

# Intra-Household Resource Allocation: Power and Bargaining in Rural South Africa

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**Abstract** – Households are often modeled as harmonious collective entities that pool income and allocate resources to maximize the total household utility. Increasing empirical and theoretical evidence suggests this type of altruism does not characterize many households. We use data from rural South Africa to test this idea by modeling expenditures on household and individual goods. We find that households do not pool income, they do have different expenditure preferences and that expenditures vary by household and community factors.

## ***1. Introduction***

South Africa faces the daunting post apartheid task of increasing the well being of all of its citizens. The design and implementation of these economic development policies often focus on the household. Most of this policy is implicitly based upon the assumption that rural households behave in the same manner as individuals. The mainstream literature models the household as a united entity where a single voice, either actual or assumed, makes productive and allocative decisions (Haddad, et. al 1997). Out of this assumption comes the notion that households pool their resources and allocate them according to some joint utility function.

Embedded in this assumption, however, are some controversial beliefs about homogeneity within the typical family unit. Of particular importance are the assumptions concerning gender relations and productive and allocative priorities within the household. There is an emerging trend to analyze development policy outcomes recognizing that household relations are not necessarily characterized by altruism. These models specify some amount of intra-household conflict arising from different individual preferences and a process of bargaining over resource allocation. Gender is a particularly important aspect of this differentiation within the household. Numerous case studies indicate that husbands and wives have different productive and allocative priorities and that conflict, rather than strict cooperation, is an important consideration in the household.

Given this conflict, a potentially welfare-enhancing change, such as rising household income, is less likely to be successful if the benefits accrue to a member of the household who does not exhibit altruistic behavior. If the increase in household income

gives one member an exploitative bargaining advantage, the additional income may not even represent a Pareto improvement for the entire household. Recognition of this differentiation within the rural household has profound implications for designing and implementing appropriate economic policy.

Using income and expenditure profiles for different rural household configurations, we show that rural, black South African households do indeed have differing preferences that become apparent when looking at how male and female household heads make spending decisions. In addition, we make a first attempt at modeling the power relationships among household members that determine these expenditure allocations. Estimating expenditure functions for a subset of households with male heads and female spouses we show that the expenditures vary by the sex of the earner, education levels, and household location represented by province. The important implication is that households do not pool income, and do not behave as the unitary model predicts. The goal is to alert policymakers that by mistakenly targeting the rural household as a purely cooperative unit, rather than a group of individuals with differing resource endowments and preferences, unintended consequences will emerge.

## ***II. A Statistical Look at South African Households***

The use of a particular specification of household model requires some understanding of the ways in which rural households operate. Do rural households behave in a unitary way, pooling their income and allocating resources according to some joint household utility function? Do they cling to their individual earnings and allocate them according to their own preferences? Or, is there a more nuanced process by which income earners bargain over both income pooling and resource allocation? Using South

African black rural household data we explore these questions of control of household income and expenditure patterns through the lens of different household models.

One of the more serious problems with the unitary model involves the reallocation of income among family members. With the unitary model, initial allocation of endowments are irrelevant because the joint utility function determines the household's distribution. However, numerous studies reveal that husbands and wives do not pool resources and that expenditures change dramatically if income is reallocated within the household (see for example, Fapohunda 1988, 147, Alderman, et al. 1995, Haddad and Hoddinott 1995). For example, one study shows that if cash income is diverted from men to women, food expenditures rise and alcohol and cigarette expenditures fall (Appleton 1991, 20). This evidence empirically supports the idea that men and women have distinct allocative priorities within the household. The unitary model cannot explain this income reallocation and has no way to incorporate power and bargaining within the household.

An analysis of income and expenditures is one way to shed light on this issue. Income data show the distribution of income within households and how it varies by household structure and characteristics. If this income is pooled, expenditure patterns should not vary according income allocations within the household. This section looks at the income and expenditures on certain classes of goods broken down by sex of the household head and other features of household structure.

## **Section II.A – The SALDRU Data**

The data cited in the following sections are drawn from a household survey commissioned by the World Bank for the Project for Statistics on Living Standards and

Development (PSLSD). With World Bank technical support and funding, the study was undertaken by the South African Labour and Development Research Unit (SALDRU) at the University of Cape Town, and the data collected in late 1993. Despite some of its problems, the SALDRU data is used extensively in this paper and several other studies (see for example, May, et al., 1995, Leibbrandt, et. al., 1996, Klasen 1995 and Klasen 2000) because it provides the only recent source of detailed information on rural incomes, assets, and production for the nation as a whole. In addition, findings from the SALDRU data cohere with other studies in many critical areas, including income and demographic figures. In perhaps the most complete critique of the SALDRU data and its design and collection, May, et al. (1995) finds that, despite its shortcomings, the data set is “a useful and largely reliable source for research.”

Most of the data breakdowns in this paper are done by the sex of the household head. The category of household head is itself fraught with controversy over both what constitutes a household and the designation of its “head.” Using the SALDRU data, Le Roux (1994), cited in Budlender (1999), elucidates ten different categories of family and household in South Africa. In addition, nearly 20 percent of them fit into an eleventh category that could be classified as “other,” implying an even wider range of existing household types and structures.

A second controversy is summed up in the question, “head of what?” Definitions of headship historically have not focused on any one particular characteristic of the designate. Sometimes headship refers to ownership of a dwelling, others by economic contribution to the collective household income pool, still others by the oldest adult resident in the household. All of these definitions themselves are controversial. Some

surveys rely on the judgment of the enumerators, while others allow the specification of the household head to be decided by the household during the interview.

Head of the above-defined household is a more controversial classification. Historically, head of household has meant eldest male member of the household, or male with the largest economic contribution to the household. To avoid imposing a certain definition of household head, the SALDRU survey allowed respondents to classify themselves. This reconciles the survey results with actual household perceptions of headship. However, it leaves largely unexplained, the question of “head of what?” In some cases, the household’s self-defined head is clearly the owner of the dwelling or the largest source of income, other times not. In the end, the analytic breakdown employed in following sections is useful for understanding some of the basic characteristics of households and how they differ by the perception of their household head, but sheds less light on the circumstances that drive the creation of those perceptions.

## **Section II.B – Income Generation**

Regardless of the sex of the household head or the age and demographic structure of the household South Africans generate income from a wide variety of sources. A normal view of the rural African household is of an entity isolated from markets and producing agricultural products for home consumption. However, the data show this is misleading in the discussion of rural South Africa. Even among poorer rural black inhabitants, most earn only a small percentage of their incomes from agriculture. The majority of income comes from wages, remittances and pensions. The following section uses both the aggregated total monthly income figures and our household member-specific income composites to show the interaction between household structure and

income generation. Income and expenditure data is quoted in South African Rand (SAR).<sup>1</sup>

Black rural incomes are uniformly low in South Africa. The mean household monthly income for male and female-headed households is R898.20 and R676.69, respectively. However, there are enormous variations based on sex of the household head, education, location and other factors. For most of these households the generation of income encompasses numerous activities but, contrary to most of Sub-Saharan Africa, agricultural sales is relatively insignificant. Even among the poorest of rural households, agriculture makes up little more than 10 percent of household income. The poorest rural households create livelihoods with a small amount of agriculture, some wage work, and remittances from household members working in cities, mines, or large commercial farms. In the higher income quartiles, wages become increasingly important, outweighing all other sources in the third and fourth quartiles.

In addition to income levels, it is important to understand how household members contribute individually to the household's collective income. Income flows into the household from male and female household heads, male and female spouses, children and other household members. Our assertion is that income sources matter to allocation of resources. A first step in evaluating this claim is understanding the relative income contributions of household heads, spouses, children and others. The SALDRU survey contains approximately 2300 rural black households with a declared household head and a spouse. The following data focuses on two types of households; one with a male head and female spouse (approximately 2300 households), and one with a female head and no spouse (approximately 1200 households).

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<sup>1</sup> At the time of the survey (1993), one US dollar was worth approximately 3.27 South African Rand.

The first step was to assign income to individual earners within the household. The procedure was to aggregate individual incomes from various income sources, including wage, profits, remittances, and other types of income attributable to individual household members. This total assignable male head and female spouse income was subtracted from the composite household total monthly income figures. The residual was classified as joint income. The majority of this joint income comes from the value of imputed household production, imputed rent from owner occupied or in-kind housing, and the production and sale of agricultural goods.

Table 1: Assigned Incomes, Male Headed Households with Spouse

Income Quartile	Male Head		Female Spouse		Other Household Members	
	Assigned Income	Percent of Total	Assigned Income	Percent of Total	Assigned Income	Percent of Total
1	108.32	54	14.05	9	51.46	38
2	259.01	59	45.06	10	138.51	31
3	368.38	49	123.94	17	259.65	34
4	816.71	40	336.08	15	927.04	44
All	405.86	50	140.11	13	373.37	37

Within male-headed households, the male head is the source of the largest percentage of income. However, in the upper two quartiles male head income is less than half the household's total. This occurs for several reasons. First, a higher household income usually means that more household members are earning. Second, at higher incomes, households report more profit income and larger imputed rents from owner occupied housing. These categories of income could not be assigned to individual household members.

This income assignment is crucial to the identification of expenditure preferences based on control of income. However, a complete picture of bargaining within the household needs to relate individual income generation and household expenditure

preferences. The following section creates expenditure profiles different classes of goods and household types.

## Section II.B – Household Expenditure

Households allocate their incomes to a wide variety of consumption expenditures. A starting point for this analysis is to aggregate individual expenditures into five categories representing different types of household expenses.

Table 2: Expenditure Categories

Expend1	Expend2	Expend3	Expend4	Expend5
Food Items	Household Expenses	Personal Care	Discretionary	Savings/Other
Grains	Rent	Meals Eaten Out	Cigarettes	Savings
Dairy	Washing Supplies	Personal Care Products	Alcohol	Dues
Meat and Fish	Child Care	Clothes	Entertainment	Donations
Fruit	Telephone	Dentist/Doctor	Luxury Goods	Remittances
Vegetables	Newspapers/Magazines	Hospital	Holidays	
Oil	Bedding/Towels	Medical Supplies		
Sugar	Furniture	Traditional Healer		
Other Foods	Cloth Materials	Shoes		
	Home Repair			
	Kitchen Equipment			
	Transportation			
	Automobile Expenses			
	Insurance			
	Utilities			
	Household Help			

Expenditures on these categories of goods reflect the preferences of the household or the household decision maker. These preferences depend on a wide variety of individual and household characteristics, including sex and age structure, education levels, and total household income. The following tables show the monthly expenditure levels on each of these five categories for male and female-headed households.

Table 3: Monthly Expenditures

	All Households	Male Headed	Female Headed
Expend1	416.50	423.49	399.96
Expend2	342.81	366.83	285.22
Expend3	73.25	77.71	62.73
Expend4	37.44	43.85	22.07
Expend5	57.01	67.08	33.59
Total Expenditures	915.99	963.63	804.30
Valid N	4172	2914	1240

Male headed households spend more on all of the categories because their incomes are larger. This expenditure gap is small in food and other household items, and large between discretionary and miscellaneous expenditures (Expend4 and Expend5, respectively). However, to the extent that different income levels, household sizes and family structures affect expenditures for male and female-headed households, the above figures do not adequately illustrate the main sources of expenditure variation. The following tables report the same expenditure patterns as household per capita figures separated by income.

Table 4: Per-capita expenditures

	All Households	Male Headed	Female Headed
Per Capita Expend1	87.93	90.22	82.66
Per Capita Expend2	89.28	100.80	62.11
Per Capita Expend3	19.27	21.62	13.84
Per Capita Expend4	13.82	17.59	4.93
Per Capita Expend5	27.80	35.94	8.58
Per Capita Total Expenditures	221.84	243.41	171.89
Valid N	4172	2914	1240

Per capita expenditures are important indicators of how spending is allocated among household members. However, the income differences between different household configurations also drive some of the differences in expenditures on different categories. While the descriptive statistics for per-capita expenditures do not show large absolute differences across different household types, the percentage differences are large and consistent with the conventional wisdom regarding the way in which rural men and

women and their households allocate expenditures. For example, the familiar Engel curve relationship, where households allocate a declining proportion of their income to food as household income rises, is apparent. Conversely, as incomes rise, a larger percentage of household income is allocated to personal care and discretionary expenditures. At low income levels, female-headed households allocate more resources to food and less to discretionary items. In the middle income quartiles, expenditure on food essentially converges and the discretionary expenditure gap widens considerably.<sup>2</sup>

There are perhaps two categories of expenditure that best illustrate differing household preferences – food and discretionary expenditures (Expend1 and Expend4, respectively). The following tables compare the expenditure – for each income quartile – on these two categories between households with 1) a present male head and female spouse, and 2) a female head with no spouse. Households headed by men with no spouse were excluded because they tended to be young, single men with no dependants. Food expenditures are presented in household per-capita figures. Discretionary expenditures, comprised largely of alcohol and cigarette purchases, are unlikely to be distributed to individual household members and thus are presented as totals, rather than in per-capita figures.

From a power and bargaining perspective, the two household categories suggest different degrees of autonomy and decision making power for the women. Presumably, the household with a designated male head would exhibit preferences more consistent with the male household head's own preferences. Women within these households may well have some decision making power, but constrained are to a menu of choices heavily influenced by the head's preferences. The male head has the power to make an initial set

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<sup>2</sup> Complete sets of these descriptive statistics are available from the authors.

of decisions resulting a restricted set of expenditure options, and the women chooses from this limited set.

In a household headed by a woman with no spouse, resource allocation choices, as reflected in expenditure patterns, are not the result of an intra-household bargaining process and are less likely to be distorted by power of someone else to impose their preferences on the household. However, other constraints, including her community, education, income and others, may influence her expenditure decisions.

Table 5: Household expenditures; Total monthly income of less than R329.90

Type of Household	Per Capita Food Expenditure	Discretionary Expenditure	Household Size	N
Male Head/Female Spouse	61.73	24.68	5.8	334
Female Head	78.75	11.64	5.0	404

Table 6: Household expenditures; Total monthly income R329.90 – R562.03

Type of Household	Per Capita Food Expenditure	Discretionary Expenditure	Household Size	N
Male Head/Female Spouse	74.68	31.17	6.0	339
Female Head	85.11	12.57	5.5	362

In these lower income quartiles, the data support the idea that men and women have different preferences and allocate resources to different priorities. Women allocate significantly more resources to food and far less to discretionary items. An interpretation is that male household heads satisfy demand for their discretionary goods first, followed by household goods. Female household heads seem to do the opposite.

Table 7: Household expenditures; Total monthly income R562.04 – R1012.03

Type of Household	Per Capita Food Expenditure	Discretionary Expenditure	Household Size	N
Male Head/Female Spouse	85.04	35.71	6.8	461
Female Head	80.64	24.04	6.7	247

As incomes rise through the third income quartile, expenditures on both food and discretionary items begins to converge. In fact, the gap in food expenditure becomes statistically insignificant.

Table 8: Household expenditures; Total monthly income greater than R1012.03

Type of Household	Per Capita Food Expenditure	Discretionary Expenditure	Household Size	N
Male Head/Female Spouse	100.90	64.40	7.2	568
Female Head	99.18	56.93	7.2	211

In this highest income quartile, expenditures on food are virtually identical and discretionary expenditures continue to converge. As incomes rise, both male and female household heads allocate more of their resources to both goods. However, rising income for female household heads is allocated to discretionary goods at a rate higher than that of male household heads – implying a higher income elasticity for female heads. However, because the small initial expenditures on these goods for female headed households, even with the higher elasticities, the values never converge.

These expenditure patterns highlight some differences in resource allocation preferences between male and female headed households. Male household heads satisfy their demand for discretionary goods first and then allocate increasing proportions of resources to household goods. Women seem to do the opposite; they first satisfy the demand for household goods, and then allocate increasing proportions of resources to discretionary goods.

The descriptive statistics analyzed the previous section highlight some of the allocative priorities of different types of rural South Africa households. These differing expenditure patterns suggest that individuals within a household do not always pool income and allocate it according to the household’s joint utility function. Rather, an

individual earns the income, and other individuals within the household have the power to affect the available expenditure choices. Final expenditure patterns can be seen as the outcome of differing individual resource endowments (incomes), the effects of differing preferences and the existence of power differentials within the household. Differing resource endowments and expenditure preferences are documented in the descriptive statistics. The following section is devoted to modeling these differential power relationships.

### ***Section III – Modeling Household Consumption***

The household unit presents a conundrum for neoclassical microeconomics. Individuals are typically presented as rational economic actors in an unhindered market environment, maximizing their utility subject to specific constraints. These market exchanges represent mutually beneficial transactions to the participating individuals. While this may be appropriate at the individual level, a problem of aggregation emerges if an entire family is the unit of analysis. Familial relations are often not deterministic and in many cases are not analogous to exclusively rational market exchanges.

This dilemma is solved in the neoclassical approach by assuming no individual economic optimizing behavior takes place within the household. The mainstream unitary model, as represented by Gary Becker's *A Treatise on the Family*, portrays the household as a harmoniously acting collective unit in which the entire family's income is apportioned according to the needs of the household. A dichotomy emerges between the family and the market; pure rational economic behavior exists in relation to the outside market and pure cooperation exists between the family members. Market behavior does

not enter familial relations and cooperative behavior is not exhibited outside the household.

Becker sees the household as a mutually beneficial unit in which all actions of production and consumption are subordinate to the entire household's welfare. Throughout his analysis he interweaves both altruism and the notion of a benevolent dictator to make this point. Altruistic behavior necessitates "...that members do not have to be supervised because they willingly allocate their time and other resources to maximize the commodity output of their household" (Becker 1991, 32). Conceding that altruism may not always be the primary motive in household action, (although he always refers only to children and not adults as the violators of the altruism assumption), Becker invokes the "benevolent dictator" who will enforce the most productive allocation of labor time. Individual selfishness is not possible because household members are altruistic, or even if they are not, an altruistic benevolent dictator makes the allocation decisions.

Once production decisions are made, allocation of resources within the household is determined by the household's collective well being, represented by a joint utility function. Any intra-household distribution, other than the one in which the marginal utilities of each individual and goods are equal is not efficient and could therefore not be the outcome. A critical implication of this result is that no matter who within the household is the recipient of income, the distribution of goods will remain the same. This type of cooperation is the basis for traditional economic analysis at the household level.

An implication of this type of household model is that, because distribution is not in any way contested, it can be dropped in order to simplify the analysis. This convenient

assumption highlights traditional economic view of the household as an “aggregated individual,” and informs the following model.

### **Section III.a.— A Unitary Model**

A common articulation of the unitary model assumes that households pool their income and allocate it to goods providing the highest level of utility. In functional form, Equation 1 shows the household maximizing a Lagrangian where utility is earned from leisure and goods, subject to a budget constraint.

$$Lagr.^{HH} = U^{HH} (L_a, X_a^1, \dots) + \lambda[(Y^F + Y^M + Y^J) - P^1 X_a + \dots] \quad (1)$$

Where, individuals (a,b,c ...) in the household purchase or produce goods ( $X_1, X_2 \dots X_N$ ) consume leisure (L) and pool women’s income,  $Y^f$ , men’s income,  $Y^M$ , and joint household income,  $Y^J$ . Total household income is then  $Y^{HH} = Y^F + Y^M + Y^J$ .

For maximization purposes marginal utilities are constant across people and commodities and distribution are determined by individual utility preferences. Sources of income are irrelevant. More specifically, for good  $X^1$

$$\begin{aligned} \partial U^{HH} / \partial Y^F &= \partial U^{HH} / \partial Y^M = \partial U^{HH} / \partial Y^J = \\ f_{X_a^1}(\partial X_a^1 / \partial Y^F) &= f_{X_a^1}(\partial X_a^1 / \partial Y^M) = f_{X_a^1}(\partial X_a^1 / \partial Y^J) = \\ f_{X_b^1}(\partial X_b^1 / \partial Y^F) &= \dots \end{aligned} \quad (2)$$

Equation 2 shows that for good  $X^1$ , utility is the same across sources of income and is allocated to whomever receives the most utility. Equilibrium occurs where marginal utilities for each person are equal for each good and across all goods. The

source of income, the structure of the household, and institutional factors do not come into play because they in no way affect the allocation of that income

### **Section III.b —Towards A Non-Cooperative, Game-Theoretic Household Model**

The data in earlier sections suggest that the structure of household earning does affect the allocation of resources within the household. In addition, a wide variety of anthropological and sociological evidence supports the claim that conflict exists in the typical African household. As early as 1949, it was reported that husbands and wives do not have perfect knowledge about each other's income (Guyer 1988, 159). More recent studies also reveal such phenomena as husbands and wives loaning money to one another at relatively high interest rates, selling goods and services to each other, and paying each other for labor time (Gladwin and McMillan 1989, 350, and Tripp 1989, 615). All of this evidence suggests a great deal of intra-household negotiation.

The portrayal of a unified household masks this increasing evidence that many decisions within the household are conflictual in nature. To better understand the behavior of individuals within the household, we develop a theoretical model based on the idea that it matters to whom income accrues. With the recognition that bargaining is at the core of household dynamics, a game theoretic paradigm, where rationality is assigned at the individual rather than the household level is a better way to model household outcomes. In this context, "players" try to maximize their gains while interacting with another rational utility maximizer who may have different preferences.

When this heterogeneity is introduced, as it can be in these bargaining models, a greater realism emerges.

In the agricultural household men and women must struggle over productive and allocative decisions. Since they are not homogenous subsets of a larger unit, their individual specifications have to be considered. Quite simply, women do not always control the fruits of their labor and the extent to which they receive payments dependent upon a second player, the husband. While many of these studies cited above focus primarily on household production relations, the argument easily extends to the allocation of income derived from household production and other income sources.

The growing awareness of unequal gender relations is the motivation for these non-cooperative models. Researchers have relied on anecdotal and smaller studies to demonstrate gender differences regarding productive and allocative decisions within agricultural households. Furthermore, theorists have relied more on descriptive rather than actual non-symmetric equations to represent inherently unequal power relations. Recent work, including Warner and Campbell (2000) and Darity (1995), attempt to capture mathematically these non-symmetric power relations.

Following Warner and Campbell (2000), we use a Stackelberg approach, where a male household head shapes a set of menu choices to which women can respond. While standard Stackelberg models are based on who moves first, in our framework it is power rather than time that determines the 'first mover.' This does not suggest a uni-directional power relation. Women have some control over resource allocation; however, it is through a constrained menu of choices set by the husband. The situation is analogous to the Marxian notion of the wage setting relationship. The capitalist has first-mover

advantage in setting wages and workers have influence within the constrained menu of choices set by the capitalist. Ultimately we are looking for differing allocative decisions that reflect these unequal power decisions.

A non-cooperative household is one where income is not pooled and different preferences within the household suggest that some form of bargaining must take place in advance of the intra-household allocation of resources. From this game theoretic perspective the unit of analysis becomes the individual (male and female) within the household. Unlike the unitary model, individuals within households maximize their own utilities, subject to a budget constraint. For male headed households,

$$Lagr.^M = U^M (L^M, G^{HH}, G^M) + \lambda[(Y^M + (1 - \alpha)Y^F + \beta^* Y^J) - P^{HH} G^{HH} + P^M G^M] \quad (3)$$

and for the female,

$$Lagr.^F = U^F (G^{HH}) + \lambda[(\alpha Y^F + \beta^* Y^J) - P^{HH} G^{HH}] \quad (4)$$

where  $L^M$  is male leisure,  $G^{HH}$  is a collectively consumed good shared by the entire household. We assume that women do not consume leisure.<sup>3</sup>  $G^M$  is a good consumed by men, and it is assumed that the marginal utility of  $G^M$  is greater than  $G^{HH}$  for the man. The individual  $Y$ 's are sources of income previously identified.

Alpha ( $\alpha$ ) and  $\beta$  represent percentage allocations of source income. Beta ( $\beta$ ) is assumed to be a fixed parameter. Alpha ( $\alpha$ ) is the key variable because it represents the amount of female income allocated to women. Given general assumptions concerning extra-household patriarchal forces and intra-household negotiating this is assumed to be less than one. Thus, relative control of income is attained through direct control of

income ( $Y^M$  or  $Y^F$ ), an assumed constant ( $\beta$ ), and  $\alpha$  which represents the “negotiating” variable. For our purposes here,

$$\partial U^M / \partial Y^M = \partial U^M / \partial (1 - \alpha) Y^F = \partial U^M / \partial \beta^* Y^J > \partial U^M / \partial \alpha Y^F \quad (5)$$

It is evident that increased utility for the man would be achieved through reducing  $\alpha$ , thus increasing income under the control of the man. In terms of expenditures this would mean a reallocation of spending away from  $G^{HH}$  and towards  $G^M$ .

$$\alpha = \alpha (\text{intra-household bargaining, extra-household factors}) \quad (6)$$

The determination of  $\alpha$  is complex and one of the main themes of this research. It can be thought of as function of intra and extra-household factors that influence bargaining. More specifically intra-household factors are household characteristics including age of male and female, children, education, sources of income and others. Extra-household factors include ethnicity, geography, the institutional environment and others.

To solve this choice problem we take the partial derivatives of the women’s Lagrangian (eq. 4), solve for a given  $\alpha$ , substitute this equation into the man’s Lagrangian (eq.3), differentiate and ultimately solve his optimization problem in terms of  $\alpha$  and the benefits derived from his utility function. See Warner and Campbell (2000) for a full derivation.

The empirical reality of rural South African households does not imply that a game theoretic model is unquestionably superior to traditional household models. Weaknesses of the game theoretic model exist on many levels, including theoretical and

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<sup>3</sup> There are numerous cases studies of rural South Africa suggesting that women face far greater demands

empirical verification. On the theoretical side, assigning purely rational behavior to individuals within the household obscures a great deal of the non-market behavior that does take place within the household. Within almost any household, some interaction is different than that associated with pure market relationships and collective non-market relationships can be lost if a purely adversarial game theoretic model is employed. Sen's point that the bargaining model should include love, affection and concern is well taken (Sen 1984, 375). However, the assumption of individual rationality does highlight some critical differences between control of income and economic allocation.

A better understanding of the relationship between observed variables and allocative decisions could inform policymakers on more appropriate policy decisions. The following section estimates expenditures based on some of these negotiation variables.

#### ***Section IV – Empirical Model and Results***

To better understand the behavior of individuals within the household and how they use power in the bargaining process, we estimate expenditure functions. These estimates relate the expenditure on discretionary goods to household characteristics. Discretionary expenditures (Expend4) are clearly a more important category of expenditures to men and male headed households. As a stylized fact we use these discretionary expenditures to represent  $G^M$  in the non-cooperative model. Clearly women do purchase discretionary items but the evidence presented here strongly suggests them men, in contrast to women, consistently allocate more resources to discretionary

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on their time than do men. See for example, Moser (1992), Murphy (1990), and .

expenditures. If the unitary model holds, source of income should not matter in the determination of these expenditures.

To test this proposition, two expenditure functions were estimated for the roughly 2300 households with a male head and female spouse. The two models were similar, each including income measures, household size, education of the head and spouse, and dummy variables for province. However, the unitary model used a composite income figure, while the non-cooperative used incomes assigned to different members of the household.

If the unitary model was correct, we could expect the coefficient on the total household income to be the same as that of the individually assigned incomes in the non-cooperative model. The other variables shed light on the other factors influencing expenditures on discretionary goods. Regression results are presented in Table 9.

Overall the results are encouraging. The signs are as our theory would suggest and, for the most part, statistically significant. These results support the growing evidence in favor of non-cooperative household modeling. There are a number of variables that stand out as important in explaining expenditures on discretionary goods. First, for all three income variables, the coefficients are positive. This would suggest that the Expend4 category are normal goods; as income rises, expenditures rise. The unitary household monthly income variable is positive and significant at the 99% level. However, the assumption of a cooperative household masks gender differences in income allocation. When broken down by source of income as the non-cooperative model suggests, it is clear that income source matters. The effect of male controlled income on discretionary purchases is positive and statistically significant

Table 9: Regression Results

Variable	Unitary Household	Non-Cooperative Household
Total Monthly Household Income	4.3E-06** (3.268)	
Male Head Monthly Income		5.98E-06* (2.363)
Female Spouse Monthly Income		3.10E-06 (.817)
Education of Male Head	-5.62E-04 (-1.153)	-5.06533E-04 (-1.040)
Education of Female Spouse	-.001261* (-2.505)	-.001276* (-2.563)
Log of Household Size	-.013792** (-5.309)	-.012851** (-5.071)
Kwa-Zulu/Natal	6.69E-04 (.183)	.001957 (.542)
Free State	.015001** (2.463)	.016666** (2.764)
Mpumalanga	-.005930 (-1.35)	-.004594 (-1.066)
Northern	-.007885* (-2.135)	-.007463* (-2.037)
Northwest	-.001426 (-.329)	-4.69E-04 (-.111)
Constant	.067187** (12.053)	.065489** (11.883)
R <sup>2</sup>	.02627	.02616
F Value	6.78132	6.14513
N	2271	2298

T-Statistics are in parenthesis. \*, \*\* represent significance at the 95% and 99% levels, respectively

at the 95% level. While the female coefficient is positive, it is smaller than the man's coefficient, and statistically indistinguishable from zero. This suggests that while overall household income does purchase discretionary items, it is done principally through income accruing to the male household head. This also seems to confirm that income is not pooled and expenditure preferences are not uniform within the household.

The education variables are a way to begin to characterize power within the household. Additional education for any household member enhances the ability to generate income and may increase bargaining possibilities through improving threat points of negotiation. In our theoretical model, an increase in women's education would increase the value of alpha. Thus, education is a source of power, in part because of increased contributions to household income, but also because in the event of a total breakdown in intra-household bargaining, educated household members have a better fallback position. Both models demonstrate the effect of women's education on discretionary spending is negative and statistically significant at the 95 percent level. Men's education, while not significant, also has a negative impact on discretionary spending. This needs further research but could suggest possible targeting of policy that might alter the overall expenditure pattern of the household.

The log of household size is a control variable that captures overall per capita expenditures. Clearly, as household size increases, holding income and other factors constant, we would expect falling discretionary expenditures. Our data confirms this and the coefficients are negative and significant at the 99% level. The variable is in log form to reflect the non-linear nature of expenditure patterns with additional household members.

Province of residence has, in some cases, a large and significant effect on discretionary expenditures. Under apartheid, language and cultural groups were forcibly moved to 'homeland' areas. One of the effects was to group black South Africans into certain areas based on their language or cultural background. This allows us to use province as an imperfect proxy for culture. The Free State and the Northern Province dummy variables were highly significant, in opposite directions, and suggest an avenue for further research.

## ***Section V – Conclusion***

As South Africa emerges from apartheid planning and policymakers undertake the arduous task of implementing comprehensive development strategies it is critical that all members of society, and the familial institutions they work and live within, are understood. This is especially critical at the lower end of South Africa's economic resources and opportunity spectrum. This paper seeks to outline the inadequacies of the traditional unitary household model and begin to replace it with a gender specific non-cooperative household model.

Assumptions of altruistic behavior, as suggested by the unitary household model, may lead policymakers to erroneously believe that merely increasing income to these disadvantaged households would automatically benefit the individuals within the household via some process of income pooling and benevolent allocation. As evidenced by differing expenditure patterns of male and female headed households, different allocative preferences exist. Additionally, the econometric evidence demonstrates that power and control, within a male head-female spouse household, are used to negotiate differing expenditure outcomes. Policymakers, attempting to improve household welfare,

by augmenting male wages for example, may do so at the expense of the entire household. If rising wages alter power relationships in some manner, this increase in wages may not even be a Pareto improvement for the household.

Equating power and control with earned income is an important first step to understanding intra-household expenditure negotiation. Sources of income do matter. A more sophisticated approach will better delineate power within the household. For a policymaker this is important because if a goal is to increase household food expenditures it adds an additional layer of complication. Increasing household income, increasing the power of household members with strong preferences for food, or promoting some longer term expenditure determinants like education, all have the potential to reach this policy goal. Only by increasing the understanding of how rural households operate will policymakers be able to able to predict the effects of various policy prescriptions.