Parent Altruism

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Abstract

This paper offers a method for testing altruism and applies this to investigate whether parents of young children in rural Pakistan are altruistic. The estimated "altruism coefficient" (defined in the paper) indicates the degree of altruism. Parent altruism is of evident interest in designing welfare programmes. Indeed, we show that parent altruism implies positive effects of parental income on child outcomes. Thus the effectiveness of income transfer programmes targeted at child poverty is conditional on the degree of parent altruism. The prediction of the altruistic model that is tested is that the demand for child goods is increasing in adult consumption, prices constant. M-demands provide the natural estimation framework. The test is conducted for a number of items of adult consumption. For all but tobacco the data decisively reject the null of selfishness. This result is robust to replacing child clothing with child schooling or child labour. We argue that the aberrant behaviour of tobacco may be understood in terms of its addictive properties. We also suggest that the results are consistent with fathers being less altruistic than mothers, tobacco being a predominantly male good.

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1. Introduction

The recent burgeoning literature on household decision making has been largely preoccupied with preference heterogeneity amongst members of a household, evidence of which shows that the commonly used unitary model is restrictive. In these models, agents can be egoistic or altruistic; what matters is that their preferences are not identical. This paper shifts attention to the question of whether agents are altruistic. While the primary concern here is with proposing and implementing a test of parent altruism, the basic idea has wider application, to altruism in other contexts. The test is simple and intuitive. It is implemented by estimation of m-demands, a procedure that obviates the need for data on total income or expenditure. This is of practical importance as these data are often unavailable in household surveys for OECD countries and, while often available in surveys from developing countries, they are difficult to measure accurately (see Section 4).

The question of parent altruism is of evident interest in designing welfare. For example, in the context of addressing child poverty, economists have debated the alternatives of making direct income transfers to parents and subsidising child inputs. Direct transfers will only have the desired effect if there are positive income effects on child outcomes and we show that these only arise under parental altruism (Section 3.2). In general, the absence of parent altruism would, of course, have profound consequences for the future life-chances of children. This is especially so in low-income countries where the role of the state in provision of health-care and education is typically limited, resulting in a larger role for parental income and parental preferences. This paper uses data from rural Pakistan, where there is a high prevalence here of child labour and malnutrition even in households that are living well above subsistence.

Parent altruism is a critical assumption in many economic models, ranging from models of child labour (e.g. Basu and Van (1998), Basu (2000), Baland and Robinson (2000)) to models of macroeconomic policy (e.g. Barro, 1974). Although altruism is assumed in most economic models, historians and anthropologists have challenged this premise in their accounts of child labour. Recent economic analyses of data on child labour also appear to call altruism into question (see Section 2). [[While there is not as much robust evidence based upon micro-data as one might expect, the available evidence

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on the effect of household income on a range of measures of child well-being in developing and other countries suggests that it is often small (see Section 2.2).]]

We show that the altruistic model predicts a positive covariance of the demands for child and adult consumption at constant prices. In contrast, if parents were selfish, the demand for child goods would be invariant to the level of adult consumption, given prices. M-demands provide the natural estimation framework. The investigation is conducted for child consumption, schooling and child labour and the pattern of results is identical across the three. The null of selfish parents is rejected when we consider the demands for adult clothing and footwear, ceremonies and tea and coffee. However, we cannot reject selfishness in the case of tobacco consumption. We argue that this is consistent with the addictive properties of tobacco. Given that, in these data, tobacco is disproportionately consumed by males, the results are also consistent with the view that fathers are less altruistic than mothers, a view for which evidence has been accumulating in a related literature.

Section 2 reviews relevant sections of the related literatures on preference heterogeneity and child outcomes in order to motivate the analysis of altruism both generally and in the context of child labour and education. A theoretical framework is sketched in Section 3, where testable predictions are derived. Section 4 sets out the advantages of using an estimating framework involving m-demands. Specification issues including endogeneity are discussed in Section 5. The data are described in Section 6, where we also detail the construction of the empirical model. The relation of income with the key variables in the analysis is described in Section 7, where we present the results of estimating Engel curves and establish normality of the adult consumption categories that are specified as reference goods in the m-demands. Section 7 also presents a comparison of means from the data that is striking for being highly suggestive of parental selfishness. The main results are presented in Section 8, which also discusses their robustness. Our finding of a similar pattern of results for multiple definitions of adult and child goods is a compelling feature of the robustness of the results. Section 9 contains a more reflective discussion of the method and the results, and Section 10 concludes.

2. Related Literature

2.1. Preference Heterogeneity within Households

There appears to be no previous research that is primarily concerned with developing a test for altruism. The macroeconomic literature on Ricardian equivalence is concerned with translating varying assumptions regarding altruism into varying predictions of the effects of macroeconomic policy (see Seater, 1993). It therefore underlines the case made in this paper for finding a simple way of investigating whether agents are altruistic, and how altruistic. The microeconomic literature on altruism stems from Becker (1981), where altruism is posited in the formulation of models of household decision making. Maintaining the assumption of parent altruism, several authors have investigated differences in altruism across individuals (see Section 2.1.1). Others have challenged the unitary or consensus utility function in which the assumption of altruism was couched. Empirical research in this area has been primarily concerned with testing

income pooling, a prediction of the unitary model. Most studies reject income pooling, concluding that the unitary model is restrictive and that individual outcomes are a function of individual incomes. This literature on preference heterogeneity within the household sidesteps the question of altruism. In the bargaining and collective models that have been proposed as alternatives to the unitary model of household decision making, agents can be egoistic or altruistic; what matters is that their preferences are not identical. This paper asserts the importance of investigating altruism and its consequences for within-household resource allocation.

Differences in Altruism

In an interesting empirical exploration of biological motives for altruism of parents towards children, Case, Lin and McLanahan (2000) investigate whether biological children (of the mother) fare better in the intra-household distribution of resources than foster, adopted or step-children. They estimate Engel curves for food using household survey data from South Africa and the US, with the usual demographic variables extended to reflect the nature of the relation of parent and child. Comparison of the demographic coefficients in Engel curves allows the authors to make relative statements about how replacing a biological child with a non-biological child changes budget-shares. Case and McLanahan find some support for the hypothesis that (young) biological children are favoured in the within-household distribution of food when mothers control food expenditure.

A number of recent studies concerned with investigating preference heterogeneity between adults have found evidence consistent with the view that mothers are more altruistic towards children than fathers. A child outcome such as child height or school attainment is modeled as a function of total household resources and the share of income controlled by the mother or else some other indicator of her relative power in household decision making. This index is typically significant, and the range of contexts and outcomes for which this is so is quite remarkable (see Thomas (1996, 1998), Martinelli and Parker (2001), Pitt *et al* (2001) for example).

These studies do not directly model or test altruism of parents towards children but, instead, seek to establish differences in altruism across children within a household or between mothers and fathers.

Income Pooling and the Unitary Model

The consequence of preference heterogeneity for household demands has recently been investigated in a number of studies. The evidence suggests that the distribution of income amongst household members influences who gets what in the within-household allocation of resources[2]. This is a violation of income pooling, a prediction of the unitary

[2] Income pooling between spouses (or partners) is investigated in Schultz (1990), Thomas (1990), Phipps and Burton (1992), Browning *et al* (1994), Browning (1995), Lundberg, Pollak and Wales (1995) and Fortrin and Lacroix (1998), amongst others. Tests of income pooling between adult children and their elderly parents include Altonji, Hayashi and Kotlikoff (1992) and Pezzin and Schone (1997) using US data, and Hayashi (1995) using Japanese data. In contexts where child labour is prevalent, income pooling between earning children and their parents has been investigated by Bhalotra and Attfield (1998) using data from contemporary Pakistan and by Moehling (2000) using nineteenth century American data.

model. The unitary model of household decision making can be justified either by assuming that all members of the household have identical preferences or else by assuming that decisions are taken by a benign (altruistic) dictator. A unitary utility function implies altruism and, indeed the unitary utility function has been labeled the altruistic utility function (see Bergstrom (1997), for example). However, non-altruistic models can generate income pooling, and altruism can hold in cooperative or in non-cooperative models in which incomes are not pooled (see Bergstrom, 1997). Thus rejection of income pooling does not imply rejection of altruism. Indeed, in the bargaining and collective models proposed as alternatives to the unitary model agents can have egoistic or altruistic preferences. The investigation of altruism in this paper has, in this sense, a niche distinct from that occupied by the literature on preference heterogeneity and income pooling

In the context of parents and young children, altruism is the natural assumption. There are biological reasons related to the propogation of genes, which lead us to expect altruism to flow "downwards" rather than upwards. This is reinforced by cultural and emotional reasons such as that, when young, children are vulnerable and charming and typically live with their parents. For these reasons, rejection of altruism in this context would be rather surprising. Nevertheless, as indicated in Section 1 and discussed further in the following Section, altruism is not a trivial assumption.

2.2. Does The Evidence Challenge Altruism?

The purpose of this Section is to argue that parent altruism is not so evident as to be unworthy of investigation. We shall show in Section 3 that altruism predicts a positive income effect, a high degree of altruism implying a large income effect. Studies of income effects on various child outcomes in poor and rich nations show some unexpectedly small effects[3]. For surveys of the determinants of child achievement in rich nations, see Haveman and Wolfe (1995) and Currie (2001). This Section documents evidence of small or absent income effects on child labour and education in developing countries. It also points out that anthropologists and historians have debated parent altruism although economists have tended to assume it.

A strong form of parental altruism is a critical assumption in the much-cited papers on the economics of child labour by Basu and Van (1998) and Basu (2000). The authors show that this assumption, (together with the assumption that adults and children are substitutable in production), is sufficient to generate multiple equilibria in the labour market. Analysis of the likely impact on child labour of policy interventions such as bans, trade sanctions, adult minimum wages, and changes in fertility depends upon the validity of the altruism assumption. More recent research on the economics of child labour has tended to continue to assume parent altruism (e.g., Baland and Robinson, 2000). Yet, this assumption has not been tested. Basu and Van (1998) defend their assumption by arguing

[3] The size of the income effect depends upon whether closely correlated variables such as parental education are held constant. Also, it will tend to be under-estimated when income is measured with error. The small income effects observed in many studies may therefore be spuriously small. For the purposes of this Section, it is enough to indicate that there may be a case for doubting altruism. In what follows, we suggest a method for investigating altruism that does not rely upon income data.

that it is evident that the children of the non-poor do not work. However, micro-data from a number of developing countries suggest that they do.

The relevant data from rural Pakistan are described in Figure 1[4]. Rural income inequality is high and only households in the first quartile fall under the poverty line. Yet, among the 25% of households at the top of the distribution, which cannot be classed as poor, 9.5% of girls and 5% of boys are engaged in wage labour which, in Pakistan, is seldom combined with school attendance (see Bhalotra (2000), Table 1). As the wage labour market is relatively under-developed in the rural economy, comparing child with adult participation rates puts the former into perspective. The rates for men and women in this sample are 36% and 15% respectively. Farm labour participation of girls actually *increases* with the household's standard of living, reaching 31% in the upper quartile. For boys, there is a gently sloped downward gradient and the upper quartile displays a participation rate of 20%. The third panel shows that school attendance for girls (boys) is only 36% (73%) in the upper quartile as compared with 31% (79%) on average. Overall, moving up the income distribution has a much smaller impact on rates of school attendance and child labour than one might expect. Figure 2 presents non-parametric estimates of the relation of living standards and hours of child wage labour conditional on participation. Once again, there is no clear tendency for child labour to decline with living standards.

Multivariate analyses of the relation of income and child labour that control for observed heterogeneity across households in size, demographic composition, land ownership, location and parental education also find very small income effects on participation and even smaller income effects on hours of work. Indeed, the estimated income elasticity is often zero or even positive! However, most available estimates are subject to simultaneity, measurement error and aggregation biases that can be shown to result in an under-estimation of the income effect. Thus, while this evidence, ranging across several countries, is indicative, it cannot be taken too seriously (see Bhalotra and Tzannatos (2001) for a review). Income effects on *schooling* are similarly smaller than we might expect, although the true effect may again be larger as the available estimates are afflicted with similar (downward biases) on account of specification errors (see Behrman and Knowles (1999) for a survey)

After attempting to overcome some of the common specification problems, we obtain somewhat larger but nevertheless small income elasticities for the sample of households studied in this paper[5]. The marginal effect of income on child *farm* work is zero for girls and –0.66 for boys. The income elasticity of hours of *wage* work

[4] Living standards are denoted, in Figure 1, by average food expenditure per capita as this is smoother than income. Child work participation rates for several other developing countries can be found, disaggregated by income group, in Grootaert and Patrinos (1996) and Canagarajah and Skyt-Nielsen (2000), for example. They support the argument made in the text.

[5] What is small? The following is a useful benchmark. If parents were altruistic by the definition used in Basu and Van (1998) then the working child would have a target income and the child wage elasticity would be –1. In this case, the Slutsky condition implies a negative income elasticity greater than unity.

conditional on participation is –0.34 for girls and -0.16 for boys[6]. More pertinent to a discussion of parent altruism, there is a threefold increase in the income effect on child hours of work once we condition on parents' hours of work (Bhalotra, 2001). This is consistent with exogenous increases in income being used to purchase adult leisure at the same time as they are used to purchase child leisure (or child education). All of this evidence would *appear to* violate the notion of parental altruism evoked in the literature, according to which parents will get their children out of work and in to school at any reasonable cost to themselves (see Section 2.2)[7].

The strong form of altruism (as in Basu and Van, 1998), that subsistence constraints compel child labour, can be directly investigated by exploiting the fact that subsistence constraints imply a negative wage elasticity of labour supply[8]. The wage elasticity was estimated for child wage workers in the current sample. It is significantly negative for boys and zero for girls. Boys thus appear to work towards a target income and this target is, plausibly, the shortfall between household subsistence needs and non-child income. However, the target may not be subsistence, or else subsistence may be defined (by parents) to include tobacco consumption. The evidence for girls is more ambiguous. Girls appear to work even in circumstances when it is unclear that their earnings contribute to subsistence. A wage elasticity of zero is consistent with the hypothesis of selfish parents. In particular, if parents wanted to extract as much as they could from a child, they would get her to work to the maximum level consistent with maintaining her health. The level of the wage would then be irrelevant.

Overall, the economic analyses of micro-data for child labour casts enough doubt on parent altruism to make it worth investigating. This appears not to have been recognised and economists have yet to question parent altruism, even in the context of child labour and education. In contrast, parent altruism has been actively debated in anthropological and historical analyses of child labour. In both fields of enquiry, the evidence is only indicative, it being difficult to generalise from small non-random samples and difficult, especially in historical studies, to construct appropriate counterfactuals. However, there are some compelling indications of non-altruism. Records from nineteenth century Brazil suggest that the state siezed children from parents

[6] The farm labour elasticities are from Bhalotra and Heady (2000) and the wage labour elasticities from Bhalotra (2000). In the case of boys, observation of a larger income effect for farm work as compared with wage work does not contradict the preceding discussion of the data based upon Figure 1 because income elasticities are higher for participation than for hours (as, for example, for adults in the US: see Heckman, 1994), and the farm labour estimates are from tobits whereas the wage labour estimates are for hours.

[7] Of course explanations other than non-altruism can explain these data. For instance, if labour markets are imperfect, large landowners for whom the marginal benefit of child labour is relatively high may be more likely to employ their children to work on their farms than smaller, poorer landowners. This "wealth paradox" is analysed in Bhalotra and Heady (2000).

[8] This is shown in Bhalotra (2000). As always when testing a theoretical prediction, we can only go as far as to say that if child labour were necessary then we would observe a negative wage elasticity for children. While a positive wage elasticity would constitute a rejection of the subsistence-hypothesis, observation of a negative (or zero) wage elasticity is consistent with the subsistence view but may also be consistent with other views of why children work (as suggested in the text that follows).

when the children were found to be in work, the parents being accused of exploitation (Rizzini, 1999). A popular but not unchallenged view amongst the elite during British industrialisation was that the parents of working children were avaricious (see Nardinelli (1990) p. 94), and an analysis of nineteenth century data for America concludes that parents of working children were selfish (Parsons and Goldin, 1989). In an anthropological study conducted in the Sialkot region of Pakistan, Khan (2001) observes that households supplying child labour are not terribly poor, that they own televisions and other consumer goods and that child income, which is always handed over to parents, is typically spent on above-subsistence consumption[9]. Numerous other investigations by anthropologists and journalists suggest that parents expect children to work even when they are not verging on subsistence. It is generally very difficult to discern whether these are altruistic parents who perceive the returns to schooling for the child to be relatively low or whether they are non-altruistic parents who are unwilling to struggle in order to finance the education or above-subsistence consumption of their children. By some accounts, parents are selfish, have unwanted children in regions where fertility controls are unavailable or unpopular, and then set them to work. It is therefore useful to put this hypothesis to the test using large scale representative data from a region in which the average household is poor, fertility is high, and child labour is prevalent.

2.3. Contributions

The contributions of this paper are to relatively small literatures in both areas, altruism and child labour. To summarise, the paper proposes what would appear to be the first test of altruism. The test is simple and general and has the advantage that it does not require data on total expenditure and income; it represents an early application of m-demand functions. The estimated "altruism coefficient" is increasing in the degree of altruism. Previous studies have tended to investigate resource transfers from young adults towards their elderly parents, and they typically reject income pooling, thereby undermining altruism (Section 2.1). As biological models of altruism predict "downward" flows more readily than reverse flows (see Bergstrom, 1997), it remains to investigate altruism towards young children. Altruism flowing from parents towards children is the natural hypothesis, more plausible than bargaining and carrying wider policy relevance. Parent altruism is a critical assumption in recent theoretical models of child labour and policy interventions such as income transfer programmes rely upon it. Parents typically decide whether (and how much) children attend school or work and since the returns to education accrue when the child has grown up and possibly left home, there is an evident agency issue. It is of great significance since it is when children are young that health and educational capital is most rapidly formed and future economic and

[9] Sialkot is a region that, prior to the introduction of a major ILO-UNICEF programme in 1997, produced 90% of the world's footballs. A large part of the stitching was done informally, in homes, the eventual product being sold through multinational firms such as Adidas and Nike. It was the involvement of these children in stitching the footballs that featured in the American media and stimulated some of the recent demands for labeling of products made with child labour, and trade sanctions against goods produced with child labour.

reproductive success is likely to be conditional on this[10]. This as well as the evidence cited in the preceding section make the assumption of altruism non-trivial. The empirical application we present is set in a village economy where the question is sharpened and its implications more profound, given the limited role of the state in determining the welfare of children. The average household in rural Pakistan is poor, discount rates are high, life expectancy is low, and there is a high probability of running into binding economic constraints, all of which might be argued to inculcate attitudes that conflict with altruism. A contrary view is that altruism is encouraged by traditional family structures, the importance of reciprocity in informal insurance mechanisms that bind family and community, and social norms that develop around these institutions[11]. By virtue of conducting the analysis for multiple goods including a predominantly male good, we allow for the possibility that mothers and fathers exhibit different degrees of altruism.

3. A Test of Altruism

We assume that parents decide the allocation of resources to children. This is plausible *a priori* in our context of children under 15 in rural South Asia, and it is supported by evidence from anthropological studies that children hand over their earnings to their parents[12]. We do not model bargaining between parents over the allocation of resources to their children as this would distract from the current purpose[13].

[10] There is plenty of evidence on both counts. On the role of child health in determining cognitive ability and achievement, see Glewwe and Jacoby (1995), for example. On the role of education in determining future economic success, see Bowles (1972) for a stimulating early discussion although there have since been scores of studies showing pecuniary returns to a year of education in the region of 10%. Investments in the health and education of children are expected to contribute to reproductive success for the following reasons. Other things being equal, educated individuals are more likely to find partners and marry, this effect tending to be stronger amongst men than amongst women (e.g. Qian, 1998). At given levels of income, parental education is a significant determinant of child education (e.g. Behrman et al (1999), Bhalotra and Heady (2000), Lam (2000)), creating a perpetuation effect in terms of the quality of offspring and their consequent reproductive success. There are similar intergenerational perpetuation tendencies in health. Adult nutritional status is, to a large extent, determined in childhood: it is difficult to catch up from a lagging position in the growth curve (e.g. Micklewright and Ismail, 2001). Also, well-nourished mothers tend to produce children of higher birthweight, who are more likely to be healthy and survive (e.g. Mahler (1996), Breslin (1998), Reich (1989), Rogers (1989)).

[11] The reciprocity that is institutionalised in the vertically integrated family in many developing countries, whereby young adults in poor countries tend to care for their elderly parents, is expected to contribute to altruistic behaviour of parents towards young children. Indeed, Cigno (1993) suggests a rationale for reverse flows in terms of a "self-enforcing family constitution". To the extent that boys are more likely than girls to offer old-age security to their parents, a reciprocity argument would suggest greater altruism of parents towards boys than towards girls. In Pakistan, parents are more likely to live with and rely upon sons in their old age but this is by no means universal- the converse is more common in Indonesia, for example. Investigation of differences in altruism towards sons and daughters is a promising avenue for future work.

[12] See Khan (2001) for Pakistan and Gupta (1998) and Burra (1995) for India.

[13] Models of bargaining between spouses are available in the literature (see Section 2.1).

Altruism towards children is captured by a utility function for parents that includes child consumption and leisure. Let subscripts *a* and *c* denote adult and child respectively and let C and L denote (above-subsistence) consumption and leisure. Then the Beckerian definition of altruism is U_a (C_a, L_a, v(C_c, L_c)) where v is the sub-utility of the child (Becker, 1981: Chapter 8). This is what much of the literature on income pooling and intra-household allocation refers to as the *caring* utility function. We prefer to specify the altruistic utility function as U_a (C_a, L_a, C_c, L_c), which Pollak (1988) refers to as *paternalistic* preferences (also see Bergstrom (1997), where this utility function is termed "altruistic"). Think of L_c as schooling and C_c as child clothing, as these will arise in our empirical model. Then Beckerian altruism or caring would imply that parents care how much their children enjoy attending school or wearing nice clothes. I think it more likely, at least in the context of rural Pakistan, that parents care that their children attend school, whether they like it or not. Similarly, child clothing provides warmth and health protection to some extent, beyond which it may bring a status-glow to parents. In any case, the test of altruism we derive is unaffected by whether we follow Becker or Pollak.

3.1. The General Case

The altruistic utility function is :

(1a) $U = U(C_a, L_a, C_c, L_c)$

where U denotes U_a or the utility of parents. The utility function of the non-altruistic (henceforth *"selfish"*) parent is :

(1b) $U = U(C_a, L_a)$

which is clearly a restricted form of (1a)[14]. The budget constraint is

(2) $w_a L_a + w_c L_c + p_a C_a + p_c C_c = m$

where m is full income, $\boldsymbol{w=(w_a, w_c)}$ is a vector of wage rates and $\boldsymbol{p=(p_a, p_c)}$ is a vector of prices.

The first order conditions for the maximisation of (1a) subject to (2) are:

$$(3)\ g_1(C_a, L_a, C_c, L_c) := \frac{U_{Lc}}{U_{Ca}} = \frac{w_c}{p_a}$$

[14] It is assumed that even the selfish parent ensures that the child survives. Adult and child consumption and leisure refer throughout to above-subsistence quantities.

$$(4)\ g_2(C_a, L_a, C_c, L_c) := \frac{U_{Cc}}{U_{Ca}} = \frac{p_c}{p_a}$$

$$(5)\ g_3(C_a, L_a, C_c, L_c) := \frac{U_{La}}{U_{Ca}} = \frac{w_a}{p_a}$$

where U_i denotes the marginal utility that adults derive from consumption of good i and we have chosen to express the marginal rates of substitution (MRS) in terms of adult consumption, C_a, which we term the reference good. Let us now introduce some notation. We can rewrite equations (3)-(5) as $G(C_a, L_a, C_c, L_c) = q$ where $G = (g_1, g_2, g_3)^T$, $q = (w_c, p_c, w_a)^T/p_a$, and the superscript T denotes transpose. The price vector q is held constant. Let DG denote the derivative of G, which is a 3x4 matrix. This can be partitioned as $DG = (DG_{Ca}, DG_y)$, where $\mathbf{y}=(L_a, C_c, L_c)$, DG_{Ca} is 3x1 and DG_y is 3x3. Let $G(C_a^*, \mathbf{y}^*) = q$ and suppose DG_y evaluated at the solution $(C_a^*, \mathbf{y}^*)$ is invertible. Then, by the implicit function theorem, the equation $G(C_a, \mathbf{y}) = q$ has a unique solution for $\mathbf{y}$ as a function of C_a in a neighbourhood of $(C_a^*, \mathbf{y}^*)$. Moreover, for this solution $\mathbf{y} = F(C_a)$, the derivative of F is given by $DF = -DG_y^{-1} DG_{Ca}$. This is equivalent to

$$(6)\begin{pmatrix} \partial L_a/\partial C_a \\ \partial C_c/\partial C_a \\ \partial L_c/\partial C_a \end{pmatrix} = -\begin{pmatrix} \partial g_1/\partial L_a & \partial g_1/\partial C_c & \partial g_1/\partial L_c \\ \partial g_2/\partial L_a & \partial g_2/\partial C_c & \partial g_2/\partial L_c \\ \partial g_3/\partial L_a & \partial g_3/\partial C_c & \partial g_3/\partial L_c \end{pmatrix}^{-1} \begin{pmatrix} \partial g_1/\partial C_a \\ \partial g_2/\partial C_a \\ \partial g_3/\partial C_a \end{pmatrix}$$

We are interested in the signs of the elements of DF, the partial derivatives on the left hand side of (6). These are ambiguous in the general case[15]. Let us therefore consider the additively separable utility function

$$(7)\ U = u_1(C_a) + u_2(L_a) + u_3(C_c) + u_4(L_c)$$

Then analogous to equations (3)-(5) above, we have

[15] The diagonal terms of the 3x3 matrix, DG_y, are positive but, in the general case, the signs of the off-diagonal terms and the terms in DG_{Ca} are of ambiguous sign.

$$(8)\ G=\begin{pmatrix} g_1 \\ g_2 \\ g_3 \end{pmatrix}=\begin{pmatrix} u_4'(L_c)/u_1'(C_a) \\ u_3'(C_c)/u_1'(C_a) \\ u_2'(L_a)/u_1'(C_a) \end{pmatrix}$$

Recall that **y**=(L_a, C_c, L_c). Then

$$(9)\ DG_y^{-1}=\begin{pmatrix} 0 & 0 & u_1'/u_2'' \\ 0 & u_1'/u_3'' & 0 \\ u_1'/u_4'' & 0 & 0 \end{pmatrix}$$

We can now write DF = $-DG_y^{-1}\,DG_{Ca}$, the analogue of (6) as

$$(10)\begin{pmatrix} \partial L_a/\partial C_a \\ \partial C_c/\partial C_a \\ \partial L_c/\partial C_a \end{pmatrix}=-DG_y^{-1}\begin{pmatrix} u_4'u_1''/(u_1')^2 \\ u_3'u_1''/(u_1')^2 \\ u_2'u_1''/(u_1')^2 \end{pmatrix}=\begin{pmatrix} u_2'u_1''/u_1'u_2'' \\ u_3'u_1''/u_1'u_3'' \\ u_4'u_1''/u_1'u_4'' \end{pmatrix}$$

It is now clear that each of the partial derivatives on the left hand side of (10) is positive, given that $u_i^{\ell}>0$ and $u_i^{\ell\ell}<0$ for i=(1,2,3,4).

We are not directly concerned with the first element $\partial L_a/\partial C_a$ which refers to adult leisure and adult consumption. The other two elements concern us as they involve child and adult consumption. Let us define X_c as the generic child good, $X_c = C_c$ or L_c. Then altruism as defined by the utility function (7), which is the additively separable case of (1a), predicts that $\partial X_c/\partial C_a > 0$. On the other hand, if parents were selfish as described by (1b) then we would expect $\partial X_c/\partial C_a = 0$. We thus have a testable prediction of the altruistic model. Henceforth, we shall refer to $\partial X_c/\partial C_a$ as the *altruism coefficient*, where subscripts c and a refer to child and adult respectively and X is consumption (C) or leisure (L). *The larger the altruism coefficient, the greater the degree of altruism*, a complete lack of altruism being revealed in a coefficient of zero[16]. The rest of this section discusses an appropriate estimating framework for this condition.

[16] The general utility function (1a) imposes no evident restriction on the size of the elasticity (or the altruism coefficient). It is straightforward to show that, with an additively separable utility function, the elasticity can be less than or greater than unity. The Stone-Geary utility function (assumed, for example, in Basu, 2000) implies an altruism elasticity of unity.

M-Demands for Child Goods

We chose to define adult consumption (C_a) as *the reference good*. A condition on the choice of reference good is that it be normal (see Browning, 1998). We have established that each element of adult consumption that we use is, in our data, a normal good (see Table 1 and Section 7). The first order conditions (3)-(5) can be solved simultaneously for the quantity of the reference good to get **m-demands** of the following form[17] :

(11) $L_c = f^1(\boldsymbol{p}, \boldsymbol{w}, C_a)$
(12) $C_c = f^2(\boldsymbol{p}, \boldsymbol{w}, C_a)$

The third m-demand equation implied by (3)-(5) is $L_a = f^3(\boldsymbol{p}, \boldsymbol{w}, C_a)$ but, as this does not involve children, it does not concern us here. The m-demands are homogeneous of degree zero in prices ($\boldsymbol{p}$) and wages ($\boldsymbol{w}$). Estimation of (11) and (12) will yield estimates of the altruism coefficients, $\partial C_c/\partial C_a$ and $\partial L_c/\partial C_a$.

In principle, we might have defined the child good (leisure or consumption) as the reference good. However, the altruism coefficient would then be undefined under the null of selfish parents (i.e., it would contain a zero in the denominator- see equation (17) below). Defining as the reference good a good like adult consumption that appears in the parents utility function both under the null and under the alternative hypothesis avoids this problem.

Altruism & Income Effects on Child Outcomes

In order to develop further the intuition of the test, consider an alternative way of deriving m-demands which involves starting with the commonly used Marshallian demands for each commodity :

(13) $L_c = L_c(\boldsymbol{p}, \boldsymbol{w}, m)$
(14) $C_c = C_c(\boldsymbol{p}, \boldsymbol{w}, m)$
(15) $C_a = C_a(\boldsymbol{p}, \boldsymbol{w}, m)$

There is a similar equation for L_a which is suppressed as it is of no direct interest here. We can now eliminate total expenditure (m) using the demand equation for the reference good, C_a. Given that C_a is normal, we can invert (15) to get

(16) $m = m(\boldsymbol{p}, \boldsymbol{w}, C_a)$

Substituting (16) in (13) gives

(17) $L_c = L_c(\boldsymbol{p}, \boldsymbol{w}, m(\boldsymbol{p}, \boldsymbol{w}, C_a)) = f^1(\boldsymbol{p}, \boldsymbol{w}, C_a)$

[17] The "*m*" arises because they can be derived from marginal rates of substitution. This nomenclature has no relation to the fact that total expenditure is denoted m. Discussion of m-demands in relation to more conventional demand formulations is in Section 4.

which is nothing but (11), the m-demand for child leisure. The m-demand equation for child consumption, (12), can similarly be derived from (14) and (16). The advantage of this approach is that it reveals that the altruism coefficient is simply the ratio of the income effects of the two goods (the child good and the reference good). From (17), it follows that

$$(18)\ \frac{\partial L_c}{\partial C_a} = \left(\frac{\partial L_c}{\partial m}\right)\left(\frac{\partial m}{\partial C_a}\right) = \left(\frac{\partial L_c / \partial m}{\partial C_a / \partial m}\right)$$

Given that the reference good (adult consumption) is normal, the denominator of the final term in (18) is positive. Thus testing for altruism by investigating whether $\partial L_c/\partial C_a > 0$ boils down to finding out if the child good (L_c in this example) is normal! While this is intuitive, this insight has not been sufficiently exploited in, for instance, the literature concerned with small income effects on child outcomes (see Section 2.2). It is straightforward to show that (18) holds in logarithms or that the *elasticity* of the child good (L_c above or, more generally, X_c) with respect to C_a equals the ratio of the income elasticities of X_c and C_a.

Let us now summarise the propositions that we have derived. Recall that C_a is above-subsistence adult consumption. Let X_c denote a child good (leisure, schooling or consumption). The partial derivatives below refer to a model in which all wages and prices are held constant.

Proposition 1: The null hypothesis of selfish parents predicts that $\partial X_c/\partial C_a = 0$ and the alternative of altruistic parents predicts $\partial X_c/\partial C_a > 0$. This affords a test of altruism. The coefficient on C_a in a model explaining the variation in X_c is referred to as the *altruism coefficient.*

Proposition 2: As long as adult consumption is normal, an alternative and equivalent prediction of altruism is that the child good, X_c is normal, or $\partial X_c/\partial m > 0$. Under parental selfishness, we expect $\partial X_c/\partial m = 0$.

These are very intuitive results. Proposition 1 says that if parents are altruistic and derive disutility from child labour then, controlling for prices, we should observe that child labour is associated with a cutting back of adult consumption. This follows from the simple intuition that parents will equate the marginal utility of consumption to the marginal utility of child leisure, which is higher if children work. Similarly, if parents value child consumption then child consumption should be increasing in adult consumption. Proposition 2 states that the demand for child goods (leisure or consumption) is increasing in parental income under altruism[18].

[18] The test has power against most relevant alternatives except for the one where there is no income effect on the child good as would be the case, for example, if preferences were quasi-linear (e.g. $U=C_a+v(X_c)$).

Section 4 argues that robustness favours estimation of m-demands for child goods (Proposition 1) over direct estimation of income effects (Proposition 2).

4. M-Demands

This Section highlights the virtues of using m-demands in this paper. While they have been implicitly defined in Section 3, they are now defined explicitly in relation to more conventional formulations of demand. Demands that are modeled as a function of prices and the quantity of a reference good, rather than total expenditure, are termed m-demands. Suppose there are two goods, q_1 and q_2, with prices p_1 and p_2, and total expenditure is m. Then alternative formulations of the demand for q_1 are as follows:

(19) $q_1 = f(p_1, p_2, m)$	Marshallian demand
(20) $q_1 = g(p_1, q_2, m)$	Conditional demand
(21) $q_1 = h(p_1, p_2, q_2)$	M-demand

Browning (1998) proposes the m-demand formulation as a way of maximising the preference information that can be recovered from the data when information on total expenditure is unavailable, making it difficult to estimate conventional demand models. In the current context, total expenditure *is* available. However, as the proposed test of altruism derives directly from the marginal rate of substitution condition, it turns out that an m-demand is the most natural way to investigate the hypothesis at hand.

Also, while the data used in this paper offer information on total expenditure and total income at the household level, these variables are notoriously difficult to measure accurately. This is especially so in rural economies where income from self-employment is often the largest component of household income. Incomes from self-employment are a combination of labour and non-labour incomes and labour income is highly endogenous to the household decision-making process by which resource allocations to children are determined. It is difficult to find a valid instrument unless a "natural experiment" happens to be available. The additional problem of income volatility, especially in farming households, means that income in the month preceding the survey, for example, may be a misleading indicator of average living standards. On account of being smoother, total expenditure is often preferred to income. However, it has its own measurement problems. Actual expenditure tends to under-estimate consumption unless adjustments are made for consumption of home-produced goods, as well as for wages in kind, gifts, remittances and any public transfers. Even if these adjustments are made using imputed values, it remains difficult to incorporate durables and leisure.

The alternative that we pursue of using information on particular items of (adult) expenditure avoids many of these problems. This is potentially very important since the finding that income effects on child outcomes are either absent or often surprisingly small (see Section 2.2) may be spurious if measurement error in income (or total expenditure) is substantial : we know that conventional measurement error in a variable biases its coefficient towards zero[19].

[19] If the dependent variable denoting the child outcome is an expenditure (such as clothing & footwear expenditure used in this paper) then measurement error in total expenditure, were this to be used as a regressor, may bias its coefficient (upwards) towards unity! This is the case if there

M-demands have some other useful features too. *First*, as is apparent from the derivation of these demands from Marshallian demands, income is a natural instrument for the reference good (adult consumption or ceremonies); also see Section 6. *Second*, as in the case of Marshallian demands, within-period m-demands are correctly specified even if some households are liquidity constrained. This robustness is of particular importance in the setting of a poor village economy that is considered in this paper. *Third*, there is no need to make (possibly implausible) separability assumptions. Given the quantity of the reference good, the m-demand for any particular commodity does not depend upon the quantities of other commodities. This avoids the estimation problem of dealing with additional endogenous regressors, which is especially desirable when some are censored (adult labour in a model of child labour is a case in point).

5. An Empirical Model

In this section, we discuss the specification issues that arise in translating the theoretical model into a valid empirical model. This includes choice of functional form, incorporation of taste heterogeneity and dealing with endogenous regressors.

Functional Form

The estimated equations based on the (within-period) m-demands in equation (4) and (5) involve regressing the level of demand of the child good (L_c or C_c) on the level of adult consumption (C_a) and the relevant prices, the real wage rates of children (w_c) and adults (w_a). We use a (semi-) log linear functional form that is both flexible and easy to estimate[20]. a is a vector of demographics that represent observable heterogeneity across households in the sample and e is a random error term that captures unobserved heterogeneity, functional form mis-specification and other specification errors including measurement error. The content of the vector a is described in Section 6.2 after the data have been introduced. We shall replace child leisure, L_c, with work, H_c, and expect the altruism coefficient to reverse sign (if H is a bad) [21]. In an alternative specification, we will replace L_c with schooling, S_c. In this case, all signs are preserved as L and S are both goods.

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is common measurement error in child expenditure and total expenditure (see Deaton, 1997, for example).

[20] Browning (1994) shows that quasi-homothetic preferences such as the Linear Expenditure System (LES) yield m-demands that are an affine function of the level of the reference good and that the m-demands associated with homothetic preferences are linear in the reference good.

[21] In line with the literature and with common intuition, we are defining child labour as a bad (i.e. as bringing disutility to altruistic parents). It may be argued that this is unclear if the value of work experience or self-esteem produced by child labour is sufficiently large. However, most of us would agree that schooling is a good. Since child labour is certainly inversely related to schooling (though it is not the exact inverse), the estimates will immediately tell us if this assumption is implausible. To anticipate the results, we do find that the sign on the altruism coefficient in the child labour equation is the opposite of that in the schooling (and child consumption) equations, which indicates that it is a bad.

Endogeneity

In general, the reference good in an m-demand function is endogenous just as, in a Marshallian demand function, total expenditure (denoted m) is endogenous (e.g., Deaton (1985), Blundell (1986)). To see why, ignore price variation and write down the simple Marshallian demands for adult consumption and a child good, let us say C_c :

(22) $C_a = \chi_a m + \nu_a$
(23) $C_c = \chi_c m + \nu_c$

We expect $E(\nu_a|m)\neq 0$ and $E(\nu_c|m)\neq 0$, for example, on account of infrequency of purchase (which makes for lumpy expenditures) and measurement errors common to individual commodity expenditures (C) and total expenditure (m)[22]. Inverting on the reference good, C_a, in (22) and substituting in (23) gives the m-demand for the child good:

$$(24)\ C_c = \frac{c_c}{c_a} C_a - \frac{c_c}{c_a} n_a + n_c$$

It is now easy to see that C_a is correlated with the error term in (24). There is a measurement error bias arising from the fact that C_a is a choice variable described by $C_a = (\chi_a m + \nu_a)$ rather than by $\chi_a m$. Also, any correlation of ν_c and ν_a on account of heterogeneity will cause ν_a to be correlated with C_a.

Instruments

Income is a valid instrument for the reference good in an m-demand for the same reason (see Browning (1998) and equation (18) above) as it is a valid instrument for total expenditure in the often-estimated (Marshallian) Engel curves. As for efficiency, income is certainly correlated with the level of the reference good. We use a cubic in log income and also investigate the overidentifying restriction associated with the community unemployment rate. Tests of this restriction as well as of the power of the instruments are in Table 9. The covariance matrix is adjusted for generated regressors. The reported estimates are 3SLS. In order to confirm their robustness, they were compared with 2SLS estimates which, in every case, yielded almost identical coefficients and smaller standard errors. We also present OLS estimates in order that the importance of controlling for the endogeneity of the reference good can be assessed.

[22] If C_c were replaced by L_c, we would similarly expect $E(\nu_c|m)\neq 0$ because total expenditure (m) is a function of the labour supplies of all family members (including L_c) and, additionally, the determinants of labour supply and income may include common unobservables.

6. Data and Measurement

This section describes the data and defines the variables, addressing any issues of measurement. The data refer to 2400 *rural* households interviewed under the Pakistan Integrated Household Survey (PIHS) of 1991. This is a stratified sample survey and the lowest stratum is a cluster of households. Since households living in close geographic proximity will tend to have some unobservables (like climate, soil or culture) in common, the standard errors of all estimates obtained on these data are adjusted to allow for intra-cluster correlations (see Deaton (1997), Chapter 2). The data are available from the Living Standards Measurement Survey unit of the World Bank.

Following international conventions, children will be defined as under 15 (e.g. ILO, 1996b). The survey contains extensive information on income, expenditure and the demographic characteristics of households. The average household size in the sample is 8, the average number of adults (age greater than 14) being 4. Thus, while the theoretical discussion is cast in terms of *parents* and children, in an empirical context where integrated families are common we are in fact investigating altruism of *adults* (that may include uncles, aunts, sisters-in-law and grandparents) towards children[23]. As described below, age and gender differences in household structure are controlled for in the estimated model and this allows intercept effects of different family types (e.g., families with and without men and women over the age of 60) on the level of adult consumption. The categories of adult consumption that we consider include some that are disproportionately consumed by males if not strictly male goods. In these ways, the empirical modeling is sensitive to heterogeneity in male and female preferences.

The estimated equations are of the form:

$$(25)\ X_c = \alpha(a) + \beta_p \ln(w_a) + \beta_c \ln(w_c) + \gamma \ln(C_a) + e$$

where a is a vector of demographics, w are wage rates and $X_c = C_c$, S_c or H_c - the "child good" is alternatively defined as consumption, schooling and child labour. C_a is any of five "adult goods" specified below. In every specification, C_a is instrumented.

Adult Goods and Above-Subsistence Consumption (C_a)

The alternative items proxying C_a in the empirical analysis are (a) *Adult clothing* and *adult footwear*, which are explicitly assigned as adult-only consumption in the survey, (b) *Tobacco* and (c) *Tea* and *coffee* which are predominantly consumed by adults, (d) the sum of expenditures on (a), (b) and (c) which we shall refer to as "adult goods", and (e) *Ceremonial expenditures* which are not exclusively consumed by adults but which represent an interesting element of above-subsistence consumption that it seems

[23] This does not make our results much less interesting from a biological perspective since household members in Asian households are typically closely related to one another. This is less true in sub-Saharan Africa where the practice of child fostering is much more widespread and the blood-chain can grow quite dilute (Ainsworth (1992) provides a quantitative assessment of child fostering in Tanzania).

likely increases adult utility rather more than it increases child utility[24]. Five variants of every equation are estimated, one for each of these definitions of C_a. This increases the power of the test[25]. Also, as we shall discover, it is useful to compare a predominantly male good (like tobacco) with goods that are consumed by men and women in similar proportions. It is also useful to have a range of goods, some of which are more addictive than others (like tobacco and tea) and some of which may be thought to be set fairly rigidly by social obligations (like ceremonial expenditures).

Child Goods (X_c)

Child consumption (C_c) is defined as the sum of expenditures on child clothing and footwear as this is clearly assigned in the survey. For the case in which C_a is defined as adult clothing and footwear so that C_a and C_c refer to the same good, the altruism coefficient, $\partial C_c/\partial C_a$ has a particularly clear interpretation. The other child good in the altruistic parent's utility function (1a) is child leisure, L_c. Rather than attempt to measure leisure, we replace it with schooling and, in an alternative specification, with child labour. School attendance is not exactly the inverse of child labour since a substantial fraction of children are neither in school nor in work and, in the case of household farm/enterprise work, some children combine school and work[26]. The analysis is conducted separately for current child consumption and for the work and school participation of children, allowing for the possibility that these are weighted differently in the parent utility function.

Pakistan has very low levels of school enrollment, even in comparison with other low income countries, and its child workforce participation rates are among the highest in the world (ILO, 1996b). Investigation of altruism in the specific context of child labour is therefore of particular significance. Since employment questions in our survey are only addressed to individuals ten years or older, child labour and school attendance in this paper refer to 10-14 year olds. A profile of child activities is presented in Table 2; further discussion is in Section 7. Regular work that produces marketable goods includes employment on the household-run farm or enterprise (henceforth, "*household employment*") and employment for wages outside the home (henceforth, "*wage employment*"). In the first instance, participation in work is defined as participation in either activity. However, for reasons discussed in Section 8, we also present results for work defined exclusively as wage employment.

[24] Households in developing countries are known to spend quite a lot on birth, marriage and death ceremonies. These expenditures may be reciprocal and they may represent investments in social capital. We choose to define C_a as ceremonial expenditures in one variant of the model in order to investigate how parents trade-off child consumption (or leisure) against ceremonies in their preferences. If ceremonial expenditures create utility for children, we'd expect to find a smaller altruism coefficient than if ceremonial expenditures created utility for adults alone.

[25] With more structure imposed on the form of the utility function, we might be able to test restrictions such as that the elasticities of the child good (X_c) with respect to C_a are the same for all definitions of C_a. However, with a general utility function like (1a), the form in which ceremonies or tobacco appear may be different than the form in which adult clothing appears, in which case they will not yield identical elasticities.

[26] See Bhalotra (2000) for details.

A household-level measure of participation in child labour or child school attendance is defined as the proportion of children in the household engaged in work (or school). The sample mean is 0.32 for work and 0.52 for school. The proportion is of course zero if no children work and undefined if there are no children in the selected age band. For this reason, it is necessary to drop households that do not have a child in the 10-14 age range. This results in a loss of 44% of rural households. Does throwing households with no 10-14 year old children out of our sample result in a selection bias? It seems unlikely it does, especially as we are not selecting on fertility (all births) but on this particular age band[27].

Prices, Demographics and Other Controls

Wage rates for adults and children are obtained from community (or cluster) level questionairres in which village leaders are asked what the going wage for agricultural activity is for adults and children. As a quality check, the wage data were examined to confirm that they behave plausibly, and they do. For example there is a lower incidence of child labour in villages in which the male wage is higher[28]. The child wage is missing for 22 of 151 clusters and the male wage for 3. Since a missing value for a community translates to missing values for every household in it (resulting in 1.6% of adult and 14.4% of child wage rates missing at the household level), missing values are imputed using other community level information such as whether there is a market, a shop, a post office, electricity, gas, and a bus running through the village. The imputation involves generating a predicted value from the best available subset of these data (see Little and Rubin, 1987).

The survey also provides individual-level information on earnings and hours, permitting calculation of individual wage rates. However, only 36% of men and 10% of children are in wage employment (recall that self or household employment dominates wage employment in this rural economy). Wage rates were predicted for the rest of the sample using a selection-corrected (Heckman, 1974) unemployment-adjusted (see Ham (1986) and Card (1988)) Mincerian model. However, the prediction errors are large. A further potential problem is "division bias": the fact that the wage, when observed, is computed as earnings divided by hours. In the model in which the dependent variable is child labour (H_c), measurement error in hours will result in a spuriously negative correlation of hours and wages. A natural option might appear to be to instrument the individual wage with the village wage. This was done but the village wage turns out to be a weak instrument. This is not as surprising as it may first appear, given that the village wage is not the average of the observed wages. Overall, the use of market wage rates at the village level is preferred.

[27] If fertility decisions are correlated with decisions on investments in child quality (as reflected, for example, in C_c or L_c), then households with no children may have unobserved characteristics that differ in endogenous ways from those of households with children. However, there is no similar reason that households with no 10-14 year old may be systematically different than households in which at least one child in this age range is present.

[28] This is plausible a priori and is also a key prediction of the model in Basu and Van (1998) and Basu (2000) referred to earlier.

Demographic variables that allow for taste heterogeneity appear additively in the specification. The logarithm of household size is included together with the proportions of household members in an exhaustive set of age-gender categories. The age groups chosen are under-10, 10-14, 15-24, 25-59 and 60-plus. The omitted group is (arbitrarily) chosen to be children under 10. Studies for high-income countries often include the age of the household head as a demographic variable but they typically select samples consisting of married couples with no children. In the current context, it is important to control for the vast degree of heterogeneity in family types and compositions, which the age-gender variables do. Price data are unavailable and, as the data are a cross-section, province dummies are included to allow for regional variation in prices. The regressors include indicator dummies for the presence of a primary, middle and secondary school in the community, which may be thought of as prices. Other exogenous variables included on the grounds that they are expected to influence preferences over child goods are the gender and the religion of the head of household, an indicator for whether the household owns land, and a measure of the size of the plot, indicators for land tenancy arrangements (whether renting or sharecropping land), and an indicator for whether the household owns an enterprise.

The land and enterprise variables are included because the larger proportion of children in work in Pakistan and, indeed, across the developing world are engaged in farm (or enterprise) labour on farms (or enterprises) run by their households. The distinction between the self-employed and wage labour in village economies may also be correlated with lifestyle and tastes[29]. We investigated changes in the altruism coefficient arising from imposing the restriction that the land and enterprise variables do not influence the demand for child goods and have confirmed that this does not alter the pattern of results that we obtain without this restriction.

7. Descriptive Analysis

This Section presents a brief description of the key variables, adult consumption (C_a) and child consumption, school and labour (C_c, S_c, H_c). The emphasis is on the relation of each to household income. We also report simple tests of the mean differences in adult consumption between households with and without working children. What is revealed by these descriptive data is quite remarkable, motivating the analysis to follow. Of the child outcomes, child labour claims rather more attention in this Section because the evidence on it is more compelling. The formal analysis in Section 8, however, considers all of the three child outcomes.

7.1. Expenditure Shares & Engel Curves

Relevant expenditure shares are reported in Table 1. Observe that these households spend, on average, 54% of their budget on food, an indication of their level of

[29] For instance, the self-employed may drink more tea or smoke more tobacco as they spend a lot of time not far from their kitchens! On the other hand, they may spend less on clothing and footwear because they do not go out to work (see Browning and Meghir (1991) for evidence that, in British households, the demand for adult clothing is correlated with their labour supply, income-constant).

poverty. Together, expenditures on all of the adult consumption items we consider comprise 8.2% of the budget of the average rural household and cermonial expenditures account for a further 3.1%. A striking observation is that the expenditure share of tobacco, tea and coffee, at 3.8%, slightly exceeds the expenditure share of education (ignoring the opportunity cost of education, of course), at 3.5%.

As C_a is defined as the reference good in the m-demands reported in the following section, we need to confirm that all definitions of C_a are normal goods. In order to permit unrestricted non-linearity in the relation of C_a and m, semi-parametric Engel curves of the following form were estimated :

(26) $\omega_a = F(\ln m) + \beta \ln N + \sum_k \gamma_k (N_k/N) + v$

where w_a is the budget-share of the adult consumption category, F is an unrestricted function, m is household expenditure per capita, instrumented by household income, N is household size, N_k/N is a vector describing the age-gender composition of the household and v is a random error term. Estimates of composition effects are useful as they allow us to compare the coefficients associated with the proportions of adult males and females in the household. This is a useful way to denote relative claims of household members on unassigned consumption items- which is of relevance in Section 10.1 below. Estimates were obtained using the procedure suggested by Robinson (1988). The estimated curves are plotted in Figure 4 for some of these goods. They are non-linear and the quadratic logarithmic function provides a reasonable fit to the non-parametric relation (for further details of estimation and tests, see Bhalotra and Attfield, 1998)[30].

The total expenditure elasticity at the mean is positive in every case. Interestingly, ceremonies and health appear to be luxuries, education borders on being a luxury, while all the elements of adult consumption considered in this analysis are, like food, necessities, albeit with elasticities close to one (see Table 1). This sharpens the question of whether child education, leisure or consumption is sufficiently valued in relation to adult consumption. The elasticity was also computed for each quartile of the distribution of (log) expenditure in order to be certain that none of these goods is inferior for a sub-sample of the households in these data. This consideration is especially pertinent for tobacco, as the m-demand estimates discussed in Section 8 turn out to be strikingly different for tobacco than for the other goods. The elasticity of tobacco spending with respect to total spending is close to 1 for the bottom three quartiles and it is 0.53 for the uppermost quartile, well away from being negative.

7.2. Extent and Nature of Child Labour

The relation of child labour and household income has already been discussed in Section 2.2. With reference to Figures 1 and 2, it was observed that the data appear to challenge the view that parents are fundamentally altruistic and send their children to work only when constrained to choose between this and starvation.

[30] I am grateful to Cliff Attfield for giving me the Gauss program for the Robinson procedure.

This Section makes some brief comments intended to describe the context in which we are working. Child labour in rural Pakistan displays two striking features relative to child labour in other developing countries. First, Pakistan exhibits a relatively high rate of employment of children in *wage* labour. The vast majority of working children in developing countries are engaged in work on household farms and enterprises and, in many parts of sub-Saharan Africa, there is no wage employment of children (see Canagarajah and Nielsen (2000) and Bhalotra and Heady (2000), for example). Activity rates for children in our sample are in Table 2. Wage employment engages 12% of girls and 6% of boys. Average hours in wage labour in the reference week are 31 for girls and 45 for boys. Employment on household farms and enterprises engages about 22% of boys and 28% of girls, and average hours in this case are considerably lower, at 23 and 13 a week respectively. The second remarkable feature of the Pakistan data is the wide gender gap in education, which is partly reflected in a higher work participation rate for girls. The rest of the enrolment differential is explained by there being more girls than boys that report being neither in income-generating work nor in school (this probably reflects domestic work).

7.3. Tests of Differences in Means: Adult Consumption and Child Labour

The proposed test for altruism has the intuitive prediction that above-subsistence consumption will tend to be lower in households with working children. For each of the three adult goods and for their sum, Table 3 reports t-tests for the null that mean budget-share is the same in households that have no working children as it is in households with at least one working child. The comparisons are also presented for boys and girls separately and for wage work as distinct from household farm/enterprise work (Table 3A)[31]. *The results are striking.* Across the board, the data appear inconsistent with altruism. For adult wear, tea and coffee, expenditure shares are invariant to child labour: adult consumption is no lower in households where children work. The strongest suggestion of parental selfishness emerges in the case of tobacco as a significantly higher fraction of the budget is spent on tobacco in households where children work![32]

Disaggregating by gender is revealing. Households in which at least one girl works are seen, on average, to consume significantly more not only of tobacco but also of tea & coffee and adult clothing! In contrast, in the sub-sample of households containing at least one working boy, tobacco and tea consumption are on average no different than in other households but the share of income spent on adult clothing and footwear is significantly lower. The suggestion of non-altruism in these data is therefore much more evident for girls than for boys. *Disaggregation by the two types of child work* confirms the broad pattern observed with the aggregative definition. The only change worthy of remark is that, in the case of household farm/enterprise work, the evidence of selfish

[31] Although, as discussed, we estimate m-demands rather than Engel curves, it is more informative to look at budget *shares* in this descriptive exercise as these are normalised measures of spending.

[32] It is not the case that there is a close overlap between tobacco-consuming households and household with a child in work. Overall, 41% of households in the sample have at least one child in work and 70% buy some tobacco. Of households with child labour, 25% consume no tobacco. Of households with no child labour, 34% consume no tobacco.

behaviour that was earlier only significant for tobacco is found to be significant for tea & coffee as well. Overall, the fact that the broad pattern of results is fairly similar for market wage labour and household labour strengthens the interpretation of these results.

These are, of course, only unconditional correlations. The adult consumption items we consider behave like necessities, or the poor tend to spend a higher fraction of their budget on them than the rich[33]. Now the poor are also more likely to have working children than are the non-poor. This alone can generate the positive correlations that we observe between child labour and the share of adult consumption in the raw data. But how much force is there in income variation between the two samples? This was investigated for the case of tobacco, where the suggestion of selfish behaviour in the data was most marked, in the following manner. An Engel curve was estimated on the sample of households with no working children. The estimated parameters were then used to predict the change in tobacco-share that these households would exhibit if they were made as poor as the average household with a working child[34]. The prediction is that their tobacco share will increase by 6.6%. However, the actual tobacco share of households with working children is, on average, 21% higher! So the income differential between the two samples of households cannot alone explain the higher tobacco share in households with child labour. We now proceed to investigate whether the results reflected in the t-tests persist in an m-demand formulation that involves conditioning on prices, demographics and relevant exogenous covariates[35].

8. Results

Layout

Estimates of m-demands are presented for three child-specific items: child labour (Table 4; and child *wage* labour in Table 5) child school attendance (Table 6) and expenditures on child clothing and footwear (Table 7). The reference good is adult consumption. Results are reported separately for each of tobacco; tea & coffee; adult clothing & footwear, the sum of these three categories (referred to as "adult goods"), and for ceremonies. All expenditures other than ceremonies are normalised upon the number of adults in the household and expressed in logarithms. The altruism coefficients expressed as elasticities are summarised in Table 8. Tests on the instrumental variables are in Table 9. Appendix Tables 1 & 2 present a comparison of alternative estimators**.** Below, we discuss the results pertaining to altruism without detailing the effects of other covariates, which can be seen in the Tables.

[33] Similar evidence obtains for historical England as well as for contemporary England (e.g. Banks, Blundell and Lewbel, 1997).

[34] The average household with atleast one working child is 16.5% poorer than the average household with no working children.

[35] In the m-demand formulation, income contains no additional information once the level of the reference good (adult consumption) is held constant. Income can therefore be used as an instrument for the reference good: see Section 5.

8.1. Child Participation in Work

Refer to Table 4, which contains estimates of (4). Consistent with parent altruism, we find that expenditures on adult clothing & footwear, tea & coffee and ceremonies are lower in households in which the proportion of working children is larger. However, we are unable to reject the null of selfish parents in the case of tobacco: there is no cut back in tobacco consumption associated with children working! [36].

The result for tobacco is consistent with the cross-tabulations presented in Section 7.3 but, in the case of the other goods, the initial appearance of parent selfishness is reversed now that we are conditioning on relevant covariates. Although, as expected, the coefficients alter with IV, the broad pattern of the results is robust to the choice of estimator, as also to conditioning on the presence of schools and on demographic and land-related characteristics of households (Appendix Tables).

Leaving tobacco aside, how large are the estimated altruism coefficients? They are fairly substantial. The coefficient on adult clothing & footwear of –0.35 implies that a 10% increase in spending on these items is associated with a reduction in the proportion of children in work of 0.035. So, at the mean, work participation in the sample would fall from 32% to 27.5%, a reduction of about 13%. The effect associated with ceremonies is only about half as large. While the coefficient on tea & coffee is a substantial –0.24, this is only significant at 10%. This, together with the tobacco result, may be interpreted as suggesting that addictive consumption may tend to dominate concern for children. However, as we shall see, tea & coffee consumption takes a significant coefficient in the variants reported below. *Overall*, with the notable exception of tobacco, we observe an altruistic tendency for households with working children to spend less on adult clothing and footwear (elasticity of 1.3), tea and coffee (elasticity of 0.75) and ceremonies (elasticity of 0.63). There is no reduction in tobacco expenditures associated with working children.

Wage Work Only

The equations in Table 4 are re-estimated with the definition of the dependent variable restricted to participation in wage work for the following reasons. First, in contrast to child labour on household farms and enterprises, child wage labour involves long hours, a monetary wage, and working outside the home. Overall, it comes closer to the conventional definition of employment, and it is likely to be more harmful to the child. Second, if children are expected to inherit the household farm or enterprise, the value of work experience gained as a child may be large, making schooling less attractive irrespective of altruism. We therefore expect that if parents are altruistic, they will

[36] The results for the composite termed "adult goods", which refers to the sum of expenditures on adult clothing & footwear, tea & coffee and tobacco are consistent with altruism. These results are of course just weighted averages of the results for the component items (the weights are implicit in Table 2). Since we find that the components display different responses, these average results are not interesting in themselves. They are presented mainly to suggest what we would conclude if we were not to disaggregate by component. *In particular, the interesting difference in tobacco consumption would not have been revealed*.

display a more well-defined aversion to child wage labour. Refer to Table 5. The broad pattern of results persists and all of the response coefficients are larger.

8.2. School Attendance

The equations were estimated again with school attendance replacing work as the dependent variable (Table 6). This is because, as discussed in Section 6, one is not the exact inverse of the other. Consistent with the results for work, parental selfishness is rejected for ceremonies and for all categories of adult consumption other than tobacco expenditures. The only notable difference is that the tea & coffee coefficient is now significant at 1% and the associated elasticity, at 1.4, is much the same as that for adult clothing and footwear. The elasticity for ceremonial expenses is 0.57, similar to that obtained in the work equations.

8.3. Child Consumption

Estimates of (5) are in Table 7. Child consumption is expressed per child and adult consumption per adult and both are in logarithms. The pattern of estimates is similar to that obtained for child labour and schooling. This reinforces the robustness of the results. With the exception of tobacco, there is a significant positive relation of child and adult consumption, which is consistent with altruism. For adult wear and tea & coffee the elasticity is close to unity, and for ceremonies it is about 0.4.

8.4. Instruments and Alternative Estimators

A polynomial in the log of household income is used to instrument the regressor, C_a (adult consumption, ceremonies); see Section 5. We also investigate the overidentifying restriction associated with the community-level unemployment rate[37] (see Table 9). The instruments are fairly efficient; tests are in Table 9. All estimates reported so far are 3SLS instrumental variables estimates. In order to assess the importance of instrumenting, OLS estimates of every equation were also produced. The signs on the altruism coefficients are preserved though, unsurprisingly, the coefficients increase with IV. We also investigated changes in the altruism coefficient that result upon suppressing the taste shifters in the IV model. This indicates how much work the conditioning variables other than the wage rates do. Once again, the signs on the altruism coefficient are unaltered though the size of the effect is not. These alternative models are presented in Appendix Table 1 for the illustrative cases of $X_c=H_c$ (child labour) and C_a= tobacco and adult clothing & footwear. We also display there the difference made by introducing the over-identifying restriction (in the cases where it is significant): as we would expect with a valid restriction, there is little change in the coefficient and a considerable gain in efficiency. As a further check on robustness, we confirmed that 2SLS and 3SLS estimates produce almost identical coefficients. If one of the 2 equations in the model was mis-specified then the 3SLS covariance matrix would be inconsistent and the resulting coefficients biased and inconsistent for 3SLS but not for 2SLS. As expected, the 3SLS

[37] Together with actual income, this may be thought of as representing (a general function of) expected income.

estimates are associated with lower standard errors than under 2SLS, though the efficiency gains are fairly modest. Appendix Table 2 contains comparable 2SLS and 3SLS estimates for the two illustrative cases.

9. Discussion of Results

This Section reflects upon the results. It considers how our results compare with related findings in the previous literature, how we might reconcile the exceptional behaviour of tobacco spending with the results for other goods, and the interpretation we might lay on altruism.

9.1. Altruism or Selfishness?: The Distinctiveness of Tobacco

How do our findings relate to the available evidence on household decision making? The tendency in previous studies is to reject income pooling. Although this does not have any clear implication for whether altruism holds, by virtue of rejecting the unitary model it does undermine support for altruism (see Section 2.1). However, previous studies have primarily investigated income pooling amongst spouses or between adults and their elderly parents, and altruism may be more likely to flow downwards from parents to young children. Also, the finding that income pooling is rejected is not robust to a selectivity bias that affects many of these studies which restrict the sample of couples to those in which both partners are in full-time employment (e.g. Browning *et al*, 1994). If women are more likely to work in households in which consensus is difficult to achieve, then the sample selection will bias the results towards rejection of income-pooling.

As there is no research directly focused on altruism and the effects of parental income on child well-being (which we have shown to be an index of altruism) are sometimes small and sometimes large, there is no very valid benchmark against which to compare our results.

We find a clear rejection of selfishness for all but one specification of the model. In particular, expenditures on adult clothing & footwear, tea & coffee and ceremonies are all consistent with parental altruism. This is robust to whether the child good is defined as schooling (or, inversely, child labour) or consumption. The exception relates to tobacco spending, in respect of which we cannot reject selfishness. This result is robust to the choice of estimator and to the choice of child and adult good. Whatever concerns with model specification one may have, why does tobacco behave differently than all other above-subsistence adult consumption?

An immediate possibility is that tobacco is inferior and the other commodities specified as reference goods are not. However, we have established that tobacco is not close to being inferior anywhere in this sample (see Section 7.1). Can these seemingly divergent results then be reconciled? We suggest now, that they can. Tobacco has two properties that distinguish it from ceremonies and the other items of adult consumption, and both of these can be adduced to rationalise what is observed. First, the *addictive* properties of tobacco may mean that it is effectively a subsistence good in the sense that

the demand for it is fairly inelastic[38]. If so, the results are coherent as, taken together, they suggest that above-subsistence consumption is indeed cut back in order to avoid child labour, or to finance child clothing and schooling. Tea & coffee were introduced into the analysis in order to investigate the role of addictive agents[39]. While the altruism coefficient on tea & coffee is only significant at 10% in the child labour equation, it is significant at 1% in the schooling and child consumption models.

This encourages an alternative interpretation of the results, relating to the second distinctive property of tobacco: that it is a predominantly *male good*. Engel curves for tobacco estimated on these data indicate that an adult male (aged 25-59) consumes four times as much tobacco as an adult female does. In contrast, men consume only 70% of the tea and coffee that women consume, on average (see Section 7.1). The pattern of results that we obtain is therefore consistent with the view that fathers are less altruistic than mothers[40].

Evidence from experimental studies of gender differences in altruism is mixed. Andreoni and Vesterlund (1998) find that the male and female demand curves for altruism cross: at high prices, women demand more and, at low prices, men demand more. Also, men are more likely to be both perfectly selfish and perfectly selfless, while women tend to be "equalitarians". While the prices interpretation is not inconsistent with the results in this paper, our analysis does not allow for differences in the altruism parameter across men in the sample. More pertinent to the current study are analyses of microdata, especially for developing countries, that have revealed again and again, in several contexts, that resources in the hands of women improve child welfare significantly more than the same resources in the hands of men (see Section 2.1). This literature investigates preference heterogeneity between mothers and fathers by studying the effect on child outcomes of, for example, raising the bargaining power (income share) of women in the household.

[38] Strauss and Beegle (1995) also make the observation that tobacco expenditures are likely to exhibit small elasticities on account of addiction. Apart from addiction, tobacco is a stimulant. In historical and contemporary data, we find a higher share of the budget is spent on tobacco amongst the poor and also amongst manual workers. It seems plausible that tobacco – and also tea, coffee, sugar- are stimulants that provide relatively under-nourished people with the energy needed to work. However, we do not rely upon this speculation as the point is well made with reference to addiction.

[39] Estimates of the Becker-Murphy model of rational addiction on US data indicate that smoking is addictive (e.g. Chaloupka, 1991). Evidence that caffeine (which is in tea and coffee) is habit-forming is contained in Olekalns and Bardsley (1998).

[40] Heterogeneity in parental preferences may be incorporated into the theoretical framework offered in this paper to demonstrate this but it is intuitive enough. Several models of preference heterogeneity between parents are available in the literature (see the following footnote). In this paper, we impose very little structure on the model and focus on altruism of decision-making parents towards children, rather than on the question of how multiple decision makers reach a consensus.

9.2. Reflections on Altruism

Analysis of altruism in the context of child labour or schooling is interesting because a clear agency issue arises when parents take these decisions and (pecuniary) returns on them accrue when the child has possibly left home and may or may not make return transfers. We find very similar results for child labour (and schooling) and child consumption, suggesting that the value put on future child consumption is not a lot lower than that put on current child consumption.

Let us consider this result further. The appearance of schooling (or child labour) in the parents utility function suggests that parents derive utility from their children attending school (or disutility from child labour). This may be interpreted as parents valuing the future consumption of their children. Is this "pure altruism" or is it because they expect better-off children to make larger transfers to them when they are old? First, it is unclear that better educated and higher-earning children make larger transfers (for recent evidence from India, see Kochar, 2001). It is plausible, for example, that the children in whom parents invest the most are most easily distanced from their maternal home by virtue of the new ideas and opportunities they encounter. Second, even if it were true that parental altruism were not "pure" or were motivated by reciprocal considerations- or by parents gaining status from having well-educated children- do we care? This, of course, depends upon the context. If we are interested in the propensity of parents in a given society to invest in their children because we are interested in school enrollment rates, then we may be uninterested in the deeper motivations underlying observed propensities[41].

11. Conclusions

Parent altruism is assumed in a variety of economic models, though it has not directly been the subject of investigation. We argue that it appears sometimes to be challenged by the data and, as it is of great significance for welfare and policy design, it merits investigation. This paper suggests a test of altruism that can be conducted on most available data by estimation of m-demands. The idea is simple. If, for example, parents value child consumption then, at constant relative prices, their demand for child consumption will be increasing in the demand for their own consumption. The estimated *altruism coefficient* measures the size of this trade-off. Future work could use this test to measure the degree of altruism of parents towards sons vs daughters, for example.

We demonstrate that, if parent consumption is normal, then this is equivalent to testing for normality of the child good. A problem with directly investigating the effect of variations in income on child outcomes is that data on income or total expenditure are either not available or are mis-measured. In the case where the outcome is child labour, income is clearly endogenous and it is very difficult to find a valid instrument for it. The insight that altruism implies positive income effects on child outcomes encourages a new

[41] An analogy may assist this argument. Conventional economics would not raise an eyebrow at marmite appearing in the utility function of a consumer. Marmite may appear because some people actually like its taste. More likely, it may appear in the utility function because it is an investment in the future health of the individual. In this respect, it is not very different from having child schooling in the utility function of a parent.

look at a vast literature on the effects of parental income on child outcomes, and establishes the direct relevance of investigating altruism in the context of income-transfer programmes. Future work that investigates the application of this test to data on spouses (or on adult children and their elderly parents) is merited.

We use data from rural Pakistan and the child "outcomes" that we consider are child consumption, child schooling and child labour. We show that research on child labour using both this sample and other samples has found surprisingly small income effects. This is consistent with non-altruism but also with alternative explanations such as measurement error and endogeneity bias in the income coefficient, or inadequate modeling of non-linearity in the income effect. Tests of differences in means conducted on the Pakistan sample show that expenditures on items like tobacco and adult clothing are no lower in households in which children work. This too is suggestive of non-altruism. But what does a more formal test suggest? For a range of above-subsistence consumption items including ceremonial expenses and expenditures on adult clothing & footwear and tea & coffee, we can decisively reject the hypothesis of selfish parents. However, when we consider tobacco consumption, we cannot. These results are statistically fairly robust and their robustness is further underlined by their being very similar across the three child goods.

We suggest that a possible interpretation of the consistent differentiation of tobacco from the other goods is that it is a predominantly male good, and that fathers are less altruistic than mothers. Tobacco is also distinctive for its addictive and stimulant properties, which could result in it effectively being a subsistence good. This would reconcile the seemingly divergent results that we find. We investigate this by conducting the analysis for tea & coffee and find that tea & coffee consumption is consistent with altruism. For this reason, we lean towards the male-good explanation, though it is recognised that the comparison with tea & coffee is only indicative since they are probably weaker in their addictive and stimulant properties than tobacco.

Consider policy implications of the analysis for child labour and schooling in particular. Policies that have been proposed as offering ways of reducing child labour or raising school enrollment include providing income subsidies to households with working children, the introduction of adult minimum wages, trade sanctions and bans on child labour[42]. Legislative approaches are not easily justified in a world of altruistic parents but if it can be argued that the state cares more about child welfare than parents do, then the case for legislation is strengthened. Our results raise the concern that the policy of providing income subsidies to households with working children may encourage smoking rather than discourage child labour. Income subsidies should therefore be conditional on the child attending school, or on infants being taken to clinics for regular health checks,

[42] The range of programmes instituted by international organisations in the last five odd years with the express purpose of reducing child labour reflect some of these alternative approaches. While the ILO tends to favour legislative measures, UNICEF has focused on investments in the education sector. Yhe World Bank perceives the problem as being primarily a symptom of poverty and it has supported some income-transfer programmes targeted at reducing child labour. The effectiveness of, for example, legislation and income-transfer programs depends, amongst other things, on the relative significance of non-altruism in determining child labour.

as is the case in recent programmes in Latin America[43]. Alternatively, if community organisations supported by local governments and NGOs are able to control consumption of tobacco, they might, in one stroke, contribute to reducing child labour and to improving adult health. Analysis of price effects is beyond the scope of this study and a tax on tobacco will be difficult to implement in an informal rural economy[44].

References

To be completed

[43] For example, Progresa in Mexico and Bolsa Escola in Brazil (see World Bank, 2001) and Becker (2000).

[44] Even though smoking is addictive, estimates of cigarette demand equations for the US indicate that price increases reduce demand. More addicted (more myopic) individuals display relatively large price elasticities in the long run (see Chaloupka, 1991).

Table 1
Expenditure Shares & Elasticities

Variable	Mean	Std. Dev	Elasticity
Tobacco	0.020	0.028	0.66
Tea & coffee	0.018	0.014	0.76
Adult clothing & footwear	0.043	0.035	0.96
Adult goods	0.082	0.050	0.85
Ceremonies	0.031	0.065	1.66
Child clothing & footwear	0.028	0.024	0.77
Food	0.537	0.165	0.83
Education	0.035	0.053	1.00
Health	0.103	0.137	1.48

Notes: The figures in columns 2-3 are means and standard deviations of shares of total household expenditure. The elasticities in column 4 are of the expenditure (not share) of each item in column 1 w.r.t. total expenditure and are computed for the mean household in the sample. *Adult goods* is the composite of the adult consumption categories in the first three rows of the Table.

Table 2
A Profile of Child Activities
Participation Rates, Rural Pakistan

	Boys	Girls
Wage work	6.2%	11.9%
Household farm work	22.1%	28.1%
Household enterprise work	2.3%	1.6%
School	72.8%	30.5%
None of the above activities	14.0%	42.4%
Domestic work	n.a.	99.4%
Number of children	1209	1096

Notes: Children are defined as 10-14 year-olds. n.a.=not available.

Table 3
Differences in Mean Budget-Shares: T-tests

Commodity	Mean share	All Children	Boys	Girls
Adult goods	0.086	- 0.86	1.04	**-3.42**
Tobacco	0.023	**- 3.24**	-1.36	**-2.79**
Tea	0.019	- 1.21	-0.60	**-2.06**
Adult clothing	0.033	1.52	**2.54**	**-1.98**
Adult footwear	0.012	1.54	**2.01**	-0.69
Education	0.024	5.74	7.74	1.97
Food	0.544	- 4.66	-3.86	-2.70

Notes: A dummy (D) is defined as 1 if the household has at least one working child, and 0 otherwise. The mean budget share of households with D=1 is then compared with that in households for which D=0. The null hypothesis is: mean(D=0)-mean(D=1)=0. Where the t-test associated with this hypothesis is significant, it is in bold. For adult goods: ≤0 indicates rejection of altruism. Work refers to either of wage employment or employment on the household farm or enterprise. N=1343, which is the sample of households with at least one 10-14 year old.

Table 3A
Differences in Mean Budget-Shares: T-tests
Distinguishing market work and household farm/enterprise work

	Wage labour			**Own farm/enterprise**		
Commodity	**All**	**Boys**	**Girls**	**All**	**Boys**	**Girls**
Adult goods	-1.18	1.66	**-3.60**	-0.62	1.01	**-2.96**
Tobacco	**-2.66**	-0.10	**-2.55**	**-2.49**	-1.17	**-2.00**
Tea	1.10	0.18	-0.22	**-1.95**	-0.74	**-2.45**
Adult clothing	-0.18	**2.14**	**-3.01**	1.53	**2.43**	**-1.80**
Adult footwear	0.41	**1.81**	-1.54	1.65	**1.90**	-0.57
Education	2.57	6.60	-1.57	5.41	6.98	1.83
Food	-2.44	-2.12	-0.70	-5.21	-4.06	-2.42

Notes: See Notes to Table 3.

Table 4: Child Work Participation
M-Demands: 3SLS Estimates

	Tobacco	Adult Wear	Tea &Coffee	Adult Goods	Ceremonies
ln expenditure	**0.422**	**-0.346**	**-0.242**	**-0.306**	**-0.160**
	[1.58]	**(2.46)***	**(1.73)**	**(2.25)***	**(1.99)***
Ln child wage	0.044	-0.049	0.023	-0.020	0.006
	[1.22]	(1.47)	(1.37)	(0.82)	(0.23)
Ln adult wage	-0.253	0.064	0.025	0.069	-0.051
	[1.79]+	(0.76)	(0.29)	(0.79)	(0.85)
Ln household size	-0.045	-0.185	-0.227	-0.207	0.063
	[0.48]	(3.58)**	(3.02)**	(3.67)**	(0.73)
prop 10-14 boys	-0.346	0.108	-0.154	-0.035	0.193
	[0.93]	(0.49)	(0.88)	(0.19)	(0.82)
prop males 15-24	0.245	-0.511	-0.705	-0.659	-0.205
	[0.55]	(3.38)**	(2.85)**	(3.49)**	(1.27)
prop males 25-59	-0.441	-0.214	-0.299	-0.171	0.119
	[0.93]	(0.94)	(1.24)	(0.83)	(0.43)
prop males >60	0.481	-0.095	-0.079	-0.098	0.267
	[0.92]	(0.31)	(0.24)	(0.33)	(0.85)
prop 10-14 girls	0.501	0.621	0.313	0.391	0.513
	[1.33]	(2.74)**	(1.78)	(2.21)*	(2.21)*
prop females 15-24	0.979	-0.570	-0.750	-0.666	-0.019
	[1.20]	(2.82)**	(2.28)*	(2.83)**	(0.11)
prop females 25-59	-0.203	-0.506	-0.639	-0.643	-0.145
	[0.38]	(1.84)	(2.30)*	(2.41)*	(0.38)
prop females >60	0.140	-1.421	-1.744	-1.672	-1.337
	[0.15]	(4.11)**	(3.40)**	(4.12)**	(3.85)**
non-muslim	-0.226	0.133	0.154	0.192	0.182
	[0.81]	(1.78)	(2.25)*	(2.77)**	(2.01)*
female head	0.056	0.056	0.071	0.087	0.184
	[0.39]	(0.73)	(1.01)	(1.26)	(2.09)*
acres	-0.003	0.003	0.002	0.002	-0.000
	[1.07]	(1.69)	(1.16)	(1.47)	(0.38)
rent	0.290	0.118	0.058	0.077	0.140
	[1.89]+	(2.28)*	(1.09)	(1.60)	(2.50)*
sharecrop	0.160	0.148	0.130	0.136	0.100
	[2.28]*	(3.92)**	(3.23)**	(3.71)**	(2.12)*
own land	0.180	0.120	0.127	0.106	0.102
	[2.33]*	(3.68)**	(3.89)**	(3.63)**	(2.78)**
own enterprise	-0.003	0.041	0.012	0.039	0.001
	[0.04]	(1.23)	(0.39)	(1.24)	(0.03)
primary school	-0.062	0.053	-0.008	0.027	-0.010
	[0.56]	(1.02)	(0.16)	(0.57)	(0.16)
middle school	-0.000	0.045	-0.039	-0.002	-0.020
	[0.00]	(1.05)	(1.36)	(0.07)	(0.57)
secondary school	-0.059	-0.090	0.001	-0.048	0.036
	[1.01]	(2.44)*	(0.02)	(1.72)	(0.79)
Observations	*1318*	*1318*	*1318*	*1318*	*887*

Province dummies are included in all equations in Tables 4 – 7 and Table 10, though not shown.

Table 6: Child School Attendance
M-Demands: 3SLS Estimates

	Tobacco	Adult Wear	Tea & Coffee	Adult Goods	Ceremony
ln expenditure	**-0.339**	**0.722**	**0.742**	**0.756**	**0.301**
	[1.49]	**(3.49)****	**(3.08)****	**(3.84)****	**(3.15)****
ln child wage	-0.017	0.148	-0.003	0.103	0.018
	[0.53]	(3.01)**	(0.10)	(2.92)**	(0.61)
ln adult wage	0.222	-0.236	-0.273	-0.310	0.036
	[1.85]+	(1.92)	(1.86)	(2.44)*	(0.51)
ln household size	0.078	0.275	0.472	0.358	-0.186
	[0.97]	(3.63)**	(3.65)**	(4.36)**	(1.82)
prop 10-14 boys	0.988	0.254	0.776	0.496	0.384
	[3.13]**	(0.78)	(2.58)*	(1.86)	(1.38)
prop males 15-24	-0.365	0.468	1.238	0.902	-0.085
	[0.97]	(2.11)*	(2.91)**	(3.30)**	(0.44)
prop males 25-59	0.549	0.537	0.932	0.482	-0.198
	[1.36]	(1.60)	(2.25)*	(1.61)	(0.60)
prop males >60	-0.299	0.649	0.975	0.803	-0.364
	[0.67]	(1.42)	(1.74)	(1.85)	(0.97)
prop 10-14 girls	-1.001	-1.489	-0.843	-1.037	-1.124
	[3.12]**	(4.47)**	(2.79)**	(4.04)**	(4.07)**
prop females 15-24	-0.696	0.978	1.864	1.345	0.082
	[1.00]	(3.30)**	(3.29)**	(3.95)**	(0.39)
prop females 25-59	0.199	0.530	1.005	0.893	-0.320
	[0.44]	(1.31)	(2.10)*	(2.31)*	(0.71)
prop females >60	-0.470	1.323	2.734	2.108	0.856
	[0.60]	(2.60)**	(3.10)**	(3.58)**	(2.08)*
non-muslim	0.185	-0.072	-0.112	-0.210	-0.275
	[0.78]	(0.66)	(0.95)	(2.09)*	(2.56)*
female head	-0.056	-0.022	-0.041	-0.089	-0.125
	[0.46]	(0.19)	(0.34)	(0.88)	(1.20)
acres	0.002	-0.005	-0.005	-0.005	0.000
	[0.98]	(2.41)*	(2.07)*	(2.51)*	(0.04)
rent	-0.191	-0.074	0.093	0.021	-0.070
	[1.46]	(0.97)	(1.01)	(0.30)	(1.06)
sharecrop	-0.111	-0.080	-0.005	-0.042	-0.029
	[1.87]+	(1.43)	(0.07)	(0.79)	(0.52)
own land	-0.065	-0.039	-0.079	-0.011	0.009
	[0.99]	(0.81)	(1.40)	(0.25)	(0.22)
own enterprise	-0.036	-0.103	-0.036	-0.106	0.010
	[0.69]	(2.08)*	(0.70)	(2.35)*	(0.20)
primary school	0.071	-0.055	0.108	-0.000	0.044
	[0.75]	(0.72)	(1.22)	(0.00)	(0.61)
middle school	-0.012	-0.145	0.040	-0.057	0.034
	[0.23]	(2.29)*	(0.81)	(1.29)	(0.82)
secondary school	0.045	0.139	-0.088	0.055	-0.067
	[0.92]	(2.56)*	(1.45)	(1.36)	(1.23)
Observations	*1318*	*1318*	*1318*	*1318*	*887*

Table 7: Child Consumption
M-Demands: 3SLS Estimates

	Tobacco	Adult Wear	Tea & Coffee	Adult Goods	Ceremony
ln expenditure	**-0.741**	**0.861**	**1.058**	**0.948**	**0.385**
	[1.44]	**(4.82)****	**(3.06)****	**(4.68)****	**(2.40)***
ln child wage	-0.134	0.051	-0.125	-0.000	-0.110
	[2.08]*	(1.12)	(3.19)**	(0.00)	(2.27)*
ln adult wage	0.703	0.081	-0.078	-0.032	0.305
	[2.88]**	(0.69)	(0.35)	(0.23)	(2.64)**
ln household size	-0.299	0.006	0.364	0.121	-0.553
	[1.43]	(0.08)	(1.95)	(1.41)	(3.33)**
prop 10-14 boys	0.170	-0.568	0.149	-0.252	-0.178
	[0.24]	(1.82)	(0.34)	(0.83)	(0.41)
prop males 15-24	0.021	1.604	2.434	2.085	0.509
	[0.03]	(6.00)**	(3.96)**	(6.00)**	(1.55)
prop males 25-59	1.777	1.760	2.579	1.735	0.710
	[1.80]+	(4.55)**	(3.65)**	(4.34)**	(1.21)
prop males >60	-1.112	1.549	1.805	1.881	-0.190
	[0.75]	(3.04)**	(2.19)*	(3.32)**	(0.29)
prop 10-14 girls	0.152	-0.218	0.648	0.230	0.461
	[0.20]	(0.65)	(1.49)	(0.74)	(1.06)
prop females 15-24	-1.474	2.016	3.355	2.540	0.592
	[0.83]	(6.06)**	(3.84)**	(5.93)**	(1.57)
prop females 25-59	1.634	2.707	3.112	3.039	1.240
	[1.40]	(5.75)**	(4.09)**	(5.94)**	(1.61)
prop females >60	-1.175	2.661	4.357	3.504	0.985
	[0.63]	(4.54)**	(3.30)**	(4.79)**	(1.47)
non-muslim	0.795	0.207	0.105	0.009	-0.090
	[1.58]	(1.86)	(0.62)	(0.07)	(0.49)
female head	0.150	0.055	0.075	-0.036	-0.146
	[0.47]	(0.46)	(0.42)	(0.30)	(0.86)
acres	0.012	-0.000	-0.000	0.000	0.006
	[2.16]*	(0.11)	(0.00)	(0.09)	(2.52)*
rent	-0.313	-0.020	0.175	0.101	0.028
	[0.99]	(0.26)	(1.46)	(1.28)	(0.28)
sharecrop	-0.127	-0.146	-0.009	-0.094	-0.059
	[0.93]	(2.68)**	(0.10)	(1.63)	(0.70)
own land	-0.117	0.006	-0.111	0.030	-0.007
	[0.75]	(0.12)	(1.31)	(0.62)	(0.10)
own enterprise	0.101	-0.032	0.052	-0.025	0.124
	[0.83]	(0.63)	(0.73)	(0.48)	(1.73)
primary school	0.251	-0.014	0.184	0.038	0.152
	[1.13]	(0.18)	(1.54)	(0.49)	(1.30)
middle school	0.121	-0.021	0.178	0.068	0.187
	[1.06]	(0.35)	(2.60)**	(1.33)	(2.92)**
secondary school	-0.001	0.018	-0.284	-0.080	-0.233
	[0.01]	(0.35)	(3.15)**	(1.73)	(2.76)**
Observations	*1193*	*1193*	*1193*	*1193*	*803*

Table 8
Altruism Elasticities

	Child labour	*Child schooling*	*Child consumption*
Adult wear	1.3	1.4	0.96
Tea & coffee	0.75	1.4	0.90
Ceremonies	0.63	0.57	0.40

Notes: The figures are elasticities evaluated at sample means.

Table 9
Tests on the Instruments

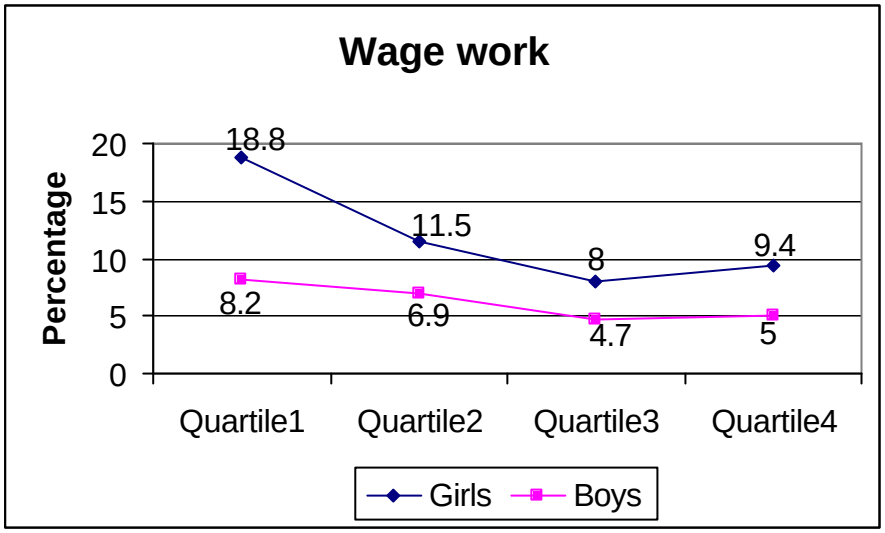
Dependent Variable	**Tobacco**	**Tea & Coffee**	**Adult Wear**	**Adult Goods**	**Ceremony**	**Child Wear/Lab**
Child labour, $\chi^2(2)$	4.4 (0.11)	15.4 (0.0)	17.4 (0.0) 65.6 (0.0)	24.4 (0.0)	19.3 (0.0)	20.7 (0.0)
Child school, $\chi^2(2)$	24.1 (0.0)		15.5 (0.0)	23.0 (0.0)	18.5 (0.0)	20.1 (0.0)
with overid			64.4 (0.0)			
Test: overid, $c^2(3)$			*3.1 (0.38)*			
Child consumption, $c^2(3)$	10.7 (0.01)	13.9 (0.0)	21.0 (0.0)	29.2 (0.0)	14.5 (0.0)	15.6 (0.0)
with overid.			56.6 (0.0)			53.6 (0.0)
Test: overid, $c^2(3)$			*6.7 (0.08)*			*3.2 (0.36)*
R^2 of auxiliary model	0.087	0.35	0.24	0.28	0.12	0.15
Observations	1318	1318	1318	1318	887	1193

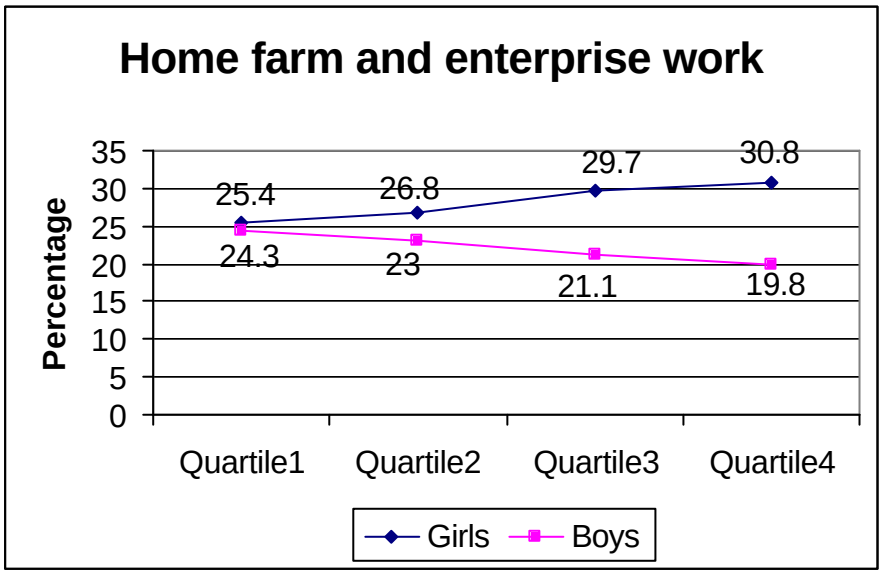
Notes: These are χ^2 tests of the power of the instruments, the associated [p-value] is in parentheses and the estimates are the 3SLS estimates. These tests indicate the joint significance of the instruments in the auxiliary model. The overidentifying restrictions investigated refer to the regional unemployment rate and the education of the mother and the father of the child. These restrictions are rejected in all cases other than for adult and child wear. For these cases, tests of the validity of the restrictions are presented (in italics).

Appendix Table 1:
Alternative Estimators of M-Demands : Child Participation in Work

	Tobacco			Adult Wear			
	Pref.	**Drop controls**	**OLS**	**Pref**	**Overid.**	**Drop controls**	**OLS**
ln expenditure	**0.422**	**0.390**	**0.013**	**-0.346**	**-0.407**	**-1.100**	**-0.032**
	(1.73)	**[2.69]****	**(2.50)***	**(2.60)***	**(5.71)****	**[1.78]+**	**(2.47)***
ln child wage	0.044	0.027	0.019	-0.049	-0.061	-0.148	0.011
	(1.18)	[0.64]	(1.75)	(1.45)	(2.37)*	[1.22]	(1.12)
ln adult wage	-0.253	-0.298	-0.097	0.064	0.092	-0.137	-0.077
	(1.54)	[2.25]*	(2.22)*	(0.62)	(0.97)	[0.66]	(1.70)
ln household size	-0.045		-0.116	-0.185	-0.196		-0.125
	(0.53)		(3.46)**	(3.29)**	(3.84)**		(3.71)**
prop 10-14 boys	-0.346		-0.173	0.108	0.159		-0.141
	(0.90)		(1.05)	(0.50)	(0.74)		(0.85)
prop males 15-24	0.245		-0.310	-0.511	-0.542		-0.345
	(0.58)		(2.97)**	(3.44)**	(3.81)**		(3.32)**
prop males 25-59	-0.441		-0.089	-0.214	-0.237		-0.092
	(0.90)		(0.49)	(0.98)	(1.03)		(0.52)
prop males >60	0.481		0.283	-0.095	-0.161		0.242
	(0.87)		(1.16)	(0.28)	(0.47)		(0.99)
prop 10-14 girls	0.501		0.323	0.621	0.675		0.345
	(1.36)		(1.91)	(2.79)**	(3.24)**		(2.04)*
prop females 15-24	0.979		-0.204	-0.570	-0.629		-0.272
	(1.32)		(1.66)	(2.55)*	(3.38)**		(2.24)*
prop females 25-59	-0.203		-0.434	-0.506	-0.518		-0.447
	(0.34)		(1.85)	(1.77)	(1.74)		(1.90)
prop females >60	0.140		-0.965	-1.421	-1.494		-1.039
	(0.15)		(3.86)**	(3.63)**	(3.96)**		(4.08)**
non-muslim	-0.226		0.145	0.133	0.129		0.154
	(0.87)		(2.59)*	(1.32)	(1.17)		(2.73)**
female head	0.056		0.082	0.056	0.051		0.080
	(0.37)		(1.27)	(0.65)	(0.56)		(1.23)
acres	-0.003		-0.000	0.003	0.003		0.000
	(1.23)		(0.05)	(1.64)	(2.24)*		(0.32)
rent	0.290		0.107	0.118	0.121		0.103
	(1.94)		(2.22)*	(2.13)*	(2.08)*		(2.12)*
sharecrop	0.160		0.171	0.148	0.145		0.170
	(2.28)*		(5.19)**	(3.78)**	(3.55)**		(5.14)**
own land	0.180		0.105	0.120	0.123		0.104
	(2.21)*		(3.66)**	(3.48)**	(3.38)**		(3.70)**
own enterprise	-0.003		0.018	0.041	0.046		0.020
	(0.04)		(0.66)	(1.11)	(1.24)		(0.77)
Primary school	-0.062		0.017	0.053	0.058		0.022
	(0.64)		(0.41)	(0.85)	(0.85)		(0.52)
Middle school	-0.000		-0.028	0.045	0.058		-0.022
	(0.00)		(0.93)	(0.90)	(1.15)		(0.74)
Secondary school	-0.059		-0.036	-0.090	-0.100		-0.040
	(0.85)		(1.18)	(1.82)	(2.04)*		(1.32)
Observations	*1318*	*1329*	*1327*	*1318*	*1318*	*1329*	*1327*

Figure 1
Child Participation Rates by Quartiles of Food Expenditure Per Capita





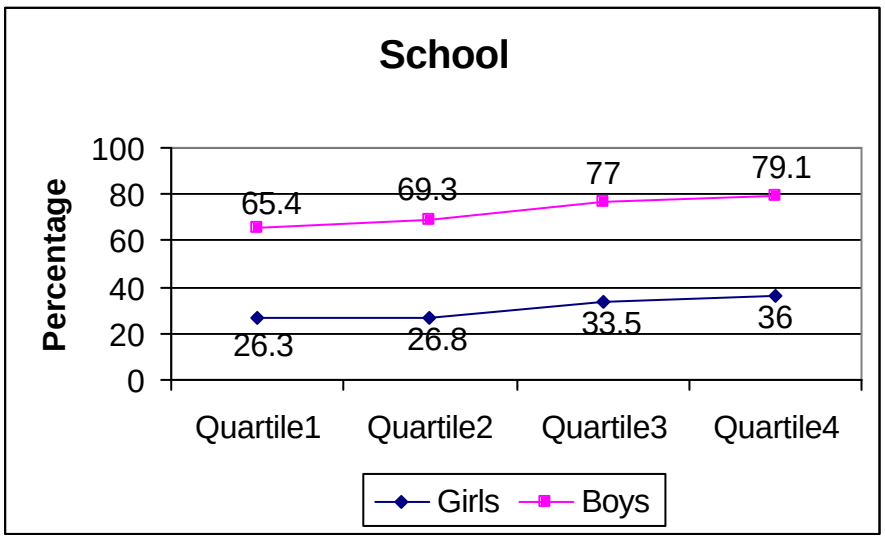
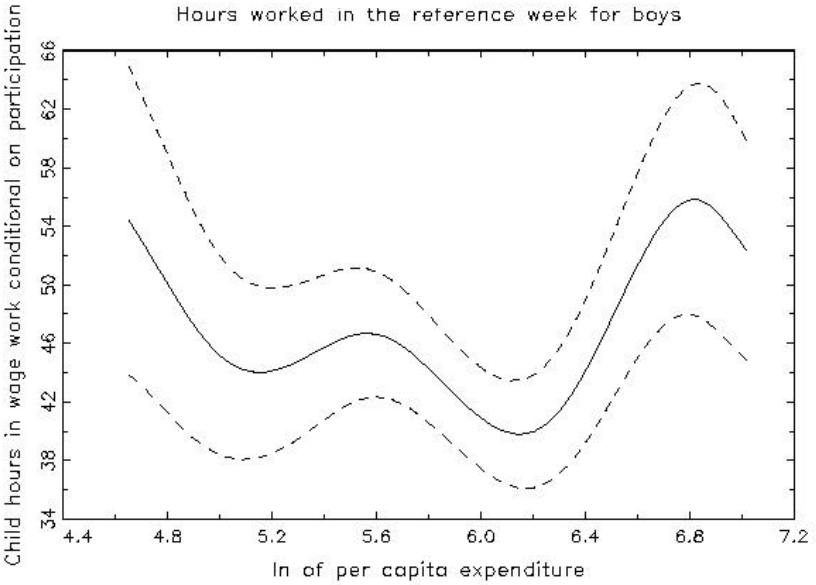


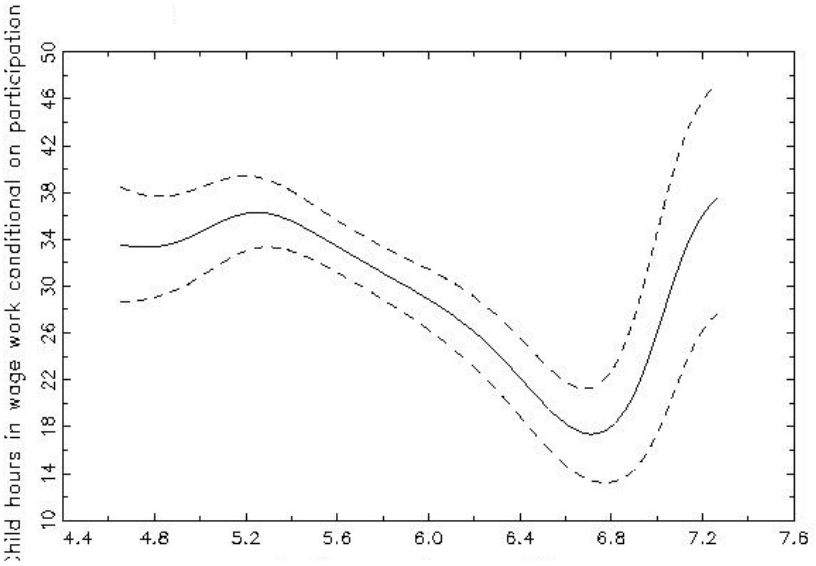
Figure 2

The Relation of Hours of Child Wage Work and Household Expenditure: Nonparametric Estimates

Boys



Girls



Notes: Child hours in wage work conditional on participation as a function of the logarithm of per capita expenditure of the household. The nonparametric estimation uses a Gaussian Kernel.

Utility

Figure 3