SCHOOL OF ECONOMICS

Discussion Paper 2004-04

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ISSN 1443-8593
ISBN 1 86295 172 1

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Original Version November 2003
Revised May 2004

[*]Pushkar Maitra and Ranjan Ray acknowledge funding provided by an Australian Research Council Discovery Grant. Geoff Lancaster and Ranjan Ray acknowledge funding provided by an Australian Research Council Large Grant. Pushkar Maitra was a Visiting Research Fellow at the Economic Growth Center at Yale University when he was working on this version of the paper. The authors thank Gary Deng for his excellent and painstaking research assistance, David Stifel, Geeta Gandhi Kingdon, Brett Inder, seminar participants at the University of Sydney and Purdue University and participants at ESAM 2003 Meetings held at Sydney, 32nd Australian Conference of Economists held at Canberra, the NEUDC Conference held at Yale University and the Empirical Development Economics Workshop at Monash University for their comments on earlier versions of the paper. They are also grateful to the Editor and an anonymous referee for helpful remarks. This is a substantially revised version of the Monash University, Department of Economics Working Paper # 20-03. The authors retain full responsibility for remaining shortcomings.

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Abstract

The collective approach to household behaviour models the household utility function as the weighted average of the utilities of the individual members of the household. These weights, which measure the relative bargaining power of males and females within the household, are generally regarded as fixed and exogenous. This paper extends the collective approach and estimates a model where the weights are endogenously determined. The novelty of the analysis lies in the simultaneous equations estimation of the bargaining power and the budget share equations that allow for the endogeniety of the power variable in the examination of its impact on the budget share of the various items. A by-product of this analysis is that the paper proposes and implements an alternative test of the unitary household model. The estimation is conducted using two different data sets from three Indian States. We find that relative bargaining power has a statistically significant effect on the budget share of an item and that the effects are typically non-linear and vary significantly across items. The paper offers possible explanation for the graphs depicting the relationships (a) between the male's bargaining power vis-à-vis the woman's and their relative education level, and (b) between the budget share of an item and the male's bargaining power. An interesting implication of the results is that child welfare and, more generally, household welfare is better protected in households where the bargaining power is spread evenly between the spouses than in those where one partner enjoys a dominant position in the decision making.

JEL Classification: D13, C31.

Keywords: Collective Household Model, Spousal Power, Expenditure Patterns, India.

1. Introduction

Does the "power" of an individual in making household decisions have an impact on that household's expenditure pattern? Specifically, what is the nature and magnitude of the impact, if any, of changing power relationships inside the household on the budget share of various items in the household's expenditure? What are the principal determinants of the "power" of an individual in making decisions? More fundamentally, what is an appropriate measure of "power"? If, as we report later, the answer to the first question turns out to be positive, then the next two questions acquire considerable policy importance. This paper attempts to answer some of these questions on household level unit record data from India.

The traditional models of the household are typically based on the notion that household preferences can be characterised by a single utility function. While this approach has proved useful for its elegance and analytical tractability, the underlying hypothesis of a single utility function encompassing all family members has been increasingly challenged in recent years. Such challenges have included attempts at modelling household utility to incorporate divergent and conflicting preference of different family members. In particular, Chiappori (1988) and Browning and Chiappori (1998) propose a "collective" approach based on a model of intra household resource allocation that obeys a Pareto efficient sharing rule satisfying certain regularity conditions.[1] According to this framework, household utility is defined as the weighted sum of the utility of individual members of the household. These welfare weights turn out to be proxies for the power of each member of the household.

Basu (2001) has pointed out that a potentially limiting characteristic of these models is that the welfare weights that are assigned to each member are generally regarded as exogenous to the household decision making process. To be a little more specific, consider a household with two members – a man and a woman. Define the Pareto weight of the

[1] See Manser and Brown (1980) and McElroy and Horney (1981) for cooperative bargaining models and Kanbur and Haddad (1994) and Lundberg and Pollak (1994) for non-cooperative bargaining models.

individual to be $\theta \in [0,1]$ which, in other words, measures the balance of power within the household. Let z denote the set of variables that determine θ so that the power function can be written as $\theta(z)$. In the traditional collective model of the household, z typically consists of variables that are exogenous to the household. Basu (2001) criticises this assumption and argues that there are reasons to believe that θ might actually be affected by changes in the household's choice vector. For example, the power of a woman in influencing household decisions is determined by her share of total earnings[2] which, in turn, depends on the labour supply of the spouses. Since labour supply is a choice variable for the household, θ gets influenced by the household's decision.

This paper examines whether relative spousal power (measured by her/his income share) has an effect on household expenditure patterns. The notion that female income-share has significant effects on household expenditure patterns is nothing new. Hoddinott and Haddad (1995) using data from Cote D'Ivoire find that raising women's share of cash income increases the budget share of food and reduces the budget shares of alcohol and cigarettes.[3] More recently, Maitra and Ray (2002) using data from South Africa find that the identity of the income recipient has an important effect on expenditure shares. However, unlike Hoddinott and Haddad (1995) and Phipps and Burton (1998), we allow for the endogeniety of the bargaining power variable and provide evidence on the impact of household characteristics on the intra household balance of power. The 3SLS simultaneous equations estimation procedure, that is used here, not only recognises the joint endogeniety of the power variable and the budget shares but, also, allows for a non diagonal covariance matrix between the errors of the various equations.

[2] See Blumberg and Coleman (1989), Desai and Jain (1994) and Riley (1997) for sociological and anthropological evidence in support of this proposition.

[3] See, also, Phipps and Burton (1998) for Canadian evidence on the differential impact of male and female incomes on household expenditure pattern. Koolwal and Ray (2002), using a woman's educational experience vis-a-vis the man's, as a measure of her bargaining power, observe on Nepalese data some interesting non-monotonic relationships between a woman's "power" and the household's expenditure outcomes.

Estimation is conducted using two different data sets from three States in India. Our estimation results show that relative bargaining power has a statistically significant effect on the different budget shares and the effects are typically non-linear. The relationship between relative bargaining power and budget shares also varies significantly between items. The nature of impact of the economic affluence of a household, as measured by its per capita household expenditure, on the male bargaining power varies between the data sets and in some cases between the rural and urban areas of a state. In contrast, there is general agreement that an inverse U shaped relationship exists between the adult male's share of household earnings and his share of adult educational experience in the household.

The rest of the paper is organised as follows: Section 2 lays out the theoretical framework and the estimation methodology. Section 3 describes the data sets used and discusses some of their salient features. The empirical results are presented and discussed in Section 4.The paper ends on the concluding note of Section 5.

2. Estimation Methodology

The essence of the collective approach[4] based household models is that allocations within the household are Pareto Efficient. Following Browning and Chiappori (1998), the household's objective function can be written as the weighted sum of utilities of the different members. Consider a household with two members: a man (m) and a woman (f). Assuming that utility depends on both consumption (x) and leisure (l), the household's problem can be written as:

$$\text{Max } \theta U_m\left(x_m, x_f, l_m, l_f\right) + (1-\theta) U_f\left(x_m, x_f, l_m, l_f\right) \qquad (1)$$

subject to the full income constraint:

[4] See Chiappori (1992), Bourguignon, Browning, Chiappori and Lechene (1993), Browning and Chiappori (1998). Strauss, Mwabu and Beegle (2000) provide an excellent summary of the issues involved.

$$\sum_{i=m,f} p' x_i \leq \sum_{i=m,f} w_i \left(T_i - l_i\right) + I \qquad (2)$$

U_i represents the utility of member $i\left(i = m, f\right)$, x_i represents a vector of private consumption of individual i, w_i, T_i, l_i represent the wage rate, time endowment and leisure of individual i. Total household unearned income is I and p represents the vector of prices. Note that prices and wages are assumed to be exogenous. The variable $\theta \in [0,1]$, which denotes the welfare weight of member *m*, depends on prices, household income and other variables such as household size, socio economic status of the household, etc.

The household level budget share of good g $\left(b^g\right)$ can be written as the θ weighted average of the budget shares of that good for the spouses $\left(m, f\right)$, namely b_m^g and b_f^g so that $b^g = \theta b_m^g + \left(1-\theta\right) b_f^g$. If we include standard demographic variables (household size and composition variables) as additional explanatory variables, we can write the estimating equation as follows:[5]

$$b^g = \alpha_0^g + \alpha_1^g \theta + \beta_m^g \theta^2 \mu + \beta_f^g \left(1-\theta\right)^2 \mu + \gamma^g \log\left(n\right) + \sum_{k=1}^{K} \varphi_k^g \left(\frac{n_k}{n}\right) + \varepsilon^g; \quad g = 1, \ldots, G \qquad (3)$$

where μ denotes household income, n denotes household size and n_k is the number of individuals in the age sex class k.

Turning now to the bargaining power variable, θ, the literature traditionally assumes that it is a function of exogenous variables, which we will call the *z*-vector, so that $\theta = \theta\left(z\right)$. Clearly this is a restrictive assumption and in reality $\theta\left(z\right)$ is likely to be endogenous to household decision-making. One of the contributions of this paper is that it provides for the

[5] See Lancaster, Maitra and Ray (2003) for details on the derivation of equation (3). The parameters β_m^g, β_f^g that enter non-linearly in equation (3) are the income coefficients in the budget share equations of, respectively, the male and the female spouse.

endogenous determination of $\theta(z)$ by allowing the *z*-vector to include choice variables. θ denotes the male share of household earnings as a measure of male power within the household.[6] Investigation of the impact of θ on budget share is a crucial feature of the present study. However θ, thus defined, could be correlated with the unobserved determinants of budget shares, i.e., θ is potentially endogenous in the budget share equations. Hence, the empirical exercise is based on a 3SLS estimation procedure that allows for the simultaneity and joint endogeniety of θ and the budget shares, b^g.

An important conclusion of the unitary household model is that the power of an individual member of the household does not have any effect on household expenditure patterns. In our framework this implies that θ does not have any effect on the household expenditure patterns. The sufficient condition for θ not to have any effect on household expenditure patterns is given by the condition:

$$\alpha_1^g = 0; \beta_m^g \theta = \beta_f^g (1-\theta) \qquad (4)$$

A test of the unitary model is, hence, a joint test of the null hypothesis, namely, that θ does not have any effect on household expenditure patterns. However, complications arise from the fact that the null hypothesis in equation (4) is data dependent and therefore the test needs to be conducted at different values of θ.

Per capita household expenditure is used as a proxy for household permanent income. Household expenditure is easier to measure than household income and is typically measured with less error. Moreover household expenditure is a better proxy for permanent income because, while measured income might be subject to transitory fluctuations, households typically use a variety of mechanisms to smooth consumption over time. However household expenditure is also likely to be correlated with unobserved determinants of the household

[6] As we have noted in the introduction, there is a fairly large literature in sociology and anthropology that argues that male share of earnings is a good measure of his bargaining power within the household.

budget shares and failure to account for this potential endogeniety could result in inconsistent estimates.

To account for the potential endogeniety of male power and per capita expenditure, we jointly estimate male power, per capita household expenditure and the budget shares using 3SLS estimation methodology. The advantage of the 3SLS estimation methodology is that it takes into account not only the potential endogeniety of the bargaining power (θ), expenditure and the budget share $\left(b^g\right)$ variables but also allows for mutual feedback between the equations via a non diagonal covariance matrix of their residuals.

The empirical analysis is based on the 3SLS estimation of the following system of equations:

$$\theta = \theta\left(X_1, EXP\right) + \nu_1 \tag{5a}$$

$$EXP = EXP\left(X_2\right) + \nu_2 \tag{5b}$$

$$b^g = b^g\left(\theta, EXP, X_3\right) + \nu^g; g = 1, \ldots, G \tag{5c}$$

where EXP is per capita household expenditure, X_1, X_2, X_3 are the vectors of exogenous determinants in the three equations, v_1, v_2, v^g are the stochastic error terms and the other variables are as defined earlier.

3. Data and Descriptive Statistics

In order to examine the robustness of the principal results, two different data sets are used in this study. First, we use data from the 50th Round of the National Sample Survey (NSS) data set, collected in 1993 – 94. For estimation purposes we restrict ourselves to households residing in Kerala, Bihar and Maharashtra. The information on consumer expenditure, earnings, household size and composition was combined into a comprehensive

data set from the unit records of the households for the purpose of this study. The estimations were performed separately on the rural and urban data of each of the three States in the NSS considered here. These three States were chosen because of differences in their location, cultural practice and state of economic development. We ignored households where male and female earnings are both reported as zero. The second data set is the Uttar Pradesh and Bihar Survey of Living Conditions (henceforth referred to as the SLC data set), which is a two-part study of rural poverty carried out in 1997 – 98 in South and Eastern Uttar Pradesh and North and Central Bihar. The data set used is from the quantitative component of the study, which draws on data collected from household and community surveys modelled after the World Bank's living Standard Measurement Surveys (LSMS).[7] The SLC data was collected between December 1997 and March 1998 from 120 villages drawn from a sample of 25 districts in the states of Uttar Pradesh and Bihar. The main reason for using the SLC data is to examine the robustness of our results. A total of 2250 households were interviewed for the survey. Of these, we ignored those households where both male and female earnings are reported to be zero. This left us with a total of 1273 households. It is worth noting that the NSS data set involved more observations and greater sampling variability than the SLC data. Consequently, in general, the former yielded estimates that are better determined and results that are sharper than the latter.

Both the data sets used the following nine commodity classification of household expenditure: food; tobacco; alcohol; fuel and light; clothing; footwear and bedding; education; medical items; transport; other commodities.

Table 1 presents the sample means of the principal variables of interest in this study. Consistent with Engel's law, the mean budget share of food varies on the NSS data between the low value of 0.58 for the relatively affluent urban Maharashtra to the high value of 0.72 in

[7] This data set is available from the World Bank website:
http:/www.worldbank.org/lsms/country/India/upbhhome.html

case of the relatively poor rural Bihar. In Bihar and Maharashtra, but not in Kerala, the NSS data records much higher mean value of the male bargaining power (θ) in the urban areas than in the rural. Kerala also differs sharply from Bihar and Maharashtra with respect to the relative educational experience of the adult male *vis-à-vis* the adult female in the household. The disparity between male and female education levels is virtually non-existent in Kerala in sharp contrast to the other two States. Note, however, that notwithstanding the even match of male and female educational levels in Kerala, this state records a high mean value of the male bargaining power (θ), similar to that in the other two States. In other words, the adult male retains a dominant role in intra household decision-making in all the three States. The mean values of the variables in the SLC data set for Bihar – UP generally lie in between the rural and urban mean figures of Bihar in the NSS data, thus, confirming the consistency between the SLC and the NSS data sets. The heterogeneity between the three States, reflected in the summary means presented in Table 1, justifies the selection of Bihar, Kerala and Maharashtra, for this study.

4. Estimation Results

4.1 The Determinants of Balance of Power

The 3SLS coefficient estimates[8] of the male power (θ) equation (5a) are presented in Table 2.[9] It is clear from Table 2 that the nature of relationship between male bargaining power, θ, and its various determinants varies sharply both across States and also between the rural and urban areas of a given State. For example, the male's share of household earnings in rural Maharashtra is, *ceteris paribus*, sharply, significantly and positively affected by per capita expenditure, but the effect is weak and insignificant in urban Maharashtra. In contrast,

[8] Using the Breusch-Pagan test, the null hypothesis of diagonal covariance matrix of the residuals is rejected for both the data sets. This provides justification for the 3SLS estimation procedure used here.
[9] To save space, we present only the estimates using the NSS data. The estimates using the SLC data are available on request.

in both rural and urban Kerala, rising household affluence, as reflected in an increase in per capita expenditure, tends to lower the male share of adult earnings in the household. The fact that in rural Maharashtra and in Bihar (both rural and urban areas), the share of male earnings tends to be lower in richer households is possibly due to the fact that, in the more affluent households, females are better educated and hence able to contribute to household earnings much more than in the economically disadvantaged households. Also, spousal matching, via dowry and other mechanisms, ensures that educated males with superior income earning ability attract better-endowed female partners who can match them in these respects. It is also clear from Table 2, however, that this is not true everywhere.

The impact of family size on the male share of earnings also varies sharply between the various States. In Kerala, though not everywhere, the male share of household earnings is higher in the larger households. This is possibly due to the presence of dependents, especially of children, in the larger household that constrains the ability of the adult female to contribute to household earnings there. Note, however, that the demographic effect of household size on male power in the other two States is either insignificant or is in the reverse direction to that in Kerala. The male's share of household earnings tends to be lower in households belonging to the scheduled caste (SC) or scheduled tribe (ST). In contrast, the religion of the household has no significant impact on the male's bargaining power inside the household.

These estimates essentially show that it is hazardous to offer general explanations in view of the non-robustness of the nature and magnitude of the determinants of male bargaining power between the various regions. However, one result on which there is general agreement is the inverted U shaped relationship between the male share of adult earnings and the male share of adult educational experience in the household.[10] Figures 1 and 2, which

[10] Let E_m and E_f denote the years of education attained by the male and the female respectively. Then the male share of educational experience is defined as $E_m \Big/ \left(E_m + E_f\right)$.

present the predicted effect of male share of educational experience on male share of adult earnings, confirm this. The rising segment of the inverted U shaped graphs is explained by the feature that increased education level of the adult male *vis-à-vis* his female partner enables him to earn higher relative wages and, hence, contribute a larger share of the household earnings. The non-monotonicity and the backward bend suggests that beyond a critical value of the male's share of adult educational experience in the household (typically, around 0.6), the male earns such a high wage rate that he is on the backward bending segment of his labour earnings curve. It is also worth noting from Figures 1 and 2 that, in all the 3 States considered here, the turning point in the inverted U relationship occurs at a higher value of the male's share of adult education in the household in the urban areas than in the rural. If the above explanation for the inverted U shaped relationship is true, then this suggests that the backward bend of the male labour earnings curve occurs at a higher relative male wage rate in the urban areas than in the rural.

The overall message from Table 2 is that, notwithstanding differences in the sign, size and significance of the impact of the right hand side variables of equation (5a) on θ, the idea of endogeniety of intra household bargaining power is sustained by the estimates. This provides support to the framework of Basu (2001) and its extension considered here, along with the simultaneous equations estimation procedure used here to take care of this endogeniety.

4.2 The Impact of Intra Household Balance of Power on Household Expenditure Patterns

The NSS evidence on the impact of changing power relationships inside the household on household expenditure pattern is contained in Tables 3 – 5. The corresponding estimates using the SLC data are presented in the Appendix (Table A1). These tables present the 3SLS estimates of the budget share equations, b^g (equation (5c)) which contain the

bargaining power variable, θ, as one of the endogenous determinants of budget share.[11] Note that, to save space, these tables contain only a subset of the variables used on the right hand side of the estimated budget equation (5c). Since the focus of this study is on the bargaining power variable θ, these tables report the estimated coefficients of the linear and quadratic terms involving θ. The coefficient estimates of the household compositional variables (n_k/n) have not been presented here but are reported in Lancaster, Maitra and Ray (2003).

In the conventional unitary household model, the identity of the income recipient is irrelevant in the determination of the household's expenditure outcomes. In other words, a test of $H_o : \frac{\partial b^g}{\partial \theta} = 0$, i.e. of the hypothesis that a change in the male's share of household earnings (θ) has no impact on budget share (b^g), constitutes a convenient test of the unitary household model. In the collective household model, a change in θ affects household expenditure pattern by: (1) altering the "permanent income" of the household, and (2) modifying the household preferences in favour of that of the partner who now has a greater "say" in the household decisions. In Basu's extension of the collective household model (Basu (2001)) that endogenises θ, (1) and (2) feed through to θ itself which, in turn, leads to a further change in household preferences. The traditional version of the collective household model ignores this recursive effect due to its assumption of non-exogenous and non-changing θ and, consequently, distorts the impact of θ on budget share, b^g, even though it allows $\frac{\partial b^g}{\partial \theta} \neq 0$, unlike the unitary household model.

In view of the presence of linear and quadratic terms involving θ in the budget share equation, b^g, (see equation (3)), it is not possible to make inference on the sensitivity of b^g

[11] We have not presented here, for space reasons, the coefficient estimates of the per capita household expenditure equation (5b), but these are contained in Lancaster, Maitra and Ray (2003), which is available on request.

to θ by simply examining the statistical significance of the linear coefficient estimate, $\hat{\alpha}_1^g$. To do so, we need to impose and do a joint test $\left(\chi^2(2)\right)$ of the two restrictions, given by equation (4), which will ensure $\frac{\partial b^g}{\partial \theta} = 0$. Tables 3 – 5 (and Table A1 in the appendix) contain the computed χ^2 values, for each item and at a selection of θ values. A comparison with the critical $\left(\chi^2(2)\right)$ values shows that, consistent with previous evidence (Hoddinott and Haddad (1995), Phipps and Burton (1998)), there is widespread rejection of the hypothesis of insensitivity of budget share, b^g, to the male bargaining power, θ. This is true of both the NSS and the SLC data sets. Closer inspection of the χ^2 values reveals the following further features of interest.

First, the rejection of $\frac{\partial b^g}{\partial \theta} = 0$ occurs mainly in case of the jointly consumed items, Food, Education and Transport, which can be viewed as "public goods" in the context of household spending. In contrast, for items such as "Tobacco" and "Alcohol", which are primarily and, often exclusively, consumed by the adult male, the rejection is either marginal or, in case of some θ values, the hypothesis is not rejected. Note, for example, that the SLC and several of the NSS data sets agree that the budget share, b^g, of Alcohol is insensitive to the male bargaining power, θ, at several values of the latter. A possible explanation lies in a combination of cultural and religious factors that set a severe constraint on Alcohol consumption in India even when the male's share of household income records very high values. It is worth noting that, consistent with the present results, Phipps and Burton (1998) also found, on Canadian data, that they were unable to reject the idea of income pooling, underlying the unitary household model, in case of Alcohol and Tobacco, but they did so in case of Food and Transport.

Second, there is, in general, a U-shaped relationship between the computed χ^2 values and θ. In other words, the rejection of $\frac{\partial b^g}{\partial \theta} = 0$ is more likely to occur at the extreme values of θ, where one of the partners is dominant, rather than in the middle $(\theta = 0.5)$ where the power is more evenly spread between the spouses. A possible explanation of this result is that a spouse tends to exert her/his influence on household decisions more forcefully once she/he enjoys an overwhelmingly dominant power in the bargaining. Since the nature of consumer preferences differs between the male and the female partners, this feature could provide a possible explanation for the non-monotonic relationships between b^g and θ implied by the coefficient estimates and graphically depicted, for selected items, in Figure 3. Note that, in most cases, the switch occurs around θ = 0.5 or 0.6, i.e. when the dominant role moves from one spouse to the other. The rejection of the unitary model of the household is also seen from the fact that, in case of none of the major items of expenditure, do the graphs resemble a horizontal straight line that is implied by the conventional framework (unitary household model).

To save space and focus our attention, Figure 3 reports the graphs of the relationship between b^g and θ for only the major items of spending, namely, Food, Fuel and Light, Transport and Education. The figures generally agree that there is an inverted U-shaped relationship between b^g and θ for the "necessary" items, Food and Fuel & Light and a U-shaped relationship in case of the "luxury" items, Transport and Education. As the male spouse's bargaining power increases, from a low value of θ to moderate values, preferences move away from the latter items to the former. As θ continues to increase and the male spouse acquires superior bargaining power *vis-à-vis* his female partner, the household preferences shift back from the "necessity" items such as Food towards "luxury" items such as Transport. It is interesting to note a parallel between the inverted U-shaped relationship

between b^g and θ in case of Food, seen from Figure 3, here, and a similar, relationship between the incidence of child labour (also, a "necessary" item) and the male's share of household income, derived analytically in Basu (2001).[12]

What explains the inverted U-shaped relationship between b^g and θ for "necessities" and U-shaped relationship for "luxuries"? While any explanation must be tentative, one possibility is as follows. Both the partners have a preference for "luxury" items over "necessities". Consequently, at the extreme values of θ, the dominant partner is able to mould the household preferences towards the luxury items leading to a rise in their budget share, and a fall in that of the necessities. In between the extremes, especially around $\theta = 0.5$, neither partner is able to dominate the other and they compromise in favour of items, such as Food, Fuel & Light that are jointly consumed in the household. Consequently, the budget share of the necessities, especially of items that are collectively consumed by the household, tends to rise in the middle range of the θ.

Before concluding this section, let us reiterate some of the distinctive empirical findings of this study. First, male bargaining power has little or no impact on the budget share of Alcohol and Tobacco. Second, while the present results for the major items are generally supportive of the previous rejections of the unitary household model, they also point to non-monotonic relationships between budget share of such items and bargaining power that appears to have been overlooked in much of the previous literature. The findings of this study show that, as a spouse's bargaining power rises to alter her/his status, from one of subjugation to one of dominance in decision making, the household's preferences switch, initially, from luxuries to necessities and then re-switch back to the former. This suggests a more complex relationship between household spending and a spouse's share of income

[12] Since Basu (2001) defines θ as the female's share of household income, the relationship derived and presented as Figures 4, 5 in his paper is a U-shaped one, consistent with the inverted U-shaped relationship obtained for Food in this study.

earnings than is appreciated in the literature. An interesting implication of our findings is that, contrary to the conventional view, both the male and the female spouses have a preference for "luxury" over "necessity" items, though the composition of the composite item called "luxury" varies between the two partners.

5. Conclusion

The "collective approach" to modelling household consumption defines household utility as the weighted sum of the utilities of the different members of the household. These weights, which turn out to be proxies for the relative bargaining power of the different members of the household, are however considered to be fixed or exogenous to the analysis. That overlooks the possibility that the weights could be altered by the outcomes themselves. This paper extends the "collective approach" by proposing and estimating a framework where the weights are endogenised and simultaneously determined with the household's expenditure and earnings decisions.

The empirical results of our analysis using household level unit record data set from India provide considerable support for the idea that the welfare weights, i.e. the bargaining power, are jointly determined with the expenditure outcomes and that they are significantly affected by changes in the household's socio economic status. For example, contrary to what is implied by the conventional treatment of the "collective household" model, the welfare weights are, in many cases, significantly affected by aggregate household expenditure. Consistent with recent empirical evidence, the present study rejects an important implication of the unitary household model, namely, that the identity of the income recipient is irrelevant in the determination of the household's expenditure outcomes. Also, consistent with existing evidence, this study finds that such rejections are either marginal or do not occur for some of the smaller items for expenditure, especially those, such as Alcohol, that are privately

consumed inside the household. However, the present results generally point to more complex relationships between the household's expenditure outcome and intra household balance of power than is appreciated in the literature. Whether such complex relationships are peculiar to the Indian data or holds more widely is a matter for further research.

An important implication of our results is that it is not the case that a household where the female partner is dominant in decision making will necessarily direct its purchases towards items which are jointly consumed, typically necessities. A household where power is more evenly spread between the spouses is more likely to experience such an outcome. Our results also suggest that such an even spread of power is most likely to exist in a household where the educational experience is also spread evenly between the spouses. This leads to the policy implication that improvements in literary and educational levels need to be targeted towards both men and women, not just one or the other. Our analysis therefore provides additional reasons for promoting both male and female educational levels inside the household as means of improving both their income earnings opportunities in order to prevent the overwhelming dominance by either partner in the decision making process of the household. For example, child welfare, which requires household spending to be directed towards jointly consumed, "necessities" such as Food, Fuel & Light, will be maximised in households where both income earnings and the educational experiences are evenly distributed between the spouses. This finding has profound policy implications, especially in the South Asian context of this study where, with the exception of Kerala, both the income share and the share of education is dominated by the male partner.

References:

Basu, K. (2001). Gender and Say: A Model of Household Behaviour with Endogenously Determined Balance of Power, Mimeo, Cornell University.

Blumberg, R. and M. Coleman (1989): "A Theoretical Look at the Gender Balance of Power in the American Couple", *Journal of Family Issues*, **10**, 225 - 250.

Bourguignon, F., M. Browning, P. A. Chiappori and V. Lechene (1993): "Intrahousehold Allocation of Consumption: Some Evidence on French Data", *Annales d'Economie et de Statistique*, **29**, 137 - 156.

Browning, M. and P. A. Chiappori (1998): "Efficient Intra Household Allocations: A General Characterisation and Empirical Tests", *Econometrica*, **66**(6), 1241-1278.

Chiappori, P. A. (1988): "Rational Household Labour Supply", *Econometrica*, **56**(1), 63-89.

Chiappori, P. A. (1992): "Collective Labour Supply and Welfare", *Journal of Political Economy*, **100**(3), 437-467.

Desai, S. and D. Jain (1994): "Maternal Employment and Family Dynamics: The Social Context of Women's Work in Rural South India", *Population and Development Review*, **20**, 115 - 136.

Hoddinott, J. and L. Haddad (1995): "Does Female Income Share Influence Household Expenditures? Evidence from Cote d'Ivoire", *Oxford Bulletin of Economics and Statistics*, **57**(1), 77-95.

Kanbur, R. and L. Haddad (1994): "Are Better Off Households More Unequal or Less Unequal: A Bargaining Theoretic Approach to 'Kuznets' Effects at the Micro Level", *Oxford Economic Papers*, **46**(3), 445-458.

Koolwal, G. and R. Ray (2002). Estimating the Endogenously Determined Intra Household Balance of Power and its Impact on Expenditure Pattern: Evidence from Nepal. Washington D.C., World Bank.

Lancaster, G., P. Maitra and R. Ray (2003). Endogenous Power, Household Expenditure Patterns and Gender Bias: Evidence from India, Department of Economics, Monash Univerisity, Working Paper # 20-03.

Lundberg, S. and R. A. Pollak (1994): "Non Cooperative Bargaining Models of Marriage", *American Economic Review: Papers and Proceedings*, **84**(2), 132-137.

Maitra, P. and R. Ray (2002). Household Resources, Expenditure Patterns and Resource Pooling: Evidence from South Africa, Mimeo, University of Tasmania. Revised 2004.

Manser, M. and M. Brown (1980): "Marriage and Household Decision Making: A Bargaining Analysis", *International Economic Review*, **21**(3), 31-44.

McElroy, M. and M. Horney (1981): "Nash Bargained Household Decisions", *International Economic Review*, **22**(2), 333-350.

Phipps, S. A. and P. S. Burton (1998): "What's Mine Is Yours? The Influence of Male and Female Incomes on Patterns of Household Expenditure", *Economica*, **65**(260), 599-613.

Riley, N. (1997): "Gender, Power and Population Change", *Population Bulletin*, **52**, 1 - 46.

Strauss, J., G. Mwabu and K. Beegle (2000): "Intrahousehold Allocations: A Review of Theories and Empirical Evidence", *Journal of African Economies*, **9**(AREC Supplement 1), 83 - 143.

Table 1: Sample Means

Variable	SLC Bihar – UP	NSS Kerala (Rural)	NSS Kerala (Urban)	NSS Bihar (Rural)	NSS Bihar (Urban)	NSS Maharashtra (Rural)	NSS Maharashtra (Urban)
Sample Size	1273	1321	983	2824	983	2131	3058
Per Capita Monthly Expenditure (Rs.)	356.63	407.03	627.83	208.53	442.65	283.59	616.97
θ (Measure of Male Power)	0.893	0.831	0.811	0.856	0.925	0.703	0.858
Years of Education of Most Educated Male in the Household	5.82	6.90	7.70	3.60	7.40	5.30	8.10
Years of Education of Most Educated Female in the Household	2.46	6.60	7.50	1.80	4.90	3.20	6.60
Household Size	6.55	5.00	5.10	5.20	5.60	5.10	4.90
Budget Share of:							
Food	0.66	0.67	0.64	0.72	0.65	0.62	0.58
Tobacco	0.02	0.03	0.02	0.02	0.01	0.02	0.02
Alcohol	0.01	0.02	0.01	0.01	0.01	0.01	0.01
Energy/Fuel and Light	0.03	0.07	0.07	0.09	0.07	0.08	0.07
Transport	0.02	0.07	0.08	0.08	0.09	0.011	0.09
Medical Items	0.06	0.02	0.03	0.01	0.03	0.01	0.03
Clothing	0.09	0.05	0.05	0.03	0.02	0.5	0.04
Education	0.02	0.04	0.05	0.01	0.03	0.03	0.05
Other Items	0.09	0.03	0.05	0.04	0.08	0.06	0.11

Table 2: 3SLS Estimates[(a)] of Male Power (θ) – NSS Data

Variable	Kerala		Bihar		Maharashtra	
	Rural	**Urban**	**Rural**	**Urban**	**Rural**	**Urban**
Constant	0.811[(c)]	0.931[(c)]	-0.007	0.120	-1.191[(c)]	0.110
	(4.31)	(4.15)	(0.06)	(0.84)	(8.07)	(1.03)
Education Share of Most Educated Male	1.734[(c)]	1.353[(c)]	1.716[(c)]	1.467[(c)]	1.376[(c)]	2.090[(c)]
	(7.70)	(3.91)	(11.22)	(7.39)	(8.16)	(14.83)
(Education Share of Most Educated Male)^2	-1.352[(c)]	-0.933[(c)]	-1.138[(c)]	-0.974[(c)]	-0.942[(c)]	-1.501[(c)]
	(6.46)	(3.00)	(9.85)	(6.31)	(6.99)	(13.11)
Log Household Expenditure	-0.047[(c)]	-0.059[(c)]	0.033[(c)]	0.024[(b)]	0.135[(c)]	0.008
	(2.9)	(3.33)	(3.08)	(2.07)	(10.30)	(0.95)
Log Household Size	0.069[(c)]	0.116[(c)]	–0.035[(c)]	0.013	–0.067[(c)]	–0.005
	(2.83)	(4.15)	(2.58)	(0.75)	(3.43)	(0.41)
Hindu	–0.028	–0.011	–0.020	–0.002	–0.019	–0.004
	(1.59)	(0.49)	(1.51)	(0.10)	(0.85)	(0.36)
Scheduled Tribe	–0.072	–0.013	–0.134[(c)]	–0.093[(c)]	–0.064[(c)]	–0.043
	(1.15)	(0.13)	(7.95)	(3.34)	(3.28)	(1.58)
Scheduled Caste	–0.113[(c)]	–0.034	–0.052[(c)]	–0.027	–0.014	–0.026
	(4.61)	(0.81)	(5.13)	(1.37)	(0.72)	(1.77)

Notes:
(a) t-values in parenthesis
(b) Statistically significant at 5%
(c) Statistically significant at 1%

Table 3a: 3SLS Estimates[(a)] of Budget Share Equations – NSS Kerala (Rural)[(d)]

	Food	Tobacco	Alcohol	Energy	Transport	Medical Items	Clothing	Education	Other Expenditure
Constant	0.614[(c)]	0.027	0.015	0.105[(c)]	0.047[(c)]	0.010	0.100[(c)]	0.052[(c)]	0.030
	(16.75)	(1.89)	(0.88)	(9.35)	(3.1)	(1.03)	(3.54)	(3.26)	(1.62)
θ	0.043[(c)]	-0.006	-0.010	0.011[(b)]	-0.012[(b)]	-0.005	0.008	-0.008	-0.021[(c)]
	(2.81)	(-1.06)	(-1.46)	(2.42)	(-1.98)	(-1.16)	(0.7)	(-1.24)	(-2.61)
θ(θ*Per capita Expenditure)	-4.06E-07[(c)]	-6.88E-08[(c)]	-2.98E-08	-8.67E-08[(c)]	1.24E-07[(c)]	9.11E-08[(c)]	3.56E-08	1.78E-07[(c)]	1.62E-07[(c)]
	(-12.44)	(-5.49)	(-1.97)	(-8.68)	(9.3)	(10.17)	(1.41)	(12.53)	(9.71)
(1−θ)((1−θ)*Per capita Expenditure)	-3.23E-07[(c)]	-1.08E-07[(c)]	-1.14E-07[(c)]	-6.84E-08[(c)]	3.92E-08	1.15E-07[(c)]	1.29E-07[(c)]	1.95E-07[(c)]	1.35E-07[(c)]
	(-5.02)	(-4.36)	(-3.81)	(-3.47)	(1.49)	(6.53)	(2.59)	(6.93)	(4.11)
Log Family Size	0.039[(c)]	0.005	-0.001	-0.013[(c)]	0.007[(b)]	-0.007[(c)]	-0.011	-0.010[(c)]	-0.008
	(4.69)	(1.49)	(-0.28)	(-5.18)	(2.07)	(-3.18)	(-1.73)	(-2.69)	(-1.96)[(b)]
Wald Test for $H_0 : \frac{\partial b^g}{\partial \theta} = 0; \chi^2(2)$									
θ = 0.0	110.18[(c)]	27.96[(c)]	17.93[(c)]	61.86[(c)]	21.42[(c)]	113.63[(c)]	9.47[(c)]	128.07[(c)]	80.88[(c)]
θ = 0.2	80.43[(c)]	19.72[(c)]	15.70[(c)]	47.24[(c)]	11.73[(c)]	88.11[(c)]	8.47[(b)]	92.88[(c)]	62.06[(c)]
θ = 0.4	33.78[(c)]	7.22[(b)]	10.67[(c)]	22.86[(c)]	3.92	42.37[(c)]	5.94	36.27[(c)]	30.22[(c)]
θ = 0.5	12.17[(c)]	1.87	6.74[(b)]	10.06[(c)]	8.00[(b)]	15.22[(c)]	3.77	8.54[(b)]	13.06[(c)]
θ = 0.6	11.53[(c)]	2.66	3.13	6.39[(b)]	24.85[(c)]	1.35	1.51	4.34	7.23[(b)]
θ = 0.8	95.83[(c)]	27.31[(c)]	4.51	43.19[(c)]	75.95[(c)]	55.00[(c)]	1.22	99.03[(c)]	52.93[(c)]
θ = 1.0	165.07[(c)]	46.19[(c)]	10.86[(c)]	78.31[(c)]	92.97[(c)]	118.76[(c)]	4.27	182.10[(c)]	98.52[(c)]

Notes:
(a) t-values in parenthesis
(b) Statistically significant at 5% level
(c) Statistically significant at 1% level
(d) This table reports the coefficient estimates of only some of the determinants used in the estimation.

Table 3b: 3SLS Estimates[(a)] of Budget Share Equations – NSS Kerala (Urban)[(d)]

	Food	Tobacco	Alcohol	Energy	Transport	Medical Items	Clothing	Education	Other Expenditure
Constant	0.687[(c)]	0.015	-0.014	0.099[(c)]	0.001	0.025	0.036	0.043[(b)]	0.107[(c)]
	(16.06)	(1.27)	(-0.83)	(7.97)	(0.05)	(1.80)	(1.18)	(2.09)	(3.71)
θ	0.054[(c)]	0.002	0.002	0.009	-0.006	-0.004	-0.002	-0.014	-0.042[(c)]
	(3.14)	(0.36)	(0.28)	(1.85)	(-0.77)	(-0.66)	(-0.13)	(-1.66)	(-3.61)
θ(θ*Per capita Expenditure)	-4.68E-07[(c)]	-4.47E-08[(c)]	-1.50E-08	-7.42E-08[(c)]	1.08E-07[(c)]	8.93E-08[(c)]	-2.79E-08	1.25E-07[(c)]	3.07E-07[(c)]
	(-14.31)	(-4.87)	(-1.14)	(-7.8)	(7.14)	(8.41)	(-1.2)	(8.04)	(13.91)
(1−θ)((1−θ)*Per capita Expenditure)	-3.83E-07[(c)]	-4.09E-08[(c)]	-8.82E-09	-7.11E-08[(c)]	8.52E-08[(c)]	1.00E-07[(c)]	4.23E-08	1.22E-07[(c)]	1.54E-07[(c)]
	(-7.12)	(-2.70)	(-0.41)	(-4.53)	(3.43)	(5.74)	(1.10)	(4.75)	(4.23)
Log Family Size	0.063[(c)]	0.004	-0.004	-0.009[(c)]	0.004	-0.012[(c)]	0.011	-0.021[(c)]	-0.036[(c)]
	(7.28)	(1.82)	(-1.21)	(-3.56)	(1.11)	(-4.42)	(1.76)	(-5.12)	(-6.15)
Wald Test for $H_0 : \frac{\partial b^g}{\partial \theta} = 0; \chi^2(2)$									
θ = 0.0	191.67[(c)]	18.20[(c)]	0.84	74.46[(c)]	33.45[(c)]	80.31[(c)]	2.98	75.90[(c)]	109.37[(c)]
θ = 0.2	140.27[(c)]	12.01[(c)]	0.57	58.10[(c)]	21.26[(c)]	59.19[(c)]	4.57	58.21[(c)]	71.41[(c)]
θ = 0.4	53.18[(c)]	2.87	0.18	26.59[(c)]	4.42	21.83[(c)]	7.24[(b)]	25.15[(c)]	21.75[(c)]
θ = 0.5	15.26[(c)]	0.15	0.08	9.35[(c)]	0.63	4.09	8.39[(b)]	7.86[(b)]	13.83[(c)]
θ = 0.6	18.06[(c)]	2.79	0.23	3.75	7.80[(b)]	2.48	8.27[(b)]	3.44	41.23[(c)]
θ = 0.8	133.32[(c)]	18.70[(c)]	0.96	34.75[(c)]	40.86[(c)]	47.35[(c)]	4.69	38.26[(c)]	148.78[(c)]
θ = 1.0	219.73[(c)]	28.27[(c)]	1.37	64.64[(c)]	58.98[(c)]	83.88[(c)]	2.02	69.96[(c)]	203.28[(c)]

Notes:
(a) t-values in parenthesis
(b) Statistically significant at 5% level
(c) Statistically significant at 1% level
(d) This table reports the coefficient estimates of only some of the determinants used in the estimation.

Table 4a: 3SLS Estimates[a] of Budget Share Equations – NSS: Bihar (Rural)[d]

	Food	Tobacco	Alcohol	Energy	Transport	Medical Items	Clothing	Education	Other Expenditure
Constant	0.664[c]	0.020[c]	0.007	0.137[c]	0.063[c]	-0.002	0.051[b]	0.006	0.053[c]
	(20.14)	(2.92)	(0.96)	(9.16)	(4.46)	(-0.25)	(2.43)	(0.74)	(3.28)
θ	0.055[c]	0.008[c]	-0.014[c]	0.004	-0.011[c]	-0.006[c]	-0.012[b]	-0.009[c]	-0.016[c]
	(5.99)	(4.01)	(-6.74)	(1.00)	(-2.68)	(-3.60)	(-2.00)	(-3.81)	(-3.59)
θ(θ*Per capita Expenditure)	-3.23E-07[c]	-1.95E-08[c]	-1.45E-08[b]	-5.70E-08[c]	4.11E-08[c]	7.52E-08[c]	9.54E-08[c]	1.14E-07[c]	8.90E-08[c]
	(-11.14)	(-3.25)	(-2.25)	(-4.33)	(3.28)	(14.17)	(5.19)	(15.87)	(6.26)
(1−θ)((1−θ)*Per capita Expenditure)	-5.21E-08	5.52E-09	-2.27E-08[b]	-1.73E-08[c]	3.53E-08	1.89E-08[b]	-2.04E-08	4.19E-08[c]	1.09E-08
	(-1.04)	(0.53)	(-2.03)	(-0.76)	(1.64)	(2.07)	(-0.65)	(3.39)	(0.44)
Log Family Size	0.041[c]	-0.005[c]	0.000	-0.034[c]	0.006[b]	0.002	-0.007[b]	-0.005[c]	0.003
	(7.12)	(-4.36)	(-0.30)	(-13.01)	(2.53)	(1.62)	(-1.99)	(-3.83)	(1.18)
Wald Test for $H_0 : \frac{\partial b^g}{\partial \theta} = 0; \chi^2(2)$									
θ = 0.0	52.91[c]	18.04[c]	46.62[c]	2.81	17.13[c]	29.65[c]	4.07	46.57[c]	18.00[c]
θ = 0.2	43.95[c]	17.52[c]	49.36[c]	1.55	15.61[c]	17.43[c]	4.19	26.57[c]	15.29[c]
θ = 0.4	36.14[c]	16.72[c]	57.29[c]	1.12	12.60[c]	14.89[c]	6.71[b]	14.70[c]	12.93[c]
θ = 0.5	37.78[c]	16.30[c]	65.04[c]	2.36	10.37[c]	29.23[c]	10.28[c]	26.69[c]	13.44[c]
θ = 0.6	49.29[c]	16.12[c]	75.18[c]	5.65	8.17[b]	64.97[c]	16.06[c]	66.19[c]	16.95[c]
θ = 0.8	98.58[c]	17.27[c]	87.41[c]	15.92[c]	8.21[b]	172.38[c]	27.26[c]	203.93[c]	31.92[c]
θ = 1.0	125.52[c]	18.82[c]	79.52[c]	19.75[c]	12.66[c]	209.73[c]	27.04[c]	264.54[c]	40.08[c]

Notes:
(a) t-values in parenthesis
(b) Statistically significant at 5% level
(c) Statistically significant at 1% level
(d) This table reports the coefficient estimates of only some of the determinants used in the estimation.

Table 4b: 3SLS Estimates[a] of Budget Share Equations – NSS: Bihar (Urban)[d]

	Food	Tobacco	Alcohol	Energy	Transport	Medical Items	Clothing	Education	Other Expenditure
Constant	0.769[c]	0.023[b]	0.022	0.118[c]	0.059[b]	-0.033	0.034	0.046	-0.038
	(10.99)	(2.01)	(1.48)	(5.43)	(2.19)	(-1.24)	(0.93)	(1.58)	(-0.70)
θ	-0.036	0.000	-0.005	0.003	0.000	0.010	0.009	-0.015	0.034[b]
	(-1.68)	(0.04)	(-1.02)	(0.49)	(-0.06)	(1.23)	(0.84)	(-1.68)	(2.00)
θ(θ*Per capita Expenditure)	-4.70E-07[c]	-1.83E-08[c]	-1.74E-08[c]	-6.72E-08[c]	4.05E-08[c]	1.02E-07[c]	3.68E-09	2.32E-07[c]	1.95E-07[c]
	(-19.81)	(-4.7)	(-3.37)	(-9.09)	(4.39)	(11.2)	(0.3)	(23.63)	(10.55)
(1−θ)((1−θ)*Per capita Expenditure)	-6.18E-07[c]	-2.99E-08[b]	-3.09E-08	-5.19E-08	1.88E-08	1.66E-07[c]	5.78E-08	2.05E-07[c]	2.83E-07[c]
	(-6.66)	(-1.97)	(-1.53)	(-1.80)	(0.52)	(4.68)	(1.2)	(5.34)	(3.93)
Log Family Size	0.081[c]	0.000	-0.002	-0.006[b]	0.001	-0.002	0.003	-0.033[c]	-0.042[c]
	(8.42)	(0.00)	(-1.09)	(-1.96)	(0.18)	(-0.45)	(0.65)	(-8.19)	(-5.68)
Wald Test for $H_0 : \frac{\partial b^g}{\partial \theta} = 0; \chi^2(2)$									
θ = 0.0	61.94[c]	7.83[b]	2.36	9.25[c]	0.62	30.23[c]	1.45	86.29[c]	16.53[c]
θ = 0.2	38.67[c]	5.88	1.74	5.26	0.16	20.96[c]	1.40	54.53[c]	10.74[c]
θ = 0.4	11.50[c]	3.02	1.12	1.03	0.08	8.77[b]	1.29	16.55[c]	4.84
θ = 0.5	3.01	1.33	1.06	0.29	0.66	3.10	1.19	3.50	4.19
θ = 0.6	13.24[c]	0.08	1.70	3.59	2.48	2.23	1.05	14.34[c]	9.89[c]
θ = 0.8	212.28[c]	7.08[b]	8.64[b]	44.79[c]	13.82[c]	58.81[c]	0.72	271.40[c]	73.92[c]
θ = 1.0	443.37[c]	23.60[c]	15.24[c]	86.43[c]	20.56[c]	144.03[c]	1.01	580.38[c]	135.81[c]

Notes:
(a) t-values in parenthesis
(b) Statistically significant at 5% level
(c) Statistically significant at 1% level
(d) This table reports the coefficient estimates of only some of the determinants used in the estimation.

Table 5a: 3SLS Estimates[a] of Budget Share Equations – NSS: Maharashtra (Rural)[d]

	Food	Tobacco	Alcohol	Energy	Transport	Medical Items	Clothing	Education	Other Expenditure
Constant	0.631[c]	0.050[c]	0.003	0.114[c]	0.114[c]	0.000	0.034	0.029	0.025
	(18.15)	(5.70)	(0.39)	(10.15)	(6.46)	(0.07)	(1.31)	(1.91)	(1.27)
θ	-0.038[c]	-0.006	-0.001	-0.022[c]	-0.017[b]	0.006[b]	0.018	0.015[c]	0.045[c]
	(-2.89)	(-1.68)	(-0.29)	(-5.19)	(-2.58)	(2.24)	(1.84)	(2.62)	(6.1)
θ(θ*Per capita Expenditure)	-2.03E-07[c]	-3.59E-08[c]	-4.70E-09	-6.06E-08[c]	-1.18E-08	2.97E-08[c]	6.16E-09	1.32E-07[c]	1.49E-07[c]
	(-7.11)	(-4.98)	(-0.81)	(-6.55)	(-0.81)	(5.37)	(0.29)	(10.55)	(9.31)
(1−θ)((1−θ)*Per capita Expenditure)	-5.38E-07[c]	-6.61E-08[c]	1.56E-08	-2.04E-07[c]	-6.41E-08	7.80E-08[c]	1.80E-07[c]	2.11E-07[c]	3.87E-07[c]
	(-6.12)	(-2.98)	(0.87)	(-7.19)	(-1.44)	(4.6)	(2.75)	(5.51)	(7.89)
Log Family Size	0.023[c]	0.001	-0.001	-0.013[c]	0.011[c]	0.002	0.006	-0.011[c]	-0.017[c]
	(3.17)	(0.40)	(-0.90)	(-5.39)	(2.98)	(1.35)	(1.03)	(-3.52)	(-4.21)
Wald Test for $H_0 : \frac{\partial b^g}{\partial \theta} = 0; \chi^2(2)$									
θ = 0.0	43.37[c]	9.49[c]	2.67	51.71[c]	7.14[b]	24.13[c]	7.67[b]	35.06[c]	62.36[c]
θ = 0.2	34.20[c]	6.65[b]	3.29	43.26[c]	7.62[b]	18.96[c]	7.41[b]	23.15[c]	50.72[c]
θ = 0.4	20.22[c]	3.44	4.37	31.95[c]	8.81[b]	11.20[c]	6.76[b]	9.53[c]	38.53[c]
θ = 0.5	12.26[c]	2.89	5.16	27.36[c]	10.03[c]	6.91[b]	6.10[b]	7.08[b]	38.08[c]
θ = 0.6	8.39[b]	5.74	5.95	29.60[c]	11.93[c]	5.14	5.07	18.73[c]	53.57[c]
θ = 0.8	51.56[c]	31.94[c]	4.72	87.80[c]	15.11[c]	30.74[c]	3.40	127.76[c]	173.19[c]
θ = 1.0	100.79[c]	45.80[c]	1.23	131.15[c]	11.99[c]	58.33[c]	5.12	186.11[c]	228.84[c]

Notes:
(a) t-values in parenthesis
(b) Statistically significant at 5% level
(c) Statistically significant at 1% level
(d) This table reports the coefficient estimates of only some of the determinants used in the estimation.

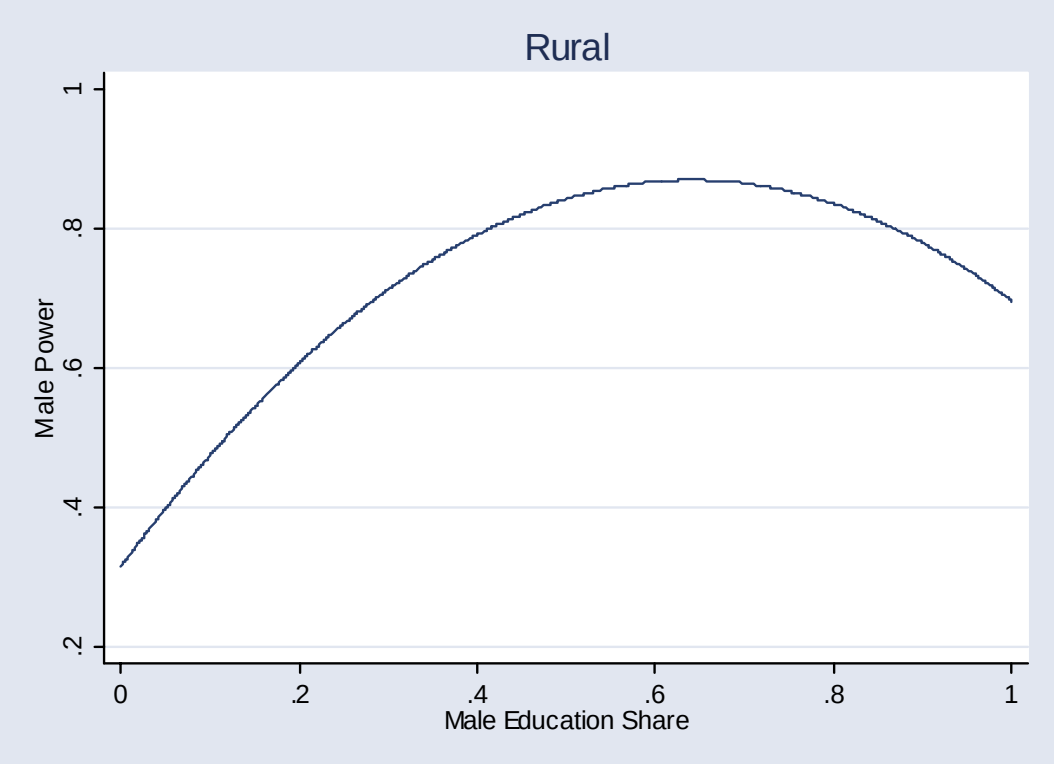
Table 5b: 3SLS Estimates[(a)] of Budget Share Equations – NSS: Maharashtra (Urban)[(d)]

	Food	Tobacco	Alcohol	Energy	Transport	Medical Items	Clothing	Education	Other Expenditure
Constant	0.547[(c)]	0.007	0.002	0.087[(c)]	0.071[(c)]	0.006	0.078[(c)]	0.074[(c)]	0.129[(c)]
	(20.16)	(1.09)	(0.23)	(10.4)	(5.44)	(0.55)	(4.64)	(5.04)	(5.27)
θ	0.034[(c)]	-0.002	0.001	0.002	0.010[(b)]	-0.009[(b)]	-0.013	-0.014[(b)]	-0.009
	(3.31)	(-0.68)	(0.22)	(0.76)	(1.96)	(-2.17)	(-2.10)	(-2.54)	(-0.95)
θ(θ*Per capita Expenditure)	-3.80E-07[(c)]	-1.81E-08[(c)]	-1.36E-08[(c)]	-6.69E-08[(c)]	-4.48E-08[(c)]	1.09E-07[(c)]	3.89E-08[(c)]	1.39E-07[(c)]	2.36E-07[(c)]
	(-25.44)	(-5.22)	(-3.49)	(-14.55)	(-6.22)	(18.46)	(4.23)	(17.15)	(17.52)
(1−θ)((1−θ)*Per capita Expenditure)	-3.17E-07[(c)]	-2.13E-08[(c)]	2.24E-09	-4.71E-08[(c)]	-1.09E-08	6.22E-08[(c)]	-1.16E-09	1.20E-07[(c)]	2.13E-07[(c)]
	(-10.96)	(-3.17)	(0.30)	(-5.29)	(-0.78)	(5.41)	(-0.06)	(7.65)	(8.17)
Log Family Size	0.062[(c)]	0.002	0.000	0.001	0.012[(c)]	-0.005[(b)]	-0.002	-0.024[(c)]	-0.048[(c)]
	(11.77)	(1.47)	(0.05)	(0.82)	(4.78)	(-2.20)	(-0.55)	(-8.22)	(-9.99)
Wald Test for $H_0 : \frac{\partial b^g}{\partial \theta} = 0; \chi^2(2)$									
θ = 0.0	316.44[(c)]	13.58[(c)]	0.09	60.00[(c)]	11.47[(c)]	87.76[(c)]	7.47[(b)]	160.31[(c)]	137.63[(c)]
θ = 0.2	206.48[(c)]	8.29[(b)]	0.72	30.96[(c)]	7.58[(b)]	45.60[(c)]	5.95	108.47[(c)]	84.87[(c)]
θ = 0.4	59.46[(c)]	1.83	3.56	2.23	3.97	6.14[(b)]	4.47	35.89[(c)]	18.02[(c)]
θ = 0.5	12.07[(c)]	0.49	6.87[(b)]	5.05	4.73	13.63[(c)]	4.67	8.58[(b)]	0.90
θ = 0.6	54.37[(c)]	4.03	11.52[(c)]	40.90[(c)]	10.16[(c)]	71.14[(c)]	6.63[(b)]	20.51[(c)]	30.22[(c)]
θ = 0.8	453.18[(c)]	25.69[(c)]	17.22[(c)]	186.51[(c)]	30.69[(c)]	291.47[(c)]	14.42[(c)]	195.44[(c)]	236.31[(c)]
θ = 1.0	728.33[(c)]	38.57[(c)]	14.44[(c)]	253.15[(c)]	39.49[(c)]	386.88[(c)]	17.91[(c)]	327.18[(c)]	366.16[(c)]

Notes:
(a) t-values in parenthesis
(b) Statistically significant at 5% level
(c) Statistically significant at 1% level
(d) This table reports the coefficient estimates of only some of the determinants used in the estimation.

Figure 1: Relationship between Male Power and his Education Share in Selected States

Kerala



Bihar

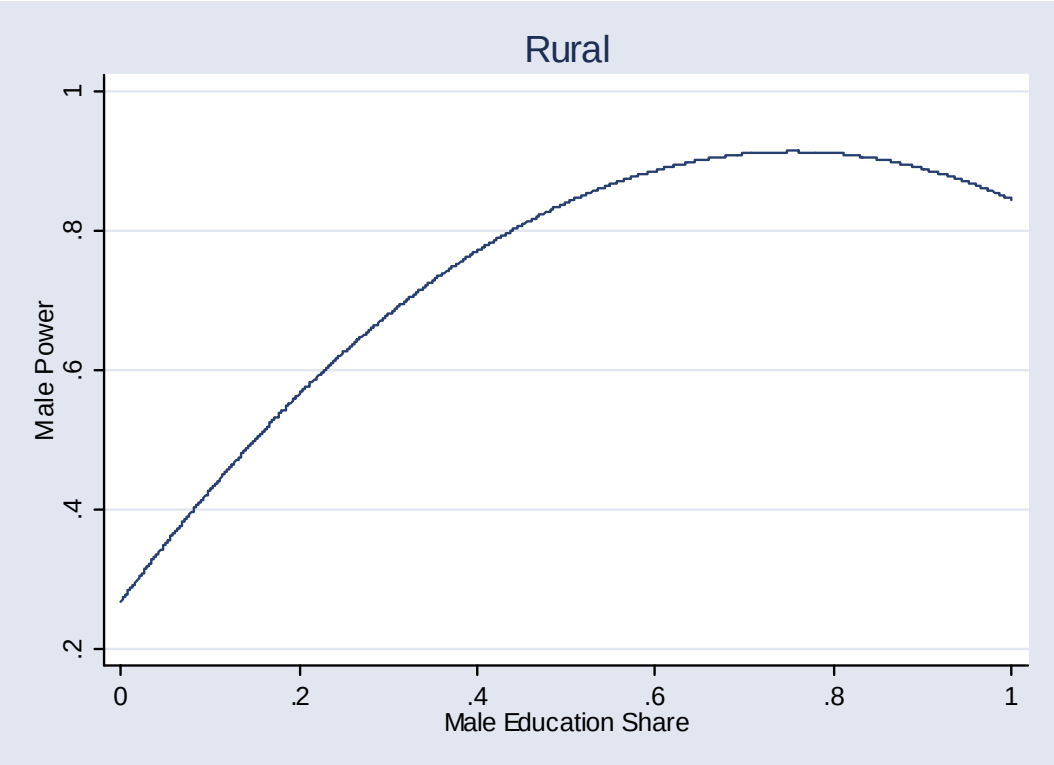


Figure 1: Continued
Maharashtra

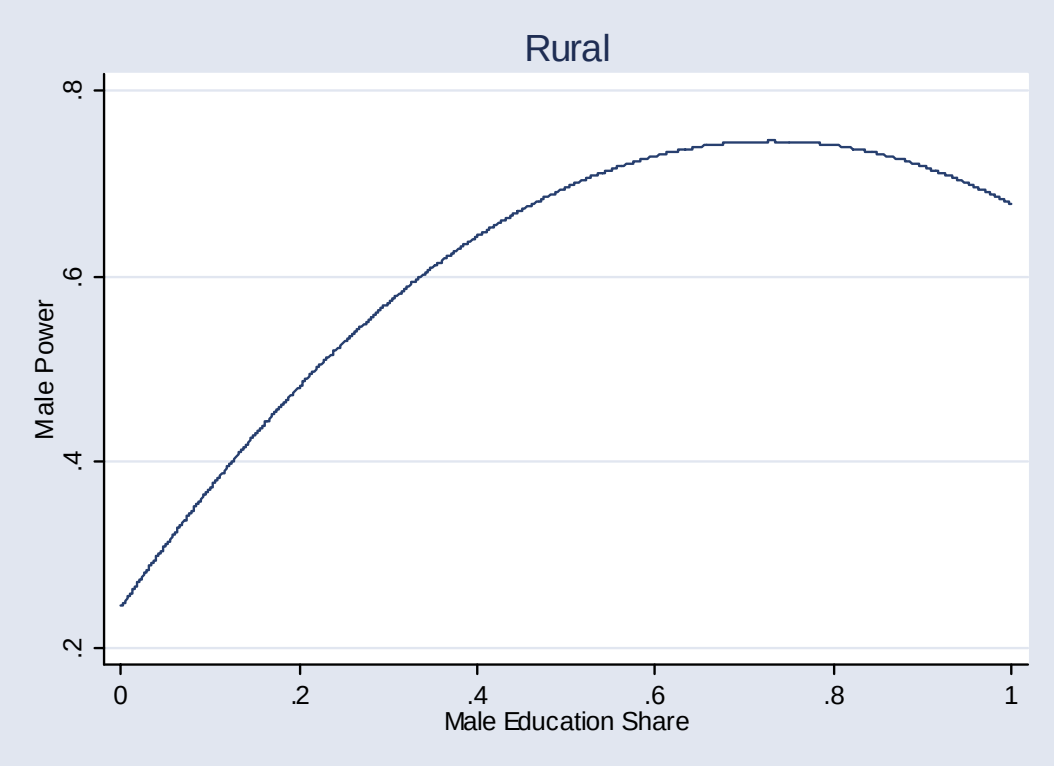
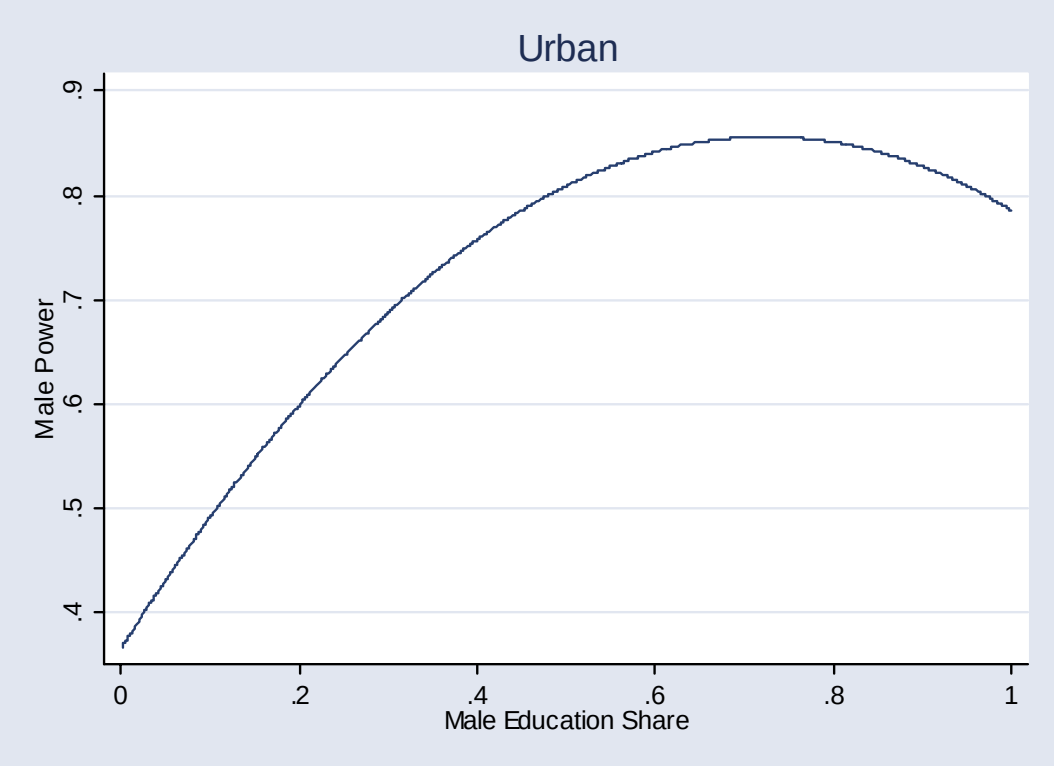


Figure 2: Relationship between Male Power and his Education Share in Selected States

Kerala



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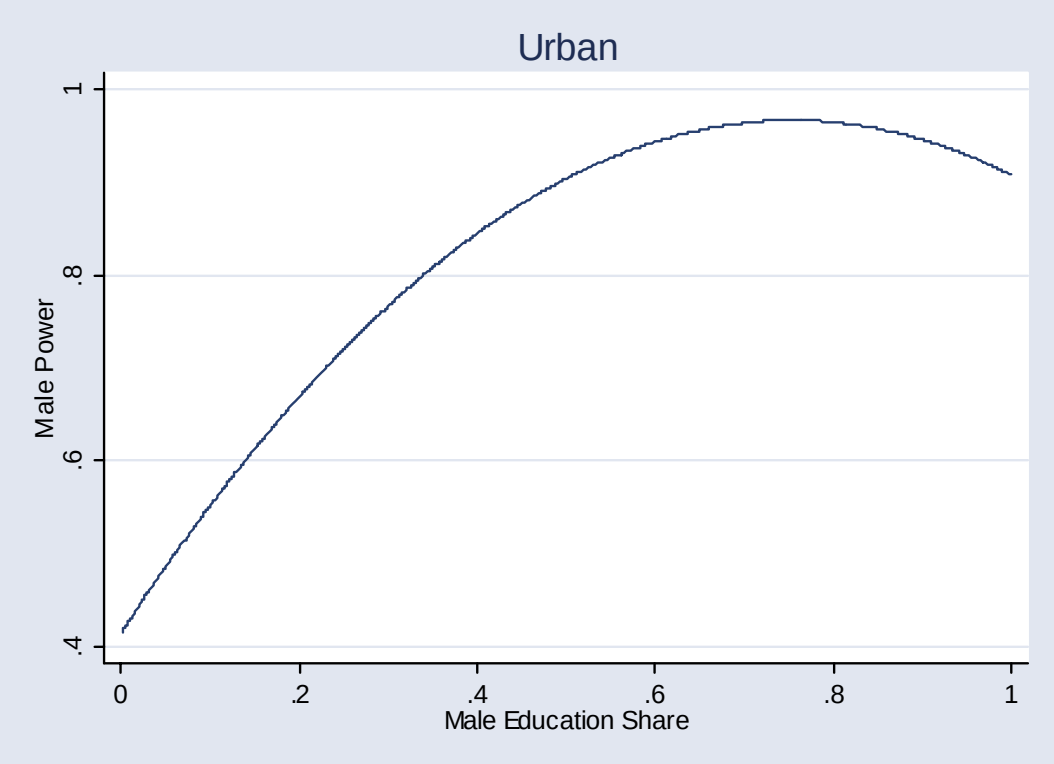


Figure 2: Continued
Maharashtra

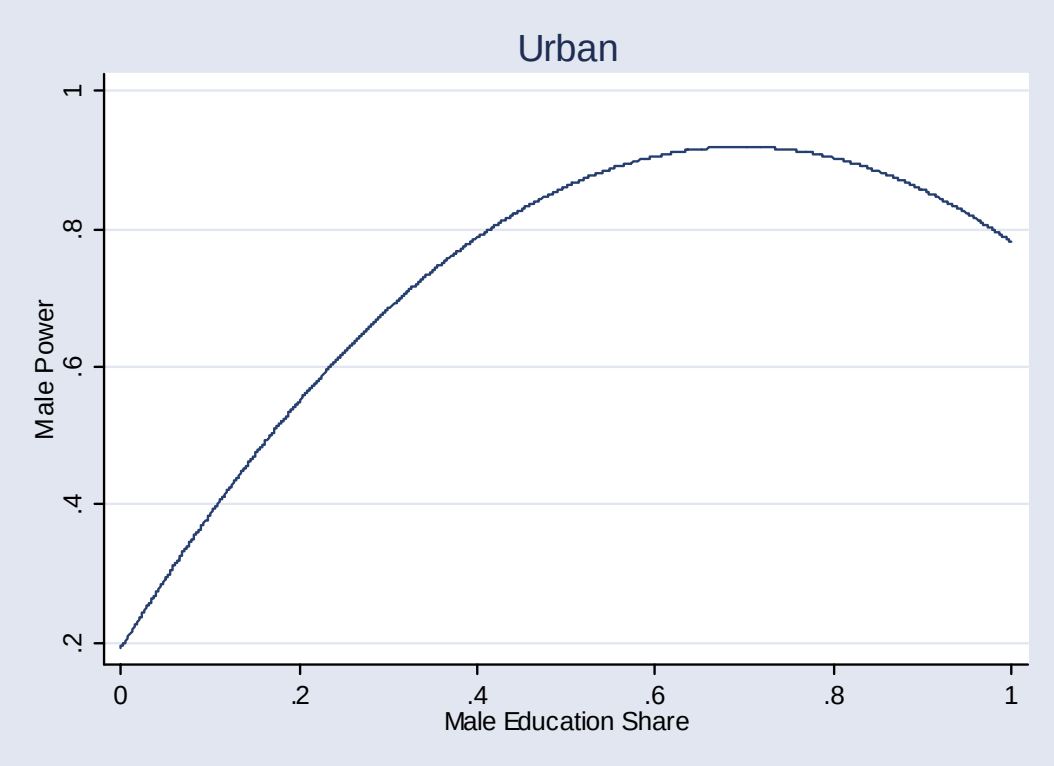
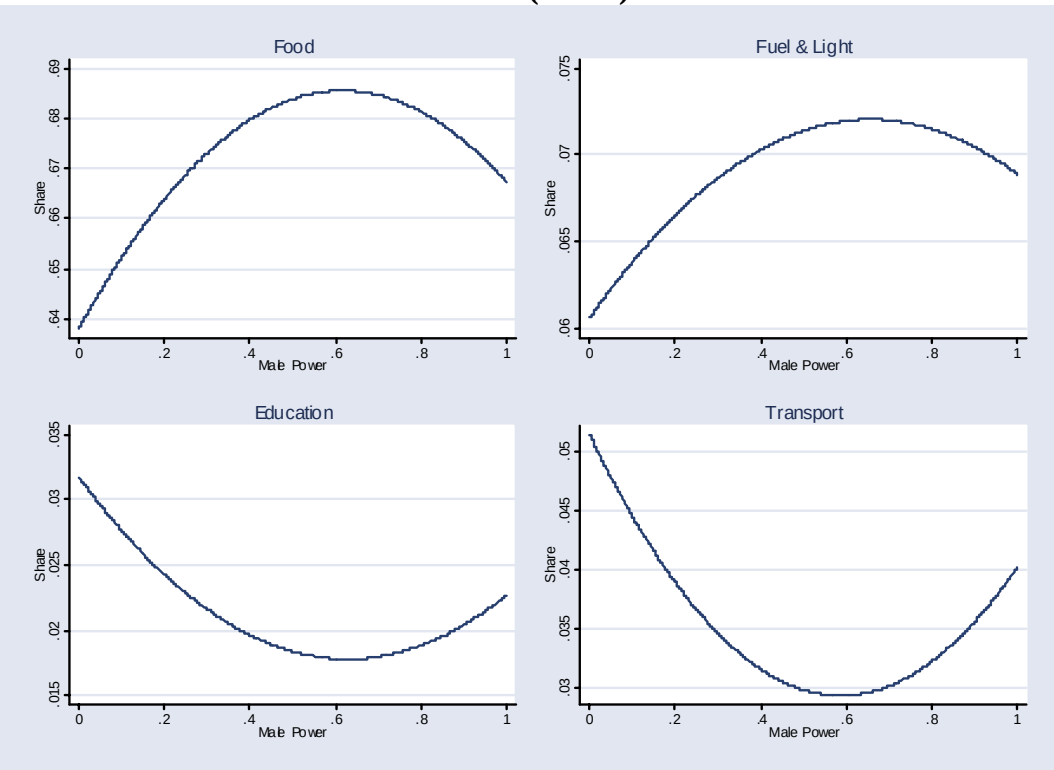


Figure 3: Relationship between Expenditure Share and Male Power in the Household

Kerala (Rural)



Kerala (Urban)

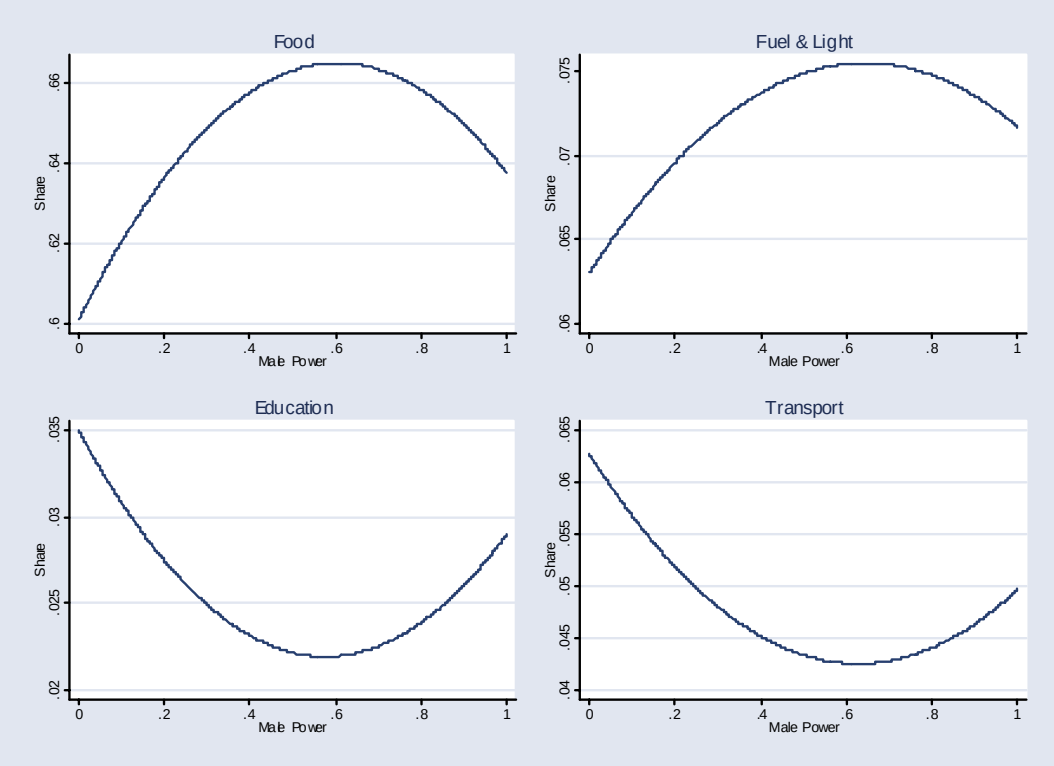
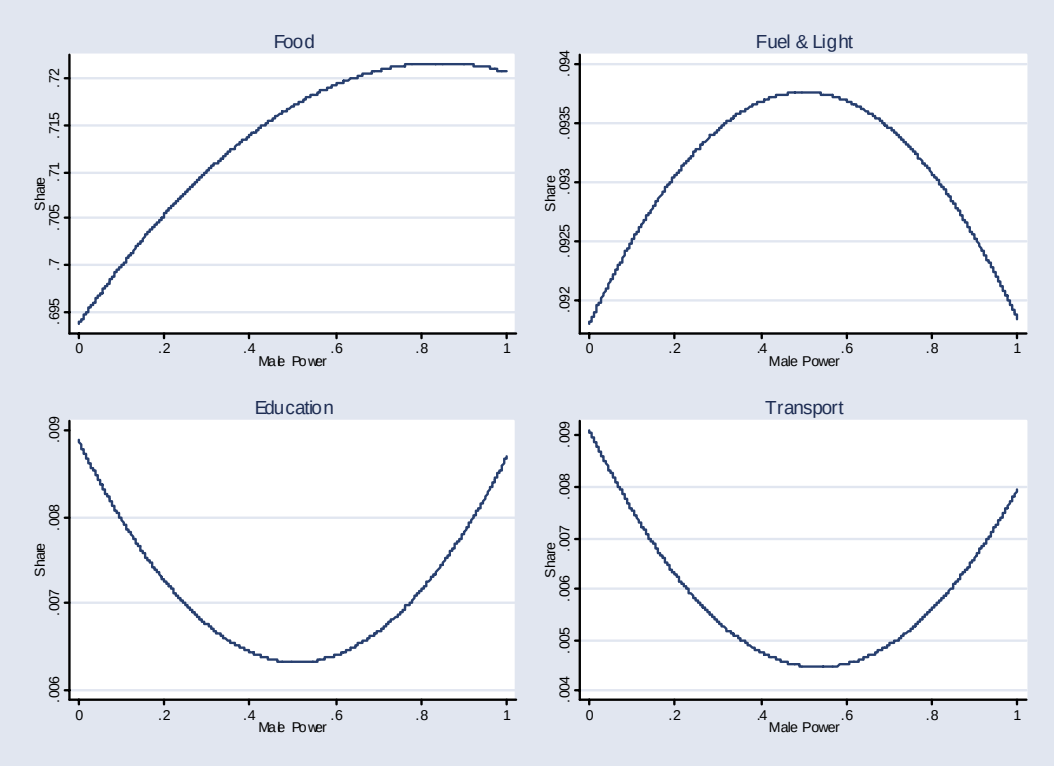


Figure 3: Continued
Bihar (Rural)



Bihar (Urban)

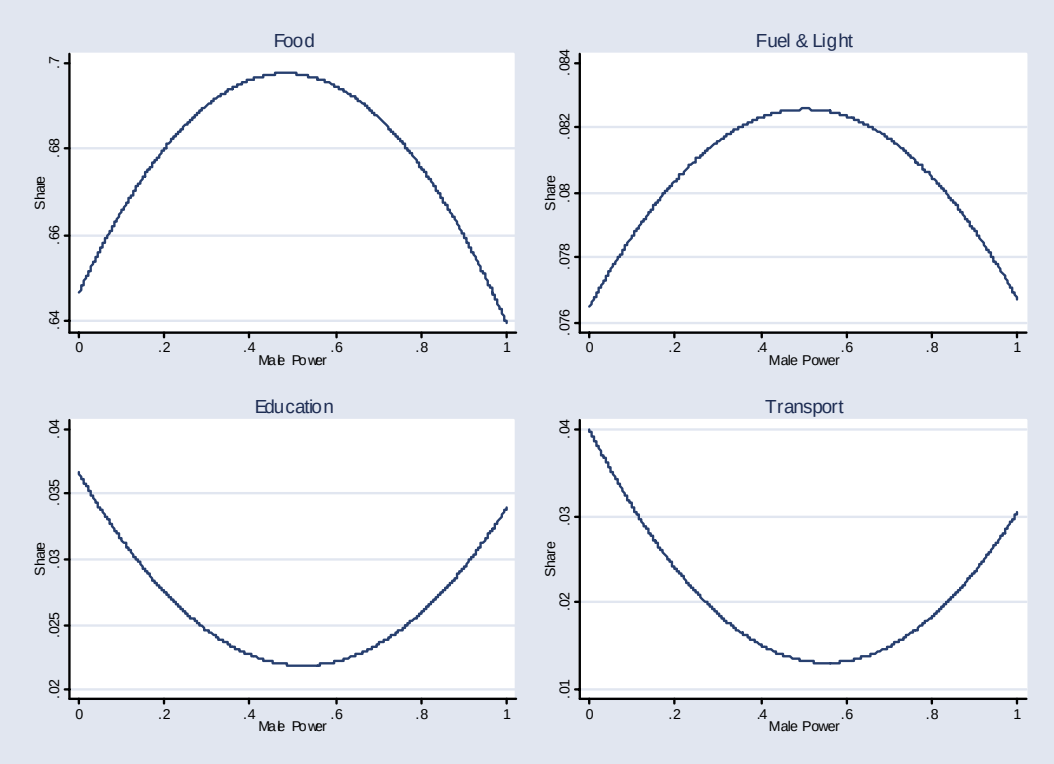
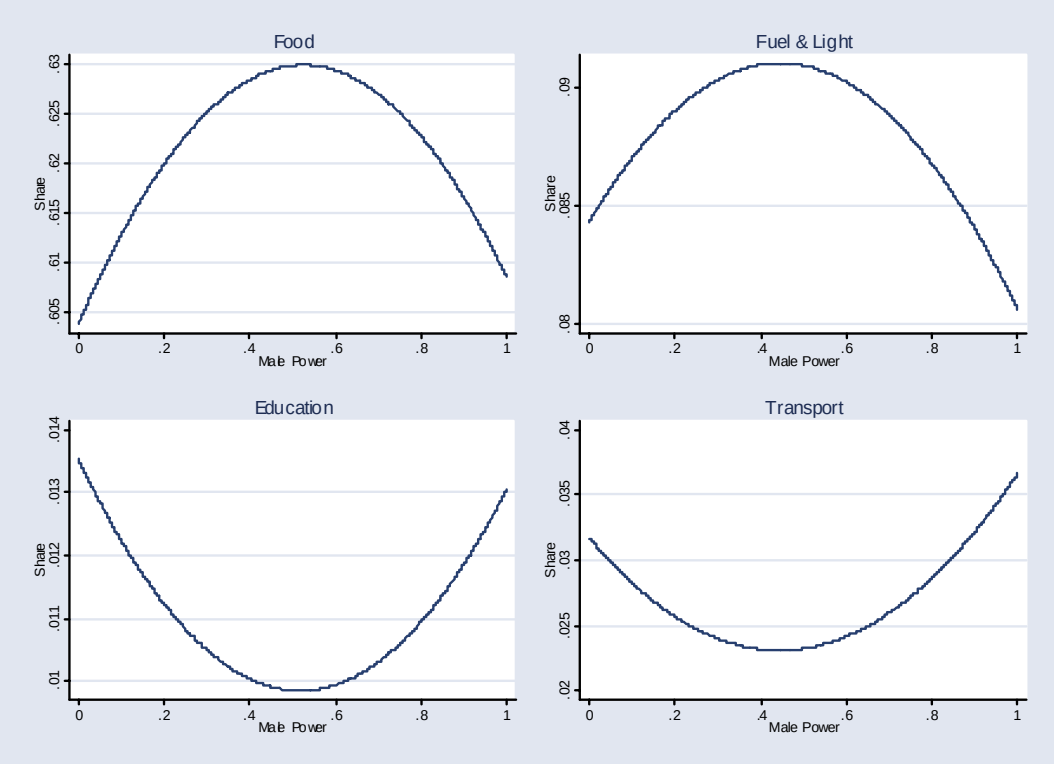


Figure 3: Continued
Maharashtra (Rural)



Maharashtra (Urban)

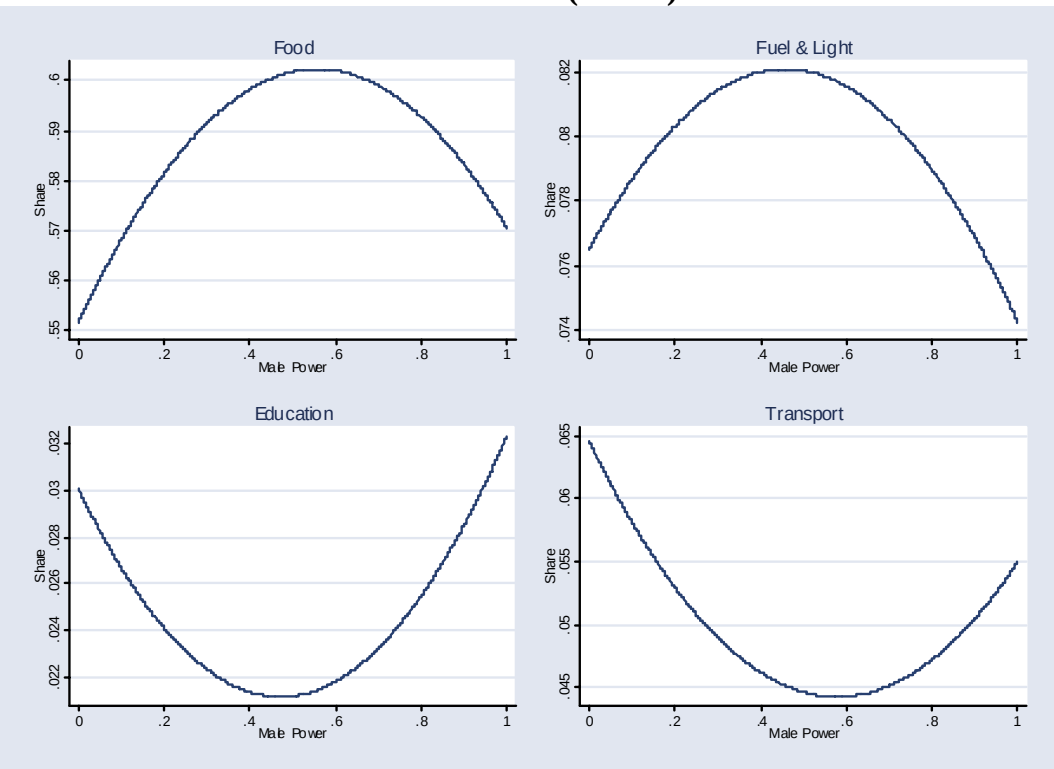


Table A1: 3SLS Budget Share Estimates[(a)] – SLC[(d)]

	Food	Tobacco	Alcohol	Energy	Transport	Medical Items	Clothing	Education	Other Expenditure
Constant	1.036[(c)]	0.039	0.019	0.029	-0.056	-0.008	0.039	-0.114[(c)]	0.016
	(11.37)	(1.96)	(0.81)	(1.16)	(1.88)	(0.12)	(1.06)	(4.78)	(0.23)
θ	-0.237[(c)]	0.001	-0.017	0.012	0.048	0.162[(c)]	-0.028	0.101[(c)]	-0.042
	(3.04)	(0.05)	(0.89)	(0.58)	(1.91)	(2.97)	(0.91)	(4.96)	(0.71)
θ(θ*Per capita Expenditure)	-1.7E-05[(c)]	-5.68E-07	3.18E-07	8.43E-07	1.78E-06[(c)]	-6.07E-07	-1.72E-06[(b)]	-4.32E-08	1.71E-05[(c)]
	(9.25)	(1.41)	(0.69)	(1.69)	(2.96)	(0.47)	(2.35)	(0.09)	(12.07)
(1−θ)((1−θ)*Per capita Expenditure)	-6.6E-05[(c)]	-2.38E-06	-2.84E-06	4.07E-06	8.72E-06	3.30E-05	-5.83E-06	1.52E-05[(c)]	1.64E-05[(c)]
	(4.13)	(0.68)	(0.71)	(0.94)	(1.67)	(2.93)	(0.92)	(3.61)	(1.33)
Log Family Size	-0.033[(c)]	-0.007[(c)]	-0.004	-0.009[(c)]	0.002	-0.004	0.015[(c)]	0.012[(c)]	0.029[(c)]
	(4.17)	(3.81)	(1.77)	(4.29)	(0.80)	(0.77)	(4.67)	(5.51)	(4.67)
Wald Test for $H_0 : \frac{\partial b^g}{\partial \theta} = 0; \chi^2(2)$									
θ = 0.0	32.89[(c)]	8.96[(b)]	1.17	2.75	4.23	8.89[(b)]	0.85	49.32[(c)]	69.97[(c)]
θ = 0.2	22.19[(c)]	8.36[(b)]	1.17	2.12	5.32[(b)]	8.85[(b)]	0.90	54.58[(c)]	51.02[(c)]
θ = 0.4	11.03[(c)]	7.10[(b)]	1.16	1.21	8.46[(b)]	8.93[(b)]	1.57	63.65[(c)]	24.00[(c)]
θ = 0.5	9.52[(c)]	5.92	1.14	0.69	11.99[(c)]	9.14[(b)]	2.65	70.46[(c)]	9.06[(b)]
θ = 0.6	19.65[(c)]	4.13	1.10	0.34	18.24[(c)]	9.64[(c)]	4.91[(b)]	78.54[(c)]	0.51
θ = 0.8	134.17[(c)]	0.07	0.87	2.93	38.83[(c)]	12.08[(c)]	14.60[(c)]	79.72[(c)]	86.16[(c)]
θ = 1.0	237.19[(c)]	3.39	0.80	8.07[(b)]	35.78[(c)]	12.91[(c)]	16.53[(c)]	42.65[(c)]	242.18[(c)]

Notes:
(a) t-values in parenthesis
(b) Statistically significant at 5% level
(c) Statistically significant at 1% level
(d) This table reports the coefficient estimates of only some of the determinants used in the estimation.

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