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Abstract

This paper detects pro-girl (age 5-15) bias in intrahousehold allocation of consumption budget in the rural Philippines using Deaton's "adult goods" method. Based on additional checks (including those for endogeneity), the results appear to be robust. The paper also finds that a larger share of girls among household members is positively associated with a larger budget share on transportation, suggesting that parents pay more for girls' transportation, possibly due to safety concerns. The results also suggest that, despite some earlier results in the literature, the adult goods method is capable of detecting gender bias, although alcohol and tobacco may not be suitable for detecting gender bias.

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1. Introduction

Gender disparity is an important but often contentious issue. While gender disparity is regarded as being less serious in Southeast Asia than in South Asia, for example, the direction of gender disparity in the Philippines has been debated, as we will see in section two. One possible reason for the contention could be that there are many potential aspects of gender disparity, and that gender bias may differ among different aspects. Parents may discriminate against girls in one aspect, for example, while favoring girls in another to compensate them (Quisumbing, Estudillo and Otsuka, 2004). Therefore, it would be desirable to examine gender disparity in as many aspects as possible.

A majority of the existing studies on gender focus on education, health, and labor market outcomes, in part because individual-level data are widely available on those aspects. In contrast, gender disparity in intra-household allocation of consumption budget has been poorly understood due to the paucity of data on consumption allocation at the individual-level. This knowledge gap can potentially be addressed either by collecting individual-level data on consumption or by making indirect inferences based on consumption data at the household aggregate-level which are widely available. While a small number of attempts have been made in line with the first approach, collecting fully-individual level data on consumption would present both practical and conceptual difficulties. Direct observation of food consumption by individuals at meal time can be intrusive (thus affecting the respondent's behavior itself), and some of consumption goods, such as housing and utility, are public goods not assignable at the individual-level (Deaton, 1989; Fuwa, 2006). Indirect approaches, based on household-level data, thus remain attractive (Browning et al., 1994).

This paper applies one of such indirect inference methods originally proposed by Deaton (1989), which focuses on consumption of goods exclusively consumed by adults (which are observable in household consumption data) rather than of goods consumed by children (not observed in household consumption data). We examine how a household adjusts its consumption of

adult goods in response to an addition of a child, which acts like a negative income effect. Pro-boy (girl) bias could be inferred if a household is found to reduce a larger amount of consumption of adult goods to make room for feeding and clothing boys (girls) than for girls (boys).

We find significant bias in favor of girls, rather than boys, in intrahousehold allocation of consumption budget. We further find that an addition of a girl in the household is associated with a significantly higher budget on transport, suggesting that parents are willing to pay more for girls' transportation than for boys', possibly for safety reasons.

Deaton's "adult goods approach," despite its potential attractiveness, has often been discredited due to its failure to detect gender bias even in the areas where gender disparity is a serious problem, such as South Asia (Case and Deaton, 2002). Exploring potential sources of its "successes," as well as "failures," of this method, however, would be worthwhile. This paper provides one of the few cases where the method detects significant gender bias in intrahousehold consumption allocation and, to my knowledge, the only one finding significant pro-girl, rather than pro-boy, bias. A methodological implication of our results is that alcohol and tobacco may not be suitable adult goods for detecting intrahousehold disparity. In addition, the relatively small budget shares of adult goods, often cited as one of the possible reasons for the past 'failures' of the method in the literature, may not necessarily be a key obstacle for successful application of the method, although the existence of a large proportion of households with no purchase of any adult good may.

2. Gender Relations in the Philippines

Southeast Asia has generally been recognized by Western observers as an area where "men and women enjoy equally many economic privileges and freedoms" and where "births of male and female children are equally valued" (Atkinson and Errington 1990, pp. 3-4). Nevertheless, the issue of gender disparity in the Philippines remains somewhat contentious. On the one hand, there is a view that, despite the relative equality between women and men in the region compared to other

areas, women's "life circumstances and everyday tasks are such that they are disadvantaged" (Atkinson and Errington, 1990, pp. 40-55). Haddad and Kanbur (1990) further present quantitative evidence, based on individual-level food intake data collected in a Philippine province, that poverty among women is underestimated when intrahousehold inequality is ignored.[1]

On the other hand, however, there is a view that Filipino households exhibit strong preferences for gender equality in intrahousehold resource allocation. Quisumbing, Estudillo and Otsuka, (2004) document that daughters are given more schooling, on average, while sons inherit larger lands. By endowing their female and male children with more of the productive assets that are complementary to respective comparative advantage (girls with nonfarm jobs and boys with farming), the argument goes, parents achieve both efficiency and equity in their distribution of intergenerational asset transfers. In addition, the Global Gender Gap report has ranked the Philippines ninth highest in terms of overall gender equality among 134 countries, on a par with northern European countries (Hausmann, Tyson and Zahidi, 2009).[2] The gender ratio (male to female) in the Philippines was 1.05 for children of age 0-15 in 2003, which was comparable with the rich country standards (e.g., 1.05 in the US) and contrasted with countries with high gender ratios such as India (1.09) and China (1.17) (World Bank). Furthermore, there is an even stronger (if minority) view, such as Nakpil (1963), claiming that a Filipina is "the schemer who goes through the steps of the conventional requirements (shyness, virtue, religion)" but, in fact, who "quietly holds all the power and behind the throne controls men's involvements" in politics, labor markets and many aspects of household affairs (Blank-Szanton 1990, p. 381).

Such debate on gender relations in the Philippines is not surprising given the history of the country. The "reasonably egalitarian gender relations and images of gender" in the pre-Spanish period were transformed by "the 300 years of a weak colonial state and religious institutions trying to reshape the system of symbolic content" leading to relatively more male-dominant practices in

landownership and in other household resource control (Blank-Szanton 1990, pp. 379-80; Quisumbing, Estudillo and Otsuka, 2004, p. 108). The departure of the Spanish in the late 19th century was followed by the U.S. colonial policy of universal education allowing Filipino women to reclaim the "precolonial identity" by "reinventing traditions" (Blank-Szanton 1990, p.380; Quisumbing, Estudillo and Otsuka, 2004, p. 109). It is against this background that we examine intrahousehold inequality in consumption budget allocation between girls and boys.

3. The 'Adult Goods' Approach

Investigating intrahousehold gender inequality typically requires individual-level data, rather than household aggregates. While we would like to obtain all information at the individual level, doing so would be both expensive and impractical. In particular, food consumption constitutes a large proportion of consumption budget in developing countries, but desirability of collecting food consumption data at the individual-level has long been debated (Deaton, 1989; Fuwa, 2006). With a few exceptions (Haddad and Kanbur, 1990), collection of such data has been relatively rare.

This paper takes an alternative route and follows Deaton (1989)'s 'adult goods' approach. It starts with the recognition that some consumption goods are consumed exclusively by a subset of household members, and that consumption surveys at the household level can reveal the amount of those goods consumed by them. Alcohol, tobacco and adult clothes, for example, are consumed only by adult members. While it may sound paradoxical to focus on those goods *not* consumed by children in order to make (indirect) inferences about allocation of consumption towards children, this approach's underlying logic has intuitive appeal, as follows. Suppose that a child is born to a childless couple. Assuming that the couple's total income is unchanged, we expect that some portion of the couple's consumption budget previously spent on adult goods would have to be diverted to feed and clothe the newborn. Thus, the way the couple adjusts its consumption of adult goods in response to an addition of a child would act as a negative income effect. Consumption of

goods other than adult goods, on the other hand, could increase or decrease, depending on the combination of income and substitution effects.

If the negative income effect due to the addition of a child is larger in size for a boy than for a girl, that is, if the couple is observed to sacrifice a larger amount of their consumption of adult goods to make room for boys' consumption than for girls' (controlling for the total income), then it implies gender bias in *total* consumption budget allocation in favor of boys. The key assumption here, called 'demographic separability' in the literature, is that the addition of a child exerts only income effects (with no substitution effects) on the consumption of adult goods (Deaton, 1989).

In order to estimate econometrically the negative income effects due to the addition of a child, we follow Deaton (1989) and estimate an Engel curve of the form:

$$w_{ij} = p_j q_{ji}/x_i = \alpha_j + \beta_j \log(x_i/n_i) + \eta_j \log n_i + \sum_{k=1}^{K-1} \gamma_{jk} (n_{ik}/n_i) + \boldsymbol{\theta}_j' \mathbf{z}_i + u_{ij}, \qquad (1)$$

where w_{ij} is the expenditure share of adult good j in household i, p_j is the price of good j, q_{ji} is the quantity demanded of good j by household i, x_i is total expenditure of household i, n_i is household size, n_{ik} is the number of household members in the k-th age-gender category and $\mathbf{z}_i$ is a vector of household characteristics (educational dummies for the household head, occupational dummy for farmers, village dummies). This specification has the theoretical advantage of being consistent with a utility function and has been found to fit the data well (Deaton 1997, p. 231). We focus on the differences among γ_{jk} parameters, which indicate the effects of replacing a household member in age-sex category k (e.g., a girl of age group 5-15) with a member in another category (e.g., a boy of the same age group), holding the household size and per capita expenditure constant, on household consumption of adult good j.

For the purpose of detecting gender bias in intra-household consumption allocation, it suffices to test the difference in γ_{jk} coefficients in the demand function. However, it is useful to also

calculate 'outlay equivalent ratios' (or "π-ratios"), which allow us to test the validity of the empirical identification of adult goods and are defined as follows (Deaton, 1989):

$$\pi_{jr} = \frac{\partial p_j q_j / \partial n_r}{\partial p_j q_j / \partial x} \cdot \frac{n}{x} = \frac{(\eta_j - \beta_j) + \gamma_{jr} - \sum_{k=1}^{K-1} \gamma_{jk} (n_k/n)}{\beta_j + w_j} \qquad (2)$$

for each adult good j and for each gender-age category r. η_j, β_j, and γ_js are parameters estimated by regression equation (1) above, and w_j and n_k/n are, respectively, the average (across sample households) budget share of adult good j and the average share of gender-age category k. The numerator on the left hand side, $\partial p_j q_j / \partial n_r$, is the marginal effect of adding one person of category r (e.g., a girl of age 0-4) on the consumption of good j (e.g., alcohol), and $\partial p_j q_j / \partial x$ in the denominator is the marginal effects of an increase in total income on the consumption of good j. Since the denominator is positive if adult goods are normal goods while the numerator is negative if the person category r represents a child (whose addition induces a reduction in the consumption of adult good i), the ratio is negative. Dividing the ratio by consumption per capita (x/n) makes the ratio in terms of the share of per capita consumption. The 'outlay equivalent ratio' thus measures the additional amount of income, expressed as the share of per capita income, that is required to restore the original level of adult good consumption after an addition of a child to the household. For example, a π-ratio of -0.1 means that if a girl is born to a couple, her birth has the same effect on their consumption of alcohol, say, as would a 10 % reduction in the couple's per capita income.

Furthermore, as shown in Deaton (1989), since the negative impact on the consumption of adult goods works like a reduction in income, the amount of the reduction of expenditure on each adult good ($\partial p_i q_i / \partial n_r$) would be in proportion to the marginal propensity to consume of each good ($\partial p_i q_i / \partial x$); for example, if 5 % of an additional income is spent on adult clothes and 1% is spent

on alcohol, then the ratio of the reduction in the consumption of adult clothes and of alcohol due to an addition of a child should be 5 to 1, suggesting that the π-ratios for a particular category of child r (e.g., a girl of age 0-4) should be the same for all adult goods. Consequently, a test of equality of the π_{jr}-ratios for a given age-gender group (r) based on various adult goods j serves as a test of whether those goods can indeed be treated as adult goods. We test the null hypothesis:

$$H_0: \pi_{ir} = \pi_{jr}, \text{ for all adult good i and j,} \qquad (3)$$

where r refers to children's age-gender categories. The adult goods we utilize in our analysis are: liquor, tobacco, adult clothes, adult footwear, gambling, and entertainment. The age-gender categories we use are age groups 0-4 and 5-15 for boys and girls.[3]

Because of its modest data requirement, the adult goods approach has been widely applied in a variety of countries. No or little gender bias has been found based on this methodology, however, in counties where gender discrimination is considered to be widespread, including Bangladesh and Pakistan (Ahmad and Morduch, 1993; Deaton, 1997). Furthermore, in India, while significant boy bias has been found in the state of Maharashtra where gender disparity is regarded as relatively less serious than in north western states (such as Haryana, Punjab and Rajasthan) or Andhra Pradesh, no significant gender disparity has been found in the latter areas (Subramanian and Deaton, 1991; Deaton, 1997; Case and Deaton, 2002; Fuwa et al., 2006). Applications in other countries, such as Cote d'Ivoire, China, Taiwan and Thailand, have similarly found no evidence of significant gender disparity (Deaton, 1989; Burgess and Zhuang, 1996). One notable exception, however, is Gibson and Rozelle (2003) who find significant pro-boy bias in Papua New Guinea. Nevertheless, the consistent results from its application in South Asia underlie the view that this method is not 'working' and has low power (Strauss and Beegle, 1998).

The interpretation of those empirical results has been debated. Some attribute the "failure"

to identify significant gender bias in South Asia to its methodological flaws. They point to its reliance on a set of goods with tiny budget shares or not consumed at all by many households, which could make the empirical results fragile (Strauss and Beegle, 1996; Ahmed and Morduch, 1993). Furthermore, the validity of some adult goods, such as alcohol and tobacco, is questioned; since those goods are addictive, consumption of those goods may not adjust as readily in response to an addition of a child, as assumed by the underlying logic of the method (Strauss and Beegle, 1996). In addition, the underlying assumptions of demographic separability and of exogenous household compositions have been challenged (Strauss and Beegle, 1996; Kingdon, 2005).[4]

An alternative interpretation, on the other hand, takes the view that the adult goods method may well be "working" and that there indeed may be no gender bias in consumption allocation. Instead, there may be significant gender discrimination in other aspects of intrahousehold resource allocation that leads to skewed sex ratios in South Asia. For example, those girls severely discriminated may have died in early ages (e.g., because they were not seen by doctors promptly when critically ill) so that most of them are not included in the sample (Ahmed and Morduch, 1993). Or, more generally, discrimination may mainly work through allocation of time, but not of money, such as mothers taking less time away from work after the birth of a girl (Deaton, 1997).

4. The Philippine Data

The dataset used in this study was collected in the rural Philippines by the International Rice Research Institute (IRRI) in 2003 (Fuwa, 2005). Four sample villages were selected purposefully to represent different rice-ecosystem conditions in the country. Two villages were selected in Luzon island and can be characterized as non-irrigated but favorable in terms of rice ecosystem. One of them is located in Laguna province, and its relative proximity to the Metro Manila area is a key characteristic. The other is located toward the northern end of the Central Luzon plain in the province of Nueva Ecija. The other two villages are both located in the province of Iloilo on Panay

island, but in contrasting environments. One is located in an upland area, with a substantial portion of the village comprised of hilly and mountainous landscape. The last village, in contrast, is completely flat, serviced by a well-functioning irrigation system, and characterized by its relatively large share of household members working abroad, many of whom are seafarers.

The consumption module of the survey enumerated 94 food items (with recall period of 'typical one month') and 74 non-food items (with the reference period of 'past 12 months'). With the adult goods analysis in mind, efforts were made to include as many 'assignable' consumption items as possible (e.g., adult vs. child clothes and footwear). The consumption expenditures are deflated by provincial cost of living indices.

5. The Empirical Results

Budget share of Adult Goods

As recognized in the literature, the budget shares of adult goods are typically small (Table 1); the average (including the households with no purchase of adult good) share of all the adult goods combined is 7 %, of which more than half (nearly 4%) is accounted for by alcohol (1.4%) and tobacco (2.4%). The level of those budget shares is roughly comparable with that found in South Asia but lower than the 13 % share observed in Papua New Guinea (Gibson and Rozelle, 2003).[5] Each non-food adult good accounts for at most 1.3 % (adult clothes) or less, on average. There are few households (less than 2%) that did *not* purchase *any* adult good. More than 70 % of the sample households purchased alcohol or tobacco. Over 30 % incurred expenditure on gambling, while only 11 % did so on entertainment. Among other consumption items, education accounts for roughly 7 % on average while medical, clothing and transportation account for roughly 4 % each.

INSERT Table 1 Here.

Detecting Gender Bias in Intrahousehold Consumption Allocation: Main Results

Our main regression results of estimating equation (1) by OLS are reported in Table 3 while the

descriptive statistics of the variables used in the regressions are found in Table 2. The estimated outlay equivalent ratios are summarized in Table 4.[6] The effects of adding a girl or a boy on adult good consumption are found to be mostly negative, consistent with the negative income effect interpretation; such effects are statistically significant in 20 out of 32 cases (Table 3).

Focusing on gender disparity, we find in most of the cases that the negative income effects on adult good consumption of *girls* are *larger* in magnitude than the income effects of boys within the same age group. In particular, for the age category of 5-15, the negative income effects of adding a girl are significantly larger than those of a boy based on the consumption of adult clothes and of gambling, as well as on all the non-food adult goods combined and on all the adult goods combined. Based on all the adult goods combined, a 10 percentage point increase in the share of girls (roughly corresponding to 0.5 person) of age 5-15 is associated with a 0.7 percentage point decrease in the budget share of adult goods while the corresponding effects of boys of the same age range is 0.4 percentage point and the difference is statistically significant (table 3, last column). The implied gender disparity for the age range 0 to 5, on the other hand, is found to be statistically insignificant. Parents in the rural Philippines are willing to sacrifice a roughly 75% larger amount of their adult good consumption (corresponding to around 520 pesos more per girl, evaluated at the mean per capita consumption level of 19,349 pesos) to generate the budget needed to feed and clothe a girl of age 5-15 than they are for a boy of the same age group. This implies that a larger share of consumption budget is allocated for girls than for boys.

INSERT Table 2 and Table 3 Here.

The estimated outlay equivalent ratios (π_{jr}-ratios) tell a similar story, as expected (Table 4). In all but 4 (out of 32) cases the point estimates are negative, indicating negative income effects on adult good consumption due to additional children. The estimated π_{jr} ratios are statistically

significantly larger for girls of age 5-15 than for boys of the same age group, implying that the magnitude of negative income effects of girls are larger than the income effects of boys, based on the same set of adult good categories as discussed in the previous paragraph. The point estimates based on all the adult goods combined suggest that the negative income effect due to an addition of a boy of age 5-15 is equivalent to a 12% reduction in per capita income while the corresponding income effect due to an addition of a girl is roughly four times the effect of boy's addition (49%).

As discussed in section 3, if an addition of a child exerts pure income effects, without substitution effect, the π_{jr}-ratios calculated with each of all adult goods should be identical. The last column of Table 4 shows the results of testing the null hypothesis that all the π_{jr}-ratios are equal for all adult good items. For all the four age-gender categories, we cannot reject the null, suggesting that our choice of adult goods is appropriate.

INSERT Table 4 Here.

In our data, we find no significant gender difference in the π_{jr} -ratios based on liquor or tobacco, in line with Gibson and Rozelle (2003) who found significant boy bias in Papua New Guinea. These goods are potentially addictive, and thus the consumption of them may not be as responsive to the addition of a child as are other adult goods (Strauss and Beegle, 1996). Thus, alcohol and tobacco, despite their relatively larger budget shares among adult goods, may not be appropriate candidates for the type of analysis being conducted here.

On the other hand, our results appear to contradict the often-made criticism of the adult goods method that the method is of low power due to its exclusive reliance on differences in the consumption goods with tiny budget shares (Strauss and Beagle, 1996). The budget shares of adult goods in our dataset are of similar levels as those found in South Asia, where the method has often been claimed to have "failed," but our dataset (containing, admittedly, few households with no

purchase of adult goods) still reveals significant gender bias. Our results thus suggest that a low level of budget share per se may not be a key barrier for identifying gender bias using this method. However, the existence of a large proportion of households with no purchase of any adult good may still cause problems. In sum, in sharp contrast with existing studies based on the methodology, we find significant pro-girl, rather than pro-boy, bias in intrahousehold consumption allocation.[7]

Indirect Analysis of Intrahousehold Consumption Budget Shares

While Filipino parents are found to sacrifice a significantly larger amount of their adult good consumption for generating girls' (of age 5-15) consumption budget than for boys', our data cannot directly reveal how consumption budget (other than for adult goods) is (re-)allocated across goods and across household members (i.e., who gets what). Since the consumption budget is observed only at the household aggregate level, it is not possible to directly identify children's consumption. However, attempts are made here to explore the issue indirectly with additional regression analyses relating the budget shares of consumption goods, on the one hand, and demographic composition of the household, on the other. We re-estimate equation (1) with the dependent variable (w_{ij}) replaced by the budget share of food, non-food, education, medical, clothing and transport.

As we can see in Table 5, rather surprisingly, no evidence of gender bias is found among children in most of the consumption good categories including education and health.[8] The only two household budget items with which we find marginally significant (at 9 to 10%) differences are transportation and clothes. An addition of a girl of age 5-15 is associated with a larger increase in transportation budget and a smaller increase in the budget on clothing than an addition of a boy of the same age group. Based on the point estimates, the implied magnitude of the differential impact of adding a girl versus a boy on the household budget is nearly twice larger on transport (a pro-girl bias by a 0.51 percentage point) than on clothes (a pro-boy bias by a 0.27 percentage point). In addition, based on those coefficients and evaluated at the mean per capita consumption level, the

amount of net increase in transport budget due to an addition of a girl (age 5-15) rather than a boy is around 460 pesos on average, which is of a similar magnitude as the net reduction of the budget on adult goods due to an addition of a girl (520 pesos) vis-à-vis a boy, as noted earlier.

It may be that, while both girls and boys are equally likely to be in school, girls tend to rely more on paid transportation than do boys for commuting school, possibly due to a safety concern. This is possibly consistent with the view that girls may have higher 'needs' than do boys in certain contexts. A possible reason for boys being 'favored' with more clothes, on the other hand, appears to be that teenage boys grow faster than do girls[9]. Similar differences in needs as found here between girls and boys might potentially account, in part, for the past 'failures' to reveal boy biases in South Asia as found in the earlier literature.

INSERT Table 5 Here.

6. Additional Robustness Checks

A series of robustness checks were conducted, and a brief summary is provided in this section[10]. One possibility is that the results are driven by particular subsets of villages or of household types. In order to examine the former possibility, we replicated the analysis for the four villages separately. The qualitative results are somewhat weaker due to smaller sample sizes but still very similar, and significant pro-girl bias is found in all the villages based on at least one adult good[11].

Household behavior may differ among different types of households, and the results may be driven by the behavior of a subset of households. For example, Quisumbing, Estudillo and Otsuka (2004) find that boys are given larger amounts of land while girls are given more schooling in intergenerational asset transfers among farm households. Similarly, the pro-girl bias in consumption allocation found in our analysis could result from the attempts by parents among farm households to compensate girls with larger shares of consumption to balance the larger amount of agricultural lands given to boys. Non-farm households with similarly egalitarian parents, however,

would have no reason to allocate larger consumption budget for girls and would allocate consumption goods equally between girls and boys. In order to examine such a possibility, the same analysis was conducted by splitting the sample between farm and non-farm households. We find, however, that pro-girl bias exists among both farm and non-farm households, suggesting that the pro-girl bias in consumption is not related to the typically larger share of lands inherited to boys among farm households.

Another set of robustness checks focuses on potential endogeneity issues. In equation (1), per capita consumption expenditure and household composition are potentially correlated with household-level unobservables such as preferences and ability. As one attempt to address such issues, we have re-estimated equation (1) with 2SLS where per capita consumption is treated as endogenous and with size of owned land and remittance income as identifying instruments. The assumption is that land is not likely to be sold in response to short-term needs of budget allocation of adult goods, and that the main sources of remittance incomes are those working abroad who typically receive fixed salaries for a period of a few years. The qualitative results based on 2SLS estimation were the same as our main results[12]. It is somewhat more difficult, however, to address the endogeneity of household composition (Browning, 1992), since finding convincing instruments in our dataset appears to be difficult. As an alternative approach, we followed Altonji et al. (2005) and found that the estimated coefficients on the household composition variables remained fairly stable as the set of other covariates in equation (1) was varied, with no sign of endogeneity bias[13].

7. Conclusions

This paper investigates intrahousehold gender disparity in consumption allocation in the rural Philippines where the direction of gender disparity remains contentious. The income effects on the consumption of adult goods due to an addition of a girl of age 5 to 15 are found to be significantly larger than those due to an addition of a boy of the same age group, implying that girls receive

larger shares of the household consumption budget than do boys. Filipino parents are found to be willing to sacrifice a roughly 75% higher amount of their adult good consumption to generate the budget needed to feed and clothe a girl of age 5-15 than they are for a boy of the same age group. We also find, based on an Engel curve analysis, that the household expenditure on transport is positively correlated with higher shares of girls (age 5-15), suggesting that parents may be willing to pay more for girls' transportation for their commuting than for boys', possibly for safety reasons.

Because of the relatively high cost of collecting consumption data at the individual level, indirect methods for intrahousehold analysis, such as the adult goods approach, remain attractive despite their genuine limitations. On the methodological front, the results suggest that, among the potential candidates for adult goods, alcohol and tobacco may not be very suitable for detecting gender bias in intrahousehold consumption allocation. We also find that the small budget share per se is not necessarily a key barrier to this approach, although a large proportion of households with no purchase of adult good may. In addition, girls (or boys) may have larger needs than boys (girls) in specific contexts, further complicating the interpretation of empirical findings on gender disparity in intrahousehold consumption allocation.

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Notes

[1] The magnitude of such underestimation, however, appears to be relatively small.

[2] While the Philippines' ranking in the report is lower in terms of labor force participation, earned income and political empowerment, its record in gender equality in education and health is among the highest in the world.

[3] A parallel analysis using an alternative age grouping corresponding to school levels (primary, secondary and tertiary levels) was conducted but qualitative results were similar.

[4] Deaton (1997: 240-241) defends the former assumption arguing that, for substitution effects to be responsible for the insignificant findings despite the presence of boy bias, the substitution effects with girls and those with boys have to be of exactly the right size to offset the discriminatory income effects, which would appear "far-fetched".

[5] The reported budget shares of alcohol and tobacco are in the range of 1-3% in India and Bangladesh based on Subramanian and Deaton (1991) and Ahmad and Morduch (1993).

[6] While Tobit estimation could be an obvious alternative to OLS, as Deaton (1997) shows, Tobit performs poorly in the presence of heteroskedasticity. Nevertheless, a parallel analysis based on Tobit estimation was conducted but we find that the qualitative results do not differ from those based on OLS. Those results are available from the author upon request.

[7] An additional attempt has also been made to examine the effects of the number of children on gender disparity in intrahousehold consumption allocation. However, no evidence was found of a systematic relationship between the number of children and the pattern of gender bias in intra-household consumption allocation.

[8] In addition, individual-level information on schooling (e.g., school enrolment and years of schooling) reveals no gender disparity either (results available from the author upon request).

[9] Based on the estimated growth curves for the Philippines by Marshall (1981), between age 5 and 15, boys' height increases by 51% on average while girls' height increases by 45%.

[10] The details of the analyses reported in this section are available from the author.

[11] The only exception is that the direction of gender bias is somewhat inconclusive in village 3, with significant pro-boy bias identified with the consumption of 'gambling'.

[12] Such results should be interpreted with care; it is possible to construct a dynamic model where land assets or remittances are still correlated with unobserved ability or preferences.

[13] The required assumptions for the Altonji et al (2005) approach, however, are admittedly quite strong vis-à-vis our dataset, given its small set of covariates and its small sample size.

Table 1. Budget Shares of Consumption Items (No. of obs. = 1218)

	obs	Mean	std.dev	min	max	Share of households with non-zero
Liquor	1218	0.014	0.026	0	0.293	0.618
Tobacco	1218	0.024	0.036	0	0.255	0.570
Adult food total	1218	0.038	0.048	0	0.428	0.777
Adult clothes	1218	0.013	0.015	0	0.150	0.756
Adult footwear	1218	0.008	0.010	0	0.115	0.825
Gambling	1218	0.005	0.015	0	0.194	0.338
Entertainment	1218	0.001	0.006	0	0.182	0.114
Adult goods non-food total	1218	0.032	0.030	0	0.236	0.923
Adult goods total	1218	0.070	0.056	0	0.428	0.986
Food total	1218	0.643	0.138	0.105	0.963	1.000
Non-food total	1218	0.246	0.123	0.019	0.725	1.000
Education	1218	0.073	0.096	0	0.663	0.657
Medical	1218	0.026	0.082	0	0.779	0.821
Clothing	1218	0.038	0.033	0	0.286	0.958
Transportation	1218	0.038	0.048	0	0.621	0.942

(Source: author's calculation based on the 2003 Livelihood System of Rural Household Survey, collected by International Rice Research Institute.)

Table 2: Descriptive Statistics for the Variables Used in the Regression Analysis (No. of obs. = 1218)

Variable	Obs	Mean	Std. Dev.	Min	Max
per capita consumption expenditure (peso)	1218	19,349	14,105	2,005	145,101
household size (person)	1218	4.709	2.010	1	13
Male 0-4 (share)	1218	0.054	0.110	0	.500
Male 5-15 (share)	1218	0.118	0.156	0	.750
Male 66- (share)	1218	0.027	0.100	0	1.000
Female 0-4 (share)	1218	0.048	0.102	0	0.500
Female 5-15 (share)	1218	0.113	0.153	0	0.667
Female 16-65 (share)	1218	0.284	0.178	0	1.000
Female 66- (share)	1218	0.044	0.148	0	1.000
HH elem. grad (dummy)	1218	0.772	0.420	0	1
HH high school (dummy)	1218	0.366	0.482	0	1
HH college grad(dummy)	1218	0.073	0.260	0	1
Farmer (dummy)	1218	0.287	0.453	0	1
Village 2(dummy)	1218	0.300	0.458	0	1
Village 3(dummy)	1218	0.168	0.374	0	1
Village 2(dummy)	1218	0.236	0.425	0	1

(Source: author's calculation based on the 2003 Livelihood System of Rural Household Survey, collected by International Rice Research Institute.)

Table 3: Engel Curves with Adult Goods[a] **(No. of obs. = 1218)**

dep. var = share of consumption expenditure to total consumption								
	Type of adult goods							all adult goods combined
	liquor	tobacco	adult clothes	adult footwear	gambling	entertain-ment	non-food adult goods	
Regression coefficients (standard errors in parentheses)								
log(pcexp)	0.002	-0.007***	0.005***	0.002***	0.002***	0.001**	0.009***	0.005
	(0.002)[b]	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)
Log(hhsize)	-0.006***	-0.009***	0.004***	0.003***	-0.003***	0.001	0.002	-0.013***
	(0.003)	(0.003)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.005)
male 0-4	-0.014***	-0.027***	-0.011***	-0.005*	-0.002	0.0007	-0.018***	-0.059***
	(0.007)	(0.010)	(0.004)	(0.003)	(0.004)	(0.0002)	(0.008)	(0.014)
male 5-15	-0.014***	-0.026***	-0.003	-0.001	0.003	-0.0008	-0.001	-0.039***
	(0.006)	(0.008)	(0.003)	(0.002)	(0.004)	(0.001)	(0.006)	(0.013)
male 66-	-0.027***	-0.040***	-0.008***	0.0004	0.001	-0.0003	0.003	-0.065***
	(0.007)	(0.011)	(0.003)	(0.003)	(0.005)	(0.001)	(0.009)	(0.016)
female 0-4	-0.017***	-0.014	-0.012***	-0.006*	-0.002	-0.003***	-0.025***	-0.057***
	(0.007)	(0.011)	(0.004)	(0.003)	(0.004)	(0.001)	(0.008)	(0.015)
female 5-15	-0.021***	-0.028***	-0.011***	-0.004	-0.003	-0.002	-0.017***	-0.066***
	(0.005)	(0.008)	(0.003)	(0.002)	(0.003)	(0.001)	(0.006)	(0.012)
female 16-65	-0.032***	-0.051***	-0.002	0.003	0.00005	-0.001	0.002	-0.081***
	(0.008)	(0.008)	(0.003)	(0.002)	(0.006)	(0.001)	(0.008)	(0.014)
female 66-	-0.043***	-0.053***	-0.006**	0.001	-0.008**	-0.00002	0.003	-0.093***
	(0.008)	(0.009)	(0.003)	(0.002)	(0.004)	(0.001)	(0.010)	(0.016)
HH elem. grad.	-0.002	-0.001	0.002	0.0003	-0.001	-0.00005	0.004**	0.002
	(0.002)	(0.003)	(0.001)	(0.001)	(0.001)	(0.0002)	(0.002)	(0.004)
HH high school	0.0004	-0.007***	0.001	0.001*	-0.002***	0.0004*	-0.0004	-0.007**
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.0002)	(0.002)	(0.004)
HH college	-0.004*	0.001	0.004*	0.002	-0.001	0.002	0.003	-0.0005
	(0.003)	(0.004)	(0.002)	(0.001)	(0.001)	(0.002)	(0.003)	(0.006)
Farmer	0.003	0.002	-0.0003	0.0003	-0.001	-0.0003	0.001	0.006
	(0.002)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.004)
constant	0.0131	0.134***	-0.039***	-0.014***	-0.008	-0.0109	-0.058***	0.089***
	(0.016)	(0.025)	(0.010)	(0.007)	(0.009)	(0.007)	(0.018)	(0.036)
R-squared	0.0843	0.0925	0.1340	0.0574	0.0916	0.0341	0.1470	0.1393
F-test: boys vs. girls coefficient difference in the same age range [p-values in brackets]								
Age 0-4	0.22	0.83	0.02	0.03	0.01	1.23	0.63	0.02
	[0.64][c]	[0.36]	[0.85[	[0.87]	[0.91]	[0.27]	[0.43]	[0.90]
age 5-15	1.98	0.08	3.75*	1.32	4.16**	1.71	6.84***	4.40**
	[0.16]	[0.78]	]0.05]	[0.25]	[0.04]	[0.19]	[0.01]	[0.04]

[a] Village dummies are also included but coefficients not reported for brevity.

[b] heteroskedasticity-robust standard errors in parentheses.

[c] p-values in brackets.

***: significant at 1% level; **:significant at 5% level, *:significant at 10% level.

(Source: author's calculation based on 2003 Livelihood System of Rural Household Survey, by IRRI)

Table 4. Comparison of Outlay Equivalent Ratios by Gender and Age Group (No. of obs. = 1218) [a]

	Type of adult goods							all adult goods	F-test: equality of $\pi_j$ratios[1]
	liquor	tobacco	adult clothes	adult foot-wear	gambl-ing	entertainment	non-food adult goods		
	π_i-ratios								
male 0-4	-0.3266	-0.1447	-0.4544	-0.4232	-1.0095	0.6685	-0.5258	-0.3943	0.49 [0.818]
female 0-4	-0.5366	0.5831	-0.5080	-0.4726	-0.9478	-1.1152	-0.6954	-0.3644	0.90 [0.492]
male 5-15	-0.3066	-0.0583	0.0053	0.0296	-0.2144	-0.1441	-0.0793	-0.1236	0.31 [0.932]
female 5-15	-0.7751	-0.2100	-0.4341	-0.2703	-1.1118	-0.8264	-0.5038	-0.4943	1.07 [0.378]
	F-test: boys vs. girls [p-values in brackets]								
Age 0-4	0.22 [0.64]	0.82 [0.37]	0.04 [0.85]	0.03 [0.87]	0.01 [0.91]	2.59 [0.11]	0.63 [0.43]	0.02 [0.90]	---
age 5-15	1.89 [0.16]	0.08 [0.78]	3.73** [0.05]	1.34 [0.25]	4.09** [0.04]	2.29 [0.13]	6.69** [0.01]	4.35** [0.04]	---

[a] p-values in brackets

***: significant at 1% level; **:significant at 5% level, *:significant at 10% level.

(Source: author's calculation based on 2003 Livelihood System of Rural Household Survey, collected by International Rice Research Institute.)

Table 5. Effects of Demographic Composition on Consumption Shares (OLS): regression coefficients with standard errors in parentheses [1] (No. of obs. = 1218)

	Dep. var = share of consumption expenditure item to total household consumption					
	Type of consumption goods					
	Education	Medical	Food total	non-food total	clothing	transport
log(pcexp)	0.032[1]***	0.043***	-0.105***	0.077***	0.012***	0.016***
	(0.007)	(0.007)	(0.008)	(0.008)	(0.002)	(0.003)
Log(hhsize)	0.056***	0.017***	-0.077***	0.078***	0.006***	0.002
	(0.007)	(0.006)	(0.009)	(0.009)	(0.002)	(0.003)
male 0-4	-0.106***	0.032	0.065**	-0.086***	0.019**	-0.002
	(0.021)	(0.021)	(0.033)	(0.030)	(0.009)	(0.014)
male 5-15	0.095***	-0.018***	-0.031	0.073***	0.015***	-0.018**
	(0.019)	(0.018)	(0.027)	(0.024)	(0.006)	(0.009)
male 66-	-0.066***	0.121***	0.036	-0.081***	0.006	0.007
	(0.020)	(0.048)	(0.045)	(0.028)	(0.008)	(0.015)
female 0-4	-0.111***	0.026	0.099***	-0.120***	0.003	-0.009
	(0.018)	(0.022)	(0.032)	(0.026)	(0.009)	(0.012)
female 5-15	0.080***	-0.010	-0.045*	0.060***	0.002	0.006
	(0.021)	(0.016)	(0.027)	(0.024)	(0.006)	(0.013)
female 16-65	0.012	-0.008	-0.059**	0.051***	0.002	0.008
	(0.020)	(0.027)	(0.028)	(0.023)	(0.006)	(0.010)
female 66-	-0.008	0.054**	-0.101***	0.003	0.009	-0.004
	(0.017)	(0.027)	(0.032)	(0.024)	(0.010)	(0.011)
HH elem. grad	0.001	-0.003	-0.013	0.014*	0.003	0.002
	(0.007)	(0.005)	(0.009)	(0.008)	(0.002)	(0.003)
HH high school grad	0.003	0.0005	-0.012	0.008	0.003	0.003
	(0.006)	(0.005)	(0.008)	(0.007)	(0.002)	(0.004)
HH college grad	0.007	0.005	-0.046***	0.038***	0.002	0.009
	(0.013)	(0.014)	(0.015)	(0.014)	(0.004)	(0.006)
Farmer	-0.003	-0.006	0.018**	-0.010	0.001	-0.003
	(0.006)	(0.006)	(0.08)	(0.007)	(0.002)	(0.003)
constant[2]	-0.337***	-0.422***	1.782***	-0.626***	-0.098***	-0.117***
	(0.067)	(0.072)	(0.088)	(0.081)	(0.022)	(0.032)
R-squared	0.2147	0.0578	0.23155	0.3044	0.1516	0.0965
	F-test: boys vs. girls [p-values in brackets]					
Age 0-4	0.05[1]	0.08	0.69	0.95	1.81	0.17
	[0.83]	[0.78]	[0.40]	[0.33]	[0.18]	[0.68]
age 5-15	0.55	0.22	0.21	0.23	2.82*	2.78*
	[0.46]	[0.64]	[0.64]	[0.63]	[0.09]	[0.10]

[a] Village dummies are also included but coefficients not reported for brevity.

[b] P-values in brackets

***: significant at 1% level; **:significant at 5% level, *:significant at 10% level.

(Source: author's calculation based on the 2003 Livelihood System of Rural Household Survey, collected by International Rice Research Institute.)