2 + \gamma X + \varepsilon_i \quad (9)$$

$$HEALTHPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma \left[\log\left(TOTALEXP_i\right)\right]^2 + \gamma X + \varepsilon_i \quad (10)$$

$$ENTPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma \left[\log\left(TOTALEXP_i\right)\right]^2 + \gamma X + \varepsilon_i \quad (11)$$

$$PERSONALPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma \left[\log\left(TOTALEXP_i\right)\right]^2 + \gamma X + \varepsilon_i \quad (12)$$

$$COMMPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma \left[\log\left(TOTALEXP_i\right)\right]^2 + \gamma X + \varepsilon_i \quad (13)$$

$$TRANSPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma \left[\log\left(TOTALEXP_i\right)\right]^2 + \gamma X + \varepsilon_i \quad (14)$$

Table 14 shows that the coefficient on the log of total expenditure-squared term is greater than zero in the Engel curve for services in the aggregate. This holds true for the all-India sample, rural areas and urban areas, both in 2004-05 and in 1993-94. The result implies that the Engel curve for services in the aggregate is convex going upwards (see Figures 6 and 7 for the all-India sample)[13]. Hence, there is a consistent increase in the household budget share allocated to services as the total income or expenditure increases, which implies that services in the aggregate are a luxury good at all levels of income. This is an important result for explaining the rising importance of the services sector in India.

Using the quadratic specification described above, we derive non-linear Engel curves for each of the six different categories of services as well (estimates available with author). The results show that like the case of aggregate services, Engel curves for transport and personal services is also convex going upwards while that for communication services approximates a linear trajectory[14]. This implies that these two categories of services are luxury goods at all levels of income. In contrast, Engel curves for education, health and entertainment services are concave going upwards. This suggests that after a certain threshold level of expenditure, the household budget share devoted to education and health starts declining. Figures 8 and 9 represent the case of education services for the all-India sample in 2004-05 and 1993-94 respectively.

[13] The corresponding Engel curves for rural areas and urban areas are not notably different in terms of shape.

[14] For the survey of 1993-94, the Engel curve for communication services is convex going upwards for the sample of urban areas only

Importantly, however, we find that the concave shape of these Engel curves is being driven by outliers, i.e. there are a negligible number of households beyond the threshold level of expenditure after which the household budget share devoted to education and health services begins to decline. In particular, the peak fitted value of the household budget share allocated to education, health and entertainment services is 0.07, 0.04 and 0.02 respectively. This corresponds to the logarithm of total expenditure that equals 10.8, 9.5 and 11.2 respectively. And in a sample of 124,644 households, only 0.2 per cent (286 households) have a higher level of the logarithm of total household expenditure. Hence, in these cases, linear Engel curves are a good approximation of the true relationship.

7. Model Specification and Results: Censored Quantile Regressions

Next, given the limitations of the Tobit model outlined earlier, we estimate Engel curves for services in the aggregate and for the six categories of services using censored quantile regressions (estimates available with the author).[15]

$$SERVICESPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma X + \varepsilon_i \quad (15)$$

$$EDUPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma X + \varepsilon_i \quad (16)$$

$$HEALTHPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma X + \varepsilon_i \quad (17)$$

$$ENTPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma X + \varepsilon_i \quad (18)$$

[15] The previous section showed that any non-linear effect of the level of total household expenditure on the household budget share allocated to any of the six service categories is driven by outliers. Hence, we do not include an expenditure-squared term in these regressions.

$$PERSONALPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma X + \varepsilon_i \quad (19)$$

$$COMMPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma X + \varepsilon_i \quad (20)$$

$$TRANSPROP_i = \alpha_i + \beta \log(TOTALEXP_i) + \gamma X + \varepsilon_i \quad (21)$$

Figures 10 and 11 depict three fitted regression lines which correspond to the 35th, 50th, and 85th percentiles of the distribution of the budget share allocated to services, conditional on the logarithm of household expenditure and a set of control variables[16] for the all-India sample. We use the 35th percentile as opposed to the 25th percentile because the 25th percentile of the distribution of the budget share allocated to most service categories is zero.[17] Moreover, we use the 85th percentile rather than the 75th percentile as the former is further away from the median and hence highlights the differences between high, and low, consumption (conditional on household size, social group, religion, age-sex composition, and age, gender and level of education of household head) households (referred to as high and low conditional consumption households from here on). [18]

[16] Household size, social group, religion, age-sex composition, and age, gender and level of education of the household head

[17] For some service categories, we do not get fitted lines for even the 50th and 75th percentiles due the large number of zero expenditure entries

[18] The corresponding curves for rural areas and urban areas are broadly similar, but not reported for reasons of space

It is evident from Figures 10 and 11 that Engel curves for each percentile of the distribution of the budget share allocated to services in the aggregate is upward sloping, thereby implying that services are luxury goods. Importantly, the results are similar for each of the six service categories: education, health, entertainment, personal, communication and transport (Figures not reported). This validates the results from our Tobit estimation. In addition, these figures show that the Engel curve for a higher quantile lies above that for a lower quantile. This implies that the increase in the household budget share allocated to services increases more for high conditional consumption households relative to low conditional consumption households, as total household expenditure increases. Given that household size, age-sex composition of households, social group and religion, age of household head, gender of household head and level of education of household head are controlled for, this greater increase for high-consuming household is explained by the residual term which may represent tastes of households. In fact, estimating Engel curves on data sets from a range of countries, several empirical studies that followed Engel (1895) interpreted large errors in these models to indicative of considerable heterogeneity in tastes across consumers [Ogburn, 1919; Allen and Bowley, 1935]

For education and health services, it may be the case that households with high conditional consumption value quality[19] and hence pay significantly larger amounts for it. For personal services, it is possible that households who use these services intensively care more for both quantity and quality. For example, with an increase in total income, households spending a substantial amount on hiring domestic servants and cooks may begin to spend on hiring washing and ironing services as well. This reflects a premium on leisure. At the same time, high-

[19] This may involve a shift from from publicly provided to privately provided services.

consuming households may care about the quality of legal and accountancy services, for instance, and therefore be willing to pay significantly larger amounts for it. For transport services, households who have high conditional consumption may care more about comfort and convenience. Hence, with an increase in total income, bus journeys may be replaced by more expensive train journeys and train journeys may be replaced by more expensive flights. Moreover, within rail and air travel, people may move up from standard to premier class. For communication services, high-consuming households may care more about the quality. For instance, with an increase in total income, consumers who use postal services intensively may begin to use the local public call-office and those who use public call-office booths intensively may get their own landline or mobile telephone connection. Sixth, for entertainment services, a steeper slope for the Engel curve of a higher percentile may be explained by the desire for variety and greater comfort. For example, people who frequent fairs and cinemas and may also want to get a cable television connection. At the same time, people who spend a significant amount on going to cinemas may want better, more expensive seats for their comfort.

In addition, Figures 10 and 11 show that there is a tendency for the dispersion of the household budget share allocated to services to increase along with its level as household expenditure increases, i.e. the slope of the Engel curve for higher quantiles is steeper. For instance, the 35^{th} and 85^{th} percentiles of the conditional distribution are much further apart among richer than poorer households. This implies that those with more to spend in total devote a good deal more of their budgets to services, but that there is also more dispersion of tastes among them.

8. Conclusion

The rapid growth of the services sector in India is now well documented. And macroeconomic data clearly suggest that rising private final demand may be a potentially important explanation for the growth of services [Rakshit, 2007; Banga, 2005; Gordon and Gupta, 2004]. In order to explore the importance of high income or expenditure elasticity of demand for services as an explanation for the increasing share of the services sector in total output, we analysed consumption data for a sample of over 120,000 households at two points in time: 1993-94 and 2004-05. In doing so, we estimated Engel curve-type relationships for services in the aggregate and for six types of services: education, health, entertainment, personal, communication and transport. Such an exercise has not been attempted in the literature on India, or indeed elsewhere.

Given the problem of zero expenditure in consumption data, following the literature, we estimated these relationships by two non-linear estimators: Tobit models and censored quantile regressions. The Tobit estimates revealed upward sloping Engel curves for services in the aggregate and for each category of services under consideration, i.e. mirror images of Engel's Law for food. Given that Engel curves were specified as the relationship between the household budget shares allocated to a particular service and total household expenditure, this implied that aggregate services, education services, health services, entertainment services, personal services, communication services and transport services are all luxury goods. At first glance, our non-linear specification found Engel curves for education, health and entertainment services to be concave going upwards. This implies that at relatively high levels of income, these services become necessities. However, this result was not robust as the non-linearity was driven by outliers, i.e. few very rich households.

The set of results from the Tobit estimation were validated by our censored quantile regression estimates, which revealed upward sloping Engel curves for all categories of services and for services in the aggregate. Moreover, these results showed that as total household expenditure increases, the increase in the household budget share allocated to a particular service increases more for high consumption (conditional on household size, social group, religion, age-sex composition, and age, gender and level of education of household head) relative to low consumption (conditional on the same set of variables) households. We argued that this may represent tastes or preferences of households.

In sum, Engel curve-type relationships established for six types of services and for services in the aggregate using household consumption data reveal that services take up a larger share of household budgets as incomes or expenditures increase. Given that these services account for a little less than half of India's services GDP, this rigorous micro-econometric analysis lends credence to the view that high expenditure or income elasticities of demand for services are an important explanation for the increasing importance of the services sector in India. The explanation of the unusually high income elasticity of demand for services in the Indian context may be attributable to increasing inequality of income and household preferences that have led to the introduction of a host of consumer services which households can spend on [Rakshit, 2007]. Unfortunately, we could not carry out panel data analysis as the surveys under consideration do not cover the same households over time. However, Table 15 shows that during the period from 1993-94 to 2004-05, both mean household expenditure per capita and mean percentage of household expenditure spent on services has increased. This supports the results of our cross-sectional econometric analysis.

In addition, the results of our decomposition exercise suggested that increases in mean household expenditure are paramount in explain increases in the mean household budget share allocated to services. At the same time, we also showed that during this period, increasing relative prices of services is not an important explanation for a rise in household budget shares allocated to services and hence for the increasing share of the services sector in total output.

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Tables and Figures

Table 1: Sectoral Shares in Gross Domestic Product: 1950-51 to 2004-05

	1980-81	1990-91	2000-01	2004-05	Change between 1980-81 and 2004-05	Change between 1990-91 and 2004-05
Agriculture	38.9	31.3	24.6	21.1	-17.8	-10.2
Industry	24.5	27.6	26.6	27.2	2.7	-0.4
Services	36.6	41.1	48.8	51.7	14.9	10.6

Source: Central Statistical Organisation, National Accounts Statistics

Table 2: Private Final Consumption Expenditure on Services in India

Year	As a Percentage of Total Private Final Consumption Expenditure
1950-51	12.5
1960-61	12.5
1970-71	14.6
1980-81	16.8
1990-91	20.9
1999-00	27.2
2003-04	33.7

Source: Estimates based on National Accounts Statistics, Central Statistical Organisation

Table 3: Rates of Growth in India (per cent per annum)

	Private Final Consumption of Services	Value Added for the Services Sector	Gross Domestic Product
1970-71 to 1979-80	1.8	1.9	1.5
1980-81 to 1989-90	2.7	2.9	2.3
1990-91 to 1999-00	3.3	3.3	2.6
2000-01 to 2003-04	3.2	3.3	2.5

Source: Estimates based on National Accounts Statistics, Central Statistical Organisation
Note: Rates of growth for the three variables are computed by running Ordinary Least Squares regressions of the logarithm of each variable on a time trend

Table 4: Sample Size

	1993-94 (50th Round)	2004-05 (61st Round)
Number of Villages Surveyed	6,951	7,999
Number of Urban Blocks Surveyed	4,650	4,602
Number of Households Surveyed (Total)	**115,354**	**124,644**
Number of Households Surveyed (Rural areas)	69,206	79,298
Number of Households Surveyed (Urban areas)	46,148	45,346

Source: Surveys on Employment, National Sample Survey Organisation

Table 5: Households in the Sample with Zero Expenditure on Different Services

	Number (2004-05)	Number (1993-94)	Percentage (2004-05)	Percentage (1993-94)	Percentage Difference (1993-94 to 2004-05)
Education Services	56,841	63,281	45	55	-10
Health Services	85,828	86,467	68	75	-7
Entertainment Services	80,042	85,676	64	74	-10
Personal Services	7,740	33,040	6	29	-23
Communication Services	68,528	88,641	55	77	-22
Transport Services	33,780	45,925	27	40	-13

Total Number of Households in the Sample (2004-05): 124,644
Total Number of Households in the Sample (1993-94): 115,354

Source: National Sample Survey Organisation, Surveys on Consumer Expenditure

Table 6: Notation and Description of Variables

Variable Notation	Variable Description
TOTALEXP	Total expenditure of a household
SERVICESPROP	Proportion of total household expenditure on: services in the aggregate
EDUPROP	Education services
HEALTHPROP	Health services
ENTPROP	Entertainment services
PERSONALPROP	Personal services
COMMPROP	Communication services
TRANSPROP	Transport services
X	Vector of control variables: household size, social group, religion, age-sex categories that capture household composition, and age, gender and level of education of household head

Table 7: Engel Curve for Services: Tobit
Dependent Variable: Proportion of Household Expenditure on Services

Explanatory Variable ↓	All-India (2004-05)	Rural (2004-05)	Urban (2004-05)	All-India (1993-94)	Rural (1993-94)	Urban (1993-94)
Log of Household Expenditure	0.072*** [0.0005]	0.056*** [0.0006]	0.086*** [0.0010]	0.037*** [0.0003]	0.028*** [0.0003]	0.037*** [0.0006]
Constant	-0.452*** [0.0045]	-0.332*** [0.0053]	-0.536*** [0.0082]	-0.220*** [0.0025]	-0.161*** [0.0024]	-0.207*** [0.0050]
Vector of Control Variables	No	No	No	No	No	No
State Dummy Variables	No	No	No	No	No	No
Observations	124642	79296	45346	124640	79295	45345

Source: Regression estimates based on primary data from National Sample Survey Organisation
Note: Standard errors in brackets; ***p<0.01, **p<0.05, *p<0.1

Table 8: Engel Curve for Services: Tobit (including control variables)
Dependent Variable: Proportion of Household Expenditure on Services

Explanatory Variable ↓	All-India (2004-05)	Rural (2004-05)	Urban (2004-05)	All-India (1993-94)	Rural (1993-94)	Urban (1993-94)
Log of Household Expenditure	0.071*** [0.0007]	0.059*** [0.0009]	0.082*** [0.0013]	0.036*** [0.0004]	0.031*** [0.0004]	0.038*** [0.0008]
Constant	-0.459*** [0.0083]	-0.384*** [0.011]	-0.540*** [0.014]	-0.197*** [0.0053]	-0.157*** [0.0074]	-0.207*** [0.0090]
Vector of Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
State Dummy Variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	124640	79295	45345	115192	69119	46073

Source: Regression estimates based on primary data from National Sample Survey Organisation
Note: Standard errors in brackets; ***p<0.01, **p<0.05, *p<0.1

Table 9: Engel Curve for Services: Instrumental Variable Tobit Estimation
Dependent Variable: Proportion of Household Expenditure on Services

Explanatory Variable ↓	All-India (2004-05)	Rural (2004-05)	Urban (2004-05)
Log of Household Expenditure	0.152*** [0.00531]	0.147*** [0.00695]	0.140*** [0.0122]
Constant	-0.94*** [0.0341]	-0.91*** [0.0442]	-0.88*** [0.0799]
Vector of Control Variables	Yes	Yes	Yes
Observations	106649	74956	31693
First Stage F-statistic	1308.51 [0.000]	738.79 [0.000]	281.47 [0.000]
Amemia-Lee-Newey minimum chi-squared statistic	0.578 [0.4473]	0.247 [0.6192]	0.558 [0.4551]

Source: Regression estimates based on primary data from National Sample Survey Organisation
Note: Standard errors in brackets; ***p<0.01, **p<0.05, *p<0.1

Table 10: Marginal Effects from the Tobit Regression for Aggregate Services (2004-05)
Dependent Variable: Proportion of Household Expenditure on Services

Explanatory Variable ↓	All-India Conditional Expectation	Rural Conditional Expectation	Urban Conditional Expectation	All-India Unconditional Expectation	Rural Unconditional Expectation	Urban Unconditional Expectation
Log of Household Expenditure	0.048	0.039	0.057	0.064	0.053	0.075

Source: Regression estimates based on primary data from National Sample Survey Organisation

Table 11: Marginal Effects from the Tobit Regression for Aggregate Services (1993-94)
Dependent Variable: Proportion of Household Expenditure on Services

Explanatory Variable ↓	All-India Conditional Expectation	Rural Conditional Expectation	Urban Conditional Expectation	All-India Unconditional Expectation	Rural Unconditional Expectation	Urban Unconditional Expectation
Log of Household Expenditure	0.021	0.018	0.022	0.030	0.026	0.031

Source: Regression estimates based on primary data from National Sample Survey Organisation

Table 12: Decomposition of an Increase in Household Budget Share allocated to Services: 1993-94 to 2004-05

Percentage change due to:	Based on means of 2004-05 and coefficients of 1993-94	Based on means of 1993-94 and coefficients of 2004-05
Mean Characteristics:	77.0	76.0
Total Household Expenditure	67.0	67.0
Coefficients	23.0	24.0

Source: Regression estimates based on primary data from National Sample Survey Organisation

Table 13: Implicit GDP Deflators (at 1993-94 constant prices)

Year	Agriculture	Industry	Services
1993-94	100	100	100
1994-95	110	111	109
1995-96	112	121	118
1996-97	131	127	127
1997-98	144	135	134
1998-99	155	146	145
1999-00	161	148	152
2000-01	163	154	158
2001-02	167	158	165
2002-03	179	164	169
2003-04	185	172	174
2004-05	173	186	190

Source: Own Estimates based on National Accounts Data, Central Statistical Organisation
Note: Base year for index numbers is 1993-94

Table 14: Engel Curve for Aggregate Services: Tobit (Non-Linearities)
Dependent Variable: Proportion of Household Expenditure on Services

Explanatory Variable ↓	All-India (2004-05)	Rural (2004-05)	Urban (2004-05)	All-India (1993-94)	Rural (1993-94)	Urban (1993-94)
Log of Household Expenditure	0.002 [0.0065]	0.037*** [0.0080]	-0.006 [0.011]	-0.010 [0.0039]	0.0042 [0.0040]	-0.033 [0.0074]
Log of Household Expenditure Squared	0.004*** [0.0004]	0.001*** [0.0005]	0.005*** [0.0007]	0.003*** [0.0003]	0.002*** [0.0002]	0.005*** [0.0004]
Constant	-0.189*** [0.026]	-0.302*** [0.032]	-0.193*** [0.047]	-0.0304** [0.015]	-0.0624*** [0.016]	0.0519* [0.028]
Vector of Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
State Dummy Variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	124640	79295	45345	115192	69119	46073

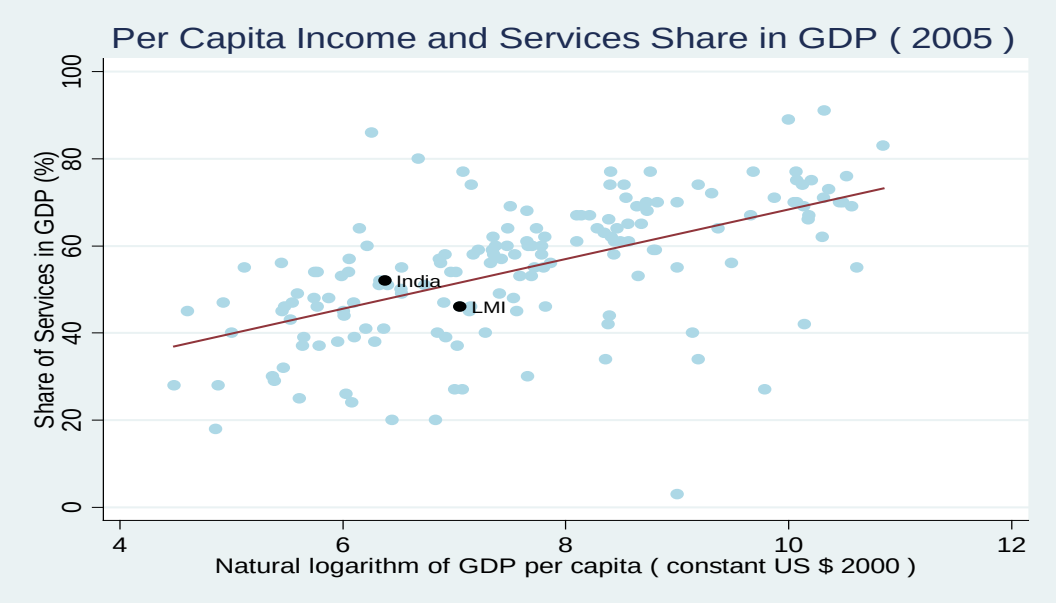
Source: Regression estimates based on primary data from National Sample Survey Organisation
Note: Standard errors in brackets; ***p<0.01, **p<0.05, *p<0.1

Table 15: Some Time-Series Evidence

	Mean (1993-94)	Mean (2004-05)
Percentage of Household Expenditure spent on Aggregate Services	10.5 %	12.7 %
Total Household Expenditure Per Capita (nominal terms) (Rupees per month)	432	852
Total Household Expenditure Per Capita (real terms) (Rupees per month)	384	455

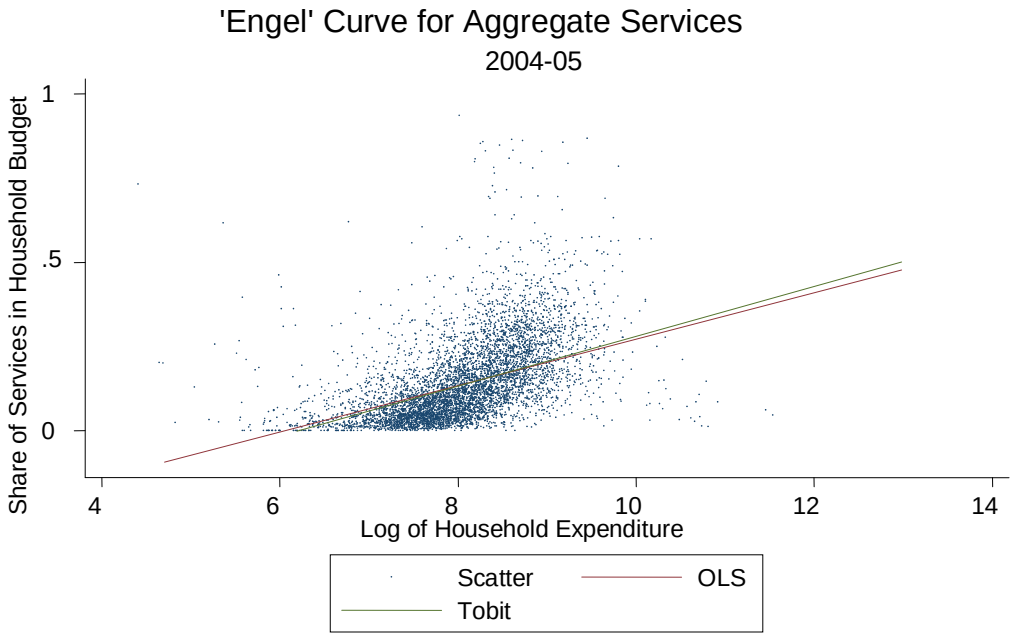
Source: Author's estimates based on primary data from National Sample Survey Organisation

Figure 1



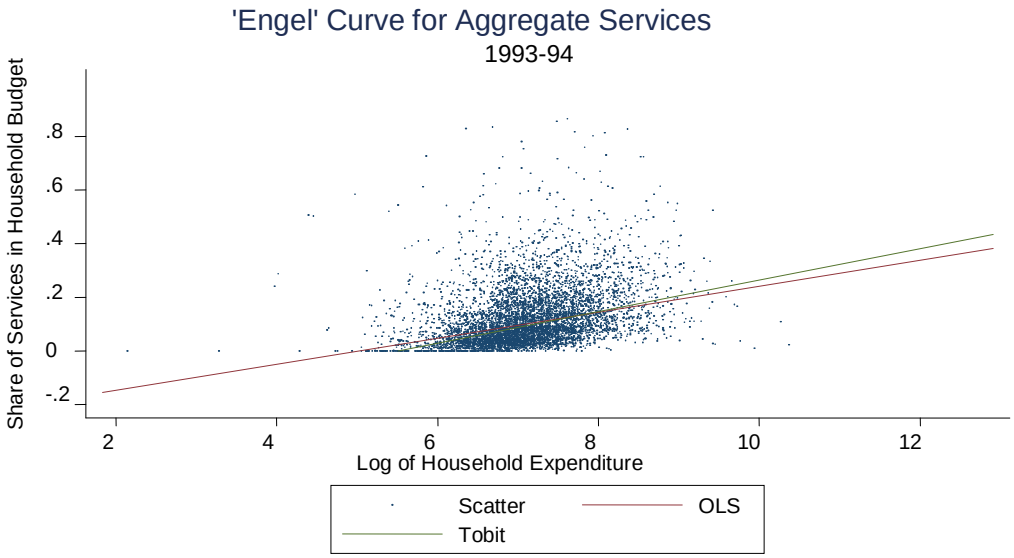
Source: World Bank, *World Development Indicators*, Online Database
Note: Note: The scatter points represent other countries in the sample, while the red line is a fitted regression line. LMI refers to Lower Middle Income Countries.

Figure 2



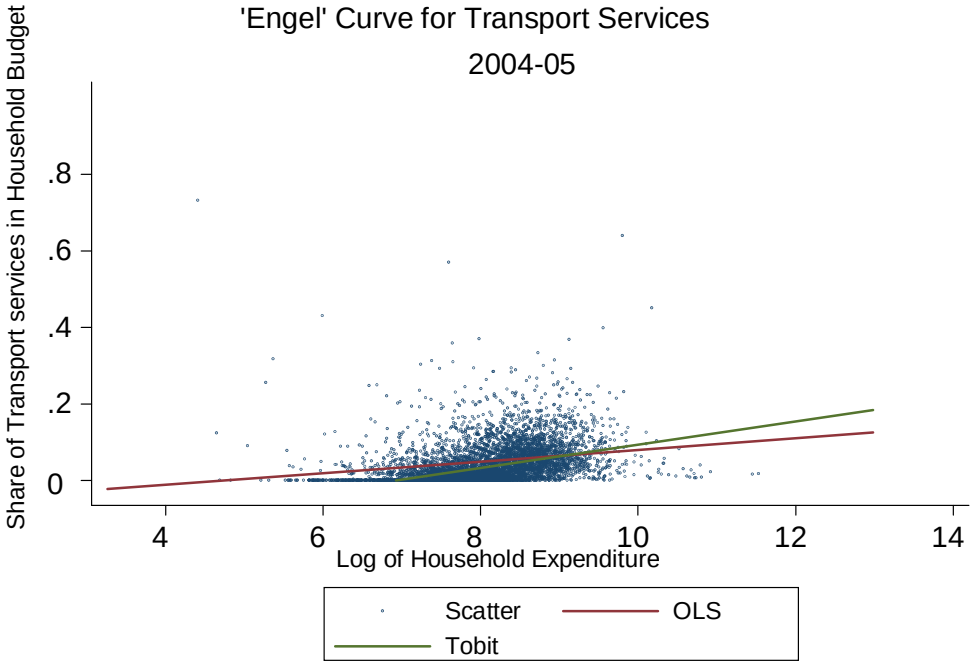
Source: Based on primary data from National Sample Survey Organisation, India

Figure 3



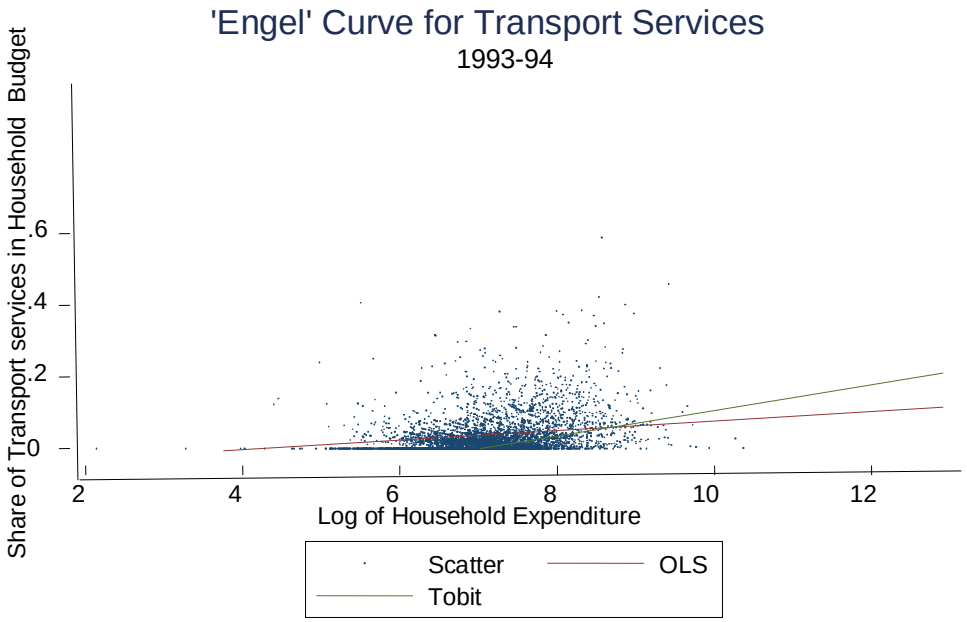
Source: Based on primary data from National Sample Survey Organisation, India

Figure 4



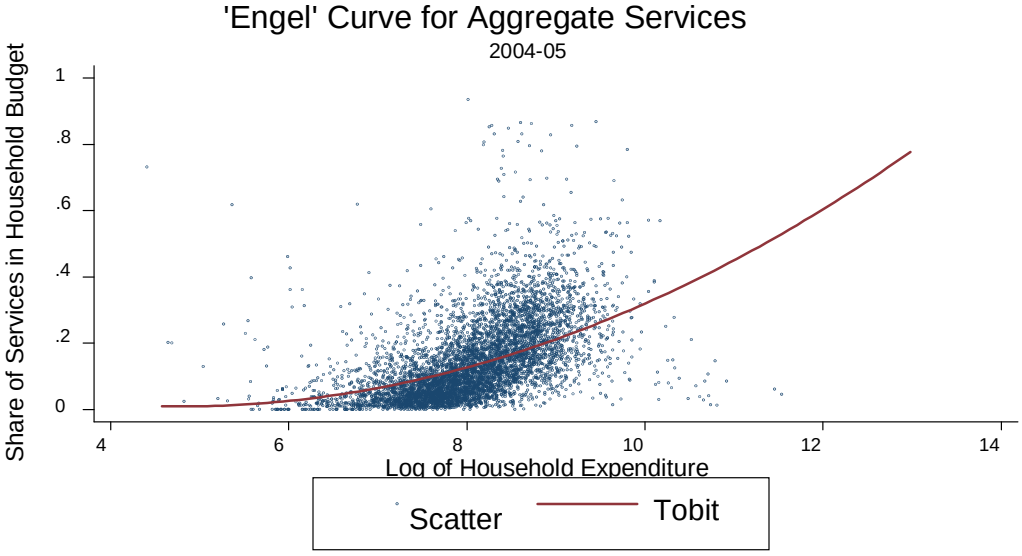
Source: Based on primary data from National Sample Survey Organisation, India

Figure 5



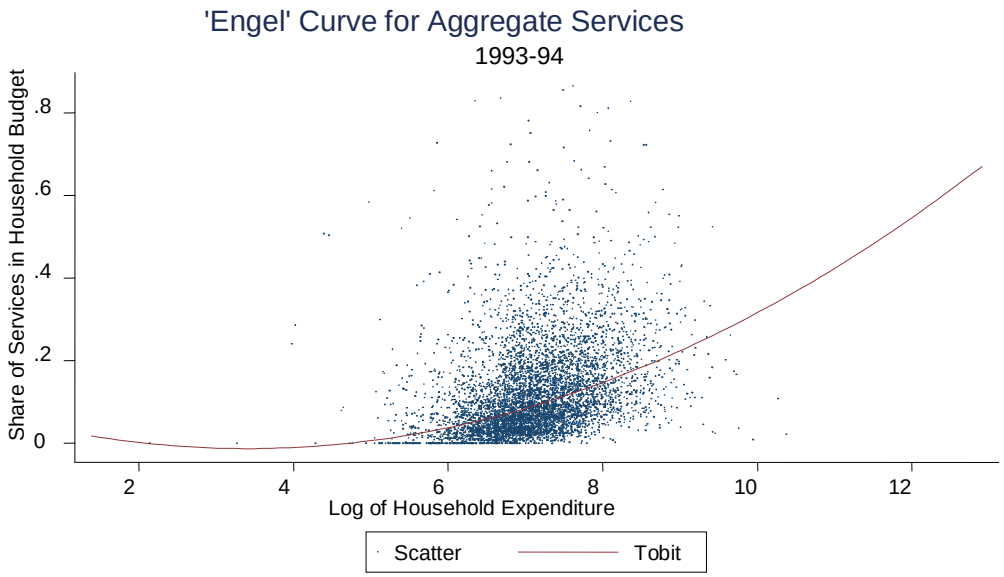
Source: Based on primary data from National Sample Survey Organisation, India

Figure 6



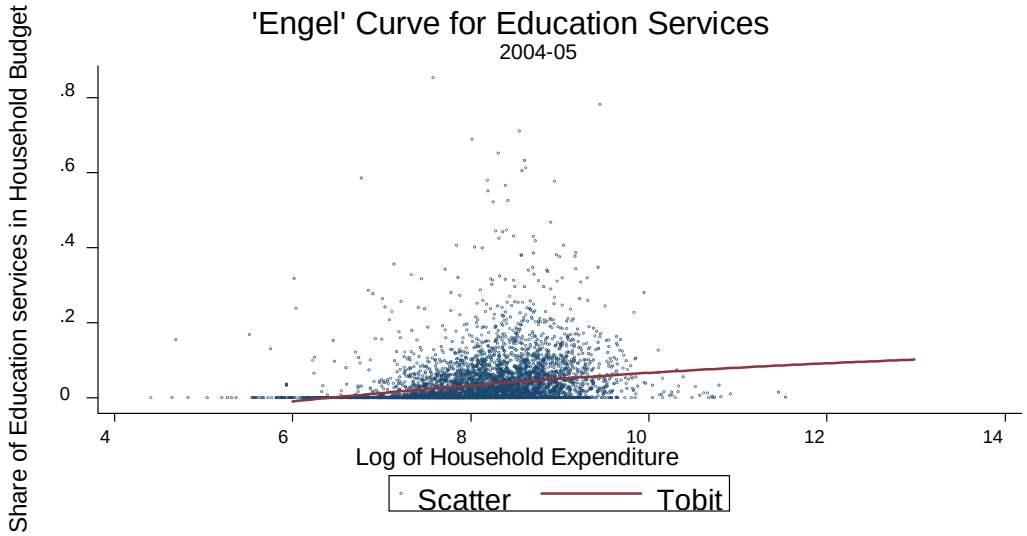
Source: Based on primary data from National Sample Survey Organisation, India

Figure 7



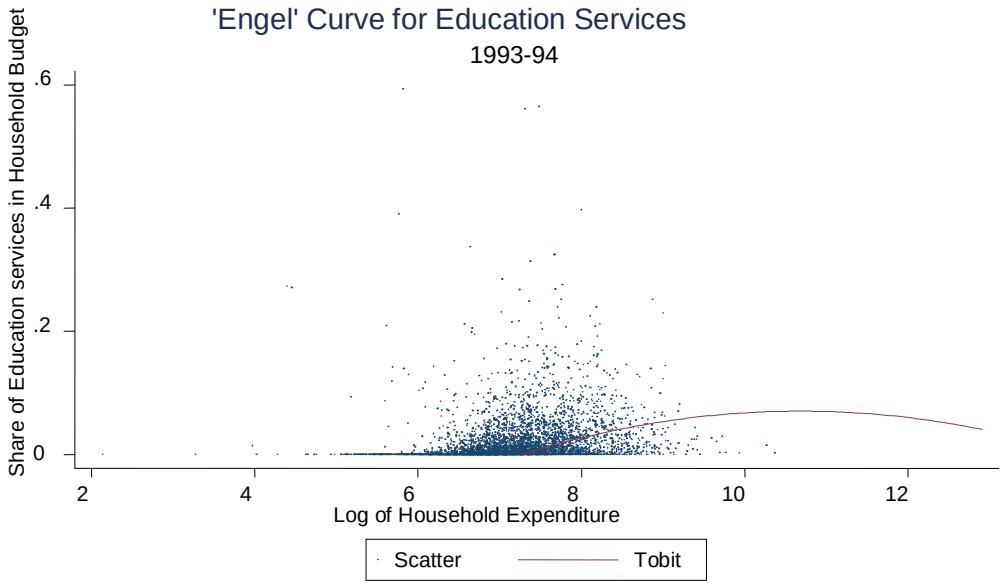
Source: Based on primary data from National Sample Survey Organisation, India

Figure 8



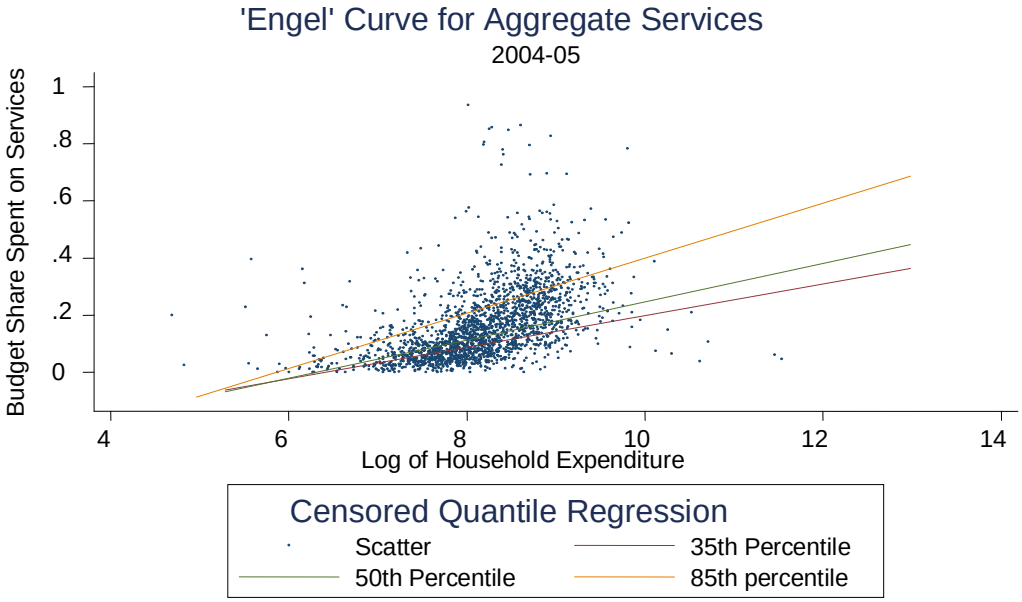
Source: Based on primary data from National Sample Survey Organisation, India

Figure 9



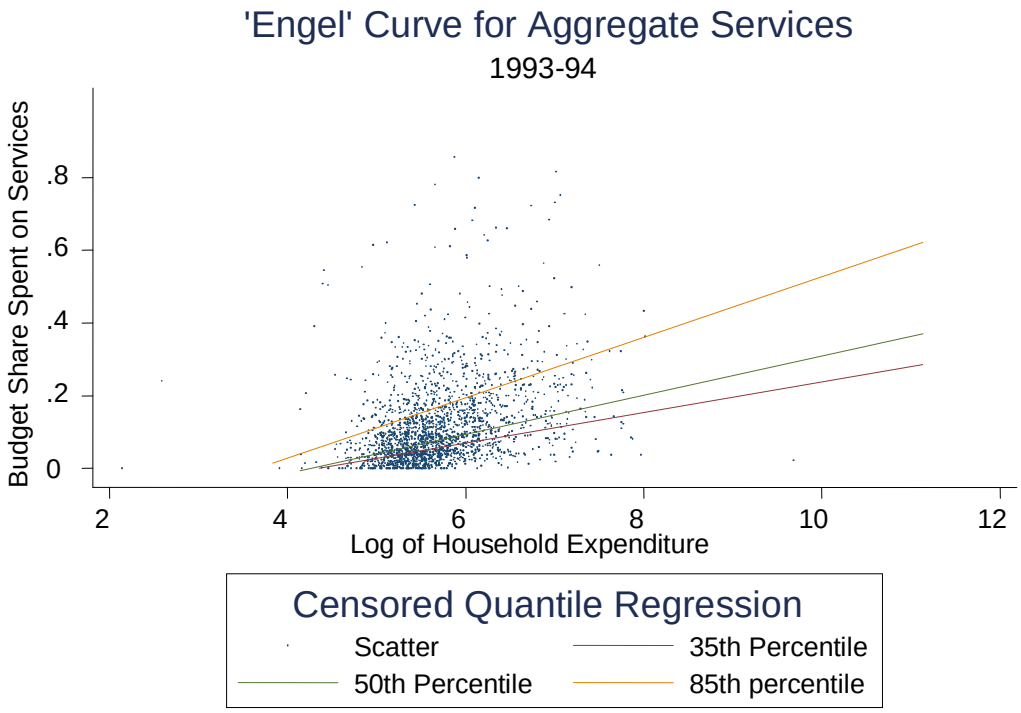
Source: Based on primary data from National Sample Survey Organisation, India

Figure 10



Source: Based on primary data from National Sample Survey Organisation, India

Figure 11



Source: Based on primary data from National Sample Survey Organisation, India