RAND

Income Shares and Shares of Income: Empirical Tests of Models of Household Resource Allocations

Duncan Thomas and Chien-Liang Chen

April 1994

DRU-705-RC

Labor and Population Program

Working Paper Series 94-08

Income shares and shares of income: Empirical tests of models of household resource allocations

Duncan Thomas
RAND and UCLA

Chien-Liang Chen
UCLA

December, 1993

1. INTRODUCTION

The vast majority of the literature in economics on household decisions assumes (either explicitly or implicitly) that the household maximizes a unique utility function given a set of constraints dictated by the household budget and available technology. While treating the household as a "black box" (or more precisely as a single homogeneous unit) has the virtue of simplicity and convenience, the micro-economic theory of demand is predicated on the behavior of *individuals* characterized by their own preferences. Aggregating a group of individuals into a household in this way involves invoking assumptions that are neither theoretically appealing nor likely to be innocuous, at least in some contexts. In essence, it amounts to assuming that all household members have identical (or *common*) preferences and so the household is, to all intents and purposes, the elementary decision unit. An alternative justification for this "traditional" economic model of the household is the assumption there is one household member (a *dictator*) who determines all allocations (either from the point of view of pure self-interest or behaving as an altruist).

The extent to which these simplifying assumptions are inappropriate is clearly an empirical issue and will certainly depend on the research or policy issue at hand. While it is hard to overstate the contribution of this simple model to our understanding of many behavioral choices, there are some decisions that are difficult to examine in the framework of the traditional model. These include, for example, the formation, dissolution and partition of households. Furthermore, for some purposes, it is key that we have a good understanding of the mechanisms underlying individual choices.

For example, public policy may change the structure of decision-making within the household and the implications of these changes need to be taken into account. As an example, investments in raising the productivity of irrigated rice in the Gambia, which have been traditionally grown by women, resulted in changes in the allocation of labor. Although the intent of the program was to raise the productivity of women, men took primary control over the crop (see, for example, Dey, 1992; von Braun and Webb,

1989). Whether women (and other household members) were better or worse off as a result of these innovations is not at all clear. However, in order to evaluate the impact of these kinds of programs on the welfare of all households members, we need to consider the potential behavioral responses of individuals within the household: this calls for an *individualistic* model of the household.

Using household budget survey data from Taiwan, this paper tests an implication of the *common preference* model: that is, shifting the distribution of resources within the household should have no impact on household commodity demand. For some goods, this implication is rejected by the data.[1] We turn, therefore, to a more general *individualistic* model of the household and determine whether the data are consistent with household members choosing allocations Pareto efficiently. Treating household income as endogenous (or measured with error) the answer is unambiguously affirmative and our evidence for Taiwan is consistent with empirical results reported for France (in Bourguignon, Browning, Chiappori and Lechene, 1993) and for Canada (in Browning, Bourguignon, Chiappori and Lechene, 1993). There is some suggestion that the *common preference* model may not be rejected for all sub-groups in the data and so the final section of the paper attempts to identify some of the characteristics of these households.

---

[1]For similar results see, *inter alia*, Browning, Bourguignon, Chiappori and Lechene (1993a, 1993b), Quisumbing (1993), Schultz (1990), Thomas (1990, 1993). While this literature is small, the results are suggestive that resources in the hands of different individuals within a household do not have the same impact on the welfare of all members. In particular, there is some evidence that a reallocation of resources among men and women may affect household commodity patterns along with the health and welfare of children. The results, however, are certainly not universal: see, for example, McElroy and Horney (1981).

2. MODELS OF HOUSEHOLD RESOURCE ALLOCATIONS

We begin with a general model of household decision-making and relate it to the "traditional" or *common preference* model. This is followed by a description of an *individualistic* model of the household proposed by Chiappori (1988, 1992) that assumes household allocations are Pareto efficient. One of the implications of this assumption forms the basis for the empirical tests presented in the paper and they are described in some detail. The strategy followed here is closely related to that of Bourguignon, Browning, Chiappori and Lechene (1993).

Assume the preferences of each household member depend on their own and possibly other members consumption of a vector of goods, x, which include leisure and home produced goods. For expositional simplicity, let there be two people in a household, then household welfare will be given by

$$\text{Max } \psi [U^1(x; \kappa), U^2(x; \kappa)] \qquad [1]$$

where ψ may be thought of as a Bergson-Samuelson type household welfare function. Utility of each member is conditional on individual and household characteristics, κ, some of which, such as tastes, will be unobservable. The household maximizes welfare given a budget constraint and the technology underlying home production activities. Letting y^i be the income of member i and assuming y^0 represents joint income, then, in general, demand for a good, x_i, will depend on all prices, p, and incomes, y^0, y^1 and y^2 as well as characteristics κ:

$$x_i = x_i(p, y^0, y^1, y^2; \kappa) \qquad [2]$$

The key point in this general model is that no restrictions are place on the effects of individual incomes.

According to the "traditional" model of the household, all members share the same preferences so that U^1 and U^2 are identical or, observationally equivalently, household allocations are determined by a dictator. In either case, demand depends on total household income, $y=y^0+y^1+y^2$:

$$x_i = x_i(p, y; \kappa) \qquad [3]$$

as well as prices and household characteristics. According to this model, it matters not a wit who controls

income in the household and thus rearranging its distribution within the household should have no impact on demand. This suggests a very simple test of the common preference model: conditional on household income, individual income will not affect demand. That is, in the demand function:

$$x_i = x_i(p, y, y^1, y^2 ; \kappa) \qquad [4]$$

the coefficients on y^1 and y^2 should be zero. We will test this hypothesis below.

Testing the common preference model seems like a sensible first step. Rejection of the model, however, tells us precious little about mechanisms that underlie resource allocations. Recently, there has been a surge of interest in developing theoretically more appealing models of households that explicitly take account of the fact that individuals within a household may have different preferences.

One class of models in this literature suggests that household allocation decisions are the outcome of a bargaining process in which household members seek to allocate resources over which they have control to goods they especially care about. While the exact nature of this bargaining process may take a number of forms,[2] the intuition underlying all these models is quite simple.

Each household member has some fall-back position (level of utility) and will quit the household if his (her) welfare falls below this "threat point" level. If the sum of utilities associated with these fall-back positions is less than total household welfare, then the household will dissolve. Any utility over and above the sum of the individuals' threat points is shared among household members presumably in accordance with their bargaining strength. We clearly need to assume some kind of structure for this process and thus place additional restrictions on the model. Failure to reject the traditional *common preference* model of the household in favor of this model does not necessarily mean that treating the

[2]In this framework, it is necessary to define the appropriate concept of equilibrium. Many studies have drawn on the seminal work of McElroy and Horney (1981) who focus on Nash equilibrium; see also refinements in McElroy (1990, 1991). Manser and Brown (1980), Ulph (1989), Bjorn and Vuong (1984, 1985) consider alternative equilibria. Lundberg and Pollak (1992) describe a model in which household members have separate spheres of interest over which they may bargain. Related class-based models of conflict are discussed in Folbre (1986) and Hartmann (1985).

household as a single unit is appropriate; it may simply mean that these additional restrictions are false (Chiappori, 1988).

Chiappori (1988, 1992, 1993) has proposed a different *individualistic* model of the household in which members allocate resources in such a way that no allocation could result in one member being better off without some other member being worse off: that is resource allocations are *Pareto efficient.* It turns out that even under fairly general conditions, this condition imposes testable restrictions on data.

Continuing with the assumption that there are two people in a household, assume that each has altruistic preferences in the sense that each cares about the other's consumption of a private good, x^1 and x^2, which may be vector valued. Let all public goods be represented by the vector X. Then, for all Pareto-efficient allocations, there exists some μ so that the household optimization program is

$$\text{Max } \mu\, U^1(x^1, x^2, X; \kappa) + (1-\mu)\, U^2(x^1, x^2, X; \kappa) \qquad [5]$$
$$px + PX = y$$

where p and P are prices of private and public goods, respectively, and y is total household income. (Chiappori, 1992). The weighting function, μ, is a function of prices, incomes and possibly other factors including household characteristics, κ. The demand for any private good, x_i is a function of prices and income as well as the weights, μ:

$$x_i = x_i(p, P, y; \mu, \kappa) \qquad [6]$$

The weights play a central role in these models. Conditional on μ, these demand functions satisfy the usual properties of homogeneity, Slutsky symmetry and so on. Treating the weights as endogenous leads to a series of Slutsky-like conditions and testable restrictions on the data (Browning and Chiappori, 1993). Given three sources of income, y^1, y^2 and y^0, then it is easy to see from differentiating the demand function that the ratio of any two income effects, $(\partial x_i/\partial y^1)/(\partial x_i/\partial y^2)$ is independent of i -- and this is true for all public and private goods.

This is a very powerful result as it suggests a simple test for Pareto efficient allocations with few

additional restrictions on the model. It says, for example, that the ratio of male income effects to female income effects will be the same across all pairs of goods. We will also test this hypothesis.

The collective mode can also be given an interpretation in the context of income pooling. Assume public good allocations are given, X^*. Further, let preferences be "caring" (in the sense of Becker) so that one person cares about the other's allocation only to the extent it gives that person individualistic welfare. This imposes weak separability in each individual's utility function, $U^1(x^1, \omega(x^2); X^*)$, Under these assumptions, the household optimization program can be rewritten as a two stage process. We can treat the household as if all members pool their income and then allocate it according to some sharing rule. Thereupon, in the second stage, each household member maximizes his (her) own utility given their income share, (conditional on making choices about public goods within the household). The income sharing rule is clearly related to the weights, μ. The rule also has a very nice intuitive interpretation as an indicator of relative bargaining power of household members: the more powerful the individual, the bigger that person's share of the pie. In fact, since co-operative bargaining outcomes are Pareto efficient, those models are a special case of this more general framework.

Since there is no price variation in the data used here, we rewrite [4] as a series of Engel curves:

$$x_i = x_i(y, y^1, y^2 ; \kappa) \qquad i=1,...,G \qquad [7]$$

Holding household income, y, constant, the effect of individual income, y^i, on demand can be interpreted as the impact of changing the share of household income attributed to member i. According to the common preference model, those effects are zero.

Testing for Pareto efficiency involves cross-equation restrictions and amounts to checking that

$$\theta \quad \frac{(\partial x_i/\partial y^1)}{(\partial x_i/\partial y^2)} \quad - \quad \frac{(\partial x_j/\partial y^1)}{(\partial x_j/\partial y^2)} \quad = 0 \qquad \forall\ i \neq j$$

for all pairs of goods. This involves the computation of a non-linear Wald test statistic:

$$W = \theta'[\Theta V \Theta']^{-1}\theta \quad \sim \chi^2$$

where Θ is the derivative of the restriction vector, θ, with respect to the coefficients on individual incomes in [7]. V is the estimated variance-covariance matrix which involves residuals from both goods i and j. Rather than simultaneously test all ratios are equal, we present non-linear Wald tests for each pair of goods in order to determine whether there are departures from Pareto efficiency for any goods. Apart from identifying those goods for which Pareto efficiency is rejected, one advantage of this strategy is that test results do not rely on the choice of commodity groups or number of commodities included in the system of regressions.[3]

3. DATA

The Personal Survey of Income Distribution (PSID) is an income and expenditure survey that has been conducted on an annual basis in Taiwan since 1976 in which a new sample of households are drawn in each wave. In this study, we use one year of the survey, 1980, as our first foray into a potentially very rich database; future work will integrate other survey rounds into the analysis.

The PSID collects information on socio-demographic and economic characteristics of all household members along with detailed household expenditures on a broad range of commodities. These sorts of data are fairly standard and commonly reported in most budget surveys. Key for this study, however, is the fact that the income module of the PSID is very unusual. In particular, the survey collects income information at the *individual*, rather than household level, for *both* labor *and* non-labor income. It is standard practice to collect income from labor sources (such as wage income and income from different types of self-employment) at the individual level. It is relatively rare for expenditure surveys to also obtain detailed information on non-labor income at the individual level. We will exploit this aspect of the survey below and experiment with both non-labor income as well total (non-labor and labor) income.

---

[3]Since the critical value of the Wald test statistic is a function of the number of goods, it is possible to mask rejection of Pareto efficiency by simply including a large enough set of goods in the system.

In addition, in the PSID, household members were able to record labor and non-labor income that is held jointly by two or more individuals.

We distinguish the household head and spouse and refer to them as the male and female heads. Single head households will, therefore, either have a male or female head; the vast majority of households in the survey (85%) have both a male and female head. For brevity in exposition, these heads are referred to as the male and female in the household. Household composition is treated as fixed and thus we side-step an additional layer of complexity regarding household formation and partition; that important issue is put to the side in this paper.

Descriptive statistics are reported in Table 1. All 14,697 households are included in the first column; only those households with both a male and female head in the second column and the third column further restricts the sample by excluding rural dwellers.

Incomes are reported for the previous twelve months and at least some income is reported by almost all men (90%) and half the women; the male head accounts for about two-thirds of household income. While almost one third of households report some joint income, the values are not typically large and it accounts for a small fraction of total household income. Non-labor income is comprised of interest income, income from financial investments and rental income; fully 80% of male and 20% of female heads report some nonlabor income. On average, it accounts for 15% of male and 10% of female income (and among women who report some nonlabor income, this proportion rises to about 15%).

In part, these relatively high proportions of individuals with non-labor income reflects the fact that savings rates in Taiwan are very high. In this sample, the average household saves about one quarter of their income. (See, for example, Deaton and Paxson, 1993, who use all years of this survey to examine savings and consumption over the life-cycle.)

The expenditure module of the survey contains amounts spent on about seventy different commodity groups including, for example, specific foods (such as rice, wheat and flour, other grain),

alcohol, tobacco, housing, clothing disaggregated into male, female and children's clothing, energy by source, health, travel and education (which includes expenditures on "education, culture and research"). While many budget surveys, such as the US Consumer Expenditure Survey or British Family Expenditure Survey, collect information at a substantially more disaggregated level, those surveys also tend to focus on relatively shorter periods (from a week to a month). The PSID, however, records expenditures for the previous year. While this raises questions about the extent of recall error, there is one advantage for our purposes: there are unlikely to be many households who report no expenditures for commodities simply because they had not purchased that item during the reference period. Rather, zero expenditures probably reflect the household does not consume the good, at least for everything except very infrequently purchased durables such as a car.[4] After some experimentation, we have chosen to focus on ten expenditure groups. Mean shares of household income are reported in the bottom panel of Table 1: for all but three of the commodity groups (alcohol, tobacco and education), more than 98% of households report some purchases.[5]

Engel curves are seldom linear and this is certainly true in the 1980 PSID. For the tests presented in this paper, it is imperative that non-linearities be properly controlled so that any observed differences in the effects of individual income are not simply picking up non-linearities in the Engel curve. For example, assume the common preference model is correct and that women's share of household income tends to rise with total income. If expenditure on a commodity, such as education, also increases with income, then the inclusion of female and male income in an Engel curve that is linear in household

---

[4]The expenditure module does contain some questions about expenditures on durables. For about half a dozen households, reported expenditures were several times larger than total income. In all cases, these expenditures were for the purchase of an automobile and thus presumably do not represent "normal" consumption behavior. So that these households do not have an unduly large influence on our estimates, we have made an arbitrary assumption that the value of the services from these purchases will be realized over ten years and so have reduced the expenditures by a factor of ten.

[5]Alcohol is purchased by 93% of households, tobacco by 78% and education expenses are reported by 64% of households.

income would lead to the conclusion that women's income (and thus her share of income) has a significant effect on education expenditures. Rejection of the common preference model would occur only because the Engel curve has been mis-specified.

As a first step in capturing these non-linearities, we examine shares of the budget spent on commodities, rather than expenditures themselves. It is conventional practice to use shares of expenditure but since the focus here is on the effect of individual income on budget allocations, it would be necessary to incorporate the (potentially different) effects of individual income on savings in order to compare estimated income effects. This substantially complicates the problem and so we follow a more straightforward approach. Shares are specified as a fraction of household income[6] and we also allow considerable flexibility in the effects of household income in the empirical specification.

In the context of a model of household resource allocations, individuals make decisions not only about expenditure on commodities but also about consumption of leisure and, therefore, labor supply. Following the intuition of the bargaining model, couples will bargain over both commodity consumption and time allocation. Thus, it is not clear that labor income is appropriately treated as predetermined in this model.

Under the assumption that household decisions are made in a static framework, non-labor income and the value of assets may be treated as predetermined and they thus provide potential instruments for both household and individual income. This is a strong assumption that assumes away all dynamic and life-cycle behavior. It also begs the important question of how assets are accumulated (Guyer, 1993). The assumption is, however, driven by the information contained in the PSID: there are no other potential instruments available in the survey. The full set of instruments includes linear and quadratic terms in non-labor income of the male and female head, held jointly and attributed to other household members along

[6]Recall that about 25% of income is saved in the average household and so income shares are, on average, much smaller than expenditure shares.

with the current market value of household assets held in housing, housing land and other non-business fixed assets.

In general, identification in these models is not trivial. From a theoretical point of view, the instruments must be associated with the power a household member brings to the negotiating table and should be uncorrelated with individual unobservables such as tastes for work. The intuition of the bargaining model suggests that an individual's options in the event of dissolution of the household are plausible instruments (McElroy, 1990). These might include, for example, state divorce laws or the availability of alternative partners in the community. As an empirical fact, good instruments should also be highly correlated with an individual's control over current resources and it seems reasonable to suspect that community characteristics may not perform very well. See, for example, Nelson and Startz (1990) and Staiger and Stock (1993) for illustrations of how weakly correlated instruments can lead to substantially misleading inferences.

It has been argued that in a life cycle model, bequests or dowries serve as indicators of power to assert one's preferences (Schultz, 1990). Apart from the fact that these are quite difficult to measure in socio-economic surveys, it is not even clear that they are good instruments. For example, dowries are usually negotiated between the parents of the bride and groom and may reflect the perceived desirability of the marriage from the point of view of the parents rather than any power the bride will have in the new household.

4. EMPIRICAL RESULTS

In order to examine the sensitivity of the evidence to changes in assumptions and sample composition, a series of empirical Engel curves of the form [7] are reported in Tables 2 through 4. In addition to presenting results that include only non-labor income (treated as exogenous) and (instrumented) total income, we will discuss estimates that treat income as predetermined (and measured without error).

In each case, the share of income spent on the commodity group is regressed on measures of income, controls for household composition, the presence, age and education of the male and female heads as well as controls for location of residence. As a first step in controlling for household income, y, we use *per capita* household income (PCY) and take its logarithm (since the distribution is not symmetric). In addition, in order to allow income effects to be very flexible, we include the square of ℓn(PCY) as well as linear splines with knots at the bottom and top quartile of the income distribution. This specification seems to capture the shape of the Engel curves reasonably well; experiments with cubics, quartics and logarithms of logarithms did not change the substance of the results reported below.

In order to untie the restriction that income and household size have equal and opposite effects on expenditure shares, the model includes the logarithm of household size. This permits the effects of household scale to be quite flexible and includes interactions with income (through the quadratic term). Household composition may also have an impact on expenditure patterns and these effects are incorporated by including the proportion of household members in seven demographic groups (with one group, older adult women, being excluded). Since household size is held constant, the regression coefficients should be interpreted as the effect of an increase in the number of household members in that demographic group (such as children under 5) relative to an equal reduction in the number of older women.

Household income is treated as endogenous and around two thirds of the variance in ℓn(PCY) is explained by the regressors. The instruments explain a significant amount of this variance: the F statistic for the joint significance of household assets (and their squares) is 94 (with a p-value less then 0.0001). Non-labor incomes are also significant ($F_{8,14661}$=287) and the F statistic for the significance of all the instruments is 293. The results for individual male and female income are similar; the R^2s are slightly smaller (0.55) but the F statistics for the significance of the instruments are larger. There can be little argument that the instruments at least satisfy the condition that they are highly correlated with both household and individual income.

The assumption of homoskedasticity of regression errors is rejected in these models and so all variance-covariance estimates are based on the infinitesimal jackknife (Hampel, 1974; Efron, 1980; White 1982) which is robust to arbitrary forms of heteroskedasiticity. Wald test statistics are based on these estimates.

Testing the common preference model

According to the common preference model, re-arranging the distribution of resources within the household should leave household consumption choices unchanged. Holding household income constant, the effect of an increase in female income (say) can be interpreted as the effect of an increase in her share of household income. These shares, and therefore individual incomes, should explain none of the variation in expenditure shares.

The first set of tests of this hypothesis are presented in Table 2. Individual non-labor incomes are included in the regressions; linear income effects are rejected and so we present results with quadratics in the incomes of males and females as well as interactions between them. Wald tests for the joint significance of the income effects are reported at the bottom of the table.

For four out of ten of the commodity groups, the common preference model is rejected: both male and female non-labor incomes do independently affect budget shares. Apparently household members do not speak with one voice when resources are allocated to the consumption of staples (rice, wheat, flour and grains) and education as well as to alcohol and tobacco.

A skeptic may argue that it is very hard to measure non-labor income and to attribute income to specific household members. More generally, non-labor income is only a proxy for control over household resources (or the share of the pie each member may spend). By these arguments, if measurement error is uncorrelated across individuals (and with household characteristics) then the estimated individual income effects would be downward biased. The fact they turn out to be significantly

different from zero suggests there may be power in the test. Furthermore, it is not the case that the rejection of the common preference model reflects non-linearities in the Engel curves: the effects of male and female non-labor income are significantly different from each other for all cases except alcohol.

Alcohol and tobacco are traditionally considered "adult goods" in the equivalence scale literature and, in some societies, may be "male" goods. Alcohol is apparently largely, but not exclusively, consumed by adult men. This is reflected in the fact that holding household size fixed, additional men (older than fifteen) in the household (and thus fewer women older than 55) is associated with substantial increases in the share of income spent on alcohol. There is evidence, however, that the presence of adult women (aged 15-54) in the household has a positive impact on alcohol consumption (relative to older women). The same is true for children: the Gorman effect of children driving their parents to drink. Obviously, it is not possible to tell whether women consume alcohol themselves but the evidence does suggest that alcohol is not an exclusive good. Tobacco is different. Rearranging household composition among women and children leaves tobacco shares unchanged which suggests tobacco may in fact be an exclusive male adult good. In principle, this provides a powerful lever for peering inside the household "black box". We will see below, however, that the robustness of the result is questionable and thus the issue warrants additional study.

Non-labor income accounts for only a small fraction of an individual's resources (10-15%) and many individuals, especially women, report no independent resources other than labor income. In Table 3, non-labor income is replaced with total income, which is measured at the individual level and treated as endogenous. It turns out that, conditional on household income, the effects of individual income are linear[7] and, once again, the distribution of income within the household does affect the consumption of staples, education, alcohol and tobacco. As the share of income attributed to a woman rises, so the share

[7]None of the quadratic terms is individually significant; we experimented with higher order polynomials and failed to reject the linear form.

spent on staples, alcohol and tobacco falls and the education share rises. The difference in the effects of male and female incomes is significant in the case of education.

This fact that as women's share of income in the household rises, the share allocated to education suggests women may choose to allocate more of their resources to investments in human capital (broadly defined). The demographic effects indicate that these investments tend to be concentrated among adults which is not too surprising in view of the fact that education includes expenditures on culture and research.

In Table 4, the sample is restricted to those households in which both the male and female head are present. Estimated effects of individual income tend to be slightly larger and standard errors are little affected. In addition to staples, education, alcohol and tobacco, there is some evidence that changes in the share of income attributed to men and women affects expenditures on clothing. It turns out that individual incomes have no effect on either male or female adult clothing, but rather this is a reflection of differences in the effects of male and female income on child clothing expenditures.

It is somewhat surprising that when all households are included in the sample, tobacco expenditures are affected by the presence of children in the household but this effect disappears when the sample includes only intact couples. If this difference is simply a reflection of sample composition, then it is not transparent why household structure does not affect tobacco shares in the model that includes individual non-labor income.

As an empirical matter, the flexible specification of household income effects turns out to be important. If the model is restricted to including only a linear and quadratic term in ℓnPCY (along with all the other covariates), then the common preference model is rejected for several additional commodities including all other food, health and housing.

The assumption that household income is endogenous is key. If income is treated as exogenous, then estimated effects are not only much more precisely estimated but they also differ significantly from

the instrumented estimates.[8] Hausman tests reject exogeneity of income. For every good, apart from health, the common preference model is rejected as individual incomes have a significant impact on expenditure shares.

In sum, all the evidence indicates that the model of a household as a single homogeneous unit is not consistent with these data. Consumption patterns do appear to be affected by the shares of income that are attributed to men and women in the household.

Testing Pareto efficiency

We turn next to testing an implication of the individualistic model of the household that assumes allocations are Pareto efficient: the ratio of income effects should be the same across all pairs of commodity groups. Table 5 presents non-linear Wald test for proportionality across each pair of goods in the three models discussed above. The first panel is based on non-labor income; we present estimates at the mean although the conclusions are the same throughout the distribution of income. The second panel tests the ratio of total income effects and in the third panel, the sample is restricted to intact couples. These test statistics are based on the regressions presented in Tables 2 through 4.

There is not a single case in which the ratio of income effects differ significantly and the Wald test statistics are typically very small. The only instance for which the p-value is less than 0.25 is the alcohol-education pair in the model with total income of intact couples.

The evidence suggests that households members do not have the same preferences but that they do behave Pareto efficiently. In view of issues regarding the power of non-linear Wald tests (Gregory and

---

[8]For example, in the education Engel curve using total individual income and restricting the sample to intact couples, the coefficient on male income is 8.0 (t=11) and on female income it is 6.3 (t=9). In the instrumented regressions, however, it is female income effects which are larger (9.0 and 10.0, for women and men respectively). Male income has a positive impact on housing shares (6.5 with a t of 6) but the effect of female income is negative (-2.7 with a t of 2).

Veall, 1985; see also Phillips and Park, 1988), it makes sense to explore the sensitivity of this result by adopting likelihood ratio methods. See Bourguignon, Browning, Chiappori and Lechene, (1993). Their evidence, from Canada and France, indicates that the common preference model is rejected by the data but that Pareto efficiency is not: the results presented here from Taiwan provide additional support for that view.

However, these results rely critically on the assumption that income is not exogenous. When income is not instrumented, the ratio of male to female income effects are 1.0, 1.2 and 1.3 for alcohol, tobacco and education; none of those is significantly different from each other. But the ratio for housing is -2.4 and that is significantly different from the ratio for all three goods.[9] This is not an isolated case: of the 45 pairs, 19 are significantly different from each other. Maintaining that income is properly treated as exogenous (and not measured with error), then household behavior is not Pareto efficient. Clearly the choice between the assumptions is a matter of judgement; our own view is that exogeneity of income is a harder pill to swallow.

Stratification on socio-demographic characteristics of households

In this section, we attempt to determine whether there are any households for whom the common preference model is consistent with the data. We begin by distinguishing urban from rural households and focus on the four commodity groups staples, alcohol, tobacco and education. Estimated income effects are reported in Table 6; all regressions include controls for household income and household characteristics, as above; these estimates are suppressed from the presentation. The sample has been restricted to intact couples and incomes are treated as endogenous.

Rural households tend to be poorer and less well educated. In the PSID sample, average *per*

[9] χ^2 test statistics are 10.6, 13.8 and 35.4 for housing paired with alcohol, tobacco and education respectively.

capita income among rural dwellers is two thirds that among their urban counterparts. In the urban sector, just over half the male heads have completed more than elementary school but only one quarter of rural men continue beyond this level. It is often argued, that rural households tend to be more traditional and, according to some, custom in Taiwan "leaves women nearly powerless to control their own fates" (Wolf, 1990). If this is true, then the *dictatorial* model of the household should be an adequate representation of household behavior in the rural sector. Other social scientists, however, posit that even in traditional Taiwanese families, men and women take on quite different tasks and each retains substantial control over his or her own domain (Gallin, 1982).

The evidence against the common preference model is certainly stronger in the urban sector: the model is clearly rejected for all four commodities. While the model is also rejected in the rural sector, significance is more marginal and it is only male income that affects budget shares after controlling for household income. These effects are not significant for alcohol or tobacco.

Focussing on urban households, one might expect older couples to either be more traditional or to have accommodated differences in preferences. In the second panel, the sample is stratified by the age of the male head. For those couples in which he is over 35, the common preference model is unambiguously rejected for all four commodity groups. Among younger couples, however, the only area of disagreement seems to be in how much of the budget should be allocated to alcohol. The small effects of individual income on education and staples (both in magnitude and in terms of significance) may be a reflection of less preference heterogeneity within younger families. In experiments with interactions between individual male and female income and the age of the male, the interactions are significant for all four goods and the estimates indicate that divergence from the common preference model tends to increase with age. Whether this reflects differences across cohorts or over the life-cycle, we cannot tell with a single cross-section; this is one dimension in which the incorporation of additional waves of the PSID will enrich the analysis.

Finally, less educated couples are likely to be more traditional whereas better educated women are more likely to participate in the labor market and have opportunities outside the home. One might expect the common preference model to do better among the less educated. But, if anything, the reverse is true. The common preference model is clearly rejected for all four commodities among the less educated. It is also rejected in the case of tobacco and education among the better educated. Interactions between own education and income in the regressions are significant (for all four goods) and indicate divergence from the common preference model tends to decline with education.

The income sharing rule may depend on differences between the male and female head. For example, if one is much better educated than the other, then that person may have more leverage to assert their preferences in resource allocations. We have experimented with several specifications including differences in years of schooling[10] as well as a control for whether the woman is better educated. None of these effects turn out to be significant (for any goods).

5. CONCLUSIONS

The results presented in this paper are very preliminary. They do suggest, however, that even in a relatively traditional society, Taiwan, the economic model of the household that treats it as a single homogeneous unit is not consistent with the data. Using household budget data, we exploit the fact that incomes are reported separately for each household member. Holding household *per capita* income constant, the share of income attributed to men and women has a significant impact on the proportion of the budget that is allocated to alcohol, tobacco, staples and education. This is true whether individual income includes only non-labor income or both labor and non-labor income. There is also a *suggestion* that departures from the common preference model may be greater among urban households and among

[10]Since education is reported in levels and not year, the years of schooling are imputed assuming each individual completed their highest reported level.

older couples.

The data are, however, consistent with an individualistic model of household decision-making that assumes resource allocations are Pareto efficient. In this model, the household may be treated as if it pools income and then allocates that income according to some sharing rule. This implies that anything that affects that sharing rule -- such as individual income -- should only affect resource allocations through its impact on the sharing rule. That is, the ratio of individual income effects should be constant across all commodity groups. Using a series of non-linear Wald tests, we find this restriction is consistent with the Taiwanese household budget data. This result is robust to a range of specifications of the Engel curves as long as income is treated as endogenous (or measured with error).

These results add to a small but growing literature in economics that suggests the common preference model may be too restrictive but that households do behave Pareto efficiently. The obvious next step is to try to understand the mechanisms underlying household allocation decisions.

REFERENCES

Bjorn, P. A. and Q. H. Vuong. 1984. Simultaneous equations models for dummy endogenous variables: a game theoretic formulation with an application to labor force participation, working paper, California Institute of Technology.

Bjorn, P. A. and Q. H. Vuong. 1985. Econometric modelling of a Stackelberg game with an application to labor force participation, working paper, California Institute of Technology.

Bourguignon, Francois, Martin Browning, Pierre-Andre Chiappori and Valerie Lechene. (1993). Intrahousehold allocation of consumption: some evidence on French data, *Annales d'Economie et de Statistiques*, forthcoming.

Browning, Martin, Francois Bouguignon, Pierre-Andre Chiappori and Valerie Lechene. (1993). Incomes and outcomes: A structural model of intra-household allocation.

Browning, Martin and Pierre-Andre Chiappori. (1993). Efficient intra-household allocations: a general characterization, mimeo, McMaster University.

Chiappori, Pierre-Andre. (1988). Rational household labor supply, *Econometrica* 56.1:63-89.

Chiappori, Pierre-Andre. (1992). Collective labour supply and welfare. *Journal of Political Economy*, 100.3:437-67.

Dey, Jenny. (1992). Gambian women: unequal partners in rice development projects?, *Journal of Development Studies*, 14:109-122.

Efron, Bradley. (1982). The jackknife, the bootstrap and other resampling plans, *SIAM CBMS-NSF Monograph*, 38.

Folbre, Nancy. 1986. Cleaning house, *Journal of Development Economics*, 22, 5-40.

Gallin, Rita. (1985). The impact of development on women's work and status: A case study from Taiwan", Michigan State University Working Paper.

Gregory, Allan and Michael Veall. (1985). Formulating Wald tests of nonlinear restrictions. *Econometrica*, 53.6:1465-8.

Guyer, Jane. (1993). Endowments and assets: The anthropology of wealth and the economics of intrahousehold allocation. Mimeo, Boston University.

Hampel, F. 1974. The influence curve and its role in robust estimation. *Journal of the American Statistical Association*, 69:383-93.

Hartmann, Heidi. 1981. The family as the locus of gender, class and political struggle: the example of housework, *Signs*, 6:3 366-394.

Jaeckel, L. A. 1972. Estimating regression coefficients by minimizing the dispersion of residuals, *Annals of Mathematical Statistics*, 42, 1020-1034.

Lundberg, Shelley and Robert Pollak. 1991. Separate spheres bargaining and the marriage market, mimeo, University of Washington.

Manser, M. and M. Brown. 1980. Marriage and household decision making: a bargaining analysis, *International Economic Review*, 21.1:31-44.

McElroy, Marjorie, 1990. The empirical content of Nash-bargained household behavior, *Journal of Human Resources*, 25.4:1-57.

McElroy, Marjorie and Mary Jean Horney. (1981). Nash-bargained household decisions: toward a generalization of the theory of demand, *International Economic Review*, 22:333-347.

Nelson, Charles R. and Richard Startz. (1990). The distribution of the instrumental variables estimator and its t-ratio when the instrument is a poor one, *Journal of Business*, 63:S125-S140.

Phillips, Peter and Joon Park. (1988). On the formulation of Wald tests of nonlinear restrictions. *Econometrica*, 56.5:1065-83.

Quisumbing, Agnes R. (1994). Intergenerational transfers in Philippine rice villages: Gender differences in traditional inheritance customs, *Journal of Development Economics*, forthcoming.

Schultz, T. Paul. (1990). Testing the neoclassical model of family labor supply and fertility, *Journal of Human Resources*, 25.4:599-634.

Staiger, Douglas and James Stock. (1993). Asymptotics for instrumental variables regressions with weakly correlated instruments. Mimeo, Harvard University.

Thomas, Duncan. (1990). Intra-household resource allocation: an inferential approach, *Journal of Human Resources*, 25.4:635-664.

Thomas, Duncan. (1993). The distribution of income and expenditure within the household, *Annales de Economie et de Statistiques*, 29:109-136.

von Braun, Joachim and Patrick Webb. (1989). The impact of new crop technology on the agricultural division of labor in a West African setting, *Economic Development and Cultural Change*, 37:513-534.

Ulph, David. 1988. A general non-cooperative Nash model of household consumption behaviour. Mimeo, Bristol University.

White, Hal., 1980, A heteroskedasticity-consistent covariance matrix and a direct test for heteroskedasticity, *Econometrica*, 48:817-38.

Wolf, Margery. (1990). *Women and the Family in Rural Taiwan*, Stanford: Stanford University Press.

TABLE 1: DESCRIPTIVE STATISTICS: Means and [standard errors]

	(1) ALL HHS		(2) MALE & FEMALE PRESENT		(3) URBAN HHS	
Income (in $000s)						
ln(per capita income)	10.84	[0.00]	10.80	[0.00]	10.91	[0.01]
Male total income	160.01	[1.08]	175.87	[1.16]	196.04	[1.47]
Female total income	43.96	[0.64]	46.26	[0.71]	49.51	[0.92]
Male nonlabor income	24.28	[0.38]	26.50	[0.43]	30.20	[0.57]
Female nonlabor income	4.24	[0.16]	3.10	[0.13]	3.81	[0.18]
% males with income>0	85.26	[0.29]	91.08	[0.26]	91.05	[0.30]
% females with income>0	42.19	[0.41]	45.42	[0.45]	41.02	[0.52]
% males w/ nonlabor income>0	78.56	[0.34]	84.49	[0.33]	84.83	[0.38]
% females w/ nonlabor income>0	18.67	[0.32]	17.97	[0.34]	20.46	[0.43]
Joint total income	3.24	[0.11]	3.13	[0.12]	2.79	[0.14]
Joint non labor income	3.01	[0.11]	2.90	[0.12]	2.60	[0.14]
Other total income	46.98	[0.80]	38.04	[0.80]	37.19	[0.97]
Other non labor income	4.19	[0.15]	2.92	[0.13]	3.19	[0.17]
% hhs have joint total income	30.54	[0.38]	31.87	[0.42]	31.72	[0.49]
% hhs have joint non labor income	29.14	[0.37]	30.33	[0.41]	30.83	[0.49]
% hhs have other total income	37.80	[0.40]	34.87	[0.43]	31.82	[0.49]
% hhs have other non labor income	28.16	[0.37]	25.73	[0.39]	25.19	[0.46]
Household composition						
# hh members	4.83	[0.02]	5.10	[0.02]	4.98	[0.02]
%age hh mems 0-4yrs old	10.57	[0.13]	11.92	[0.15]	12.43	[0.18]
hh mems 5-9yrs old	10.06	[0.13]	11.18	[0.14]	11.56	[0.17]
hh mems 10-14yrs old	10.41	[0.13]	10.94	[0.14]	10.48	[0.17]
males 15-54yrs old	28.81	[0.16]	27.73	[0.14]	27.80	[0.16]
females 15-54yrs old	28.30	[0.14]	28.88	[0.13]	29.36	[0.15]
males >=55yrs old	6.76	[0.13]	5.07	[0.10]	4.65	[0.12]
females >=55yrs old	5.09	[0.10]	4.29	[0.09]	3.72	[0.10]
%age male head/spouse exist	95.18	[0.18]	.		.	
female head/spouse exist	89.24	[0.26]	.		.	
Education						
%age males w/ no education	9.68	[0.24]	5.00	[0.20]	3.09	[0.18]
elementary	45.02	[0.41]	47.76	[0.45]	41.92	[0.52]
junior high	12.86	[0.28]	13.13	[0.30]	13.91	[0.37]
high school	18.14	[0.32]	18.96	[0.35]	22.22	[0.44]
college/more	14.30	[0.29]	15.15	[0.32]	18.85	[0.41]
%age females w/no education	26.99	[0.37]	18.22	[0.35]	12.82	[0.35]
elementary	46.50	[0.41]	52.78	[0.45]	51.48	[0.53]
junior high	9.56	[0.24]	10.76	[0.28]	12.53	[0.35]
high school	11.49	[0.26]	12.49	[0.30]	15.71	[0.39]
college/more	5.47	[0.19]	5.75	[0.21]	7.45	[0.28]
Age of male	39.98	[0.12]	42.18	[0.10]	41.59	[0.12]
Age of female	33.53	[0.13]	37.58	[0.10]	36.65	[0.11]
% urban dwellers	51.33	[0.41]	51.31	[0.45]	71.62	[0.48]
% suburban dwellers	20.24	[0.33]	20.33	[0.36]	28.38	[0.48]
% rural dwellers	28.43	[0.37]	28.35	[0.40]	0.00	[0.00]
Shares of income						
staples	5.51	[0.03]	5.57	[0.03]	4.75	[0.03]
other foods	20.77	[0.07]	21.02	[0.08]	20.98	[0.09]
alcohol	0.76	[0.01]	0.73	[0.01]	0.62	[0.01]
tobacco	1.96	[0.02]	1.93	[0.02]	1.66	[0.02]
health	3.38	[0.05]	3.33	[0.05]	3.09	[0.05]
education	2.49	[0.03]	2.57	[0.04]	2.64	[0.04]
clothing	4.98	[0.02]	5.07	[0.02]	5.19	[0.03]
housing	17.64	[0.07]	17.43	[0.07]	18.66	[0.09]
hh goods & services	3.11	[0.02]	3.19	[0.03]	3.30	[0.03]
other	36.48	[0.15]	36.26	[0.16]	35.98	[0.18]
saved	24.87	[0.16]	24.68	[0.17]	24.90	[0.20]
Value housing land	311.69	[4.25]	320.83	[4.66]	371.57	[6.04]
Value house	283.81	[3.13]	294.86	[3.47]	338.61	[4.54]
Value other assets	273.52	[10.45]	290.67	[12.14]	214.80	[15.85]
Sample size	14,697		12,408		8,890	

TABLE 2: Effect of individual non-labor income on expenditures

Shares of income on: Covariates	Staples	Other Food	Alcohol	Tobacco	Health	Education	Clothing	Housing	HH goods & services	Other
Individual non labor income										
Income - male	-4.879	2.183	-1.977	-4.762	-2.292	15.326	-7.129	9.521	10.720	8.140
	[4.18]	[0.30]	[3.29]	[4.32]	[0.26]	[3.91]	[1.72]	[0.23]	[0.27]	[0.28]
Income - male squared	1.984	-5.110	0.890	2.545	-2.476	-11.171	6.296	24.631	23.218	-27.344
	[2.50]	[0.93]	[2.23]	[3.23]	[0.40]	[2.04]	[1.51]	[0.72]	[0.68]	[0.98]
Income - male * female	-8.051	-102.250	-7.636	-12.009	-207.932	-13.102	9.380	471.676	534.506	-206.003
	[0.54]	[0.97]	[0.80]	[0.72]	[1.32]	[0.17]	[0.14]	[0.77]	[0.90]	[0.45]
Income - female	-8.780	19.241	-4.001	-9.647	4.780	39.386	-20.055	-91.366	-91.636	110.103
	[3.20]	[1.05]	[3.14]	[3.80]	[0.22]	[4.46]	[1.97]	[0.90]	[0.93]	[1.52]
Income - female squared	13.922	-98.921	8.707	23.517	-57.456	-97.318	67.876	622.560	617.588	-575.230
	[1.43]	[1.36]	[1.97]	[2.58]	[0.75]	[2.14]	[1.63]	[1.60]	[1.62]	[1.94]
Household per capita income										
ℓn(per capita income)	2.346	74.231	13.459	29.964	242.251	-185.660	18.674	-700.051	-651.397	270.472
	[0.15]	[0.61]	[1.85]	[2.16]	[1.91]	[1.15]	[0.18]	[0.87]	[0.81]	[0.40]
ℓn(pcy) squared	-0.321	-0.146	-0.638	-1.427	-7.410	10.368	-3.583	12.175	10.252	3.280
	[0.42]	[0.02]	[1.87]	[2.11]	[1.18]	[1.23]	[0.65]	[0.29]	[0.25]	[0.09]
ℓn(pcy) Q1 spline	-13.614	-216.444	-4.851	-9.746	-259.781	-43.154	124.757	1302.416	1271.219	-891.533
	[0.89]	[2.23]	[0.70]	[0.71]	[2.36]	[0.89]	[2.31]	[2.48]	[2.48]	[2.38]
ℓn(pcy) Q3 spline	19.106	149.106	7.321	14.386	209.300	-16.679	-64.338	-977.929	-947.108	612.230
	[1.83]	[2.30]	[1.49]	[1.56]	[2.81]	[0.57]	[1.82]	[2.80]	[2.78]	[2.50]
Household composition										
ℓn(hh size)	0.000	-3.063	-0.063	-0.191	0.068	1.396	0.760	-1.607	-1.758	4.251
	[0.00]	[5.22]	[1.26]	[2.21]	[0.10]	[5.39]	[2.35]	[0.50]	[0.56]	[1.91]
proportion aged 0-4	-2.778	-0.471	0.500	0.406	-3.442	-3.005	-0.280	5.918	7.674	-1.604
	[11.24]	[0.27]	[3.97]	[1.58]	[1.76]	[4.31]	[0.28]	[0.64]	[0.85]	[0.25]
-- 5- 9	-1.393	-0.613	0.316	-0.037	-6.803	0.363	-0.360	14.523	14.556	-5.660
	[5.00]	[0.34]	[2.22]	[0.15]	[3.22]	[0.47]	[0.35]	[1.47]	[1.50]	[0.81]
--10-14	-0.056	-1.481	0.332	-0.178	-9.223	3.079	1.561	26.598	26.214	-17.163
	[0.17]	[0.68]	[2.01]	[0.58]	[3.70]	[3.45]	[1.30]	[2.28]	[2.30]	[2.10]
--male 15-54	0.305	-0.671	0.733	1.488	-3.939	6.837	-1.252	-14.129	-14.608	17.949
	[1.19]	[0.41]	[5.24]	[6.10]	[1.98]	[9.89]	[1.35]	[1.59]	[1.69]	[2.90]
--female 15-54	-0.189	0.484	0.256	-0.036	-4.824	4.142	1.318	-4.811	-4.374	7.369
	[0.77]	[0.32]	[2.02]	[0.16]	[2.72]	[6.68]	[1.56]	[0.58]	[0.55]	[1.28]
--male > 55	-0.052	-2.452	1.021	2.251	-2.116	4.180	-1.759	-4.343	-5.227	8.338
	[0.16]	[1.27]	[4.61]	[6.33]	[0.92]	[4.97]	[1.63]	[0.42]	[0.52]	[1.15]
(1) male exist	0.093	-4.397	0.118	1.349	-1.043	-4.148	-0.044	8.221	8.451	-4.524
	[0.44]	[2.86]	[1.10]	[6.16]	[0.60]	[7.22]	[0.05]	[1.00]	[1.05]	[0.78]
(1) female exist	-0.364	-1.197	-0.036	0.029	-2.710	-1.768	3.001	19.129	19.210	-17.927
	[1.28]	[0.61]	[0.28]	[0.11]	[1.23]	[1.87]	[2.70]	[1.81]	[1.87]	[2.38]

TABLE 2 continued: Effect of individual non-labor income on expenditures

Shares of income on: Covariates	Staples	Other Food	Alcohol	Tobacco	Health	Education	Clothing	Housing	HH goods & services	Other
Age										
-- of male	0.003	0.031	0.006	-0.000	0.015	0.039	0.003	-0.182	-0.177	0.121
	[1.03]	[1.41]	[3.21]	[0.39]	[0.60]	[4.78]	[0.24]	[1.53]	[1.53]	[1.46]
-- of female	0.007	0.025	-0.003	-0.000	0.053	0.032	-0.057	-0.297	-0.297	0.276
	[1.42]	[0.68]	[1.62]	[0.29]	[1.28]	[1.73]	[2.73]	[1.50]	[1.53]	[1.95]
Education										
-male-elementary	-0.227	-0.279	-0.053	-0.228	-1.101	0.602	0.569	2.229	2.068	-0.743
	[1.73]	[0.31]	[0.79]	[1.78]	[1.06]	[1.80]	[1.08]	[0.45]	[0.43]	[0.22]
-- junior high	-0.344	0.094	-0.109	-0.352	-1.146	0.695	1.157	1.474	1.539	-0.835
	[2.04]	[0.08]	[1.28]	[2.15]	[0.87]	[1.38]	[1.76]	[0.24]	[0.25]	[0.19]
-- high	-0.398	1.035	-0.176	-0.616	-1.164	1.312	1.060	-1.412	-1.334	1.597
	[2.58]	[0.97]	[2.21]	[4.11]	[0.97]	[3.10]	[1.77]	[0.25]	[0.24]	[0.40]
-- college	-0.564	1.862	-0.330	-1.033	-0.959	2.203	0.218	-5.533	-5.118	5.929
	[3.99]	[1.92]	[4.42]	[7.56]	[0.87]	[5.97]	[0.39]	[1.06]	[1.00]	[1.62]
-female-elementary	0.015	0.898	0.070	-0.116	0.283	0.549	-0.107	-2.579	-2.569	1.529
	[0.22]	[1.85]	[2.20]	[1.96]	[0.49]	[2.90]	[0.39]	[1.00]	[1.01]	[0.85]
-- junior high	0.064	2.007	0.068	-0.051	1.646	0.601	-0.378	-9.905	-9.583	6.229
	[0.52]	[2.40]	[1.18]	[0.47]	[1.70]	[1.67]	[0.81]	[2.18]	[2.16]	[1.96]
-- high	0.085	2.440	0.017	-0.125	2.563	1.519	-1.542	-17.348	-16.793	13.356
	[0.41]	[1.79]	[0.19]	[0.68]	[1.65]	[2.02]	[1.95]	[2.29]	[2.27]	[2.45]
-- college	-0.377	0.548	-0.239	-0.595	-0.525	3.314	-1.992	-9.752	-9.068	12.254
	[1.50]	[0.34]	[1.99]	[2.54]	[0.28]	[3.32]	[2.07]	[1.05]	[1.00]	[1.81]
Location										
(1) urban	-0.611	3.248	-0.232	-0.358	-0.934	-0.422	1.649	4.049	4.160	-6.918
	[4.20]	[3.46]	[3.35]	[2.58]	[0.86]	[0.85]	[3.18]	[0.77]	[0.81]	[1.84]
(1) suburban	-0.305	0.860	-0.187	-0.335	-1.656	-0.962	1.841	6.927	6.972	-7.185
	[1.83]	[0.80]	[2.45]	[2.16]	[1.34]	[1.59]	[3.00]	[1.16]	[1.20]	[1.66]
intercept	-43.130	-43.317	-97.893	-207.526	-1215.296	1444.716	-430.812	2737.230	2439.414	-301.433
	[0.41]	[0.05]	[2.01]	[2.20]	[1.41]	[1.30]	[0.59]	[0.49]	[0.44]	[0.07]
Tests										
χ^2(male income=0)	18.695	2.381	10.894	19.829	2.236	32.367	5.958	2.168	2.514	2.553
	[0.00]	[0.50]	[0.01]	[0.00]	[0.52]	[0.00]	[0.11]	[0.54]	[0.47]	[0.47]
χ^2(female income=0)	17.535	2.607	11.463	16.545	2.519	28.455	3.977	3.848	4.065	4.049
	[0.00]	[0.46]	[0.01]	[0.00]	[0.47]	[0.00]	[0.26]	[0.28]	[0.25]	[0.26]
χ^2(male&female income)	20.297	2.905	13.301	21.064	2.665	38.011	6.038	3.944	4.145	4.211
	[0.00]	[0.71]	[0.02]	[0.00]	[0.75]	[0.00]	[0.30]	[0.56]	[0.53]	[0.52]
χ^2(PCY=0)	640.205	96.360	11.499	24.710	9.615	34.601	7.777	14.785	14.874	7.548
	[0.00]	[0.00]	[0.02]	[0.00]	[0.05]	[0.00]	[0.10]	[0.01]	[0.00]	[0.11]
χ^2(All income=0)	2679.270	341.644	48.352	221.977	10.449	48.634	15.997	18.102	19.071	35.344
	[0.00]	[0.00]	[0.00]	[0.00]	[0.32]	[0.00]	[0.07]	[0.03]	[0.02]	[0.00]
F(all covariates)	448.49	28.58	37.83	77.29	1.60	56.30	2.30	1.06	16.27	4.57

Notes: Heteroskedasticity consistent asymptotic t statistics in parentheses beneath coefficient estimates; p-values are below Wald and F test statistics. Per capita income, squared and spline at bottom and top quartiles treated as endogenous; instruments are linear and quadratic terms in joint non labor income, non labor income of other household members, value of household assets in housing, land and other non-residential fixed assets.

TABLE 3: Effect of individual (labor and non-labor) income on expenditures

Shares of income on: Covariates	Staples	Other Food	Alcohol	Tobacco	Health	Education	Clothing	Housing	HH goods & services	Other
Individual total income										
Income - male	-0.823	-0.858	-0.490	-1.361	-2.074	6.211	-1.105	1.052	2.217	4.500
	[2.46]	[0.47]	[2.40]	[3.69]	[0.89]	[7.33]	[1.18]	[0.13]	[0.27]	[0.73]
Income - female	-1.089	-1.064	-0.630	-1.536	-3.671	8.488	-1.165	1.064	1.631	7.530
	[2.54]	[0.45]	[2.58]	[3.48]	[1.19]	[7.19]	[0.94]	[0.10]	[0.16]	[0.96]
Household income										
ℓn(per capita income)	-27.901	96.999	-1.416	-13.498	231.978	44.424	-49.042	-839.249	-765.271	528.156
	[1.97]	[1.59]	[0.17]	[0.76]	[2.85]	[1.26]	[1.61]	[2.88]	[2.75]	[2.39]
ℓn(pcy) squared	1.141	-3.324	0.095	0.811	-8.897	-1.551	0.908	31.302	28.108	-18.839
	[1.98]	[1.35]	[0.27]	[1.10]	[2.63]	[0.92]	[0.73]	[2.62]	[2.45]	[2.01]
ℓn(pcy) Q1 spline	-7.777	-114.517	-3.207	-10.713	-157.278	-27.288	72.488	668.297	638.024	-417.014
	[0.87]	[2.63]	[0.71]	[1.12]	[2.94]	[1.19]	[3.22]	[3.38]	[3.39]	[2.91]
ℓn(pcy) Q3 spline	7.567	93.581	2.862	5.677	145.672	15.968	-47.891	-606.928	-573.167	365.700
	[1.05]	[2.77]	[0.75]	[0.70]	[3.45]	[0.98]	[2.81]	[3.92]	[3.90]	[3.29]
Household composition										
ℓn(hh size)	-0.224	-2.933	-0.139	-0.355	0.048	1.728	0.467	-0.591	-0.768	3.909
	[3.89]	[9.52]	[3.79]	[5.93]	[0.13]	[13.16]	[2.96]	[0.44]	[0.59]	[4.11]
proportion aged 0-4	-2.521	-0.345	0.640	0.784	-2.923	-4.839	0.098	5.857	7.361	-3.090
	[10.70]	[0.27]	[5.20]	[2.85]	[2.01]	[10.70]	[0.15]	[1.09]	[1.43]	[0.84]
-- 5- 9	-0.888	-0.367	0.550	0.553	-5.953	-2.175	0.233	12.401	12.162	-6.287
	[3.52]	[0.29]	[4.12]	[2.04]	[3.90]	[4.49]	[0.35]	[2.22]	[2.27]	[1.62]
--10-14	0.270	0.266	0.485	0.138	-7.097	1.767	1.050	16.277	15.699	-10.809
	[0.97]	[0.19]	[3.30]	[0.46]	[4.27]	[3.01]	[1.47]	[2.66]	[2.69]	[2.53]
--male 15-54	0.811	-1.128	0.953	2.036	-3.788	4.645	-0.342	-12.959	-13.564	15.025
	[3.96]	[1.10]	[7.91]	[9.48]	[2.94]	[10.70]	[0.65]	[2.96]	[3.25]	[5.00]
--female 15-54	0.125	1.103	0.401	0.295	-3.795	2.761	1.410	-8.774	-8.466	8.929
	[0.60]	[1.06]	[3.58]	[1.32]	[3.04]	[6.18]	[2.65]	[1.89]	[1.92]	[2.75]
--male > 55	0.363	-2.985	1.190	2.666	-2.197	2.556	-0.961	-3.076	-3.995	5.924
	[1.36]	[2.35]	[5.95]	[8.29]	[1.45]	[5.58]	[1.53]	[0.59]	[0.81]	[1.65]
(1) male exist	0.266	-4.006	0.181	1.480	-0.551	-4.516	-0.077	4.967	5.187	-2.477
	[1.47]	[4.12]	[1.91]	[7.04]	[0.50]	[11.24]	[0.15]	[1.16]	[1.27]	[0.85]
(1) female exist	-0.467	0.477	-0.087	-0.167	-1.214	-0.866	1.904	9.712	9.836	-10.277
	[2.43]	[0.46]	[0.90]	[0.83]	[1.01]	[1.80]	[3.48]	[2.16]	[2.29]	[3.24]
Age										
-- of male	0.002	0.027	0.006	-0.000	0.012	0.033	0.005	-0.136	-0.132	0.082
	[0.86]	[1.88]	[3.47]	[0.22]	[0.73]	[5.57]	[0.69]	[2.14]	[2.19]	[1.88]
-- of female	0.009	-0.001	-0.002	0.003	0.030	0.007	-0.038	-0.128	-0.130	0.133
	[2.52]	[0.11]	[1.51]	[0.78]	[1.33]	[0.80]	[3.66]	[1.51]	[1.61]	[2.26]

TABLE 3 continued: Effect of individual (labor and non-labor) income on expenditures

Shares of income on: Covariates	Staples	Other Food	Alcohol	Tobacco	Health	Education	Clothing	Housing	HH goods & services	Other
Education										
-male-elementary	-0.175	0.101	-0.031	-0.187	-0.675	0.452	0.429	-0.074	-0.261	0.804
	[1.52]	[0.18]	[0.49]	[1.54]	[1.03]	[2.05]	[1.38]	[0.03]	[0.11]	[0.47]
-- junior high	-0.360	0.794	-0.115	-0.392	-0.469	0.895	0.751	-2.337	-2.286	2.082
	[2.65]	[1.15]	[1.52]	[2.76]	[0.57]	[3.01]	[2.01]	[0.75]	[0.77]	[0.96]
-- high	-0.370	1.517	-0.162	-0.599	-0.653	1.270	0.837	-4.100	-4.050	3.485
	[2.85]	[2.27]	[2.22]	[4.36]	[0.85]	[4.64]	[2.35]	[1.37]	[1.42]	[1.69]
-- college	-0.371	1.870	-0.249	-0.843	-0.750	1.544	0.453	-6.299	-5.930	5.824
	[3.12]	[3.10]	[3.69]	[6.65]	[1.08]	[6.26]	[1.38]	[2.35]	[2.32]	[3.21]
-female-elementary	0.023	0.763	0.075	-0.098	0.167	0.490	-0.021	-1.785	-1.781	0.875
	[0.38]	[2.51]	[2.59]	[1.76]	[0.44]	[3.61]	[0.13]	[1.33]	[1.39]	[0.96]
-- junior high	0.050	1.409	0.070	-0.011	1.079	0.355	-0.029	-6.082	-5.793	3.228
	[0.57]	[3.00]	[1.58]	[0.14]	[1.89]	[1.68]	[0.12]	[2.86]	[2.85]	[2.21]
-- high	0.221	1.071	0.086	0.110	1.409	0.412	-0.557	-9.543	-9.061	6.723
	[1.85]	[1.76]	[1.48]	[0.91]	[1.92]	[1.28]	[1.72]	[3.44]	[3.42]	[3.41]
-- college	0.259	-0.775	0.027	0.102	-1.166	0.492	-0.433	-4.572	-4.019	6.011
	[2.14]	[1.18]	[0.39]	[0.81]	[1.41]	[1.21]	[1.25]	[1.52]	[1.38]	[2.70]
Location										
(1) urban	-0.697	4.006	-0.264	-0.461	-0.265	0.009	1.130	0.299	0.397	-3.840
	[6.91]	[7.40]	[4.85]	[4.41]	[0.41]	[0.03]	[4.08]	[0.12]	[0.16]	[2.08]
(1) suburban	-0.402	1.860	-0.228	-0.478	-0.772	-0.323	1.153	1.609	1.671	-2.799
	[3.68]	[3.33]	[4.04]	[4.33]	[1.13]	[1.12]	[3.99]	[0.63]	[0.69]	[1.51]
intercept	175.871	-417.712	8.085	106.319	-1347.920	-177.554	163.952	4831.194	4366.375	-2954.968
	[2.15]	[1.18]	[0.16]	[1.02]	[2.80]	[0.77]	[0.92]	[2.83]	[2.67]	[2.24]
Tests										
χ^2(PCY=0)	1997.108	365.314	23.874	90.436	19.673	55.853	13.551	51.740	53.858	26.576
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.01]	[0.00]	[0.00]	[0.00]
χ^2(All income=0)	3720.219	787.617	53.016	243.892	21.326	70.671	34.186	53.024	57.712	71.147
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
F(all covariates)	648.44	74.40	49.61	95.24	4.00	119.64	6.32	3.84	17.89	17.92

Notes: Heteroskedasticity consistent asymptotic t statistics in parentheses beneath coefficient estimates; p-values are below Wald and F test statistics. Male income, female income and per capita income treated as endogenous; instruments are male non labor income, female non labor income, joint non labor income, non labor income of other household members, value of household assets (house, land and other non-residential fixed assets), quadratics of these incomes and assets and interactions between them.

TABLE 4: Effect of individual income on expenditures -- conditional on head and spouse present

Shares of income on: Covariates	Staples	Other Food	Alcohol	Tobacco	Health	Education	Clothing	Housing	HH goods & services	Other
Individual total income										
Income - male	-1.416	2.141	-0.769	-1.995	-2.247	8.946	-2.339	9.541	10.133	-3.502
	[3.94]	[0.86]	[3.53]	[5.31]	[1.02]	[8.94]	[1.79]	[1.46]	[1.64]	[0.74]
Income - female	-1.791	2.601	-1.160	-2.356	-4.122	10.003	-3.524	8.850	8.250	2.108
	[3.87]	[0.77]	[3.84]	[4.53]	[1.35]	[7.15]	[2.04]	[1.00]	[0.99]	[0.33]
Household income										
ℓn(per capita income)	-54.551	244.976	-7.564	-36.126	203.262	124.060	-120.828	-544.510	-485.554	256.389
	[3.99]	[2.32]	[0.85]	[2.13]	[2.05]	[2.43]	[2.45]	[1.54]	[1.46]	[0.97]
ℓn(pcy) squared	2.162	-10.386	0.315	1.634	-8.675	-5.453	4.319	23.819	21.046	-10.413
	[3.83]	[2.40]	[0.84]	[2.35]	[2.07]	[2.51]	[2.16]	[1.59]	[1.50]	[0.92]
ℓn(pcy) Q1 spline	7.738	-132.266	1.018	3.876	-96.281	-29.146	81.895	293.679	279.783	-145.761
	[1.05]	[2.33]	[0.23]	[0.42]	[1.97]	[1.21]	[2.96]	[1.75]	[1.77]	[1.16]
ℓn(pcy) Q3 spline	-5.387	127.822	-0.264	-5.473	105.171	26.843	-64.977	-338.460	-316.204	159.317
	[0.86]	[2.63]	[0.07]	[0.69]	[2.42]	[1.26]	[2.79]	[2.22]	[2.20]	[1.39]
Household composition										
ℓn(hh size)	-0.157	-4.046	-0.003	-0.299	-0.868	1.903	0.665	0.628	0.252	4.461
	[2.34]	[8.87]	[0.09]	[4.18]	[2.32]	[11.27]	[2.82]	[0.55]	[0.23]	[5.31]
proportion aged 0-4	-2.423	-1.078	0.410	0.566	-1.613	-6.438	1.350	-2.311	-0.723	3.515
	[8.34]	[0.59]	[2.66]	[1.86]	[1.13]	[9.16]	[1.38]	[0.56]	[0.19]	[1.19]
-- 5- 9	-0.753	-1.490	0.358	0.417	-4.592	-3.735	1.560	3.481	3.366	1.137
	[2.60]	[0.83]	[2.28]	[1.39]	[3.06]	[5.28]	[1.63]	[0.80]	[0.81]	[0.36]
--10-14	0.521	-0.927	0.319	0.166	-5.142	0.231	2.471	3.957	3.610	-1.014
	[1.64]	[0.44]	[1.80]	[0.47]	[2.93]	[0.27]	[2.25]	[0.74]	[0.71]	[0.26]
--male 15-54	0.733	-0.070	0.587	1.217	-1.674	4.253	0.645	-18.763	-19.039	17.603
	[2.64]	[0.04]	[3.84]	[4.15]	[1.13]	[5.77]	[0.72]	[4.80]	[5.09]	[5.89]
--female 15-54	0.079	-0.606	0.337	0.255	-3.858	2.281	2.283	-11.245	-11.201	12.713
	[0.30]	[0.36]	[2.25]	[0.86]	[2.71]	[3.19]	[2.60]	[2.73]	[2.88]	[4.21]
--male > 55	-0.295	-4.393	0.351	1.254	-2.121	2.343	0.282	0.980	-0.851	5.778
	[0.79]	[1.90]	[1.63]	[3.04]	[1.05]	[2.47]	[0.23]	[0.19]	[0.17]	[1.49]
Age										
-- of male	-0.000	0.086	0.002	-0.015	0.011	0.034	0.008	-0.190	-0.175	0.086
	[0.21]	[3.85]	[1.24]	[4.63]	[0.59]	[3.86]	[0.63]	[3.61]	[3.47]	[2.23]
-- of female	0.012	-0.059	0.000	0.018	0.022	-0.008	-0.035	-0.020	-0.034	0.079
	[2.91]	[2.43]	[0.04]	[4.70]	[1.21]	[0.94]	[2.70]	[0.40]	[0.69]	[2.09]

TABLE 4 continued: Effect of individual income on expenditures -- conditional on head and spouse present

Shares of income on: Covariates	Staples	Other Food	Alcohol	Tobacco	Health	Education	Clothing	Housing	HH goods & services	Other
Education										
-male-elementary	-0.123	0.109	0.020	-0.254	-0.214	0.463	0.421	-0.871	-1.000	1.046
	[1.10]	[0.17]	[0.37]	[2.23]	[0.44]	[1.91]	[1.16]	[0.65]	[0.78]	[1.08]
-- junior high	-0.275	0.745	-0.020	-0.343	0.260	0.923	0.659	-3.934	-3.811	2.788
	[2.13]	[0.95]	[0.31]	[2.61]	[0.42]	[3.06]	[1.53]	[2.29]	[2.33]	[2.25]
-- high	-0.297	1.512	-0.070	-0.579	0.073	1.225	0.811	-5.268	-5.162	3.717
	[2.31]	[1.93]	[1.08]	[4.46]	[0.12]	[4.09]	[1.91]	[3.08]	[3.16]	[3.03]
-- college	-0.350	1.707	-0.127	-0.806	-0.169	1.507	0.530	-6.225	-5.843	5.063
	[2.84]	[2.29]	[2.11]	[6.53]	[0.30]	[5.25]	[1.31]	[3.92]	[3.84]	[4.48]
-female-elementary	-0.023	0.929	0.031	-0.171	-0.000	0.557	-0.047	-0.851	-0.896	0.183
	[0.41]	[2.62]	[1.05]	[3.10]	[0.00]	[3.78]	[0.25]	[1.14]	[1.25]	[0.32]
-- junior high	-0.105	1.807	-0.021	-0.236	0.486	0.602	-0.187	-2.943	-2.808	1.069
	[1.24]	[3.03]	[0.48]	[2.55]	[0.96]	[2.51]	[0.61]	[1.94]	[1.95]	[0.95]
-- high	-0.020	1.141	-0.063	-0.299	0.255	0.668	-0.637	-3.430	-3.279	2.906
	[0.19]	[1.46]	[1.05]	[2.46]	[0.39]	[2.08]	[1.58]	[1.71]	[1.72]	[1.94]
-- college	0.115	-1.506	-0.148	-0.326	-2.365	0.661	-0.202	1.364	1.593	2.845
	[0.92]	[1.83]	[1.91]	[2.46]	[3.02]	[1.70]	[0.48]	[0.62]	[0.75]	[1.67]
Location										
(1) urban	-0.588	3.780	-0.213	-0.278	0.271	-0.116	1.191	-1.264	-1.025	-3.133
	[6.12]	[5.72]	[3.79]	[2.66]	[0.49]	[0.42]	[3.47]	[0.76]	[0.65]	[2.53]
(1) suburban	-0.295	1.783	-0.167	-0.317	-0.035	-0.329	1.133	-1.079	-0.887	-1.208
	[2.96]	[2.66]	[2.93]	[2.96]	[0.06]	[1.17]	[3.26]	[0.66]	[0.57]	[0.97]
intercept	317.905	-1376.067	37.299	220.276	-1283.482	-685.832	626.626	3660.518	3257.736	-1700.290
	[3.99]	[2.26]	[0.71]	[2.24]	[2.18]	[2.27]	[2.22]	[1.74]	[1.65]	[1.07]
Tests										
χ^2(PCY=0)	2218.888	227.804	15.335	85.780	16.236	82.957	9.907	49.617	52.594	50.855
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.04]	[0.00]	[0.00]	[0.00]
χ^2(All income=0)	3519.753	519.155	54.222	228.838	21.540	103.106	24.905	79.004	91.839	127.723
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
F(all covariates)	676.51	47.58	30.65	76.77	5.90	102.92	3.06	9.56	22.35	30.92

Notes: See Table 3.

Table 5: Non linear Wald tests for equality of ratios of income effects

Commodity groups	Staples	Other Food	Alcohol	Tobacco	Health	Education	Clothing	Housing	HH goods & services
Non-labor income (quadratic)									
Other food	0.165	.	.	.	.	.	.	.	.
Alcohol	0.009	0.574	.	.	.	.	.	.	.
Tobacco	0.017	0.819	0.000	.	.	.	.	.	.
Health	0.014	0.023	0.012	0.015	.	.	.	.	.
Education	0.273	0.240	0.047	0.131	0.135	.	.	.	.
Clothing	0.105	0.145	0.028	0.045	0.087	0.005	.	.	.
Housing	0.419	0.019	0.192	0.354	0.051	0.147	0.167	.	.
HH gds & services	0.439	0.022	0.175	0.380	0.047	0.158	0.188	0.000	.
Other	0.580	0.001	0.439	0.443	0.117	0.182	0.157	0.034	0.040
Total income (linear)									
Other food	0.002	.	.	.	.	.	.	.	.
Alcohol	0.007	0.000	.	.	.	.	.	.	.
Tobacco	0.259	0.003	0.219	.	.	.	.	.	.
Health	0.152	0.055	0.174	0.363	.	.	.	.	.
Education	0.012	0.004	0.044	0.698	0.112	.	.	.	.
Clothing	0.072	0.006	0.059	0.007	0.156	0.133	.	.	.
Housing	0.002	0.001	0.001	0.000	0.007	0.002	0.000	.	.
HH gds & services	0.029	0.030	0.026	0.015	0.065	0.030	0.007	0.004	.
Other	0.059	0.020	0.074	0.168	0.001	0.055	0.366	0.004	0.036
Total income (male and female in hh)									
Other food	0.003	.	.	.	.	.	.	.	.
Alcohol	0.810	0.091	.	.	.	.	.	.	.
Tobacco	0.162	0.002	2.077	.	.	.	.	.	.
Health	0.393	0.133	0.119	0.586	.	.	.	.	.
Education	0.591	0.013	3.152	0.180	0.727	.	.	.	.
Clothing	0.322	0.122	0.000	0.608	0.066	0.995	.	.	.
Housing	0.367	0.052	0.968	0.245	1.045	0.135	0.489	.	.
HH gds & services	0.770	0.105	1.585	0.609	1.205	0.415	0.785	0.666	.
Other	2.571	0.546	2.600	2.580	0.969	2.558	1.909	1.486	1.765

Notes: See Tables 2, 3 and 4

Table 6: Effects of individual income on expenditures by sector of residence, age and education

Share of income on:	Staples	Alcohol	Tobacco	Education
SECTOR OF RESIDENCE				
URBAN				Sample size=8,890
Male income	-1.350	-0.967	-1.770	8.069
	[1.96]	[3.70]	[4.70]	[9.11]
Female income	-2.043	-1.496	-2.404	8.397
	[2.43]	[4.58]	[5.04]	[7.18]
F(all covariates)	99.72	5.95	30.92	134.43
RURAL				Sample size=3,518
Male income	-3.439	-1.024	-2.387	8.176
	[2.41]	[1.73]	[1.94]	[2.20]
Female income	-6.114	-1.335	-0.171	9.623
	[1.84]	[1.10]	[0.07]	[1.22]
F(all covariates)	86.38	3.30	11.95	9.98
URBAN HHs--AGE OF MALE				
$\leq$ 35 years				Sample size=5,783
Male income	-0.338	-1.263	-1.275	0.610
	[0.36]	[3.04]	[1.88]	[0.53]
Female income	0.264	-2.046	-1.726	0.142
	[0.20]	[2.86]	[1.60]	[0.08]
F(all covariates)	120.99	4.80	18.78	63.31
> 35 years				Sample size=3,107
Male income	-1.586	-0.617	-1.763	9.203
	[2.44]	[2.20]	[3.63]	[6.58]
Female income	-2.292	-1.096	-2.510	8.586
	[3.13]	[3.30]	[4.40]	[4.89]
F(all covariates)	74.64	4.69	18.12	21.71
URBAN HHs--EDUCATION OF MALE				
not completed high school				Sample size=3,651
Male income	-1.747	-1.219	-2.223	8.056
	[2.24]	[2.95]	[3.31]	[5.27]
Female income	-3.353	-1.999	-3.056	9.583
	[3.18]	[3.62]	[3.20]	[4.28]
F(all covariates)	24.87	0.48	6.36	99.68
high school or more				Sample size=5,239
Male income	-0.669	-0.621	-1.207	8.704
	[0.67]	[1.03]	[2.20]	[7.20]
Female income	-0.503	0.796	-1.792	8.255
	[0.49]	[1.14]	[2.80]	[5.60]
F(all covariates)	106.19	2.75	8.62	42.78

Notes: All samples include only households with male and female present. All covariates listed in Table 3 included in each regression. Heteroskedasticity consistent asymptotic t statistics in parentheses.

RAND
1700 Main Street
Santa Monica, CA 90407

Labor and Population Program Working Paper Series

1994

Series Number	Order Number	Title	Author
94-10	DRU-708-NICHD	*Regligious Participation Over the Early Life Course: The Interaction of Age and Family Life Cycle Effects on Church Membership*	Ross M. Stolzenberg Mary Blair-Loy Linda J. Waite
94-09	DRU-706-RC	*Like Father, Like Son; Like Mother, Like Daughter: Parental Resources and Child Height*	Duncan Thomas
94-08	DRU-705-RC	*Income Shares and Shares of Income: Empirical Tests of Models of Household Resource Allocations*	Duncan Thomas Chine-Liang Chen
94-07	DRU-670-NICHD/RC	*Human Resources: Empirical Modeling of Household and Family Decisions*	John Strauss Duncan Thomas
94-06	DRU-669-NIA	*Evaluating Health Care Reform Using the Health and Retirement Survey: A Case Study of the Health Security Act of 1993*	Dana Goldman Paul Gertler James P. Smith
94-05	DRU-653-RC	*Does Head Start Make a Difference?*	Janet Currie Duncan Thomas
94-04	DRU-636-NIA	*The Impact of Worker Preferences on Pension Coverage in the HRS*	Richard W. Johnson
94-03	DRU-634-NIA	*Transfer Behavior: Measurement and the Redistribution of Resources Within the Family*	Kathleen McGarry Robert F. Schoeni
94-02	DRU-631-NIA	*Racial and Ethnic Differences in Wealth Using the HRS*	James P. Smith
94-01	DRU-613-NICHD	*The Effects of Access to Health Care on Infant Mortality in Indonesia*	Elizabeth Frankenberg

1993

Series Number	Order Number	Title	Author
93-41	DRU-619-RC	*Abstracts of 1993 Labor and Population Working Paper Series*	
93-40	DRU-608-NICHD	*Attitudes, Values, and the Entrance into Cohabitational Unions*	Marin Clarkberg Ross M. Stolzenberg Linda J. Waite
93-39	DRU-591-RC	*Medical Care for Children: Public Insurance, Private Insurance and Racial Differences in Utilization*	Janet Currie Duncan Thomas

93-38	DRU-558-NIA	*Intergenerational Educational Mobility Effects of Family and State in Malaysia*	Lee A. Lillard Robert J. Willis
93-37	DRU-557-RC	*The Demographic Transition in Southern Africa: Another Look at the Evidence from Botswana and Zimbabwe*	Duncan Thomas Ityai Muvandi
93-36	DRU-525-NICHD	*Converging Employment Patterns of Black, White, and Hispanic Women: Return to Work After First Birth* [published as RAND RP-299. Labor and Population Reprint Series 94-05]	Young Hee Yoon Linda J. Waite
93-35	DRU-427-NICHD	*Women's Early Work Commitment, Welfare Background, and Employment After Childbirth*	Lisa Greenwell Arleen Leibowitz Jacob A. Klerman
93-34	DRU-505-NICHD	*Characterizing Leave for Maternity: Modeling the NLS-Y Data*	Jacob Alex Klerman
93-33	DRU-504-NICHD	*Employment Continuity Among New Mothers*	Jacob Alex Klerman Arleen Leibowitz
93-32	DRU-477-RC	*Information and the Demand for Supplemental Medicare Insurance*	Paul Gertler Roland Sturm Bruce Davidson
93-31	DRU-491-NIA	*Gender Differences in Marriage and Mortality for Older Adults in Rural Bangladesh: Is Widowhood More Dangerous for Women than Men?*	M. Omar Rahman
93-30	DRU-489-NICHD	*Pre-Marital Cohabitation and Subsequent Marital Dissolution: Is It Self-Selection?*	Lee A. Lillard Michael J. Brien Linda J. Waite
93-29	DRU-487-NICHD	*Reversal of the Decline in Breastfeeding in Peninsular Malaysia? Ethnic and Educational Differentials and Data Quality Issues*	Julie DaVanzo Jeff Sine Christine Peterson John Haaga
93-28	DRU-485-RF	*Assessing the Impact of the Grameen Bank on Women's Status and Fertility in Bangladesh*	Mizanur Rahman Julie DaVanzo
93-27	DRU-391-NICHD	*Trends and Future Directions in Youth Labor Markets: Implications for Army Recruiting*	Jacob Alex Klerman Lynn A. Karoly
93-26	DRU-443-NICHD	*Private Interhousehold Transfers of Money and Time: New Empirical Evidence*	Robert F. Schoeni
93-25	DRU-442-NICHD	*Family Ties and Labor Markets in the United States and Brazil*	David Lam Robert F. Schoeni
93-24	DRU-428-NICHD	*Fixed Effects, Public Policy and Teenage Fertility*	Catherine A. Jackson Jacob Alex Klerman

93-23	DRU-417-NIA	*Moral Hazard and Risk Spreading in Medical Partnerships*	Martin Gaynor Paul Gertler
93-22	DRU-389-NICHD	*Using Regional Data to Reexamine the Contribution of Demographic and Sectoral Changes to Increasing U.S. Wage Inequality* [published as RAND RP-277, Labor and Population Reprint Series 94-01]	Lynn A. Karoly Jacob Alex Klerman
93-21	DRU-384-NICHD	*Heaping in Retrospective Data: Insights from Malaysian Family Life Surveys' Breastfeeding Data*	Jacob Alex Klerman
93-20	DRU-383-NICHD	*The Goals of the World Summit for Children and Their Implications for Health Policy in the 1990s*	Anne R. Pebley
93-19	DRU-380-NICHD	*Twelve-Year Follow-Up of Respondents and Their Adult Children in a Panel Survey in Peninsular Malaysia*	John Haaga Julie DaVanzo Christine Peterson Tey Nai Peng
93-18	DRU-379-NICHD/RF	*Maternal Depletion and Child Survival in Guatemala and Malaysia*	Anne R. Pebley Julie DaVanzo
93-17	DRU-378-NIA	*Health Status and Family Support of Older Malaysians*	John Haaga Christine Peterson Julie DaVanzo Sharon Mengchee Lee
93-16	DRU-346-NIA/NICHD	*Education, Marriage and First Conception in Malaysia*	Michael J. Brien Lee A. Lillard
93-15	DRU-345-NIA	*Uncertain Health and Survival: Effects on the Savings of Retired Couples*	Lee A. Lillard Yoram Weiss
93-14	DRU-338-NIA/WFHF	*Living Arrangements of Older Malaysians--Who Coresides with Their Adult Children?* [published as RAND RP-284, Labor and Population Reprint Series 94-04]	Julie DaVanzo Angelique Chan
93-13	DRU-331-NICHD	*Timing of Child Replacement Effects on Fertility in Malaysia*	Constantijn W. A. Panis Lee A. Lillard
93-12	DRU-318-NIA	*Health Status and Driving After Age 50*	Raynard Kington David Reuben Jeannette Rogowsky Lee A. Lillard
93-11	DRU-323-NICHD	*On the Road: Marriage and Mobility in Malaysia*	James P. Smith Duncan Thomas
93-10	DRU-312-NIA	*'Til Death Do Us Part: Marital Disruption and Mortality*	Lee A. Lillard Linda J. Waite
93-09	DRU-311-NICHD	*Child Mortality in Malaysia, 1950-1988*	Constantijn W. A. Panis Lee A. Lillard

RAND Labor and Population Program Working Paper Order Form:

Name:_____

Title: _____

Company or affiliation: _____

Address: _____

City, State, and Zip: _____

Please send me the following Working Papers:

94-10. DRU-708-NICHD (Stolzenberg et al.) _____
94-09. DRU-706-RC (Thomas) _____
94-08. DRU-705-RC (Thomas and Chen) _____
94-07. DRU-670-NICHD/RC (Strauss and Thomas) _____
94-06. DRU-669-NIA (Goldman et al.) _____
94-05. DRU-653-RC (Currie and Thomas) _____
94-04. DRU-636-NIA (Johnson) _____
94-03. DRU-634-NIA (McGarry and Schoeni) _____
94-02. DRU-631-NIA (Smith) _____
94-01. DRU-613-NICHD (Frankenberg) _____
93-41. DRU-619-RC (ABSTRACTS) _____
93-40. DRU-608-NICHD (Clarkberg et al.) _____
93-39. DRU-591-RC (Currie and Thomas) _____
93-38. DRU-558-NIA (Lillard and Willis) _____
93-37. DRU-557-RC (Thomas and Muvandi) _____
93-36. RP-299 (Yoon and Waite) _____
93-35. DRU-427-NICHD (Greenwell et al.) _____
93-34. DRU-505-NICHD (Klerman) _____
93-33. DRU-504-NICHD (Klerman and Leibowitz) _____
93-32. DRU-477-RC (Gertler et al.) _____
93-31. DRU-491-NIA (Rahman) _____
93-30. DRU-489-NICHD (Lillard et al.) _____

93-29. DRU-487-NICHD (DaVanzo et al.) _____
93-28. DRU-485-RF (Rahman and DaVanzo) _____
93-27. DRU-391-NICHD (Klerman and Karoly) _____
93-26. DRU-443-NICHD (Schoeni) _____
93-25. DRU-442-NICHD (Lam and Schoeni) _____
93-24. DRU-428-NICHD (Jackson and Klerman) _____
93-23. DRU-417-NIA (Gaynor and Gertler) _____
93-22. RP-277 (Karoly and Klerman) _____
93-21. DRU-384-NICHD (Klerman) _____
93-20. DRU-383-NICHD (Pebley) _____
93-19. DRU-380-NICHD (Haaga et al.) _____
93-18. DRU-379-NICHD/RF (Pebley and DaVanzo) _____
93-17. DRU-378-NIA (Haaga et al.) _____
93-16. DRU-346-NIA/NICHD (Brien and Lillard) _____
93-15. DRU-345-NIA (Lillard and Weiss) _____
93-14. RP-284 (DaVanzo and Chan) _____
93-13. DRU-331-NICHD (Panis and Lillard) _____
93-12. DRU-318-NIA (Kington et al.) _____
93-11. DRU-323-NICHD (Smith and Thomas) _____
93-10. DRU-312-NIA (Lillard and Waite) _____
93-09. DRU-311-NICHD (Panis and Lillard) _____

Please add my name to the mailing list for future publications:

All Aging Center Working Papers _____
All Population Center Working Papers _____
All Development Center Working Papers _____
All Labor and Population Program Working Papers _____

Mailing Information

Mail to:

Labor and Population Program
RAND
1700 Main Street, P.O. Box 2138
Santa Monica, CA 90407-2138