Durable Goods and Intrahousehold Allocation in Brazil

Ana Claudia Polato e Fava

E-mail: afava@fipe.org.br

Mary Arends-Kuenning

Department of Agricultural and Consumer Economics

University of Illinois at Urbana-Champaign

September 2010

1. Introduction

Frequently, women do most of the household work in Brazil, even though 67.5% of women of childbearing and child rearing age (25 to 45 years old) participate in the labor force as well. When comparing working men and women, women on average work 5 hours less than men outside the household, as shown in Figure 1. However, they undertake about 15 hours more of household work than men. Consequently, Brazilian women tend to work 10 hours more than men. Not surprisingly, one of the concerns of Brazilian women is the unfair division of time in housework (Oliveira (2000)[1]). Given their increasing participation in the job market and their inability to engage their husbands in housework, the result is a double burden that often presents them with difficult choices between their careers and families (Oliveira (2000)).

Historically, the double burden was eased in developed countries by the introduction of durable goods such as washing machines, dryers, and vacuum cleaners. Several studies have looked at the impact of home-production durable goods, but the results are not conclusive. Greenwood, Seshadri, and Yorukoglu (2005), using US household data, conclude that the durable goods revolution was fundamental to free women's time to work outside the household. Cavalcanti and Tavares (2008) corroborate the result of Greenwood, Seshadri, and Yorukoglu (2005), analyzing data from seventeen OECD countries. They estimate that a decline in the relative price of appliances accounts for a 10 to 15% increase in the labor force participation of women in the United Kingdom. However, Jones, Manuelli, and McGrattan (2003) argue that the factor that matters the most in explaining increases in women's labor force participation is the reduction in the gender wage gap. According to their model, a reduction in men's and women's wage differential explains most of the change since 1950 in the hours spent in market work by U.S. married women.

[1]Oliveira (2000) comments on the results of a study of 300 women in positions of responsibility in the public sphere done by the Center for Women's Leadership (CELIM) in Rio de Janeiro.

Whether or not the existence of home-production durable goods is crucial in freeing women's time to work outside the household, it is important to acknowledge the improvement in welfare that these goods brought to our households. The spread of home-production durable goods promoted an increase in efficiency, making it possible for clothes and houses to be cleaned more often (Jones, Manuelli, and McGrattan (2003)), reducing time spent on housework by 70% and reducing significantly the number of maids in the U.S. between 1900 and 1975 (Greenwood, Seshadri, and Yorukoglu (2005)).

This paper is motivated by the welfare improvement that these home-production durable goods bring. The benefits of the time saved due to home-production durable goods are potentially large to Brazilian wives given their inability to engage their husbands in housekeeping. Despite that, Brazilian households tend to lack household-production durable goods. Only half of the households living on less than two dollars a day per capita owns a refrigerator. Even among the five percent richest households in Brazil, less than 20% of them own dish washers and dryers, 36% own vacuum cleaners, 60% own microwaves and 78% own washing machines (Table 2).

Moreover, Brazilian households appear to prioritize entertainment durable goods over home-production durable goods in their purchasing decisions. Color TVs are the second most frequently observed durable goods in Brazilian households, being more frequent than refrigerators in lower income households. The goal of this paper is to determine whether decisions about durable goods ownership are the outcomes of a bargaining process between husbands and wives. Some durable goods are time-savers in household production, such as washing machines, and their purchase reduces the burden on women and gives them time to work outside the household. Other durable goods, such as televisions and satellite dishes, are used in leisure time by both men and women. Husbands and wives might have different preferences about the purchase of durable goods. Whereas husbands might prefer to spend household income on entertainment durable goods, wives might prefer to spend household

income on household production time-saving durable goods because women do most of the household production in Brazil. Therefore, investigating the factors that influence the relative allocation of durable goods is important.

Recent government policy in Brazil provides an example of the importance of households purchasing behavior as regards durable goods. In April 17th 2009, the Brazilian government lowered the taxes on the so-called "white appliances" (refrigerators, stove-ovens and washing machines) aiming to reduce their price and to stimulate their sales. The policy was intended to encourage poor households to replace old refrigerators with new, more energy-efficient models and to increase access to washing machines. The tax reduction was combined with an increase in stores' credit lines.

As a result of this policy, the sales of "white appliances" increased, but the sales of the most desired durable goods, such as LCD TVs and personal computers, also increased. Stores have reported that advertising the price reductions on the "white appliances" brings consumers to the store, but once consumers are there they end up buying entertainment durable goods as well (Almeida and Casemiro (2009)). This unintended consequence of the tax reduction policy could be anticipated in the light of a bargaining process between husbands and wives, where wives take their husbands to the store to convince them to buy "white appliances" and couples end up compromising and taking home entertainment durable goods as well. Therefore, investigating the decision process of acquiring production versus entertainment durable goods for the household may help to determine the efficiency of the public policies to boost production durable goods ownership and to forecast its consequences.

In order to investigate whether decisions about durable goods ownership are the outcome of a bargaining process between husbands and wives, the Brazilian household survey *Pesquisa Nacional Por Amostra de Domicílios* (PNAD) is used to construct the proportion of marriageable women to marriageable men by cohort in the household's state of resi-

dence. The marriage market variable is used in this paper as a proxy for female bargaining power. The assumptions behind this measure of bargaining power are that husbands and wives can leave the current marriage and remarry; the marriage market is local; and the more scarce women are, the more likely they are to find a better match. Therefore, as the proportion of marriageable women to marriageable men increases in a cohort and state, women's bargaining power within a marriage would be likely to decrease.

This information is combined with the Brazilian household expenditure survey, *Pesquisa de Orçamento Familiares* (POF). From the POF data set, the dependent variable, the relative allocation of household-production durable goods to entertainment durable goods, was constructed. This relative allocation is measured both as an expenditure ratio and as a quantity ratio. Since the idea in this paper is to test whether wives prefer production durable goods over entertainment durable goods, the dependent variable is a relative measure of household-production to entertainment goods. If women prefer household production durable goods over entertainment durable goods, and the marriage market variable is a good measure of bargaining power, the marriage market variable coefficient should be negative. Alternatively, other variables that capture bargaining power can be used as well, such as indicators of households in which only the husband and households in which only the wife makes expenditure decisions, and indicators of which spouse has more schooling. By using these variables it is possible to test whether the purchase of durable goods is the result of a household common preference or whether men and women have different preferences over expenditures on durable goods.

2. Intrahousehold Allocation

Most of the recent studies in developing countries have refuted the unitary household model, where the household is considered as a single decision maker. The studies have influenced public policies, which are often now based on the premise that households bargain over

outcomes. In the unitary model, all members of the household are assumed to jointly maximize the household welfare function, and income is allocated so that the marginal rate of substitution between any two goods equates to any other pair of goods. The assumption that the household can be treated as a single individual implies that all resources are pooled and then reallocated following a common rule.

In modeling intrahousehold decisions as a bargaining process, heterogeneity in preferences among household members is considered. In the presence of this heterogeneity and spouses' bargaining power, there is no incentive for household members to pool their incomes, but instead resources are allocated to goods that are preferable to each individual. If there are gender preferences towards durable goods, in this alternative model, then these gender preferences should be reflected in different resource allocations depending on the threat point, that is, who faces better marriage market situations. This section continues by following Thomas (1990, 1997), which makes use of a Brazilian consumer expenditure survey that precedes the POF data set used here. If household members have the same preference for some goods, they would behave as a unitary household.

In the individual preference models, where there exists the bargaining within the household, households choose commodity demands, X, to maximize the product of the differences between the utility level of each member, U_m , and the threat point or reservation utility level that each member could achieve outside the household, V_0^m , which is different from the welfare function in the common preferences model. In the bargaining model, households follow a Nash equilibrium solution to the bargaining problem as described below.

$$\max \prod_m [U^m(X, Z) - V_0^m(p, A_m)] \tag{1}$$

where X is a vector of commodity demands including leisure, Z is a vector of home-produced goods, p is a vector of price, and A_m represents situations that an individual

would face if this individual decides to leave the household, which are not easily monetized, such as the marriage market. If there are N goods then X has an NxM dimension, and its element, X_{im}, is the consumption of the i_{th} good by the m_{th} member. This model assumes weak separability between the utility functions. Household welfare is maximized subject to Becker (1965)'s full-time budget constraint and home-production:

$$pX = \sum_m w_m T + I_m \tag{2}$$

$$Z = f(X, t) \tag{3}$$

Where w_m is the price of time for each individual in the household, I_m is the unearned income of each individual, and t is a vector of time of each household member or hired time. Home-produced goods are produced with commodities, X, which includes the production and entertainment durable goods, and time, t. There are substitutes for home-produced goods such as meals away from home or, alternatively, a good can still be home-produced by substituting a household member's time for maid's services. In the last case, maid's services and household member's time are substitute factors in home production and, then, maid's services and production goods are complementary factors in home-production. On the other hand, maid's services could be a cheaper alternative to household-production durable goods and, then, maid's services and production good's services are substitute factors in home-production.

In this case, the demand for good i, X_i, is given by:

$$X_i = \sum_m X_{im} = g(p, I_1, ..., I_M, A_1, ..., A_M) \tag{4}$$

Differently from the common preference model, the bargaining model demand function depends on the situation that each individual will face in the marriage market. Therefore, the hypothesis of common preferences can be tested by checking the significance of the variables that capture the marriage market situation. If spouses have different preferences for time-saving household-production durable goods and entertainment durable goods and both spouses have bargaining power, then the marriage market situation will impact the demand for durable goods, and the household is not a unitary decision maker.

3. Data

This paper combines two Brazilian data sets: a Brazilian household survey, *Pesquisa Nacional Por Amostra de Domicílios* (PNAD), and a Brazilian household expenditure survey, *Pesquisa de Orçamento Familiares* (POF). The PNAD data set offers highly detailed information on labor force participation and some information about hours spent on household work. Furthermore, PNAD is a large survey that covers almost all counties in Brazil. For these reasons, state- and region-level information is generated from the PNAD data set such as number of men and women in each State by cohort, as well by cohort and education, average income in a State, proportion of working women in a given cohort in a State and price of an hour of maid's services for both maids who reside in the household of employment and those who reside in their own household in a State. More importantly, the marriage market variable is constructed as the ratio of women to men by cohorts at the State using the information collected in PNAD.

On the other hand, the POF data set, similar to the US *Consumer Expenditure Survey* (CEX), contains detailed information on expenditure, income and the ownership of durable goods. This data set is collected to construct the *National Consumer Price Index* (INPC). The 2002/2003 survey is the first and only survey that contains information on the population living outside the metropolitan regions and is therefore nationally representative.

The income information can be identified as belonging to the husband or wife. However, information on durable goods expenditure and ownership is not available at the individual level. Therefore, it is not possible to determine individual consumption of these goods and the services they provide. They are also inherently types of household public goods.

The sample is composed of $19,662$ households in which both husband and wife are present. One of the spouses is the head of the family. Families are reported as independent consumption units[2] and both spouses are 20 to 50 years old. In Table 1, the descriptive statistics are reported. The average household per capita monthly income is $R\$418.00$[3]. Most of the households are composed of only one family, but there are a few households with two or three families sharing a house. The average household size is about four members. Husbands are on average 3 years older than wives. In 42% of the households, the wife has at least one more year of schooling than the husband and, in 31% of the households, the husband has at least one more year of schooling than the wife, leaving 27% of households where spouses have the same schooling. The dummies for educational level indicate that there are no strong differences between the distributions of men and women's education.

At the time of interview, adults living in the household are asked if they make expenditure decisions in order to determine their eligibility to participate in the personal expenditure survey. This information does not allow the researcher to identify whether the husband or the wife has the final decision over expenditures, nor whether the husband and the wife disagree about who makes the family decision. However, this information can be used to indicate who does not have any ability to decide about expenditures. For that reason, an indicator of households in which only the wife makes expenditure decisions and an indicator of households in which only the husband makes expenditure decisions are

[2]This information is relevant when there are more than one family living in the same house but these families make independent consumption decisions and do not share income.

[3]This value is about $U\$138.64$ using the average exchange rate for 2002 and 2003.

constructed. In about 82% of the households, both spouses make expenditure decisions. The households in which only the husband makes expenditure decisions are 16% of the total, and in only two percent of the households, only the wife makes expenditure decisions. These numbers indicate that it is common for both spouses to report making decisions about personal expenditure.

The household-production durable goods considered in this paper are goods that save time and help in household production. They include the following: stove-oven, refrigerator, washing machine, microwave, freezer, vacuum cleaner, dishwasher and dryer. The entertainment durable goods include the following: color TV, black and white TV, radio, sound system, VCR, CD player, DVD, computer, and satellite dish. On average, households spend 29% more on household-production durable goods compared to entertainment durable goods. Also, they own on average 31% more household-production durable goods than entertainment durable goods.

As shown in table 2 the three most frequent durable goods are, in order, stove-oven, color TV and refrigerator. Almost all of the 20% richest households[4] in the sample own these three goods. However, only 80% of the 5% poorest households in the sample own a stove-oven; the ownership increases to 83% and 88% for the 10% and 20% poorest households. Only about half of the 20% poorest households own a color TV and a refrigerator. The ownership of color TVS and refrigerators decreases to about 40% among the 5% poorest households. Among the poorest households the fourth, fifth and sixth most owned durable goods are radios, black and white TVS and satellite dishes, respectively. All of them are entertainment durable goods. A washing machine is owned by less than 10% of the 20% poorest households, and all other production goods are owned by less than 4% of them. For

[4]The 5% and 10% poorest households live with less than $U\$1.00$ daily per capita, the 20% poorest households live with less than $U\$2.00$ daily per capita, the 20%, 10% and 5% richest households live with more than $U\$5.00$, $U\$10.00$ and $U\$15.00$ daily per capita, respectively.

the richest households, the fourth most owned durable good is a washing machine, followed by VCRS, computers and microwaves.

In table 3, the percentage of the 20% poorest and richest households that own durable goods conditional on having a stove-oven; stove-oven and color TV; stove-oven, color TV and refrigerator is presented. This table shows the hierarchy of preference for these goods; for example, once the 20% poorest households own a color TV, a radio and a black and white TV are no longer the fourth and fifth most owned durable good, but instead the fourth most owned good is a satellite dish, the fifth is a radio followed by a washing machine in sixth. Regarding the order of preference for durable goods, there is no change for the 20% richest households when ownership is conditional on the ownership of the three most owned goods.

In table 4, it is shown the ratio of the average price of the new durable goods and the average monthly expenditure for each income quintile. This information is useful to compare the cost of production and entertainment durable goods. Overall, entertainment durable goods cost at least as much as production durable goods. Take, for example, a satellite dish, more frequently owned by the 20% poorest households than a washing machine, its costs is 1.26 of the average monthly expenditure of the 20% poorest households, while a washing machine costs 1.49 of the average monthly expenditure of the 20% poorest households . The most expensive goods are PCS, freezers, refrigerators, color TVS, DVD players, sounds systems, washing machines, dish washers and CD players, respectively. The cheapest goods are radios, vacuum cleaners, black and white TVS, dryers, and stove-oven.

Defining the Dependent variable

The dependent variable is constructed from the POF data set. With the aim of exploring the relative preferences of husbands and wives for production and entertainment durable goods, the dependent variable is constructed as the expenditure ratio and the quantity

ratio of household production to entertainment durable goods. The problem in working with durable goods is that purchase and consumption have different meaning and timing for these goods. The purchase of a durable good can be seen as an investment made at a certain point in time, for which the return is the stream of services provided by the durable good during its life-time. Individuals derive utility from the services that these goods provide, and that is the consumption of durable goods.

Moreover, durable goods purchases are infrequent, and the survey follows households' purchases of durable goods for one year. To deal with these difficulties, two different measures of relative allocation are constructed: the expenditure ratio, where the numerator is the aggregated rental value of production durable goods, and the denominator is the aggregated rental value of entertainment durable goods; and the quantity ratio, where the numerator is the quantity of production durable goods owned by the household, and the denominator is the quantity of entertainment durable goods owned by the household. These measures are described below.

Expenditure Ratio of Durable Goods, $share_{p/e}$

A common way to measure the services, i.e. the consumption, of durable goods is to calculate their rental equivalent value. This is usually done by assuming that durable goods follow a depreciation decay model. Here this rental equivalent measure is calculated using this model as well as using the empirical guides provided by Deaton and Zaidi (2002) to aggregate the values of production and entertainment categories. In the depreciation decay model, the rental equivalent value, rv, is estimated as

$$rv = \frac{p}{2T}(r - \pi + \delta) \tag{5}$$

where p is the average price of each durable good, $(r - \pi)$ is the real interest rate[5], δ is the

[5]The real interest rate used is the average of the 'selic' interest rate over 1979 to 2003 discounted by

depreciation rate, and $2T$ is the average service life of these durable goods[6].

There are no official estimates of the depreciation rate in Brazil. Some papers working with durable goods in Brazil[7] argue that there is no reason to believe that the depreciation rate in Brazil is different from the US estimates. Usually, these papers use the US depreciation rate to deal with Brazilian aggregated durable goods data. The Bureau of Economic Analysis (BEA) estimates that the US depreciation rate for household appliances is 16.5% (BEA (2008)).

From the purchases of durable goods, there is information on the price households pay for each durable good. From the stock of capital, it is possible to get the average time since last purchase of each durable good. By combining the information on purchase and stock of durable goods, the nominal depreciation rate is estimated by regressing the log of the average purchase price of each durable good in each State on the average time since last purchase in each State and a constant. The estimated nominal depreciation rate is about 10%[8], resulting in a real depreciation rate of approximately 15.6%, similar to the BEA estimates for the US. This is the number used to calculate the rental equivalent value of the durable goods.

Finally, the rental value is summed over all of the household-production durable goods owned by the household, as well as for the entertainment durable goods owned by the household. Then a ratio of aggregated household-production expenditure to aggregated entertainment expenditure is generated. The relative expenditure on production to entertainment goods, $share_{p/e}$, is distributed as follows:

---

the average inflation rate during the same period. Both data come from IPEA, www.ipeadata.com. The average real interest rate is 5.6%.

[6]Since the average service life is not observed in the sample, it is assumed that the life-time of durable goods is normally distributed. Therefore, the average service life is calculated as two times the time since last purchase.

[7]For example: and Kanczuk and Faria Jr. (2000)

[8]See Table 5 for estimates.

$$(6)\ share_{p/e} = \begin{cases} y = 0: & \text{no production and at least one entertainment good} \\ 0 < y < 1: & \text{more entertainment than production goods} \\ y = 1: & \text{same amount of production and entertainment goods} \\ 1 < y \leq PDG: & \text{more production than entertainment goods} \end{cases}$$

where PDG is the total number of production durable goods owned by the household. A household is assumed to have $share_{p/e} = PDG$ if has at least one production good and no entertainment good. This ratio is equal to zero if a household has no production good but has at least one entertainment good. The distribution of the expenditure ratio is censored at zero.

Quantity Ratio of Durable Goods Indicator, $own_{p/e}$

Each household owns a certain number of production and entertainment goods. There are eight different types of production durable goods and nine types of entertainment durable goods. However, one household may have more than one unity of a specific durable good (e.g. two color TVs), therefore, when calculating the number of production and entertainment durable goods we count all the production and entertainment durable goods. This way, the quantity of production durable goods can be higher than eight and the quantity of entertainment durable goods can be higher than nine. Based on that, the quantity ratio of production to entertainment durable goods is calculated by dividing the number of all production durable goods owned by the household by the number of all entertainment durable goods. This relative allocation of production to entertainment durable good, $own_{p/e}$, is distributed as follows:

$$(7)\quad own_{p/e} = \begin{cases} y = 0: & \text{no production and at least one entertainment good} \\ 0 \leq y < 1: & \text{more entertainment than production goods} \\ y = 1: & \text{same amount of production and entertainment goods} \\ 1 < y \leq PDG: & \text{more production than entertainment goods} \end{cases}$$

As in the $share_{p/e}$, household is assumed to have $own_{p/e} = PDG$ if it has at least one production good and no entertainment good and $own_{p/e} = 0$ if a household owns no production good but owns at least one entertainment good. This variable orders the relative ownership of durable goods from relatively less to relatively more production goods. Notice that a household that owns a refrigerator and a TV is similar to a household who owns all of the production and entertainment durable goods. Notice, as well, that the distribution of the quantity ratio is censored at zero. While this variable is a measure of quantity, the relative expenditure on production to entertainment goods, $share_{p/e}$, is an expenditure measure.

State-Level Variables

To construct the marriage market variable there are important considerations that must be done to guarantee that the variable is capturing the right information; for a complete discussion, see Fossett and Kiecolt (1991). The first decision to be made in constructing this variable is the relevant geographic units that indicate a distinct marriage market. In the data sets used in this paper (POF and PNAD), State is the smallest region that can be identified and therefore these are the geographic units used to construct this variable. Another, relevant decision for constructing the marriage market variable is regarding the age limit and the age differences between husbands and wives. In table 6, the proportion of married women and men by cohort is presented. The biggest increase in the proportion of married women occurs at the 20 to 24 age range, whereas for men the same happens at the

25 to 29 age range. In table 7, the mean and standard deviation of the wife's age in each man's cohort is presented. For most of the men's cohorts, the wife's average age is close to the average age in that cohort, but when the wives' age is lower than the husband's cohort age, that difference is well within the standard deviation, about 5.5 years. for most cohorts, the wives' age is less. However, that difference is well within the standard deviation. Based on that information, it was assumed that husband and wife are in the same age cohort. Alternatively, a version of the marriage market variable is used where it is assumed that wives belong to a younger cohort than husbands.

In the construction of the marriage market variable the assumption that wife and husband can leave the actual marriage and remarry is made. Therefore, the marriage market variable is constructed as the ratio of women to men in a given cohort and State of residence in 2001. This variable is used in the regressions as a measure of women's bargaining power. According to the literature on marriage markets, bargaining power is established at the time of the union, and the more scarce women are, the more likely they are to find a better match if the marriage breaks up, which gives women higher bargaining power. The marriage market variable used here is negatively associated with women's bargaining power. Therefore, if women prefer time-saving in household production durable goods over entertainment durable goods, the marriage market variable should have a negative effect on the dependent variable.

Besides the marriage market variable, there are other State-level variables constructed using PNAD 2001 including the state average income, the proportion of working women by cohort and the average price of maid's services. The price of durable goods and electricity are not available in the PNAD or available at the State-level from another source. Instead, information on the expenditure of durable goods from the POF data set described in section 3. is used to calculate the prices of the services of durable goods, that is, the

average rental value of production and entertainment goods by regions [9]. The average was weighted by the households' ownership of these durable goods in the region. The price of electricity is the average price for 2002 and 2003 from the *Agência Nacional de Enegia Elétrica* (ANEEL). These variables are used in the regressions to capture other factors that differ across States and affect durable goods allocation such as differences in living standards, price differences and women's labor market participation. Because the marriage market variable is a state-level variable and there exist differences among States in Brazil regarding development stage and wealth, the regression must have these control variables to capture these differences. Otherwise, the marriage market variable would be capturing these differences as well.

4. Econometric Model

The specification used to estimate the relative allocation of household-production to entertainment durable goods and to test the impact of bargaining power on this allocation is presented below. This specification is consistent with the previous work that has tested the common preference models using cross-sectional data, such as Lundberg, Pollak, and Wales (1997) where the expenditure ratio of two goods is used to allow for a single equation estimation. It is possible to avoid bias due to measurement errors by using the dependent variable as a ratio instead of estimating two equations. If the bargaining power variables have measurement errors, then their impact will bias the coefficient in the same direction on both equations. By doing the ratio of the dependent variable, this bias will cancel out.

However, the specification is not a conventional demand analysis because the dependent variable is not a measure of purchase (flow) but instead it is proportional to the stock of

[9]Because of the small number of observations on the purchase of certain durable goods in some states, especially the goods that have been recently introduced, the rental value was calculated by regions of Brazil.

durable goods owned by the household. As pointed out by Deaton and Muellbauer (1980), in a cross-section analysis, the stock of durable goods is a better measure than the purchase because the relevant outcome is the choice between the ownership and nonownership of a durable good. The two dependent variables, Y, estimated in this paper are the expenditure ratio of production to entertainment durable goods, $share_{p/e}$, that is, a relative expenditure measure, and the quantity ratio of durable goods , $own_{p/e}$, i. e., a relative quantity measure.

$$
\begin{aligned}
Y = {} & \gamma MM_{cs} + \beta_w DE_w + \beta_h DE_h + \theta_1 D + \theta_2 \overline{I}_s + \theta_3 WW_{cs} \\
& + \alpha_1 P^s_{maid} + \alpha_2 P^s_{prod} + \alpha_3 P^s_{ent} + \alpha_4 P^s_{elect} + \alpha_5 M
\end{aligned} \tag{8}
$$

Where MM_{cs} is the ratio of women to men in a given cohort, c, and State, s, a variable that captures if the marriage market is more favorable to husband or wife. DE_w and DE_h are, respectively, an indicator of households in which only the wife and households in which only the husband reports making decisions about purchases. Because the marriage market variable is constructed for a given cohort in a given State, its variation may be correlated with cohort and State characteristics.

To guarantee the identification of the marriage market effect on the relative allocation of production to entertainment goods, a set of State- and regional-level[10] variables is used as controls. These control variables are the average income in State s, $\overline{I}_s$, the proportion of working women in cohort c and State s, WW_{cs}, the prices of maid's services, P^s_{maid}, prices of production, P^s_{prod}, and entertainment, P^s_{ent}, durable goods and price of electricity, P^s_{elect}.

A set of household variables are used including the per capita income of the household, M, and a set of demographic variables, D, such as the number of people in the household (broken down by gender and age), the number of families in the household, the wife's age and the difference between the husband's and the wife's age, a set of dummy variables

[10]The prices of electricity, production and entertainment goods are not available at State level, but they are at regional level.

for wife's primary education, middle school, high school, and at least some college, and indicators of whether the wife has more schooling, less schooling, or equal amounts of schooling compared to the husband[11]. However, the last two variables can also be considered measures of bargaining power.

Testing The Common Preferences Model Against The Individual Preference Model

To determine whether the decision about durable goods ownership is the outcome of a bargaining process between wife and husband, and whether wives prefer household production durable goods over entertainment durable goods, a hypothesis test of common preferences against individual preferences and bargaining is performed. this test is related to the significance of the marriage market variable.

Testing: Marriage Market

The higher is the ratio of women in a given cohort to men in a given cohort, the lower is the probability of a wife to find a better match outside the marriage, lowering the wife's bargaining power. Therefore, if women prefer household production durable goods over entertainment durable goods and individuals in the household do not share common preferences, the coefficient of the marriage market variable is negative and significant.

$$H_0 : \gamma = 0$$

$$H_a : \gamma < 0$$

[11] We choose to use an indicator of whether the husband has more schooling than the wife instead of a specification that allows for a linear impact of the schooling difference between husbands and wives because little variation exists between husbands' and wives' schooling. The percentage of couples with equal years of schooling is 26 percent, and in 31 percent of the couples, the husband or the wife has one or two more years of schooling than his or her partner. Only in 17 percent of the couples does the husband have three or more years of schooling than the wife.

Under the null hypothesis, H_0, the marriage market variable does not affect the relative allocation of production to entertainment goods and, therefore, the household behaves as a unitary decision-maker. But under the alternative hypothesis, H_a, husbands' and wives' preferences differ, and the marriage market impacts the demand for durable goods. Moreover, if wives prefer production to entertainment goods, the impact of the marriage market variable is negative. This happens because the opportunities outside the family affect the intrahousehold distribution of resources through the threat point.

% endeqnarray*

Price and Income Effects

Because the dependent variable is a ratio, and both the numerator and denominator depend on prices and income, the effects of prices and income are not straightforward to interpret looking only at the coefficients of these prices and income variables. To overcome this problem, the response of the dependent variable to prices and income is derived. In most cases, the coefficients of these prices and income variables are proportional to the difference of the elasticity of production and elasticity of entertainment with respect to the specific variable. In this subsection, the hypothesis used and problems of identification are addressed.

Dependent Variable: Expenditure Ratio, $share_{p/e}$

The effect of the price of maids is easier to interpret if it is assumed that maids and entertainment goods are independent, i.e., the price of maids affects the expenditure on production goods but does not affect the expenditure on entertainment goods. The price elasticity of production goods with respect to price of maids is presented in equation (9), and depends on the coefficient of the price of maids, α_1, the price of maids, P_{maid}, and the relative expenditure of production to entertainment goods, $share_{p/e}$. The coefficient of the

price of maids indicates whether maids and production goods are substitutes, $\alpha_1 > 0$, or complements, $\alpha_1 < 0$. Notice also that the higher is α_1 and P_{maid}, the more elastic is the expenditure on production goods relative to the price of maids. As well, the lower is the expenditure on production goods relative to entertainment goods, the more elastic is the expenditure on production goods relative to the price of maids.

$$\varepsilon_{production,P_{maids}} = \alpha_1 \frac{P_{maid}}{share_{p/e}} \tag{9}$$

The own-price elasticity of production goods, $\varepsilon_{production,P_{prod}}$, and the price elasticity of entertainment goods with respect to price of production goods, $\varepsilon_{entertainment,P_{prod}}$, are not identified in equation (10). The same problem occurs with own-price elasticity of entertainment goods, $\varepsilon_{entertainment,P_{ent}}$, and the price elasticity of production goods with respect to price of entertainment goods, $\varepsilon_{production,P_{ent}}$, as shown in equation (11).

$$[\varepsilon_{production,P_{prod}} - \varepsilon_{entertainment,P_{prod}}] = \alpha_2 \frac{P_{ent}Q_{ent}}{Q_{prod}} - 1 \tag{10}$$

$$[\varepsilon_{production,P_{ent}} - \varepsilon_{entertainment,P_{ent}} \frac{Q_{prod}}{P_{ent}Q_{ent}}] = \alpha_3 \frac{P_{ent}}{P_{prod}} + \frac{Q_{prod}}{P_{ent}Q_{ent}} \tag{11}$$

Equation (12) is derived by differentiating the estimation equation with respect to the price of electricity. The price elasticity of production and entertainment goods with respect the price of electricity is not identified either. However, assuming that both goods are complements to electricity, since their services are only provided if electricity is available, it is possible to determine which good is more elastic depending on the coefficient of price of electricity, α_4.

$$[\varepsilon_{production,P_{elect}} - \varepsilon_{entertainment,P_{elect}}] = \alpha_4 \frac{P_{elect}}{share_{p/e}} \tag{12}$$

Regarding the income elasticity of production and entertainment goods, equation (13), the identification of which good is more income elastic depends on the coefficient of per capita monthly income, α_5, as well as, on assumptions on the inferiority and normality of these goods.

$$[\varepsilon_{production,M} - \varepsilon_{entertainment,M}] = \alpha_5 \frac{M}{share_{p/e}} \tag{13}$$

Dependent Variable: Quantity Ratio, $own_{p/e}$

The following set of equations is the equivalent of the set discussed above when the dependent variable is the quantity ratio of production to entertainment goods, $own_{p/e} = \frac{Q_{prod}}{Q_{ent}}$. The difference between this set of equations and the one in the previous section appears in the effect of the prices of production and entertainment goods, equations (15) and (16). These differences are the results of the absence of prices of these goods in the quantity ratio. For the other equations, everything else is the same except for the $share_{p/e}$ being replaced by $own_{p/e}$, and all the identification problems discussed in the previous section hold.

$$\varepsilon_{production,P_{maids}} = \alpha_1 P_{maid} \frac{Q_{ent}}{Q_{prod}} \tag{14}$$

$$[\varepsilon_{production,P_{prod}} - \varepsilon_{entertainment,P_{prod}}] = \alpha_2 P_{prod} \frac{Q_{ent}}{Q_{prod}} \tag{15}$$

$$[\varepsilon_{production,P_{ent}} - \varepsilon_{entertainment,P_{ent}}] = \alpha_3 P_{ent} \frac{Q_{ent}}{Q_{prod}} \tag{16}$$

$$[\varepsilon_{production,P_{elect}} - \varepsilon_{entertainment,P_{elect}}] = \alpha_4 P_{elect} \frac{Q_{ent}}{Q_{prod}} \tag{17}$$

$$[\varepsilon_{production,M} - \varepsilon_{entertainment,M}] = \alpha_5 M \frac{Q_{ent}}{Q_{prod}} \tag{18}$$

5. Results

The main results are presented in table 8 and table 9, where in table 8 the dependent variable is the expenditure ratio of production to entertainment durable goods, $share_{p/e}$, and the dependent variable in table 9 is the ratio of the quantity of production to entertainment durable goods, $owns_{p/e}$. In column one, the results are the outcome of OLS estimation and, in column two, the Tobit estimation is used to deal with censoring of the dependent variable at zero. The results are quite similar between OLS and Tobit estimation with changes in the significance of few demographic variables. In column three, the husband's and the wife's unearned income variables are replaced by indicators of whether the husband and the wife have unearned income, given that only 15% and 16% of the husbands and wives report some unearned income.

The results from both tables are grouped into bargaining variables, demographic variables such as wife and husband's characteristics, and household variables, followed by the interpretation of the income and price coefficients. The section continues with a discussion of alternative measures of the marriage market variable, presented in table 10. The final subsection presents a discussion of the different impacts of the bargaining power variables across income groups, presented in table 11 and 12.

Bargaining Power Variables

In both tables 8 and 9, the marriage market variable indicates that the allocation of production and entertainment goods is an outcome of a bargaining process between husband and wife, that is, this variable is significant at 1%[12]. In a common preference decision pro-

[12]The level of significancy is 0.001 for a two tale test and 0.002 for a one tale test.

cess, this variable would not be significant because it does not affect preferences, but under a bargaining process this variable is significant because it affects the allocation through the threat point[13]. Moreover, the negative impact of the marriage market variable indicates that cohorts and States where an excess of women exists, lowering a wife's bargaining power, have lower expenditure on production relative to entertainment durable goods. This result confirms that wives prefer production to entertainment goods and husbands prefer entertainment to production goods.

The indicators of households in which only the wife and only the husband makes expenditure decisions indicate that these households have higher allocation of production relative to entertainment goods, in expenditure, table 8, and quantity, table 9, than households in which both spouses report making expenditure decisions. That is, the coefficients of these two indicators are positively significant in tables 8 and 9. These results are consistent with the presence of a bargaining process between husbands and wives over production and entertainment goods in households in which husbands and wives make expenditure decisions. Under a bargaining process the outcome may not to be Pareto efficient, leading to a undersupply of public goods and services. However, when only one spouse makes the expenditure decision, an efficient allocation rises once households behave as an unitary decision model and in unitary household models always result in an efficient allocation by assumption.

Even though, in table 8, the coefficient of the indicator of households in which only

[13]Even after controlling for State average income and proportion of working women in a given cohort and State, someone may still wonder if the marriage market variable is capturing the bargaining power of wives or some other state effect. In reality, the correlation of the marriage market and the state income is around -0.12 and the correlation of the marriage market and the proportion of working women was around 0.07. Moreover, the test of variance inflation was rejected for all variables in the regression. These results indicate that the marriage market variable is likely capturing females' bargaining power for a given cohort in a given State.

husband makes expenditure decisions, β_h, is higher than the coefficient of the indicator of households in which only wife makes expenditure decisions, β_w, the hypothesis of equality of the coefficients of these two indicators is not rejected when the dependent variable is the relative expenditure, table 8. However, the hypothesis of equality of β_h and β_w is rejected at 10% when the dependent variable is the ratio of quantity of production to entertainment durable goods and Tobit estimation is considered (second column of table 9). In this case, households in which only the wife makes expenditure decisions have a higher number of production to entertainment goods than households in which only the husband makes expenditure decisions, indicating that the wife prefers production goods.

In summary, households in which only the husband or only the wife makes expenditure decisions have higher allocation of production to entertainment goods than households in which both spouses make expenditure decisions, as shown by the coefficients on these two indicators and the F-statistic on the bottom of table 9. Moreover, households in which only the husbands make expenditure decisions have the same relative expenditure as households in which only the wives make expenditure decisions, as shown by the F-statistic in the bottom of table 8. The non-rejection of the hypothesis of equality of these two coefficients in the relative expenditure, but the rejection of the same hypothesis in the relative quantity suggest that households in which only the wife makes decisions consume cheaper production goods.

Compared to households in which the husband and the wife have the same level of education, households in which the wife has more schooling than the husband have higher allocation to household-production goods than to entertainment goods. While this impact is highly significant for relative expenditure, table 8, it is only significant at 10% for the relative quantity of production and entertainment goods, table 9. Indeed, households in which the wife has at least one more year of schooling than the husband spend 0.13 more on production goods relative to entertainment goods. On the other hand, households in

which the husband has more schooling than the wife have the same allocation of production to entertainment goods compared to households in which spouses have the same education level. Furthermore, these results are also evidence that production goods are preferred by wives and, especially, by those wives that could benefit the most from their ownership, i.e., the ones with higher relative human capital.

The results of the tests provided by the marriage market variable, the indicators of households in which only the husband or only the wife makes expenditure decisions and the differences in husbands' and wives' schooling reject the common preference model in favor of a bargaining model. Moreover, there is evidence that wives prefer household-production durable goods and husbands prefer entertainment durable goods.

Demographic Variables

Wife's age and the difference between the husband's and the wife's age do not affect relative expenditure, table 8, but they affect the relative quantity of production to entertainment goods, table 9, lowering the quantity of production to entertainment goods. That is, as the wife gets older the number of entertainment goods relative to the number of production goods increases by 0.35%; and for each additional year in the husband's age keeping the wife's age constant, the number of entertainment goods increases 0.2% more than the number of production goods. The fact that age and age difference do not affect the relative expenditure but affect the relative quantity is evidence that this increase in quantity of entertainment goods is due to the consumption of cheaper entertainment goods or more expensive production goods. Therefore the quantity of entertainment goods is lager, but the rental value is the same.

Households where the wife has middle school or more have higher expenditure on entertainment relative to production durable goods compared to households where the wife has no education, table 8. Households where the wife has some education, i.e. primary

and middle school, have more production relative to entertainment goods compared to those households where the wife has no education, table 9. Except for households where the wife has high school, the relative number of production to entertainment goods is not significantly different from those households where the wife has no schooling. Moreover, households where the wife has college or more have a lower ratio of production to entertainment goods than households where the wife has no schooling. These results are consistent with a story that as the opportunity cost of the wives staying at home increases, they prefer to hire someone to replace their time in home-production, lowering their needs for production durable goods. This finding may also be consistent with an income effect story, once education is a measure of permanent income. As wives permanent income increases, there is a stronger income effects for entertainment goods.

The presence of children three years old and younger increases the allocation of production to entertainment goods, as showed by the coefficients of number of daughter and sons three years and younger on table 8 and by the coefficient of the number of sons three years and younger on table 9. The presence of daughters four to six and thirteen to sixteen years old decreases the allocation of household-production to entertainment durable goods. The presence of sons seven to twelve years old decreases the relative quantity of production to entertainment goods, table 9. The presence of women 61 to 70 years old decreases the relative quantity of production to entertainment goods, table 9. This result is also consistent with a story of wives replacing their time in home-production with somebody else's time instead of using production durable goods, in this case wives' time is substituted by other women living in the household such as daughters or relatives. This kind of substitution occurs when a maid's time is not feasible or not seeing as perfect substitute to a family member's time.

Prices and Income Variables

All the prices and income variables have a significant at 1% or 5% impact on the relative allocation of production to entertainment durable goods in both tables 8 and 9. The coefficient of the price of maids is positively significant, around 0.4. Based on equations (9) and (14), it is concluded that production goods and maids are substitute factors in household production. For the country as a whole, the estimated cross-price elasticity of production goods and maids' services range from 0.5 to 0.64 depending on whether maids reside in the household of employment or not.

The price of electricity has a positively significant effect, around four, on the relative allocation of production to entertainment goods. Interpreting this result in the lights of equation (12) and (17) and the complementarity of the durable goods with respect to electricity, implies that entertainment goods are more sensitive to changes in the price of electricity than production goods.

The effect of the price of production goods is positively significant, around 0.55 on tables 8 and 9. Plugging the values presented on the descriptive statistic table on the right hand side of equation (10), it is found that $\varepsilon_{production,P_{prod}} - \varepsilon_{entertainment,P_{prod}} = 2.9 > 0$. Assuming that production goods are neither Giffen nor Veblen goods, then own-price elasticity is negative. This implies that the cross-price elasticity of entertainment goods with respect to the price of production goods is negative, and therefore production and entertainment goods are complements. The same conclusions hold true if the results are analyzed using equation (15).

The effect of the price of entertainment goods is negatively significant, around 0.2 in tables 8 and 9. Plugging the values presented in the descriptive statistic table into equation (11), it is found that $\varepsilon_{production,P_{ent}} - 0.15\varepsilon_{entertainment,P_{ent}} = 0.55 > 0$. For the complementarity of the production and entertainment goods to hold, the entertainment goods must be more sensitive to changes in price of entertainment goods than production

goods. The same conclusions hold true if the results are analyzed using equation (16). For the income effect, equations (13) and (18), together with the negatively significant monthly per capita income coefficient, around 0.09 on table 8 and 0.04 on table 9, and the assumption that production and entertainment goods are not inferior goods, imply that entertainment goods are more sensitive to changes in income than production goods.

Alternative Measures of Marriage Market

In this section, the robustness of the marriage market results to the assumption that both spouses belong to the same cohort and to the assumption that educational level does not matter are discussed. To avoid small sample problems, the education groups used are having less than high school (less education) and having at least some high school (more education). There are still some State and cohort cells where the number of observations is very small for those who have more education, causing a higher variation in the range of the marriage market variable. While the main specification of the marriage market varies from 0.65 to 1.35, the marriage market by education varies from 0.5 to 3.2.

The impact of the marriage market variable assuming potential wives are from a younger cohort than husbands is smaller than the impact of marriage market variable defined as husband and wife in the same cohort. The result is still negative but significant only when the dependent variable is the quantity ratio, column five on table 10. The marriage market variable has a negatively significant effect assuming that husband and wife have the same educational level and the husband's education is used to construct the marriage market variable. The results flip to positive and insignificant when wife's education is used to construct the marriage market variable. When the results are significant, they indicate that the wife prefers household-production durable goods relative to entertainment durable goods.

Results By Income Groups.

Table 11 shows the results by income group when the dependent variable is the expenditure ratio of production to entertainment durable goods, $share_{p/e}$, while table 12 shows the results by income group when the dependent variable is the ratio of the quantity of production to entertainment durable goods, $owns_{p/e}$. When the dependent variable is the quantity ratio, the marriage market variable is negative and significant at 1% to all income groups, implying that independent of the income group the allocation of production to entertainment goods is a result of a bargaining process between husbands and wives, where wives prefer production durable goods over entertainment durable goods. Among all income groups, the middle income group has the highest impact of the marriage market variable, whereas the low income group has the lowest impact of the marriage market variable.

When the dependent variable is the expenditure ratio of production to entertainment durable goods, the marriage market variable is negative and significant only for the low and high income groups. While the marriage market is significant at 1% for the high income group, it is significant at 10% for the low income group. However, the result still implies that the allocation of production to entertainment goods is a result of a bargaining process between husbands and wives and wives prefer production durable goods over entertainment durable goods, it indicates that in expenditure share this trade-off between production to entertainment goods matters only for the low and high income group.

The indicator of households in which only the husband makes expenditure decisions shows that these households have higher allocation of production relative to entertainment goods, in expenditure, table 11, and quantity for the lower middle and high income groups, table 12, than households in which both spouses report making expenditure decisions. That is, the coefficient of this indicator is positively significant in table 11 and for lower

middle and high income groups in table 12. The indicator of households in which only the wife makes expenditure decisions implies that these households have higher allocation of production relative to entertainment goods only in quantity for the lower middle and middle income groups, table 12, than households in which both spouses report making expenditure decisions. That is, the coefficient of this indicator is positively significant for lower middle and middle income groups in table 12.

Even though, in table 11, the coefficient of the indicator of households in which only the husband makes expenditure decisions, β_h, is higher than the coefficient of the indicator of households in which only wife makes expenditure decisions, β_w, the hypothesis of equality of the coefficients of these two indicators is not rejected when the dependent variable is the relative expenditure, table 11. In the same way, in table 12, the coefficient of the indicator of households in which only the wife makes expenditure decisions, β_w, is higher than the coefficient of the indicator of households in which only the husband makes expenditure decisions, β_h, the hypothesis of equality of the coefficients of these two indicators is not rejected when the dependent variable is the quantity ratio, (table 12).

For each additional year the husband is older than his wife, the expenditure on production durable goods relative to the expenditure on entertainment durable goods increases for the low income group and decreases for the higher middle and high income group, as shown by the coefficient of husbands and wives age on table 11. For the high income group, the coefficient of husbands and wives age on table 12 shows that for each year that the husband is older than his wife, the quantity of production durable goods relative to the quantity of entertainment durable goods decreases.

In upper middle income households, if the husband has more schooling than the wife or the wife has more schooling than the husband, the household spends more on production than on entertainment durable goods. However, in high income groups, households in which the wife has more schooling than the husband spend more on production durable

goods than households in which the husband and the wife have the same schooling and than households in which the husband has more schooling than the wife. This conclusion is based on the F-statistic at the bottom of table 11, which rejects the hypothesis that households in which the husbands have more schooling than wives have the same spending behavior as households in which the wives have more schooling than the husbands.

When the dependent variable is the quantity ratio of production to entertainment durable goods, table 12, the test of equality of the indicators of households in which the husband has more schooling than the wife and the wife has more schooling than the husband rejects the equality of these coefficients, except for the middle income group. In low income households, if the wife has more schooling than the husband the quantity ratio of production to entertainment durable goods decreases. In lower middle income households, if the husband has more schooling than the wife the quantity ratio of production to entertainment durable goods increases. In high income households, if the husband has more schooling than the wife the quantity ratio of production to entertainment durable goods decreases.

Therefore, as the marriage market improves for wives, the relative quantity of production to entertainment goods increases, however, the expenditure share of production to entertainment goods increases only for the low and high income groups. This implies that increasing wives' bargaining power increases the quantity of cheaper production goods, except for low and high income households. Moreover, low income households in which wives have more schooling than the husband spend on production goods as much as households in which both spouses have the same schooling, but have less quantity of production goods. High income households in which wives have more schooling than the husband spend more on production goods than households in which both spouses have the same schooling but have equal quantity of production goods. This, also, implies that increasing wives schooling relative to their husbands increases the relative ownership of more expensive production

goods for low and high income households.

6. Conclusion

This paper intends to determine whether decisions about durable goods allocation are the outcome of a bargaining process between husbands and wives. In order to do that, several measures of female bargaining power commonly used in the intrahousehold allocation literature are used. These variables are a measure of the marriage market, the sex ratio, indicators of households in which only the husband and households in which only the wife makes expenditure decisions, and indicators of which spouse has more schooling. The idea is that if decisions about the allocation of durable goods are the result of a common preference of husbands and wives over durable goods allocation, then the relative allocation of household-production and entertainment durable goods will not be correlated with any of these variables.

The results indicate that the decision about durable goods ownership is the outcome of a bargaining process between husband and wife. The test on the coefficients of the marriage market variable and the indicators of households in which only the wife and households in which only the husband makes expenditure decisions corroborate the expectations about wives' preferences for production goods.

These results increase the understanding of consumer durable purchasing behavior in Brazil, identifying the reasons for the lack of household-production durable goods in Brazilian households and for the priority given to entertainment durable goods. Given the existence of a bargaining process between husbands and wives over decisions about durable goods ownership, wives' relative preferences for production durable goods, husbands' relative preferences for entertainment durable goods, and husbands' higher bargaining power, it is natural that there exist missing production durable goods in Brazilian households. Under these circumstances, a policy to stimulate the sales of "white appliances" combined

with more stores' credit lines available for durable goods purchases also stimulates the purchase of entertainment goods, as was observed in 2009 in Brazil.

Increasing women's bargaining power will lead to reducing the gap between production and entertainment goods ownership in Brazilian households. Demographic trends will tend to improve women's bargaining power, but at a slow pace (Oliveira, Albuquerque, and Lins (2004)). Because men marry younger women, as population growth slows, there are fewer women in the younger cohort, increasing women's bargaining power. Improvements in women's level of education will be the most important channel to increase the ownership of household-production durable goods, especially the more expensive ones. Moreover, as the Brazilian population keeps ageing, there will be the need to increase female labor force participation to financially support the growth of the dependency ratio, as well as the need to increase the time spent on elderly care. Because women do most of the household work, there will be the need to increase the ownership of household-production durable goods to free up women's time.

References

Almeida, C., and L. Casemiro (2009): "Queda do IPI faz crescer também venda de TV," newspaper.

BEA (2008): "BEA Rates of Depreciation, Service Lives, Declining-Balance Rates, and Hulten-Wykoff categories," Discussion paper, Bureau of Economic Analysis (BEA).

Becker, G. S. (1965): "A Theory of the Allocation of Time," *The Economic Journal*, 75(299), 493–517.

Cavalcanti, T. V., and J. Tavares (2008): "Assessing the "Engines of Liberation": Home Appliances and Female Labor Force Participation," *The Review of Economics and Statistics*, 90(1), 81–88.

Deaton, A., and J. Muellbauer (1980): *Economics and Consumer Behavior*. Cambridge University Press.

Deaton, A., and S. Zaidi (2002): "Guidelines for Constructing Consumption Aggreagtes for Welfare Analysis," Living Standards Measurement Study Working Paper 135, The World Bank.

Fossett, M. A., and K. J. Kiecolt (1991): "A Methodological Review of the Sex Ratio: Alternatives for Comparative Research," *Journal of Marriage and the Family*, 53(4), 941–957.

Greenwood, J., A. Seshadri, and M. Yorukoglu (2005): "Engines of Liberation," *Review of Economic Studies*, 72(1), 109–133.

Jones, L. E., R. E. Manuelli, and E. R. McGrattan (2003): "Why Are Married Women Working So Much?," Research Department Staff Report 317, Federal Reserve Bank of Minneapolis.

Kanczuk, F., and F. Faria Jr. (2000): "Ciclos Reais para a Indústria Brasileira?," *Estudos Econômicos (IPE/USP)*, 30(3), 335–350.

Lundberg, S. J., R. A. Pollak, and T. J. Wales (1997): "Do Husbands and Wives Pool Their Resources? Evidence from the United Kingdom Child Benefit," *The Journal of Human Resources*, 32(3), 463–480.

Oliveira, J. d. C., F. R. P. d. C. e. Albuquerque, and I. B. Lins (2004): "Projeção da população do Brasil por sexo e idade para o período 1980 a 2050: revisão 2004.," Discussion paper, Instituto Brasileiro de Geografia e Estatística (IBGE).

Oliveira, R. D. (2000): "For a fair sharing of time - Brazil households," UNESCO Courier.

Thomas, D. (1990): "Intra-Household Resouce Allocation: An Inferential Approach," *The Journal of Human Resources*, 25(4), 635–664.

——— (1997): *Income, Expenditure, and Health Outcomes: Evidence on Intrahousehold Resource Allocation,*chap. Intrahousehold allocation in Developing Countries: Models, Methods, and Policy, pp. 142–164. Johns Hopkins University Press.

7. Figures and Tables

Table 1: Descriptive Statistics, Brazil, 2002-2003.

Variable	Mean	Std. Dev.
Dependent Variables		
Relative Ownership Indicator	1.31	(1.42)
Difference in Ownership	-0.26	(1.57)
Rental Value Share	1.29	(2.05)
Bargaining Power Variables		
Marriage Market, same cohort	1.07	(0.10)
Marriage Market, wife in younger cohort	1.21	(0.13)
Wife's Unearned Income (in 1000)	0.29	(4.38)
Husband's Unearned Income (in 1000)	0.66	(6.33)
Transfers wife receives from other HH (in 1000)	0.16	(3.93)
Transfers Husband receive from other HH (in 1000)	0.12	(2.93)
Both make expenditure decisions	0.82	(0.39)
Only wife makes expenditure decisions	0.02	(0.14)
Only husband makes expenditure decisions	0.16	(0.37)
Wife has more education	0.42	(0.49)
Husband has more education	0.31	(0.46)
Wife's Age	33.45	(7.59)
Wife has no schooling	0.07	(0.26)
Wife has primary education	0.32	(0.47)
Wife has secondary education	0.29	(0.45)
Wife has high school	0.25	(0.43)
Wife has college or more	0.07	(0.26)
Husband's Age	36.53	(7.55)
Husband has no schooling	0.10	(0.31)
Husband has primary education	0.35	(0.48)
Husband has secondary education	0.27	(0.44)
Husband has high school	0.21	(0.41)
Husband has college or more	0.07	(0.25)
Household Variables		
Number of Families in HH	1.00	(0.06)
Number of People in Household	4.23	(1.56)
Per capita total monthly income	418.01	(781.53)
Average State Income (in 1000)	0.89	(0.28)
Prices		
Rental Value of Entertainment Durable Goods	9.31	(1.02)
Rental Value of Production Durable Goods	4.59	(0.42)
Price of a hour of maid's services	0.93	(0.25)
Price of electricity (kwatts)	0.21	(0.02)
Number of Observations	19662	

Source: POF 2002-2003 and PNAD 2001.

Table 2: Durable Goods Ownership by Income, Brazil, 2002-2003.

	5 % poorest	10 % poorest	20 % poorest	20 % richest	10 % richest	5 % richest
Production:						
has stove-oven	79.67	83.53	88.00	99.54	99.49	99.19
has refrigerator	38.41	41.69	51.55	97.71	98.02	98.37
has freezer	2.54	2.85	3.38	36.71	43.98	51.27
has washing machine	6.40	6.20	8.77	67.39	73.72	78.33
has dish washer	0.20	0.10	0.10	8.16	12.66	17.80
has vacuum cleaner	0.51	0.31	0.18	22.27	28.93	35.91
has dryer	0.20	0.20	0.31	11.34	14.69	16.89
has microwave	0.30	0.25	0.41	37.77	48.60	59.51
Entertainment:						
has color TV	41.97	47.43	54.88	97.18	98.32	98.78
has black and white TV	19.31	19.78	17.59	4.12	4.02	4.27
has radio	20.02	20.54	19.90	33.81	37.98	43.03
has sound system	1.42	1.32	1.50	7.24	9.20	10.17
has computer	0.10	0.10	0.13	37.77	51.55	61.14
has VCR	1.63	1.53	2.95	62.66	70.77	76.09
has satellite dish	11.08	11.69	13.88	29.92	29.44	29.09
has CD	1.63	1.53	1.58	10.42	12.00	13.12
has DVD	0.00	0.05	0.05	9.89	15.81	23.09
Housekeeper:						
has maid	0.41	0.31	0.53	30.22	41.84	52.29
has cleaning service	0.20	0.20	0.15	11.29	15.00	18.01
has laundress	0.41	0.31	0.25	1.91	1.37	1.02
has someone to do iron clothes	0.00	0.00	0.00	2.21	3.10	3.46
has cook	0.00	0.05	0.05	0.31	0.56	0.81

The 5% and 10% poorest live with less than $1/day/capita. The 20% poorest live with less than $2/day/capita.
The 20% richest live with more than $5/day/capita. The 10% richest live with more than $10/day/capita.
The 5% richest live with more than $15/day/capita.

Table 3: Durable Goods Ownership Conditional on The Ownership of Others,
Brazil, 2002-2003.

Conditional on having:	Stove-Oven		Stove-Oven and color TV		Stove-Oven, color TV and Refrigerator	
	20% poorest	20% richest	20% poorest	20% richest	20% poorest	20% richest
Production:						
has refrigerator	57.13	97.85	74.04	98.27		
has freezer	3.76	36.80	5.13	37.32	3.37	36.67
has washing machine	9.94	67.54	13.72	68.11	16.92	68.35
has dish washer	0.12	8.20	0.14	8.43	0.13	8.49
has vacuum cleaner	0.20	22.37	0.34	22.83	0.45	23.08
has dryer	0.35	11.39	0.53	11.52	0.71	11.67
has microwave	0.46	37.82	0.72	38.40	0.84	38.76
Entertainment						
has color TV	60.20	97.29				
has black and white TV	17.04	4.14	3.36	3.94	3.50	3.93
has radio	18.20	33.81	16.12	34.09	16.85	34.24
has sound system	1.68	7.28	2.11	7.32	2.27	7.35
has computer	0.14	37.82	0.19	38.53	0.26	38.89
has VCR	3.35	62.77	5.47	64.20	6.80	64.80
has satellite dish	15.22	29.98	23.51	30.55	24.56	30.26
has CD	1.70	10.47	2.40	10.60	2.72	10.74
has DVD	0.06	9.88	0.10	10.08	0.06	10.10
Housekeeper						
has maid	0.55	30.29	0.58	30.68	0.65	30.85
has cleaning service	0.17	11.24	0.19	11.44	0.26	11.54
has laundress	0.29	1.92	0.29	1.94	0.26	1.92
has someone to do iron clothes	0.00	2.20	0.00	2.23	0.00	2.24
has cook	0.06	0.31	0.10	0.31	0.06	0.29

The 5% and 10% poorest live with less than $1/day/capita. The 20% poorest live with less than $2/day/capita.
The 20% richest live with more than $5/day/capita. The 10% richest live with more than $10/day/capita.
The 5% richest live with more than $15/day/capita.

Table 4: Durable Goods Costs as Forgone Households Monthly Expenditures, Brazil 2002-2003.

	lower	lower-Middle	middle	upper-middle	higher
Microwave	1.38	0.75	0.49	0.30	0.10
Dryer	0.91	0.54	0.37	0.23	0.08
Washing Machine	1.49	0.78	0.50	0.31	0.10
Vacuum Cleaner	0.52	0.29	0.20	0.12	0.04
Dish Washer	1.47	0.88	0.61	0.37	0.12
Refrigerator	2.56	1.39	0.91	0.55	0.18
Freezer	2.82	1.45	0.91	0.55	0.17
Stoven/Oven	0.96	0.54	0.37	0.23	0.07
TV	2.05	1.13	0.74	0.46	0.15
Black-White TV	0.54	0.29	0.18	0.12	0.04
Sound System	1.64	0.89	0.58	0.35	0.11
Radio	0.23	0.14	0.10	0.06	0.02
PC	7.09	3.76	2.41	1.46	0.47
VCR	1.30	0.70	0.46	0.28	0.09
Satellite	1.26	0.68	0.44	0.27	0.09
CD player	1.44	0.77	0.49	0.30	0.10
DVD player	1.84	1.00	0.65	0.40	0.13

Source: POF 2002-2003

Table 5: Estimation of the Depreciation Rate for Consumer Durables, Brazil, 2002-2003 (Dependent Variable: Log of Average Price Per State).

	(1)	(2)	(3)
Average Age	-0.1087**	-0.1007**	-0.1165**
	(0.0065)	(0.0063)	(0.0066)
Bought Used	-1.1667**	-1.1547**	-1.1547**
	(0.0036)	(0.0036)	(0.0037)
Unknown (Used or New)	-0.7191	-0.8446*	-1.3161**
	(0.4124)	(0.3593)	(0.4268)
Constant	5.9182**	5.8989**	5.8989**
	(0.0016)	(0.0016)	(0.0017)
Observations	1508	1519	1506
R-squared	0.3192	0.315	0.2997

Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.
Specification (1) includes the following: refrigerator, freezer, oven, washing machine, dryer, microwave, dishwasher, vacuum cleaner, TV, radio,sound system, VCR, CD player, DVD player, computer and satellite dish.
Specification (2) includes the durable goods in (1) plus new goods such as '*taquinho elétrico*'.
Specification (3) includes the durable goods in (2) and more detailed categories of entertainment goods, such as: type of radio, sound system, DVD recorder.

Table 6: Proportion of Married People, Brazil, 2001.

	Men		Women	
cohort	Mean	Std. Dev.	Mean	Std. Dev.
15 to 19	0.03	(0.16)	0.14	(0.34)
20 to 24	0.26	(0.44)	0.42	(0.49)
25 to 29	0.56	(0.50)	0.63	(0.48)
30 to 34	0.73	(0.45)	0.72	(0.45)
35 to 39	0.79	(0.41)	0.74	(0.44)
40 to 44	0.82	(0.38)	0.72	(0.45)
45 to 49	0.84	(0.37)	0.69	(0.46)
50 to 54	0.85	(0.36)	0.66	(0.47)
55 to 59	0.84	(0.37)	0.61	(0.49)
60 or more	0.78	(0.42)	0.40	(0.49)

Source: PNAD 2001.

Table 7: Wife's Average Age by Husband's Cohort, Brazil, 2001.

Husband's Cohort	Wife's Age	
	Mean	Std. Dev.
15 to 19	19.41	(5.41)
20 to 24	22.14	(4.96)
25 to 29	25.77	(5.50)
30 to 34	29.72	(5.62)
35 to 39	33.86	(5.91)
40 to 44	38.08	(6.06)
45 to 49	42.68	(6.50)

Source: PNAD 2001.

Table 8: Main Results. Dependent Variable: Share of Rental Value of Production to Entertainment Durable Goods, $share_{p/e}$, Brazil, 2002-2003

	OLS	Tobit
Bargaining Power Variables		
Marriage Market	-0.5088	-0.5066
	(0.1495)***	(0.1520)***
Only wife makes decision over expenditures	0.1839	0.1893
	(0.1010)*	(0.1027)*
Only husband makes decision over expenditures	0.3081	0.2959
	(0.0410)***	(0.0417)***
Wife's Age	-0.0038	-0.0036
	(0.0026)	(0.0026)
Husband's age - wife's age	-0.0026	-0.0022
	(0.0030)	(0.0030)
Wife has more schooling	0.1302	0.1321
	(0.0374)***	(0.0380)***
Husband has more schooling	-0.0262	-0.0034
	(0.0389)	(0.0396)
Wife has primary education	-0.0547	0.0035
	(0.0614)	(0.0628)
Wife has secondary education	-0.2086	-0.1183
	(0.0644)***	(0.0659)*
Wife has high school	-0.3326	-0.2324
	(0.0667)***	(0.0681)***
Wife has college	-0.6134	-0.5166
	(0.0862)***	(0.0878)***
Household Variables		
Number of women 0-3 years old in HH	0.0785	0.0525
	(0.0340)**	(0.0347)
Number of women 4-6 years old in HH	-0.0823	-0.0945
	(0.0368)**	(0.0375)**
Number of women 7-12 years old in HH	0.0065	-0.0005
	(0.0253)	(0.0258)
Number of women 13-16 years old in HH	-0.0345	-0.0442
	(0.0341)	(0.0348)
Number of women 17-19 years old in HH	-0.0757	-0.0758
	(0.0496)	(0.0505)
Number of women 51-60 years old in HH	-0.0234	-0.0100
	(0.1903)	(0.1933)

Continued on next page

Table 8 – continued from previous page

	OLS	Tobit
Number of women 61-70 years old in HH	-0.1990	-0.2135
	(0.1682)	(0.1713)
Number of women older than 70 years in HH	0.0310	0.0320
	(0.1416)	(0.1441)
Number of men 0-3 years old in HH	0.1703	0.1536
	(0.0335)***	(0.0342)***
Number of men 4-6 years old in HH	0.0284	0.0146
	(0.0360)	(0.0368)
Number of men 7-12 years old in HH	-0.0011	-0.0071
	(0.0247)	(0.0252)
Number of men 13-16 years old in HH	-0.0241	-0.0299
	(0.0327)	(0.0333)
Number of men 17-19 years old in HH	-0.0101	-0.0097
	(0.0444)	(0.0452)
Number of men 51-60 years old in HH	-0.1939	-0.2190
	(0.3045)	(0.3107)
Number of men 61-70 years old in HH	-0.1770	-0.1542
	(0.2477)	(0.2513)
Number of men older than 70 years in HH	-0.1133	-0.1317
	(0.1979)	(0.2017)
Number of Families in HH	-0.1618	-0.2265
	(0.2386)	(0.2443)
Per Capita Income	-0.0921	-0.0940
	(0.0217)***	(0.0220)***
State Level Variables		
Proportion of Working Women by State and Cohort	0.1200	0.0854
	(0.2094)	(0.2132)
Average State Income (in 1000)	-0.1255	-0.1511
	(0.1318)	(0.1340)
Price of maids	0.3701	0.4174
	(0.1464)**	(0.1489)***
Region Level Variables		
Price of production goods	0.5869	0.6296
	(0.0842)***	(0.0856)***
price of entertainment goods	-0.1535	-0.1712
	(0.0407)***	(0.0413)***
price of electricity (in kwatts)	3.17	3.81
	(1.6187)*	(1.6455)**
Constant	0.0308	-0.1672
	(0.5353)	(0.5454)
Observations	19662	19662
R-squared	0.0251	

Continued on next page

Table 8 – continued from previous page

	OLS	Tobit
Testing $\beta_w = \beta_h$		
F-statistic	1.36	0.97
Probability	0.2434	0.3244
Education Differences		
F-statistic	18.55	13.47
Probability	0.000	0.0002

Standard errors in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 9: Main Results. Dependent Variable: Ratio of Production to Entertainment Durable Goods, $own_{p/e}$, Brazil, 2002-2003.

	OLS	Tobit
Bargaining Power Variables		
Marriage Market	-0.4158	-0.4156
	(0.0454)***	(0.0462)***
Only wife makes decision over expenditures	0.0964	0.0976
	(0.0307)***	(0.0312)***
Only husband makes decision over expenditures	0.0446	0.0417
	(0.0124)***	(0.0127)***
Wife's Age	-0.0035	-0.0035
	(0.0008)***	(0.0008)***
Husband's age - wife's age	-0.0021	-0.0020
	(0.0009)**	(0.0009)**
Wife has more schooling	0.0202	0.0207
	(0.0113)*	(0.0116)*
Husband has more schooling	0.0033	0.0085
	(0.0118)	(0.0120)
Wife has primary education	0.0371	0.0507
	(0.0186)**	(0.0191)***
Wife has secondary education	0.0769	0.0976
	(0.0195)***	(0.0200)***
Wife has high school	-0.0010	0.0217
	(0.0202)	(0.0207)
Wife has college	-0.1674	-0.1454
	(0.0261)***	(0.0267)***
Household Variables		
Number of women 0-3 years old in HH	0.0046	-0.0013
	(0.0103)	(0.0105)
Number of women 4-6 years old in HH	-0.0236	-0.0263
	(0.0111)**	(0.0114)**
Number of women 7-12 years old in HH	-0.0116	-0.0133
	(0.0077)	(0.0078)*
Number of women 13-16 years old in HH	-0.0205	-0.0227
	(0.0104)**	(0.0106)**
Number of women 17-19 years old in HH	-0.0113	-0.0114
	(0.0150)	(0.0153)
Number of women 51-60 years old in HH	-0.0110	-0.0081
	(0.0577)	(0.0588)
Number of women 61-70 years old in HH	-0.1189	-0.1221
	(0.0510)**	(0.0520)**

Continued on next page

Table 9 – continued from previous page

	OLS	Tobit
Number of women older than 70 years in HH	0.0086	0.0088
	(0.0430)	(0.0438)
Number of men 0-3 years old in HH	0.0244	0.0205
	(0.0102)**	(0.0104)**
Number of men 4-6 years old in HH	-0.0101	-0.0133
	(0.0109)	(0.0112)
Number of men 7-12 years old in HH	-0.0150	-0.0164
	(0.0075)**	(0.0076)**
Number of men 13-16 years old in HH	-0.0158	-0.0171
	(0.0099)	(0.0101)*
Number of men 17-19 years old in HH	-0.0107	-0.0106
	(0.0135)	(0.0137)
Number of men 51-60 years old in HH	-0.0661	-0.0718
	(0.0924)	(0.0943)
Number of men 61-70 years old in HH	0.0349	0.0399
	(0.0751)	(0.0765)
Number of men older than 70 years in HH	-0.0236	-0.0276
	(0.0600)	(0.0613)
Number of Families in HH	0.0107	-0.0024
	(0.0724)	(0.0740)
Per Capita Income	-0.0421	-0.0425
	(0.0066)***	(0.0067)***
State Level Variables		
Proportion of Working Women by State and Cohort	0.1209	0.1129
	(0.0635)*	(0.0648)*
Average State Income (in 1000)	-0.0856	-0.0916
	(0.0400)**	(0.0407)**
Price of maids	0.4120	0.4227
	(0.0444)***	(0.0453)***
Region Level Variables		
Price of production goods	0.5224	0.5320
	(0.0256)***	(0.0260)***
price of entertainment goods	-0.1997	-0.2036
	(0.0123)***	(0.0126)***
price of electricity (in kwatts)	4.14	4.29
	(0.4910)***	(0.5003)***
Constant	-0.1506	-0.1973
	(0.1624)	(0.1657)
Observations	19662	19662
R-squared	0.0868	
Testing $\beta_w = \beta_h$		
F-statistic	2.57	2.88

Continued on next page

Table 9 – continued from previous page

	OLS	Tobit
Probability	0.1092	0.0895
Education Differences		
F-statistic	2.36	1.19
Probability	0.1247	0.2761

Standard errors in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 10: Results Using Alternatives Measures of Marriage Market, Brazil, 2002-2003.

	Dependent Variable: $share_{p/e}$			Dependent Variable: $own_{p/e}$		
Marriage Market Variables:						
Women in younger cohort	-0.1461			-0.2658		
	(0.1253)			(0.0380)***		
By education level:						
Merged by wife's education		0.0876			0.0261	
		(0.0866)			(0.0263)	
Merged by husband's education			-0.1650			-0.1147
			(0.0756)**			(0.0230)***
Other Bargaining Variables	yes	yes	yes	yes	yes	yes
Household Variables	yes	yes	yes	yes	yes	yes
State Level Variables	yes	yes	yes	yes	yes	yes
Region Level Variables	yes	yes	yes	yes	yes	yes
Observations	19662	19662	19662	19662	19662	19662
R-squared	0.025	0.025	0.0252	0.086	0.0838	0.0849

Standard errors in parentheses.

* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 11: Dependent Variable: Share of Rental Value of Production to Entertainment Durable Goods by Income Group, $share_{p/e}$, Brazil, 2002-2003.

	low	lower middle	middle	upper middle	high
Bargaining Power Variables					
Marriage Market	-0.6683	-0.4930	-0.6014	-0.3705	-0.3986
	(0.3716)*	(0.3892)	(0.3723)	(0.2997)	(0.1917)**
Only wife makes decision over expenditures	-0.0273	0.2791	0.1310	0.2714	0.1019
	(0.2377)	(0.2472)	(0.2243)	(0.2078)	(0.1818)
Only husband makes decision over expenditures	0.3382	0.2587	0.3296	0.1933	0.2254
	(0.0857)***	(0.0966)***	(0.1051)***	(0.0938)**	(0.0731)***
Wife's Age	0.0162	0.0090	-0.0122	-0.0052	-0.0084
	(0.0075)**	(0.0070)	(0.0065)*	(0.0048)	(0.0031)***
Husband's age - wife's age	0.0131	0.0050	-0.0042	-0.0120	-0.0067
	(0.0075)*	(0.0076)	(0.0074)	(0.0060)**	(0.0038)*
Wife has more schooling	-0.0704	-0.0013	0.1232	0.1841	0.1572
	(0.1033)	(0.1010)	(0.0944)	(0.0720)**	(0.0456)***
Husband has more schooling	-0.1473	-0.1211	-0.0098	0.1761	-0.0638
	(0.1031)	(0.1054)	(0.0995)	(0.0757)**	(0.0460)
Wife has primary education	0.0715	-0.0805	0.0613	0.0135	-0.4882
	(0.1146)	(0.1414)	(0.1688)	(0.1800)	(0.1761)***
Wife has secondary education	0.1063	-0.1786	-0.2063	-0.1317	-0.6041
	(0.1405)	(0.1526)	(0.1734)	(0.1799)	(0.1705)***
Wife has high school	0.2665	-0.2267	-0.1111	-0.2384	-0.7772
	(0.1904)	(0.1722)	(0.1829)	(0.1827)	(0.1683)***
Wife has college	-0.2023	0.1114	-0.2906	-0.5028	-0.9689
	(0.7594)	(0.5957)	(0.3062)	(0.2152)**	(0.1714)***
Household Variables					
Number of women 0-3 years old in HH	0.0443	0.0412	0.1568	0.1037	0.0150
	(0.0689)	(0.0851)	(0.0957)	(0.0806)	(0.0555)
Number of women 4-6 years old in HH	-0.1638	-0.0843	-0.0843	-0.0000	-0.0700
	(0.0745)**	(0.0886)	(0.1001)	(0.0883)	(0.0641)
Number of women 7-12 years old in HH	0.0006	-0.0453	-0.0305	0.0375	-0.0021
	(0.0532)	(0.0637)	(0.0671)	(0.0590)	(0.0408)
Number of women 13-16 years old in HH	-0.0537	-0.1453	0.0870	-0.0947	-0.1191
	(0.0785)	(0.0848)*	(0.0859)	(0.0727)	(0.0507)**
Number of women 17-19 years old in HH	-0.1978	-0.1822	0.1200	-0.1868	-0.0649
	(0.1242)	(0.1284)	(0.1262)	(0.0969)*	(0.0639)
Number of women 51-60 years old in HH	-0.3951	-0.2381	-0.0668	0.3552	-0.0381
	(0.6093)	(0.4157)	(0.4613)	(0.3594)	(0.2701)
Number of women 61-70 years old in HH	-0.9875	0.6341	-0.6063	-0.2157	-0.0515
	(0.5436)*	(0.4441)	(0.3630)*	(0.3147)	(0.2137)
Number of women older than 70 years in HH	0.2195	-0.5358	0.1248	0.2336	0.1585
	(0.4470)	(0.3615)	(0.3233)	(0.2548)	(0.1846)
Number of men 0-3 years old in HH	0.1869	0.2110	0.1897	0.0531	0.0476
	(0.0674)***	(0.0841)**	(0.0922)**	(0.0819)	(0.0575)
Number of men 4-6 years old in HH	-0.1043	0.1646	0.0439	-0.0174	0.0316
	(0.0729)	(0.0893)*	(0.0978)	(0.0870)	(0.0592)

Continued on next page

Table 11 – continued from previous page

	low	lower middle	middle	upper middle	high
Number of men 7-12 years old in HH	-0.0354	-0.0115	-0.0237	-0.0403	-0.0092
	(0.0519)	(0.0616)	(0.0680)	(0.0569)	(0.0392)
Number of men 13-16 years old in HH	-0.0338	-0.0253	-0.0530	-0.1141	-0.0511
	(0.0750)	(0.0811)	(0.0826)	(0.0712)	(0.0479)
Number of men 17-19 years old in HH	0.0549	-0.0557	0.0667	-0.1357	-0.0662
	(0.1110)	(0.1133)	(0.1105)	(0.0869)	(0.0595)
Number of men 51-60 years old in HH	-0.3272	-0.0770	-0.1454	0.1497	-0.8435
	(0.7454)	(0.7928)	(0.6156)	(0.6770)	(0.5059)*
Number of men 61-70 years old in HH	-0.4413	-0.5222	0.3413	-0.2774	-0.0059
	(0.8409)	(0.6609)	(0.5730)	(0.4574)	(0.2863)
Number of men older than 70 years in HH	-0.4231	-0.0172	-0.1711	-0.1551	0.0109
	(0.6312)	(0.5095)	(0.4383)	(0.3356)	(0.2925)
Number of Families in HH	-0.5702	-0.1352	-0.4386	-0.0987	14702
	(0.5272)	(0.5323)	(0.6553)	(0.4577)	(0.4603)***
Per Capita Income	2.6482	0.7043	-1.1281	-0.7196	-0.0161
	(1.9101)	(1.8105)	(1.1272)	(0.4035)*	(0.0135)
State Level Variables					
Proportion of Working Women by State and Cohort	-0.1193	-0.0989	0.5210	0.2591	0.0305
	(0.5245)	(0.5348)	(0.5438)	(0.4242)	(0.2747)
Average State Income (in 1000)	0.7421	0.1166	0.0145	-0.4680	-0.2590
	(0.4617)	(0.3795)	(0.3322)	(0.2616)*	(0.1347)*
Price of maids	-0.2032	0.2511	0.4702	0.5786	0.5604
	(0.4088)	(0.3965)	(0.3736)	(0.2821)**	(0.1704)***
Region Level Variables					
Price of production goods	0.8643	0.7518	0.6244	0.6019	0.1654
	(0.3162)***	(0.2270)***	(0.2011)***	(0.1576)***	(0.1005)*
price of entertainment goods	-0.2525	-0.2625	-0.1669	-0.2040	-0.0155
	(0.1479)*	(0.1102)**	(0.0982)*	(0.0742)***	(0.0463)
price of electricity (in kwatts)	2.1170	2.8939	2.8162	4.4438	-1.1619
	(5.6511)	(4.4105)	(3.9535)	(3.1098)	(1.9367)
Constant	-0.3669	0.0010	0.3805	0.1250	0.2409
	(1.4353)	(1.3540)	(1.4053)	(1.1218)	(0.8107)
Observations	3933	3932	3933	3932	3932
R-squared	0.0274	0.0181	0.0208	0.0247	0.0469
Testing $\beta_w = \beta_h$					
F-statistic	2.24	0.01	0.68	0.12	0.41
Probability	0.1348	0.9370	0.4101	0.7275	0.5236
Education Differences					
F-statistic	0.63	1.55	2.14	0.01	22.42
Probability	0.4292	0.2139	0.1434	0.9132	0.0000

Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 12: Dependent Variable: Ratio of Production to Entertainment Durable Goods by Income Group, $own_{p/e}$, Brazil, 2002-2003.

	low	lower middle	middle	upper middle	high
Bargaining Power Variables					
Marriage Market	-0.3093	-0.3646	-0.6019	-0.3981	-0.3372
	(0.0962)***	(0.1033)***	(0.1044)***	(0.1089)***	(0.0915)***
Only wife makes decision over expenditures	0.0452	0.1736	0.1055	0.0162	0.0824
	(0.0615)	(0.0656)***	(0.0629)*	(0.0755)	(0.0868)
Only husband makes decision over expenditures	0.0326	0.0665	0.0377	0.0251	0.1013
	(0.0222)	(0.0256)***	(0.0295)	(0.0341)	(0.0349)***
Wife's Age	0.0027	0.0005	-0.0034	-0.0055	-0.0059
	(0.0020)	(0.0019)	(0.0018)*	(0.0018)***	(0.0015)***
Husband's age - wife's age	0.0026	-0.0015	0.0010	-0.0020	-0.0062
	(0.0019)	(0.0020)	(0.0021)	(0.0022)	(0.0018)***
Wife has more schooling	-0.0531	-0.0101	0.0101	0.0257	0.0341
	(0.0267)**	(0.0268)	(0.0264)	(0.0262)	(0.0218)
Husband has more schooling	0.0286	0.0480	-0.0082	-0.0337	-0.0518
	(0.0267)	(0.0280)*	(0.0279)	(0.0275)	(0.0220)**
Wife has primary education	0.0981	0.0208	0.0137	-0.0160	-0.0679
	(0.0297)***	(0.0375)	(0.0473)	(0.0654)	(0.0841)
Wife has secondary education	0.2763	0.1020	0.0086	-0.0553	-0.1543
	(0.0364)***	(0.0405)**	(0.0486)	(0.0654)	(0.0814)*
Wife has high school	0.2532	0.1299	-0.0052	-0.1273	-0.2747
	(0.0493)***	(0.0457)***	(0.0513)	(0.0664)*	(0.0804)***
Wife has college	0.3062	0.1037	-0.1103	-0.2415	-0.3983
	(0.1966)	(0.1581)	(0.0858)	(0.0782)***	(0.0819)***
Household Variables					
Number of women 0-3 years old in HH	-0.0026	0.0096	0.0233	0.0481	-0.0210
	(0.0178)	(0.0226)	(0.0268)	(0.0293)	(0.0265)
Number of women 4-6 years old in HH	0.0059	0.0049	-0.0567	-0.0451	-0.0219
	(0.0193)	(0.0235)	(0.0281)**	(0.0321)	(0.0306)
Number of women 7-12 years old in HH	0.0024	-0.0210	-0.0291	0.0169	-0.0346
	(0.0138)	(0.0169)	(0.0188)	(0.0214)	(0.0195)*
Number of women 13-16 years old in HH	-0.0146	-0.0332	0.0096	-0.0461	-0.0697
	(0.0203)	(0.0225)	(0.0241)	(0.0264)*	(0.0242)***
Number of women 17-19 years old in HH	0.0513	-0.0159	0.0123	-0.1176	-0.0330
	(0.0322)	(0.0341)	(0.0354)	(0.0352)***	(0.0305)
Number of women 51-60 years old in HH	-0.0055	-0.1285	0.0996	-0.0416	-0.0712
	(0.1578)	(0.1103)	(0.1293)	(0.1306)	(0.1290)
Number of women 61-70 years old in HH	-0.3344	0.0315	-0.1994	-0.0824	-0.1013
	(0.1407)**	(0.1179)	(0.1017)*	(0.1144)	(0.1021)
Number of women older than 70 years in HH	0.1903	-0.1622	-0.1278	0.0884	0.1062
	(0.1157)	(0.0959)*	(0.0906)	(0.0926)	(0.0882)
Number of men 0-3 years old in HH	0.0073	0.0457	0.0781	0.0124	0.0380
	(0.0174)	(0.0223)**	(0.0258)***	(0.0298)	(0.0274)
Number of men 4-6 years old in HH	-0.0402	0.0255	0.0204	0.0283	0.0190
	(0.0189)**	(0.0237)	(0.0274)	(0.0316)	(0.0283)

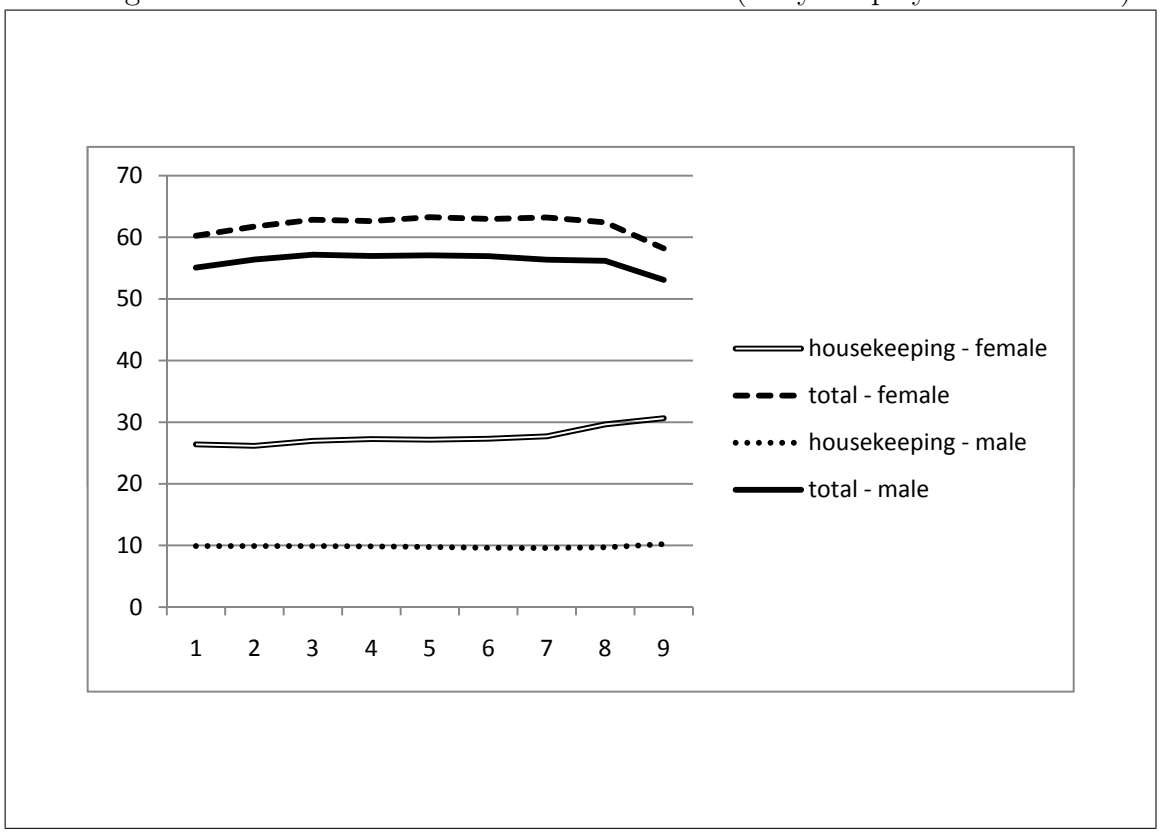
Continued on next page

Table 12 – continued from previous page

	low	lower middle	middle	upper middle	high
Number of men 7-12 years old in HH	-0.0039	-0.0058	0.0009	-0.0688	-0.0334
	(0.0134)	(0.0163)	(0.0190)	(0.0207)***	(0.0187)*
Number of men 13-16 years old in HH	0.0258	0.0042	-0.0222	-0.0879	-0.0666
	(0.0194)	(0.0215)	(0.0232)	(0.0259)***	(0.0229)***
Number of men 17-19 years old in HH	-0.0087	-0.0121	0.0168	-0.0250	-0.0521
	(0.0287)	(0.0301)	(0.0310)	(0.0316)	(0.0284)*
Number of men 51-60 years old in HH	-0.2288	0.1970	-0.2032	0.4246	-0.6255
	(0.1930)	(0.2104)	(0.1725)	(0.2460)*	(0.2416)***
Number of men 61-70 years old in HH	0.1755	-0.1265	0.2538	0.0999	-0.1065
	(0.2177)	(0.1754)	(0.1606)	(0.1662)	(0.1367)
Number of men older than 70 years in HH	-0.1444	-0.0546	0.0424	-0.0219	-0.0607
	(0.1634)	(0.1352)	(0.1228)	(0.1219)	(0.1397)
Number of Families in HH	-0.1449	-0.1419	-0.0950	0.4182	0.3163
	(0.1365)	(0.1413)	(0.1837)	(0.1663)**	(0.2198)
Per Capita Income	1.4658	0.5436	-0.3466	0.0181	-0.0082
	(0.4945)***	(0.4806)	(0.3159)	(0.1466)	(0.0064)
State Level Variables					
Proportion of Working Women by State and Cohort	-0.2438	0.1813	0.2682	0.2534	0.1915
	(0.1358)*	(0.1420)	(0.1524)*	(0.1541)	(0.1312)
Average State Income (in 1000)	0.2322	0.1891	-0.0344	-0.1056	-0.2244
	(0.1195)*	(0.1007)*	(0.0931)	(0.0951)	(0.0643)***
Price of maids	0.2915	0.1618	0.4992	0.4784	0.4695
	(0.1058)***	(0.1052)	(0.1047)***	(0.1025)***	(0.0814)***
Region Level Variables					
Price of production goods	0.5949	0.5198	0.3904	0.5248	0.4015
	(0.0819)***	(0.0603)***	(0.0564)***	(0.0572)***	(0.0480)***
price of entertainment goods	-0.2520	-0.2362	-0.1450	-0.2211	-0.1347
	(0.0383)***	(0.0293)***	(0.0275)***	(0.0270)***	(0.0221)***
price of electricity (in kwatts)	4.4622	2.9723	1.5182	3.3976	3.3841
	(1.4631)***	(1.1707)**	(1.1081)	(1.1299)***	(0.9249)***
Constant	-0.3731	0.2884	0.6973	-0.1962	-0.1198
	(0.3716)	(0.3594)	(0.3939)*	(0.4076)	(0.3871)
Observations	3933	3932	3933	3932	3932
R-squared	0.1230	0.0823	0.0773	0.1037	0.1136
Testing $\beta_w = \beta_h$					
F-statistic	0.04	2.45	1.01	0.01	0.04
Probability	0.8426	0.1179	0.3156	0.9129	0.8386
Education Differences					
F-statistic	10.56	5.16	0.52	4.99	14.86
Probability	0.0012	0.0232	0.4710	0.0255	0.0001

Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

Figure 1: Number of Hours Worked Per Week (Only Employed Individuals).



Source: PNAD 2001.