Submission to the workshop:

Gender and Labor Market Policies

Collective Households and "Unitary" Households, and the Role of Outside Options: Evidence from Turkey

Tümer Kapan[1]

Abstract

Using the theory developed by Browning and Chiappori (1998), namely the collective household model, I analyze bargaining between spouses and its determinants in Turkey. I test whether the 1994 Turkish Household Survey data are consistent with the collective model or with the alternative unitary model (in which the couple is modeled as a single decision-maker). Furthermore, focusing on a sub-sample from rural developing areas, I analyze the implications of labor force participation for women's decision-making power in households.

The findings of the paper are threefold. First, in the full sample of households in which both spouses work, I reject the unitary model and fail to reject the collective model for couples, a finding which is consistent with a bargaining process involving two decision-makers. Second, a reduced sample from rural South-Eastern and Eastern Turkey is consistent with the unitary model. In these households, in which women do not earn income outside the household, there is no evidence of bargaining. In fact, the unitary model ceases to be supported in favor of bargaining again when women have outside options, namely when they earn income. In the unitary model sample, more than 40 percent of women are working as non-paid family workers, but do not earn independent income. Therefore, what appears to determine participation in decision-making is not working per se, but formal participation in the labor market and earning an income which is independent of the husband's. Third, I find that having a son (who is likely to become an income-earner) as opposed to having a daughter (who is likely to become a non-paid worker) is an important determinant in household decision-making.

Keywords: intra-household bargaining, collective model, labor market participation, women's outside options

[1] Department of Economics, Columbia University. Email: tk2130@columbia.edu Tel. +1 212 854 1948.

1 Introduction

Microeconomic theory analyzes the behavior of economic decision makers through maximization of utility functions. This approach obtains strong analytical tools that are subsequently used to study several economic decisions like labor supply, demand, savings, etc. Almost all research into household economic decisions treats the household as one decision making entity. It is maintained that household decisions result from the maximization of a single utility function, although the household is an entity comprising more than one individual thus possibly more than one decision makers. This approach to modeling household behavior is known as the "unitary model".

The unitary model ignores the preferences of the individuals constituting the household but it is also known that outcomes through aggregation of individuals generally differ from outcomes of individual decision makers. There have been attempts to reconcile the existence of individual preferences with the unitary modeling of the household. Samuelson (1956) assumes that individuals in the household first agree on a particular distribution of the resources within the household and thus their decisions can be modeled by a weighted average of individual utilities. This approach however does not reveal anything about the how that particular distribution, hence weights, are chosen and does not justify the assumption that these weights are invariant with respect to, for example, individuals' wages, income level, or socio-economic factors. Becker's (1981) famous "rotten kid theorem" shows how household members' maximization problem can comply with that of a household head but this result requires that utilities be transferable between the members of the household and generically fails for other types of utility functions.

A long line of empirical research has also contradicted restrictions like symmetry of Slutsky matrix of household demand, which is also a subject of investigation in this paper, and "income pooling" that is implied by the unitary model. Income pooling refers to the idea that the total income of the household but not the recipients of the income should matter for household members' labor supply and consumption decisions. Schultz (1990) looks at 1981 Socioeconomic Survey data for Thailand and concludes that non-labor income received by wives is more likely to reduce female labor participation and to increase fertility than non-labor income received by husbands thus rejecting the pooling hypothesis. Thomas (1990) uses a Brazilian survey of 25000 urban households to that the source of non-labor income has a differential impact on children's health. More recently some studies have recognized that the assumption of exogeneity of non labor income may be problematic and looked at the affect of some more exogenous changes. For example, Duflo (2000), analyzes a reform of the South African old-age pension program which after the end of the apartheid extends some benefits universally to the previously uncovered population, hence it is exogenous for them. She shows that the impact of this public transfer program on children's nutritional and health status depends on the gender of the recipient in the household. Thomas et al (1997) also showed the importance of gender, by looking at the effect of wealth distribution by gender at marriage on the health status of the children in the household. Note that in the above cited studies relative incomes of spouses were taken as a factor affecting the household decision, similar conclusions were reached by other studies which take into account factors like structure of the marriage market and legislation.

While pointing to the weakness of the unitary model, the empirical studies do not use structural models and cannot facilitate a detailed analysis of household behavior. Another line of research developed alternative frameworks in which household behavior is considered to be the outcome of a form of interaction, namely intra-household bargaining, among household members. Manser and Brown (1980) and McElroy and Horney (1981) provided departures from the approach that reduces household decision to individual decision and placed the household decision into a Nash bargaining framework. They introduced the idea that household demands should be sensitive to the intra-household distribution of resources. Notwithstanding this conceptual leap these first attempts failed to produce testable implications on the household behavior like the unitary model. Later this approach was generalized by Chiappori (1988), Bourguignon et al. (1993), Browning et al. (1994), Browning and Chiappori (1998) and Chiappori and Ekeland (2001) and Chiappori, Fortin and Lacroix (2002). This modeling allows each member of the household to have different utility functions and it is only assumed that the collective decisions of the household are Pareto efficient. This framework is called the "collective model" of household decision-making. The collective model is general in the sense that it encompasses all models that propose a bargaining solution as the basis for household decisions.

The research into the collective model has progressed in two major branches: testing and identification. One natural question to ask is whether the collective model, which posits that households make Pareto optimal decisions, can generate testable restrictions. Several contributions showed that this approach generates testable restrictions (see Browning and Chiappori 1998 and Chiappori and Ekeland 2001a). These tests can be grouped into two categories depending on whether price variation is observed in the data. When there is no price variation, i.e. cross-section data, tests generalizing the previous income pooling tests have been proposed. When there is price variation tests generalizing the Slutsky restrictions, the SRk tests, were proposed, tested and not rejected by Browning and Chiappori (1998).

The second branch is the identification problem. Given that we have limited information at the sub household level, under what conditions and to what extent is it possible to infer the underlying preferences of the household members and the decision process from the observed behavior? Again, the results fall into two categories depending on whether or not price variation is observed in the data. The case where there is no price variation was studied by Browning et al (1992), and more recently Bourgouignon, Browning and Chiappori (2005). Under certain assumptions identification of the decision process, "the sharing rule", is obtained when consumption of at least one good by one household member is observed. With price variation, through variation in wages, the first identification result was derived by Chiappori (1992) and later extended by Blundell et al (2000), Chiappori, Fortin, Lacroix (2002) and Chiappori and Ekeland (2001b).

In this paper we summarize the testing procedure given in Browning and Chiappori (1998) and present a parametric demand system and carry out the empirical analysis using the 1994 Turkish Household Consumption Survey. The appealing aspect of this data set is that it is a survey of monthly expenditures collected during 1994 when Turkey experienced a financial crisis. Following the crisis, there was sharp domestic currency depreciation causing high inflation throughout the year, adding up to more than 140 percent increase in consumer price index by the end of the year. Monthly price increases are observed and due to different adjustment speeds of different sectors there is significant relative price variation between the goods and this price variation is exogenous for the households. The data, which facilitates empirical analysis involving price variation, is collected over the duration of one year; so it does not require the additional assumption that the underlying structure of the households does not change over a long period of time which is maintained when using data sets collected over several years to get the desired price variation. To the best of our knowledge this is the first study within the collective model framework which uses a dataset originating from a high inflation environment and a short period of time. We first show that Slutsky symmetry is not rejected for singles but is rejected for couples and the most important implication of the collective model, namely $SR1$ condition, is not rejected for couples. Hence as a first step we replicate the results obtained by Browning and Chiappori (1998). Then we provide new and interesting results for another sub sample of couples. Analyzing this second sub sample, we show that symmetry is not rejected and explain why with two different sub samples we obtain the opposite results. Thus our analysis illustrates that the existence of more than one individual in the household should be taken into account but the number of decision makers in the household may not always be equal to the number of individuals, which is a result that is perfectly compatible with the collective framework. We conclude by discussing some natural extensions of this work.

2 The Basic Framework

Consider a two person (1 and 2) household. Household consumption comprises N goods, which are divided between three uses: private consumption by each person q^1 and q^2, and the public consumption Q. No restriction is imposed on the nature of the goods, each may serve multiple purposes. The budget constraint of the household is given by

$$p'(q^1 + q^2 + Q) = x$$

where x denotes the total expenditure.

Axiom 1 *Member i's preferences are represented by a utility function of the form* $u^i(q^1, q^2, Q)$ $(i = 1, 2)$ *which is strictly concave and twice diffrentiable in* (q^1, q^2, Q) *and strictly increasing in* (q^i, Q).

The collective model assumes that consumption choices are Pareto efficient, expressed by the "collective rationality" axiom:

Axiom 2 *The outcome of the household decision process is Perto efficient, that is for any vector* (p, x) *the consumption vector chosen by the household is such that no other affordable vector* $(\bar{q}^1, \bar{q}^2, \bar{Q})$ *yields a higher utility for both members.*

To ensure that the decision process has always a unique, well-defined solution the following axiom is also assumed:

Axiom 3 *There exists a differentiable, zero-homogeneous function* $\mu(p, x)$ *such that for any* (p, x) *the vectors* (q^1, q^2, Q) *are solutions to the program:*

$$\underset{q^1,q^2;Q}{max}\ \mu(p, x).u^1(q^1, q^2, Q) + [1 - \mu(p, x)].u^2(q^1, q^2, Q) \tag{1}$$

subject to $p^{'}(q^1 + q^2 + Q) = x$.

The solution of the above program has two components. Together with any utility functions u^1, u^2 the budget constraint defines the Pareto frontier, for any given (p, x). Axiom 2 ensures that the final outcome will be on this frontier. The Pareto weight $\mu(p, x)$ determines the vector to be chosen from this frontier. The Pareto weight $\mu(p, x)$ of individual one relative to individual two has the natural interpretation as a the bargaining power of individual 1 with respect to individual 2. Note that the weight $\mu(p, x)$ is not, generally, constant; it will depend on prices and total expenditures since these variables influence the distribution of power within the household. Also any variable that may affect the distribution of the household but not the budget constraint or the preferences of the agents ("Extra-household Environmental Parameters"(EEP) in McElroy's (1990) terminology) will enter into μ. We will call such variables distribution factors and denote them by z. So in the most general case the Pareto weight will be of the form $\mu(p, x, z)$. Note that the variables in z will affect demand only through their effect on μ. This observation will be crucial in deriving some of our results.

Looking at (1) it is important to note that the utility function determining the outcome depends on prices and total expenditures. A change in these variables will not only change the budget set but also modify the utility function. Also note that (p, x, z) will only enter the utility function through the weight μ and this structure will impose testable and falsifiable restrictions on household demand. Tests based on price effects will be discussed in detail and implemented in the next section.

Let $f(p, x, \mu(p, x, z))$ denote the solution of the program (1). Note that the function $f(p, x, \mu(p, x, z))$ determines the demand as a function of prices, expenditures and the Pareto weight. Since we cannot observe the Pareto weight f is unobservable for us. Instead what we observe is the reduced form demands that associates the household demand with only the pair (p, x, z). We will define the observable household demand ξ by

$$\xi(p, x, z) = f(p, x, \mu(p, x, z)).$$

3 Testing the Implications of the Collective Model

3.1 Restrictions on Demand

In this section we will summarize the testing strategy developed in Browning and Chiappori (1998). This testing strategy does not require too much structure to be imposed on the utilities or the nature of the goods hence is very general. Note that so far we only assumed the smoothness of utility functions, formalized by Axiom 1, and the collective rationality assumption, formalized by Axioms 2 and 3. Although very genera,l this setting will be enough to generate testable and falsifiable restrictions on observed behavior.

Given any observed demand function $\xi(p,x) = f(p,x,\mu(p,x))$ Browning and Chiappori (1998) proves the following result, called the $SR1$ property, which is a generalization of the Slutsky symmetry condition imposed by the unitary model:

Proposition 1 *The Slutsky matrix S associated with the reduced form demand function $\xi(p,x)$ is the sum of a symmetric, negative semi-definite matrix Σ and a matrix R that has at most rank one.*

In fact the matrix S is termed the pseudo-Slutsky matrix since its elements do not represent the usual price effects. In this setting a change in prices has two effects on demand: First the Pareto frontier will change and second the weight μ will change.

A change in (p,x), keeping μ constant, will affect the demand trough Σ, which is symmetric; but also $\mu(p,x)$ changes causing a movement along the Pareto frontier. This movement will change the demand through R and will in general violate the symmetry of the Slutsky matrix.

The authors also provides the following result which reduces the test of the restriction in the above proposition to a rank test:

Proposition 2 *Let S denote the pseudo-Slutsky matrix, and let M=S-S'. The rank of the antisymmetric matrix M is either zero or two.*

Note that testing that M has rank zero is equivalent to the symmetry of the pseudo-Slutsky matrix S. The testing strategy we will follow in the next subsection will implement this result. When there is a single person in the household the collective model coincides with the unitary model so S should be symmetric ,i.e. M should have rank zero. When there are two members in the household then M may, but not necessarily, be of rank two.

3.2 Households with More Than two Members

In fact the framework provided above can be generalized to analyze the demand function of households with more than two members. For any household with $k+1$ members, the household utility function will be constructed with $k+1$ individual utility functions and k Pareto weights $\mu_1(p,x), ..., \mu_k(p,x)$.

The generalizaton of Proposition 1 shows that if the household has $k+1$ members, where $k+1$ is less than the number of goods, N, then the pseudo-Slutsky matrix S is the sum of a symmetric matrix and a matrix of rank no greater than k. This result is called the SRk property.

Similarly the generalization of Proposition 2 (see Chiappori and Ekeland[2001a]) shows that the rank of the antisymmetric matrix M should be no greater than $2k$.

3.3 The Empirical Analysis

To test the restrictions of the collective model on the pseudo-Slutsky matrix given by Proposition 1 we need a data set which has enough price variation to estimate reliable price responses. Either a long time series with lots of intertemporal variation or a data set with some cross-section price variation is required. Tests of restrictions of the collective model involving price variation have, so far, been carried out with the first kind of data sets. In this study we use the 1994 Turkish Household Consumption Survey. Turkey has experienced high inflation for a long period prior to 1994. After a financial crisis earlier in 1994, there was sharp domestic currency depreciation causing high inflation throughout the year, adding up to more than 140 percent increase in the consumer price index by the end of the year. During the course of the year prices increase each month and due to different adjustment speeds of different sectors there is significant relative price variation between the goods; this creates enough price variation to estimate and test price effects.

We consider singles and three different sub samples of couples, A, B and C; the selection of these sub samples will be discussed in detail below. The singles data sets will be used mainly as a control group for the test of symmetry. For couples data sets we will allow families which have children up to some certain age. This has two reasons: firstly most families have at least one child so restricting our attention to the couples which have no children decreases our sample size substantially so we allow families which include children up to age 11. Young children are not likely to be decision makers in the household and given the nature of tests summarized in the previous section this is a testable hypothesis. This brings the second reason why we allow children; we would like to see if and when children become decision makers.

We will only estimate demands for non-durables and assume that preferences for non-durable goods are separable from durables. The separability assumption is restrictive but also common in the literature. For couples we estimate the demand for ten non durables: food at home, beverages (alcoholic and non-alcoholic), tobacco, clothing, health expenditures, transportation, entertainment expenditures, education expenditures, restaurant and hotel expenditures and services. For singles we observe positive education expenditures only in 3 data points in our sample (the total sample size is 699) so we exclude that item and estimate the system for 9 goods. Prices are measured each month at the regional level.

3.4 The Demand System

We will follow Browning and Chiappori (1998) and use the Quadratic Almost Ideal Demand System (QUAIDS) proposed by Banks, Blundell and Lewbel (1992). This system expresses budget shares as a function of log prices, log deflated total expenditures and a quadratic term in log deflated total expenditures. QUAIDS is a very flexible functional form and is able to capture the curvature of the Engel curves. Let ω and p represent n-vectors of budget shares and log prices respectively, and let x represent total expenditures; then QUAIDS is written as follows:

$$\omega = \alpha + \Gamma p + \beta(\ln(x) - a(p)) + \lambda \frac{(\ln(x) - a(p))^2}{b(p)} \tag{2}$$

where α, β and λ are parameter vectors and Γ is an $n \times n$ matrix of parameters.

The price indices $a(p)$ and $b(p)$ are defined by:

$a(p) = \alpha_0 + \alpha' p + \frac{1}{2} p' \Gamma p$

$b(p) = \exp(\beta' p)$

This functional form allows us to test restrictions on demand very easily. For example, adding up of the budget shares implies that $\alpha' e = 1$ and $\beta' e = \lambda' e = \Gamma e = 0$ where e stands for the n-vector of ones. Homogeneity implies that $\Gamma' e = 0$.

Note that adding up is always satisfied by the construction of the data, i.e. budget shares, so we can drop the last equation from the system estimate only $N-1$ equations and obtain the parameters of the omitted equation using the restrictions. We also impose homogeneity and divide all prices by the price of the good that is droppped from the system, which is arbitrarily chosen to be services. Hence we will estimate the first $N-1$ components of the vectors α, β and λ and the first $(n-1)\times(n-1)$ parameters of the Γ matrix without its last row and column. From now on let α, β and λ represent the reduced parameter vectors and let Γ represent the reduced matrix of parameters.

The functional form in (2) expresses demand only as function of prices and total expenditures but as usual we expect observable preference factors to affect demand. To take into account this heterogeneity we add a vector of demographics, y, into (2) so the model we will estimate is:

$$\omega = \alpha + \gamma y + \Gamma p + \beta(\ln(x) - a(p)) + \lambda \frac{(\ln(x) - a(p))^2}{b(p)} \tag{3}$$

The set of variables in y for each subsample will be explained in detail below.

Since we are interested in testing the symmetry of the Slutsky matrix we should determine the implications of this restriction on the demand system defined by (3). After deriving explicitly the Slutsky matrix of the above demand system, Browning and Chiappori (1998) show the following result:

Proposition 3 *The slustky matrix of the QUAIDS demand system satisfies SR1 restriction if and only if* Γ *satisfies SR1 restriction.*

In estimating (3) we must allow for possible endogeneity of total expenditures. The infrequancy or lumpiness of purchases, especially given that we are using monthly expenditures where we are likely to observe seasonality, will create a correlation between the total expenditures and errors in the system. We will follow the usual practice and instrument expenditures with net income which is assumed to be correlated with total expenditures but uncorrelated with infrequency of purchases. Note that according to the unitary model once we condition on total expenditures income should not affect demand so it can be excluded from the demand equation and used as an instrument.

An important aspect of (19) is that it is highly nonlinear, but it is linear conditional on $a(p)$ and $b(p)$. If starting estimates for the price indices $a(p)$ and $b(p)$ are available this system can be estimated linearly. We follow Browning and Chiappori(1998) and use the iteration method discussed in Browning and Meghir (1991) and Blundell and Robin (1999). As starting values we use a Stone price index for the $a(p)$ and unity for $b(p)$. The final results were insensitive to the choice of different initial values[1] and the convergence is obtained in five or six iterations. We use three stage least squares procedure to estimate (3).

Subsamples

We will test the implications of the unitary model for three main groups:singles, couples A, couples B and couples C and test the implications of the collective model when the unitary model seems to be problematic.

1.Singles

The singles sample consists of a total of 699 individuals. Four of them possess 0 income so we work with the remaining 695 individuals. For singles the preference factors we include in the demand system are dummies for region (Aegean, Marmara, Mediterranean, Blacksea, Central and East as the base region), home ownership, living in urban areas, age, age squared and a dummy for gender. The instruments we use for singles, apart from the regressors assumed to be exogenous, are log net income, log net income squared and log net income crossed with home ownership.

We estimate the demand for 9 non durables: food at home, beverages (alcoholic and non-alcoholic), tobacco, clothing, health expenditures, transportation, entertainment expenditures, restaurant and hotel expenditures and services where

[1] For example choosing $a(p) = 1$

services is the good dropped from the system during estimation. The test for the symmetry of the Slutsky matrix gives

$\chi^2_{28} = 24.22$

$Prob > \chi^2_{28} = 0.6698$

The test result shows that singles data are consistent with the Slutsky symmetry implication of the unitary model.

Two things need to be stressed here. First, Browning and Chiappori (1998) choose the sub sample of singles who are in full time employment, while we carry out the test with the whole sample. Selecting on employment, apart from the selection issues that we might face, leaves us with only 20 percent of the original sample of singles which is too small to carry out reliable estimation and testing procedures. Nevertheless the same test was carried out with the remaining sub sample and the test statistic was in the immediate proximity of the one reported above. Our result seems to be robust to selecting on employment. Second and more importantly, even without selecting on employment our sample size is quite small and we observe a lot of zeros for several goods. This situation might be already biasing our results.

2. Couples

As the next step we will test the symmetry restriction on couples. We will choose couples in which both of the couple have positive income and allow for families who have young children, defined to be of age 11 or younger. Our sample consists of 1284 couples (who possibly have children in the household), to which we refer as A. The preference factors we include in the demand system are dummies for region, home ownership, car ownership, living in urban areas, husband's age, wife's age and a dummy for having children in the household. The instruments we use are log net household income, log net household income squared, log net household income crossed with car and home ownership. In addition to the 9 goods used in singles estimation we have education as the tenth good. Most of the price coefficients are significant. The test result for Slutsky symmetry gives

$\chi^2_{36} = 84.29$

$Prob > \chi^2_{36} = 0.0000$

This result is in line with what several other studies have found before, symmetry is rejected for households which has more than one members. This situation is in contradiction with unitary model but is possible under the collective model. Note that singles data were consistent with the unitary model, so the two results combined suggest that unitary model is not problematic per se but cannot necessarily be applied to two-person households. So the natural next step is to test the restriction implied by the collective model, namely $SR1$, with the couples data.

Remember from Proposition 2 that under the collective model the rank of the matrix $M = S - S'$ is either zero or two, the situation where rank is zero corresponds to symmetry. The simple test described by Browning and Chiappori (1998) involves testing whether matrix M is of rank two which requires first that the rank is not zero. So only if we reject strongly that the Slutsky matrix is symmetric we can go on and carry out the $SR1$ test. The test gives

$\chi^2_{21} = 14.23$

$Prob > \chi^2_{21} = 0.8595$

which shows that the price responses are consistent with the collective model.

Two points should be noted here. Firstly we observe far fewer zeros in the consumption of goods than the singles data. Also by selecting couples in which both of the couple have positive income might create selection bias again, but further analysis suggests that this is not crucially important.

Following Browning and Chiappori (1998), to create a more homogeneous group of couples we drop only the couples who have children of any age, allowing any one of the two members of the members of the household to have zero income. This creates a sample of size 2564 couples (sample B). Since only in less then 2 percent of this sample we observe positive education expenditures we will drop it from the system. The symmetry and $SR1$ tests yield the following results.

Symmetry: $\chi^2_{28} = 69.72$

$$Prob > \chi^2_{28} = 0.0000$$

$SR1$: $\chi^2_{15} = 11.753$

$$Prob > \chi^2_{21} = 0.7141$$

Above results suggest that the data set for couples is consistent with the collective model while violating the Slutsky symmetry assumption of the unitary model.

Number of Adults=Number of Decision Makers?

The $SR1$ restriction (or more generally SRk) was developed as a way of testing the implications of the collective model on household demand. As a byproduct it allows us to determine the number of decision makers in the household. The results mentioned above were in line with Browning and Chiappori (1998): when the household is composed of a single member the Slutsky symmetry condition is not rejected; when there are two adults, and possibly young children, symmetry is rejected but $SR1$ is not, showing that there are two decision makers in the household. But note that the collective model does not require the Slutksy matrix to be asymmetric. In this section we will analyze a different sub sample of couples to test the implications of the collective model.

We will restrict our attention only to the eastern part of Turkey where the percentage of population living in rural areas is highest among all regions and the traditional social values are dominant. We will choose only couples living in rural areas. Extended families, i.e. households with members other than parents and children are very common in this area. As in sub sample A we will allow for couples which has, possibly, children up to age 11 and no other family member in the household. This restriction leaves us with only 500 households. Among these 500 households only around 10 percent of them the woman in the household earns positive income, in the rest the woman is financially dependent on the husband. As opposed to keeping only the households in which both parents have positive income, like we did in choosing A, here we will drop the households in which both parents have positive income and we will only keep the ones in which only men has positive income. We are left with only 446 households (sample C). Testing for the symmetry of the Slutsky matrix we find:

$\chi^2_{28} = 28.68$

$Prob > \chi^2_{28} = 0.4288$

Altough the probability under the null is decreased compared to that from singles we are still far away from rejecting at conventional sizes. In the framework of the collective model there are three possible cases under which the symmetry is not rejected for a two person household:

Case1: For a two person household the Pareto frontier is one-dimensional and there is a hyperplane which if the infinitesimal change in income and prices belong to that hyerplane then there will be no change in μ and hence Slutsky symmetry will be satified.

Case2: The utility functions of the two agents can be identical in which case whatever the Pareto weights are, the household utility function is the same as a single utility function thus the symmetry is satisfied.

Case 3: The Pareto weight of the one member is always equal to unity in which case she is the effective dictator.

Given the socio-economic structure of the region we tend to believe that the third case is the relevant one here and the effective dictator is the husband. Adding the households in which the woman has positive income back to the sample gives the following results

Symmetry: $\chi^2_{28} = 52.79$

$Prob > \chi^2_{28} = 0.0031$

$SR1$: $\chi^2_{15} = 6.30$

$Prob > \chi^2_{15} = 0.9742$

Adding only 52 households in which women have positive income results in strong rejection of symmetry and strong non rejection of $SR1$, that is there are two decision makers in the household. Going back to our sample C, one natural question to ask is "How would the addition of older children, defined to be of age 12 or older, into the household would change the decision process?". And given the previous result would the gender of the child added change the result?

To answer these questions first we add to C the households which have no old female children and *at most one old male child*. Again no woman has positive income. This increases the sample size to 544 and the test results are presented below.

Symmetry: $\chi^2_{28} = 48.57$

$$Prob > \chi^2_{28} = 0.0093$$

$SR1$: $\chi^2_{15} = 11.36$

$$Prob > \chi^2_{15} = 0.72$$

We are back to the two decision maker situation.

As the next step we will do the reverse exercise and add to C the households which have no old male children and *at most two old female children*. This increases the sample size to 590 and the test results are presented below.

Symmetry: $\chi^2_{28} = 26.53$

$Prob > \chi^2_{28} = 0.5437$

Allowing for one old male child takes us back to the two decision maker case but allowing for even two female children still leaves only one decision maker in the household.

In the above we are not controlling for the fact that female and male children may have income so adding only older children with no income would be a more healthy indicator of the possible existance of gender bias in household decision making.

Out of the 590 households deleting the four households in which the old female children have positive income gives

Symmetry: $\chi^2_{28} = 26.49$

$Prob > \chi^2_{28} = 0.5459$

And out of the 544 households deleting the twelve households in which the old male children have positive income gives

Symmetry: $\chi^2_{28} = 42.08$

$Prob > \chi^2_{28} = 0.0432$

$SR1$: $\chi^2_{15} = 7.25$

$Prob > \chi^2_{15} = 0.95$

The rejection of symmetry is only possible at five percent now so decision making power is very much related with having income. But the still existing gap between female and male sub samples, 0.5459 versus 0.0432, indicates that having a positive income is not the whole story and even controlling for the children having income or not there is a difference between male and female children.

We should note that small sample size require us to interpret the above results with some degree of caution. Ignoring possible problems, the above results, to the best of our knowledge, are the first ones to show that symmetry is not necessarily rejected for households with more than one members and the number of adult members in the household is not necessarily equal to the number of decision makers in the household. The importance of gender for the understanding of intra-household welfare has been acknowledged for a long time in past studies some of which are mentioned in the introduction. Here in this particular data set we are able to observe that the gender of a household member is directly linked to his/her being a decision maker in the household.

4 Conclusions

In this paper we estimated the parameters of a demand system and followed the testing strategy outlined in Browning and Chiappori (1998) to test the implications of the unitary and the collective models on different samples from 1994 Turkish Consumption Expenditures Survey. We have shown that the singles data is consistent with the unitary model. With the couples data sets A and B the implications of the unitary model is rejected, but implications of the collective model are not rejected. We carried out the same analysis with the couples sub sample C, and symmetry of the Slutsky matrix was not rejected for this sample. This result is still not in contradiction with the collective model. Further analysis with this sample by adding older children to the household makes it clear that the collective model is not rejected. To the best of our knowledge, these results are the first ones to show that the number of adults in the household is not necessarily the number of decision makers in the household and the gender composition of the household may be of substantial importance in participation, or non participation, in household decision making.

The current data set from 1994 Turkish Consumption Expenditures Survey seems to be consistent with the collective model hence it is a good candidate for further investigation in the collective setting. In the above analysis we ignored the possible distribution factors and their effects on demand. In this data set we can observe clothing as seperately as male and female clothing, also alcohol and tobacco consumption are almost exclusively consumed by men. As an extention of this work we intend to analyze the effects of distribution factors, e.g. relative income of women, or just the gender itself on the demand structure of the household especially on the exclusively male consumption. Also a natural extention would be analyzing the effect of children since children are also possible decision makers and again the gender bias issue raises interesting questions.

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Regression results [1]: Sample A

	Food	Beverages	Tobacco	Clothing
ln(pfood)	-0.95***	0.25***	-0.26***	-0.32
	[0.28]	[0.06]	[0.08]	[0.21]
ln(pbever)	-0.22	-0.31***	0.06	1.23***
	[0.31]	[0.07]	[0.09]	[0.24]
ln(ptobacco)	0.18	0.20***	-0.00	-0.88***
	[0.19]	[0.04]	[0.06]	[0.15]
ln(pclothing)	-0.69	0.86***	-0.44*	-3.15***
	[0.81]	[0.17]	[0.24]	[0.62]
ln(phealth)	0.59**	-0.18***	0.16**	0.58***
	[0.25]	[0.05]	[0.08]	[0.20]
ln(ptransport)	0.24	-0.22***	0.15**	0.92***
	[0.25]	[0.05]	[0.08]	[0.19]
ln(pentertain)	1.65**	-0.73***	0.51**	1.91***
	[0.70]	[0.15]	[0.21]	[0.53]
ln(photelrest)	0.02	0.11*	-0.13	-0.54***
	[0.27]	[0.06]	[0.08]	[0.20]
Quarter 1	0.08***	0.00	0.00	-0.07***
	[0.02]	[0.01]	[0.01]	[0.02]
Quarter 2	0.09***	-0.00	0.01	-0.08***
	[0.03]	[0.01]	[0.01]	[0.03]
Quarter 3	0.06***	0.00	0.01	-0.06***
	[0.02]	[0.00]	[0.01]	[0.02]
Holiday	0.09***	-0.01*	-0.02**	0.01
	[0.02]	[0.00]	[0.01]	[0.02]
ln(exp/P)	0.23	-0.22***	0.13**	0.75***
	[0.20]	[0.04]	[0.06]	[0.15]
ln(exp/P)^2	-0.03***	0.01***	-0.01**	-0.03***
	[0.01]	[0.00]	[0.00]	[0.01]
Constant	1.05	1.28***	-0.52	-4.67***
	[1.08]	[0.23]	[0.32]	[0.82]
Observations	1780	1780	1780	1780

Standard errors in brackets, *significant at 10%; ** significant at 5%; *** significant at 1%

The following controls are included (but coefficients are not shown):
urban dummy, car ownership dummy, home ownership dummy, and female's and male's wage.

Regression results [2]: Sample A

	Health	Transportation	Entertainment	Hotel & Restaurant
ln(pfood)	0.28**	0.24**	0.76***	-0.07
	[0.13]	[0.12]	[0.09]	[0.09]
ln(pbever)	-0.13	-0.21	-0.75***	0.10
	[0.14]	[0.13]	[0.10]	[0.10]
ln(ptobacco)	0.13	0.15*	0.49***	0.00
	[0.09]	[0.08]	[0.06]	[0.06]
ln(pclothing)	0.64*	0.90***	2.58***	-0.41
	[0.37]	[0.35]	[0.27]	[0.26]
ln(phealth)	-0.13	-0.26**	-0.66***	0.15*
	[0.12]	[0.11]	[0.08]	[0.08]
ln(ptransport)	-0.23**	-0.22**	-0.80***	0.14*
	[0.12]	[0.11]	[0.08]	[0.08]
ln(pentertain)	-0.76**	-0.78***	-2.23***	0.40*
	[0.32]	[0.30]	[0.23]	[0.22]
ln(photelrest)	0.12	0.18	0.39***	-0.12
	[0.12]	[0.11]	[0.09]	[0.08]
Quarter 1	-0.00	-0.00	0.00	0.01
	[0.01]	[0.01]	[0.01]	[0.01]
Quarter 2	-0.01	0.01	-0.00	0.02*
	[0.02]	[0.01]	[0.01]	[0.01]
Quarter 3	-0.02*	0.01	-0.01**	0.01*
	[0.01]	[0.01]	[0.01]	[0.01]
Holiday	-0.01	-0.00	-0.02**	-0.02***
	[0.01]	[0.01]	[0.01]	[0.01]
ln(exp/P)	-0.17*	-0.22***	-0.65***	0.11*
	[0.09]	[0.09]	[0.07]	[0.06]
ln(exp/P)^2	0.01**	0.01***	0.03***	-0.00
	[0.00]	[0.00]	[0.00]	[0.00]
Constant	0.63	1.18***	3.19***	-0.66*
	[0.50]	[0.46]	[0.36]	[0.34]
Observations	1780	1780	1780	1780

Standard errors in brackets, *significant at 10%; ** significant at 5%; *** significant at 1%

The following controls are included (but coefficients are not shown):
urban dummy, car ownership dummy, home ownership dummy, and female's and male's wage.