

ROUTLEDGE RESEARCH IN GENDER  
AND SOCIETY

# ECONOMICS OF THE FAMILY AND FAMILY POLICIES

## 1. ECONOMICS OF THE FAMILY AND FAMILY POLICIES

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# WOMEN'S HOURS OF WORK AND MARRIAGE MARKET IMBALANCES

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## INTRODUCTION

Married women's labor supply has been the focus of a substantial amount of research. Since the 1960s the theory forming the base for that research has been Mincer's (1962) and Becker's (1965) theory of allocation of time to work and home. Research in the last 30 years has dealt mostly with econometric issues regarding the proper way to estimate the labor supply function (e.g. Heckman 1993; Smith 1980).

Grossbard-Shechtman (1984; 1993) has expanded the theoretical model of married women's labor supply by incorporating marriage decisions into the analysis. This paper presents a modified version of the Grossbard-Shechtman model more compatible with standard practice in labor economics. Also, this paper puts the Grossbard-Shechtman model of labor and marriage into perspective, by offering comparisons with traditional labor supply theory, Becker's (1973) theory of marriage and household bargaining theory. Finally, this paper contributes to the existing literature by testing the effect of marriage market imbalances on women's labor supply. Giving marriage decisions an active role in the analysis opens the doors to new generations of econometric models, of which one is estimated and presented in this paper. We use micro-level data from the 1990 US census.

## THEORY

Models of labor supply consider the relationship between market wage and reservation wage, i.e. the value an individual places on non-market activities. They posit that when the market wage exceeds the reservation wage a person will enter the labor market. One of the ways in which labor supply models have evolved consisted in expanding the utility functions from which reservation wages were derived. Early models such as Robbins (1930) assumed that an individual utility function was being maximized, leading to that individual's choice of own leisure and market goods. The reservation wage was the value of individual leisure time.

Jacob Mincer (1962) and Gary Becker's (1965) theory of allocation of time introduced a switch from individual utility maximization to family utility models. Since then, most labor supply models have viewed individual labor supply as the result of a decision process whereby a couple maximizes its joint utility function subject to a combined income constraint and time constraint. Consequently, household characteristics – such as spouse's income and number of children – have been incorporated as factors affecting an individual's reservation wage and therefore individual labor supply. The following reservation wage function, which is commonly used in the literature, derives from a family-decision model in the Mincer-Becker tradition:

$$w^* = w^*(h, I, P, A), \quad (5.1)$$

where  $h$  is hours of work,  $I$  is all sources of household income less the amount of wage income earned by the wife,  $P$  is a vector of prices for household goods, and  $A$  is a vector of individual traits which are related to the wife's employment characteristics (Heckman 1974).

Family-decision models have proven useful in bringing in considerations regarding the home-based determinants of reservation wages, but are of little use when the objective is to study the interrelationship between marriage and labor market outcomes. The "household" that inhabits the utility functions of most contemporary labor supply models has no intention to either marry or divorce. Consequently, these models do not offer a straightforward way to incorporate marriage market conditions into the modeling of labor supply decisions.

While drawing on Becker's (1965) theory of allocation of time and Becker's (1973) theory of marriage, Grossbard-Shechtman (1984; 1993) offers the first model which formally integrates an economic analysis of marriage into the analysis of reservation wages and labor supply.<sup>1</sup> Grossbard-Shechtman abandons a 30-year-old tradition of family-decision labor supply models in favor of a 60-year-old tradition of individual-decision labor supply models. It follows from her theory of allocation of time to labor and marriage that the reservation wage depends on more factors than the factors included in equation 5.1, one of these factors being marriage market conditions.<sup>2</sup> This integration between labor supply and marriage decisions is accomplished by introducing two new concepts: spousal labor and the quasi-wage for spousal labor.

In essence, Grossbard-Shechtman analyzes the decisions to marry and supply labor as an occupational choice, one choice of occupation being spousal labor. Work is called "labor" if it benefits an employer outside of marriage and is called "spousal labor" if it benefits a spouse.<sup>3</sup> Spousal labor is work not only in the sense that it is an activity often generating some disutility which has an opportunity cost in terms of foregone leisure. It is also work in the sense that most people expect to get compensated for engaging in spousal labor. There are no statistics on quasi-wages for spousal labor, a

familiar problem in a literature which is used to deal with other concepts which are not directly measurable, such as reservation wages.

Individual utility maximization leads to the derivation of two supplies of labor: labor and spousal labor. The same individual utility-maximization process also leads to the derivation of a demand for spouse's spousal labor. In deciding how much spousal labor to supply, individuals compare the quasi-wage for spousal labor with wage offers in other lines of work. In deciding how much spousal labor to consume, individuals consider the cost of spousal labor, the cost of other goods and services, and their income.

More formally, consider an individual  $i$  who derives (dis)utility from working in spousal labor ( $m_i$ ) and benefits from spouse's  $j$  spousal labor  $m_j$ .<sup>4</sup> The individual utility function can be represented as

$$U_i = U_i(h_i, m_i, s_i, m_j, x_i) \quad (5.2)$$

where  $i, j = f, m$  ( $m$  = male,  $f$  = female,  $i \neq j$ ),  $h$  denotes time allocated to labor,  $m$  is spousal labor,  $s$  is self-oriented time (usually called leisure), and  $x$  denotes commercial goods.

The budget constraint also undergoes a modification in comparison to standard labor supply models. Standard models have two sources of income: work and other (often called non-work) income. In Grossbard-Shechtman's model income can also be obtained from a third source: spousal labor  $m_j$ , and an additional type of expenditure is added: spousal labor by a spouse  $m_j$ . The budget constraint thus becomes:

$$w_i h_i + y_j m_i + V_i = p x_i + y_j m_j \quad (5.3)$$

where  $w$  is market wage for labor,  $y$  is quasi-wage for spousal labor,  $V$  is non-wage income, and  $p$  is a price vector for commercial goods and services.

Individuals decide on how to allocate their time by maximizing the utility function (5.2) subject to the budget constraint (5.3) and the time constraint

$$T = h_i + m_i + s_i \quad (5.4)$$

where  $T$  is the maximum time available (e.g. 24 hours per day). It follows from the first-order conditions that individuals who work in both types of job will attempt to reach the following equilibrium:

$$w_i = y_i + \frac{MU_{m_i}}{MU_{x_i}} - \frac{MU_{h_i}}{MU_{x_i}} \quad (5.5)$$

Equation (5.5) indicates that time is allocated between two occupations so that the wage in one occupation equals the wage in the other occupation, *plus* the monetary equivalent of the difference in marginal utility produced by these occupations. The wage in equation (5.5) can be interpreted as a reservation wage. In order to be drawn into the labor force, the individual requires a wage equal at least to  $y$ , the quasi-wage available from spousal labor,

plus the difference in non-pecuniary benefits generated by the two kinds of work. To the extent that work is less enjoyable than spousal labor, the reservation wage has to exceed  $y$ .

The factors influencing the reservation wage according to the standard equation (5.1) also enter in a reservation wage function based on this analysis. It follows from equation (5.5) that hours of work matter as they influence the marginal utility of labor and its alternatives. Individual traits matter as they influence both a person's utility and the quasi-wage for spousal labor. Household prices matter as they influence the amount of goods and services a person will buy and therefore the value of marginal utility of work and spousal labor. In the case of a married woman equation (5.1) included an income variable defined as household income less the amount of wage income earned by the wife. Income other than own income from work also enters a reservation wage function based on equation (5.5). However, Grossbard-Shechtman's analysis leads to the derivation of four separate income effects, replacing the two income effects (income from work and non-work) found in standard labor supply models. Furthermore, her model points to a number of factors that are expected to influence the reservation wage which were not included in standard models.

#### Four income effects

Traditional models consider two sources of income: income from own work  $w_i h_i$  and non-work income ( $V$  in equation 5.1). This latter category includes income earned by the spouse and income from sources other than work. According to Grossbard-Shechtman, an individual  $i$  decides on how much time to allocate to work  $h_i$ , or alternatively determines a reservation wage associated with a given amount of work, as a result of an individual maximization process described by equations (5.2) to (5.4). Own income from sources other than work (or spousal work)  $V_i$  enters the budget constraint and therefore  $i$ 's reservation wage. In addition,  $i$ 's reservation wage is also a function of  $y_j$ , the compensation the individual can receive for spousal labor, the total income from this source being  $y_j m_j$ . So far we have identified three sources of own income: income from work, income from spousal work, and non-work income. In this model decisions are made by individuals and not by couples. Before the effect of spouse's income on own labor supply can be analyzed, marriage has to be introduced in the analysis.

Following Becker (1973) Grossbard-Shechtman models marriage as a voluntary utility-maximizing transaction. In contrast to Becker's model which compares individual production levels with and without marriage, Grossbard-Shechtman conceptualizes marriage as an exchange of spousal labor. Individuals marry when the amount of spousal labor they demand corresponds to the amount of spousal labor a spouse supplies at given quasi-wages for spousal labor.<sup>5</sup>

Spouse's income enters the analysis as follows. If marriage entails that individual  $i$  is a net supplier of spousal labor to spouse  $j$  and the quasi-wage for spousal labor  $y$  is positive, then  $j$  has to pay an amount  $y_i m_i$  to  $i$  to induce the supply of spousal labor.<sup>6</sup> This monetary or material transfer from spouse  $j$  to spouse  $i$  is made in the form of a proportion of the spouse's income  $I_j$  from sources other than  $j$ 's spousal work. In other words,

$$y_i m_i = k I_j. \quad (5.6)$$

It is expected that  $k > 0$  to the extent that  $y > 0$  and that  $k < 1$  if  $j$  keeps some income to satisfy personal needs. For instance, if a married woman gets compensated for her spousal labor, her spousal income  $y_i m_i$  will be a proportion  $k$  of her husband's income. Equation (5.5), which determines the reservation wage, includes  $y_i$  and is defined for a given level of  $m$ . It follows from equation (5.6) that  $y$  can be expressed in terms of spouse's income  $I_j$  and that therefore  $I_j$  is a factor expected to affect the reservation wage. In contrast to the assumption implicit in family labor supply models, Grossbard-Shechtman assumes that the income of spouse  $j$  is not automatically shared with spouse  $i$ .<sup>7</sup> How much income is shared, i.e. the size of  $k$ , depends on many factors, including the quasi-wage  $y_i$ . Grossbard-Shechtman thus divides "non-work" income  $I$  found in the traditional reservation wage equation (5.1) into two types of income "not from own work":  $V_i$  and  $I_j$ . The latter includes spouse's income from all sources, work and non-work. It follows from equation (5.5) that the quasi-wage from spousal labor  $y$  belongs in the reservation wage function. However, given that this quasi-wage is not observable directly, equation (5.6) is used to transform equation (5.1) into

$$w_i^* = w_i^*(b, I_j, V_i, P, A_i). \quad (5.1')$$

The partial effects of  $I_j$  and  $V_i$  on the reservation wage are expected to be positive. Proportion  $k$  is not directly observable so it is omitted from equation (5.1').

A major benefit of using this theory of labor and marriage is that it leads to the consideration of factors which can influence labor supply and which have been ignored by traditional labor theory. One such factor is the major subject of this paper: marriage market imbalances. Other factors expected to be related to an individual's reservation wage and overlooked by standard labor supply models are hours of spousal labor and determinants of  $k$  and the wife's relative bargaining power: traits of husband and wife affecting marriage opportunities and not considered by standard models (see Grossbard-Shechtman 1984, 1993; Grossbard-Shechtman and Neuman 1988).

In the traditional specification of the reservation wage, equation (5.1), hours of work  $h$  are one factor influencing the reservation wage. According to equation (5.5), both hours of work and hours of own spousal labor affect the reservation wage.

### Marriage market imbalances

Marriage markets are modeled as markets for male and female spousal labor, and to the extent that people are heterosexual their supply is in the market for spousal labor of their own gender and their demand is in the market for spousal labor of the other gender.<sup>8</sup> Supplies of spousal labor are obtained from the sum of individual supplies of spousal labor. Each individual supply can be derived from an individual maximization process based on equations (5.2) through (5.4). Spousal workers  $i$  participate in a spousal labor market in which equilibrium values of  $y_i$  are established through the interaction between aggregate supply and demand for spousal labor. The aggregate demand for spousal labor is based on individual demands which also derive from an individual maximization process based on equations (5.2) through (5.4), in the following way.

Individuals  $j$  decide on how much spousal labor  $m_j$  they want to consume at any given level of  $y_j$ . The aggregate demand in the market for spousal labor  $M_j$  consists of the sum of all derived demands by individual  $j$ 's for labor by spouses  $i$ . Markets for spousal labor establish equilibrium values of  $y_i$ , the quasi-wage for spousal labor supplied by individuals  $i$ , and similarly for  $y_j$ . If women are the  $i$ 's and they are net producers of spousal labor they are expected to receive a transfer from their husbands amounting to  $y_i m_i - y_j m_j$ , which will be a proportion of the husband's income.

Not only are markets for spousal labor by women interrelated with markets for spousal labor by men, but markets for spousal labor are interrelated with markets for labor. Labor and spousal labor being two substitute forms of employment, the wage for labor influences the supply of spousal labor and the quasi-wage for spousal labor influences the supply of labor. Also, the demands for male and female labor by employers are related to conditions in marriage. The same products can be produced either by married couples or by firms, so that labor and spousal labor are also substitutes on the demand side. Consequently, markets for labor and spousal labor are tightly interrelated. Figure 5.1 presents four such markets – markets for male and female labor and markets for male and female spousal labor – based on the assumption that labor markets are segmented by gender (even though many employers may substitute between male and female employees). In a competitive equilibrium, these markets establish market clearing wages  $w_f$  and  $w_m$  and quasi-wages for spousal labor  $y_f$  and  $y_m$ .<sup>9</sup>

Let us compare a situation of equal numbers of marriage eligibles in markets for spousal labor to a situation with a marked excess of men. Initially, an excess of males is expected to lead to a high demand for women's spousal labor ( $D'$  in Figure 5.1(a)), a large supply of men's spousal labor ( $S'$  in Figure 5.1(b)), and a large supply of men's labor ( $S'$  in Figure 5.1(d)). An excess of males is equivalent to a shortage of females (keeping population size constant).<sup>10</sup> Women are expected to be in limited supply in markets for spousal



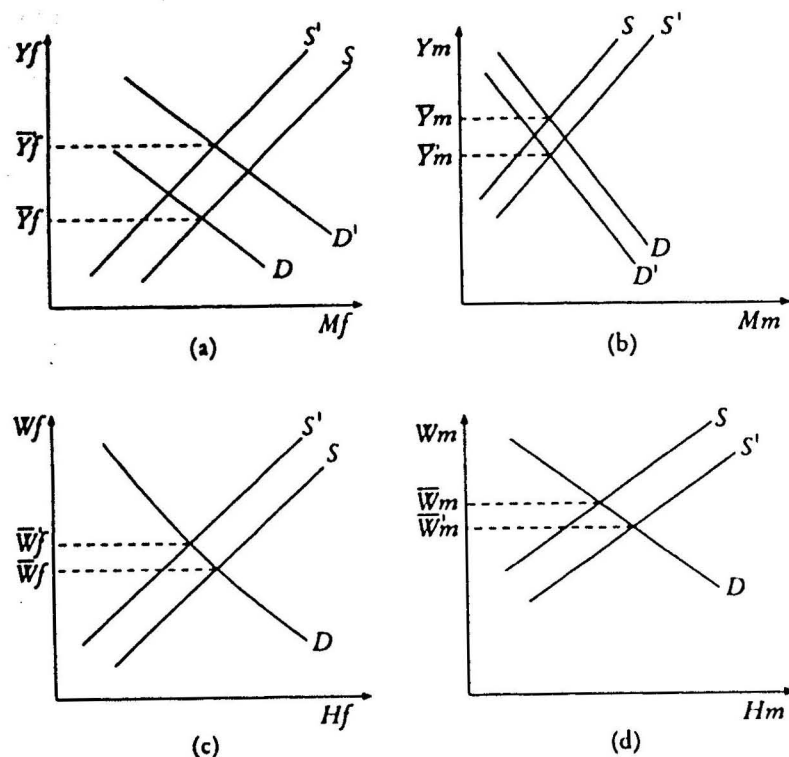


Figure 5.1 Markets for (a) Female spousal labor; (b) Male spousal labor; (c) Female labor; (d) Male labor. Primary effects of an increase in the relative number of men

labor (panel a) and labor (panel c), and their demand for men's spousal labor will be limited (panel b). The initial effect of an excess of males thus results in (1) an increase in women's quasi-wage for spousal labor  $y_f$  (panel a); (2) a decrease in men's quasi-wage for spousal wage  $y_m$  (panel b); (3) an increase in women's wage  $w_f$  (panel c); and (4) a decrease in men's wage  $w_m$  (panel d).

It follows from equation (5.5) that the higher the quasi-wage for spousal labor, the higher an individual's reservation wage. An excess of males in the market for female spousal labor causes an increase in women's quasi-wage and therefore in women's reservation wage. This predicted effect is based on the assumption that husbands do not automatically share their income with their wives.

One way of incorporating this theoretical discussion into reservation wage equation (5.1') is by recognizing that the degree to which husbands share their own income with their wives,  $k$ , is a function of marriage market imbalances. For instance, if the ratio of marriageable men to women of a given age group

(i.e. the sex-ratio) is used as a measure of marriage market imbalance and denoted by  $SR$ , it follows that  $k = k(SR)$ , where the first derivative of  $k$  with respect to  $SR$  is positive. The higher the number of men relative to the number of women in a given marriage market, the more men are willing to give women access to their income. In calculating  $SR$  one needs to include all men and women who participate in the same marriage market, i.e. who actually enter or possibly enter or re-enter this market for spousal labor. This includes married and unmarried individuals.

Individual access to spouse's income  $k$  is not simply a function of  $SR$ , sex-ratio. Quasi-wages for spousal labor  $y$  vary not only with demand and supply in spousal labor markets but also with monopolistic elements which enter into an existing marital relationship to the extent that divorce and marriage are costly (e.g. due to search costs). In that case one could find a divergence between the market  $y$  and the  $y$  obtained by a particular individual. Consequently,  $y$  can be separated into two elements:  $y = y_e + b$ , where  $y_e$  is the equilibrium value of quasi-wages for spousal labor in the market and  $b$  is a bargaining component specific to the individuals in a particular couple. Household bargaining models based on game theory can help understand factors influencing  $b$ . Overall, there is no good reason to believe that markets for spousal labor are fundamentally different from other labor markets. The degree to which a competitive market model is applicable will vary with circumstances, as is the case with any economic analysis.

Sex ratio effects on  $k$  and therefore on reservation wage and labor supply are expected to be stronger the more  $y$  and  $k$  are influenced by the market equilibrium  $y_e$  and the further a particular couple is from dual monopoly. Proportion  $k$  may thus be a function of  $SR$  and of marriage duration. The longer a couple has been married, the more divorce costs and monopolistic elements are expected to influence individual decision-making.

Grossbard-Shechtman's (1984, 1993) model leads to predictions regarding the effect of marriage duration and sex-ratios on  $k$ ,  $y$ , and reservation wage which differ from those based on game theory. The games described in household bargaining models start at marriage. Wife's and husband's relative bargaining positions are a function of remarriage possibilities, and therefore sex-ratios. Marriage market imbalances faced prior to marriage are not considered in game-theory models. It follows from the Grossbard-Shechtman model that sex-ratio effects will be strongest at the beginning of a marriage and will become less important as marriage duration increases. From a game-theory perspective, marriage market imbalances start playing a role only to the extent that divorce and remarriage become concrete possibilities, which may not occur at the very onset of marriage.

We can now expand equation 5.1' to 5.1''

$$w_i^* = w_i^*(b, m, I, V, SR, P, A, A_j) \quad (5.1'')$$

where  $SR$  denotes sex-ratio, and  $A_j$  are traits of spouse  $j$  valued in marriage markets. The reservation wage function defined in (5.1") thus differs from the traditional reservation wage function (5.1) in the following ways: our analysis leads to the inclusion of hours of spousal labor  $m$  in the reservation wage function; our analysis leads to separate income effects as explained above; in Grossbard-Shechtman's analysis sex-ratio  $SR$  is expected to affect  $y$  and  $k$  and therefore reservation wage  $w^*$ ; and individual traits of spouse  $j$  ( $A_j$ ) enter the reservation wage function. The first derivative of  $w^*$  with respect to  $SR$  will be positive. The partial effect of  $m_i$  on  $w^*$  is expected to be negative: the more  $i$  works at spousal labor, the lower the marginal utility of  $m$  and therefore the less  $i$  has to be induced financially to go to work. Positive traits  $A_j$  which compensate for income transfers will be negatively related to  $w^*$  (Grossbard-Shechtman and Neuman 1988).<sup>11</sup>

The implication of Grossbard-Shechtman's analysis of labor and marriage that will be tested here is the sex-ratio effect on labor supply. More specifically, it is hypothesized that:

*ceteris paribus*, women, especially married women, are less likely to work outside of marriage when there is an excess of marriageable males than when the number of marriageable men and women is balanced. Furthermore, the number of hours worked by women is expected to be a negative function of the relative excess of males over females.

Vice versa, marriage markets with an excess of females are expected to be associated with higher participation of women in the labor force than balanced marriage markets. A qualification to this analysis is that a relative shortage of females may also cause women's wages in the labor market to increase. It is expected that the increase in women's quasi-wage  $y$  will exceed the increase in women's wage outside of marriage  $w$ . If the reservation wage increases more than the wage, it is expected that marriage markets with an excess of males will be associated with lower participation of women in the labor force than balanced marriage markets. There are good reasons why imbalances in the numbers of men and women are expected to affect marriage market conditions more than labor market conditions. For some aspects of marriage heterosexual spouses have no substitutes. Consequently, men and women are poor substitutes when it comes to marriage. In contrast, men and women can often be excellent substitutes at the workplace, especially in a work environment such as the contemporary US which condemns discrimination according to gender. Given that the total number of workers does not change, quasi-wages for spousal labor will be affected considerably more by an excess of males than wages for male and female labor. Furthermore, lower male incomes associated with an excess of males will also cause income effects, and therefore a shift back to the left in the demand for women's spousal labor. However, the effect of these income changes is not expected to neutralize the rightward shift in demand for women's spousal labor caused

by an excess of males. After all changes are integrated, it is expected that the quasi-wage for women's spousal labor will grow with the relative excess of men over women, which leads to the marriage squeeze hypothesis above.

A number of factors are expected to affect the relationship between marriage market imbalance (relative excess of one gender) and women's labor force participation. Marriage market imbalances are more likely to affect married women than unmarried women (although it is also expected to apply to unmarried women who prepare themselves towards a career in marriage); women employed full time than women employed part time; women employed in low-paying occupations than women employed in high-paying occupations; and women with lower education (see Grossbard-Shechtman 1993).

The prediction that marriage market conditions also affect the labor supply of unmarried women does not follow as easily from household bargaining models. From a marriage market perspective, unmarried women with better marriage offers are likely to work less while single or to choose occupations compatible with the fewer hours of work they plan to work outside the home when married. With respect to part-time *v.* full-time work, it is expected that the effect of marriage market imbalances on hours of work is not linear, the marginal effect being stronger when people already work many hours. One reason for that is that women working long hours are more likely to work for monetary reasons, and therefore variations in the monetary rewards for spousal labor associated with marriage market imbalances may have more effect on their behavior than on that of women working part time. Likewise, women with a high education and women employed in high-paying occupations are more likely to work for non-monetary reasons than their less skilled counterparts, and therefore their behavior is less likely to respond to marriage market imbalances affecting monetary rewards for spousal labor.

Effects of marriage market imbalances on female labor supply have been tested at an aggregate level, using both time series and cross-sectional data. Grossbard-Shechtman and Granger (1994) analyzed time series data and used changes in cohort size to examine changes in labor supply. On average, husbands in the United States are two years older than their wives, which implies that changes in cohort size influence the  $w^*$  of women. In comparison to women born during periods of stagnant or declining fertility, women born during periods of rapid population growth will have a choice of a relatively small number of slightly older men who are potential husbands. In contrast, men born during periods of rapid population growth will have a relatively large number of slightly younger women to choose from as potential wives (relative to men born during periods of stagnant or declining fertility). Women born during rapid population growth, in effect, are faced with an excess of females in marriage markets and therefore will have a lower  $y$ , a lower  $w^*$  and a higher labor force participation rate. The results of the time series study did provide evidence, after controlling for several economic variables, for an increase in labor force participation among women born at

the onset of the baby boom and a decrease in labor force participation among women born in times of decreasing fertility.

A cross-sectional approach to testing the sex-ratio effect used aggregate data for large cities in the US in 1930 and 1980 and tested for the effects of marriage market imbalances on married female labor force participation rates (Grossbard-Shechtman 1993). The study did find evidence that cities experiencing an excess of males were associated with a lower average married female labor force participation rate.

Also, it is generally estimated that Afro-American women in the US experience more of a marriage squeeze, i.e. a relative shortage of males, than Caucasian women. This could help explain why the participation rate of married women of African origin has traditionally exceeded that of married women of European origin in this country, even after control for all variables usually included in labor supply estimations (Grossbard-Shechtman 1985).

The data previously used in testing for the effects of marriage market imbalances were aggregate level data. Since the theoretical effects of these imbalances are defined at the individual level it seems that using microdata is more appropriate. Our study is the first to look at the effects of sex-ratio on an individual's labor supply decision.

### EMPIRICAL ANALYSIS

It follows from the marriage squeeze hypothesis presented above that in marriage markets with excess males, as indicated by a high sex-ratio, women will be getting more income from spousal labor and will therefore be less likely to work outside of marriage. We tested this hypothesis using a random sample of the 1990 census Public Use Microdata Sample (PUMS) data.

#### Data

A sample was constructed from the 1 percent PUMS of the 1990 United States census. These PUMS data consist of a 1 percent sample of all respondents who filled out the long census form. The sample was limited to married white women between the ages of 25 and 29, whose husband was present in the previous year. The study was limited to white women in light of two considerations: previous research has shown that black and white women's labor supply are quite different, and we would have needed a larger sample and more resources to analyze black women as well. Also, only urban women were selected, and more specifically women who lived in the 85 most populous Standard Metropolitan Statistical Areas (SMSAs). In total, data on 17,860 married couples was obtained.

The 1990 census PUMS data was used for two reasons. First it allows for the sex-ratio to be calculated from the same data-set. The second reason is that the census data was readily available and easy to work with, making a

preliminary study such as this possible. But while the census data has those two advantages it also comes with several disadvantages when compared to using other microdata-sets such as the National Longitudinal Survey.

The most important problem is that the census data probably has a higher degree of measurement error. In other microdata studies effort is made to keep the data as accurate as possible by using such techniques as paying respondents and personally interviewing them. Also, longitudinal microdata studies the same people who fill out the forms on an annual basis, which adds to their accuracy. Despite the care taken in gathering large microdata-sets, the validity of the data collected is called into question (Juster and Stafford, 1991). With the census data the potential for incorrect data is even greater, especially when considering variables concerning labor supply. For instance, when asked about their average hours worked and the number of weeks worked in the previous year, the two variables used to compute total hours worked, people will give their normal hours worked per week. This creates a problem with regression analysis since it will reduce the variation of the dependent variable while at the same time increasing the error variance. Those two problems are expected to reduce the fit of the regression line in the hours of work equation. These problems will also affect the wage estimates, since the value for hourly wage was computed using a person's total reported earnings from working divided by their total hours worked. If, as expected, people overstate their hours worked this will cause the wage rate to be inaccurate.

We included information at both the household level and the aggregate level. For each couple we used the following variables:

- *Wife's hours worked in 1989*, in turn a product of average hours worked per week and number of weeks worked. In turn, this information was used to create a dummy for wife's participation in the labor force (equals 1 if there were any hours of work in the past year).
- *Wife's schooling*. The census only reports educational categories, which we constructed into a continuous variable.
- *Wife's age*.
- *Number of children (fertility)*.
- *Husband's income* from all sources.

We also attached the following information about the urban area of residence to which each individual household belongs:

- *Sex-ratio*. We calculated the sex-ratio for each SMSA by dividing the number of white men aged 27 to 31 by the number of white women aged 25 to 29. A two-year age difference was used in view of the fact that this is the average difference in age at first marriage for men and women in the US. Only white men were selected given that marriage markets in the US are segmented by white/non-white status. This is a relatively simple and exogenously determined measure of mate availability, in contrast to some



other measures of mate availability that have been used in recent research on the effect of mate availability on marriage rates. Following Goldman (1977) many of these studies incorporate a variety of age preferences, based on observed marriages between men and women of given ages, into the mate availability measure. As age preference is endogenous (it responds to mate availability) this is an undesirable procedure. Another measure of sex-ratio includes solely the number of unmarried men and women (e.g. Brien 1991). As the percent married responds to mate availability, this measure also suffers from an endogeneity problem. Following Wilson (1987) some researchers studying marriage have limited sex-ratios to the ratio of employed men to all women. A variation on that is incorporating men's income into the mate availability measure (Wood, 1995). Again, matching between women's characteristics and men's characteristics (including income and employment) is endogenous to the marriage market process, and we therefore preferred to use sex-ratio separately from employment measures.

- *Unemployment rate* for the SMSA in July 1990 (Bureau of Labor Statistics, 1990). We used the total unemployment rate for men and women as we assume that both men's and women's unemployment has an impact on the marriage market. From the point of view of a market for women's spousal labor, men's unemployment is expected to have an impact on the availability of desirable mates (leads to shifts in demand for women's spousal labor), while women's unemployment has an impact on women's desire to marry (leads to shifts in the supply of women's spousal labor). Both of these impacts are expected to influence marriage market conditions. Given that local unemployment rates for men and women are highly correlated, we preferred to use a measure of the unemployment rate for both genders.

Finally, we included information on whether the city is in the South or the West.

The means and variances of all variables in the data-set are in Table 5.1.

### Methods

The model tested is the common labor supply model presented by Heckman (1974, 1980), except that the hours of work equation, which depends on the reservation wage, includes an indicator of marriage market conditions (sex-ratios) and the aggregate unemployment rate, which affect both labor market conditions and marriage market conditions. We estimated the labor supply model in three stages, using both selection bias-correction and instrumental variable techniques. In the first stage a probit regression was estimated on the decision to supply labor so that we could estimate the inverse of the Mills ratio. The inverse Mills ratio was then used in the second stage as a regressor

### WOMEN'S HOURS OF WORK

Table 5.1 Means and standard deviations

	All women (n=17860)	Supplied wage labor (n=14238)	Did not supply wage labor (n=3622)
Sex-ratio	1.09 (.10)		
Log of wages		2.17 (.59)	
Predicted log of wages		2.17 (.21)	
Fertility	2.13 (1.09)	1.93 (1.00)	2.9 (1.08)
Husband's income	30458.63 (22649.60)	29915.62 (20660.91)	32593.18 (29087.42)
Unemployment	5.06 (1.21)		
Schooling	13.4 (2.41)	13.7 (2.23)	12.22 (2.71)
Age	27.20 (1.40)	27.18 (1.40)	27.31 (1.39)
West	24%		
South	23%		

Note: Standard deviations in parentheses

in the wage equation, which was estimated using OLS. Then in the third stage, both the inverse Mills ratio and the predicted wages were included in the hours of work regression, which was also estimated using OLS. The last equation was estimated on the subsample of women who had supplied labor.

Predicted wages were obtained through estimating the following equation

$$\ln W = b_0 + b_1 \text{Age} + b_2 \text{Edu} + b_3 \text{South} + b_4 \text{West} + b_5 \text{Mills Ratio} + e \quad (5.7)$$

where  $\ln W$  is the log of market wage and was computed by dividing the women's total wage earnings by the product of the average number of hours worked per week and the number of weeks worked in 1989; *Age* is a proxy for labor market experience; *South* and *West* are dummy variables which equal 1 if the person lives in the South or the West.

We estimated two different hours of work equations. The first was specified as

$$H = b_0 + b_1 \ln W + b_2 \text{Hincome} + b_3 \text{Mills Ratio} + BX + u \quad (5.8)$$

where  $\ln W$  is the predicted log of wages; *Hincome* is the total income earned by the husband; and *X* is a vector of control variables including the number of children born to a woman, schooling, region, age of woman and local unemployment rate. The second hours of work equation was identical to the



first, except for the addition of a sex-ratio variable defined for the local marriage market,

$$H = b_0 + b_1 \ln W + b_2 \text{Hincome} + b_3 \text{Mills Ratio} + b_4 \text{SR} + BX + u \quad (5.9)$$

where SR is the sex-ratio.

It follows from the marriage squeeze hypothesis presented above that in marriage markets with high sex-ratios women will be getting more income from spousal labor and are therefore likely to provide less labor outside the household. The coefficient of SR in equation (5.9) is therefore expected to be negative ( $b_4 < 0$ ). The relationship of the other variables to the amount of hours an individual works is well-established in the literature.

### Results

Table 5.2 presents our results. All the coefficients of variables traditionally included in female labor supply models have the expected sign and are significant. After control for predicted wage the effect of schooling on hours

Table 5.2 Regressions of labor force participation, predicted wages and hours of work, married white women ages 25–29, US census, 1990

	<i>In workforce</i>	<i>Predicted wages</i>	<i>Hours of work</i>
Sex-ratio	-.27** (5.39)		-117.74* (1.93)
Predicted wage			649.68** (5.06)
Fertility	-.41** (1407.6)		-412.84** (22.51)
Husband's income	-.00006** (197.1)		-.004** (12.16)
Unemployment	-.06** (39.13)		-34.21** (-6.20)
Schooling	.10** (391.8)	-.078** (29.41)	-2.33 (.21)
Age		9.98** (9.3)	
West		.04** (3.33)	-20 (1.23)
South		-.07** (7.82)	160.59** (9.50)
Mills Ratio		-.20** (7.82)	1115.62** (10.60)
Constant	1.27	.27	1141.92
R-square		.12	.13
N	17580	14190	14190

Notes: t-statistics in parentheses; \*\* indicates significance at  $p > .01$ ; \* indicates significance at  $p > .05$

of work is negative and insignificant, indicating that schooling and wages are very correlated. Increases in fertility, husband's income and unemployment rate all cause a decrease in hours worked. This indicates that unemployment is more of a reflection of women's own job opportunities in the local labor market than of the husband's opportunities and their effect on women's marriageability and reservation wage.

The parameter estimate for sex-ratio (SR) is significant and negative as predicted, offering support for the marriage squeeze hypothesis. The relatively low R-square of .13 in the hours of work equation is consistent with findings from other research (Heckman 1980; Cogan 1980). An F-test comparing an hours of work regression with and without sex-ratio indicated that including sex-ratio significantly improved the basic labor supply model.<sup>12</sup>

The results of this study show that the sex-ratio is negatively associated with the amount of labor a woman will supply. This may indicate a sex-ratio or marriage squeeze effect as hypothesized here. If so, marriage market conditions do affect the amount of labor married women supply. However, the finding of a negative sign of sex-ratio in labor supply regressions could possibly be spurious: unmeasured characteristics such as strong demand for female labor may possibly simultaneously cause migration of women, low sex-ratio and high participation of women in the labor force.<sup>13</sup>

### CONCLUSION

This study has provided evidence for a marriage squeeze effect on women's labor supply. Some of the implications from these results are now discussed and suggestions are made for further work. Evidence for a marriage squeeze effect on the hours of work of married women offers support for a theory of labor and marriage. Marriage markets and labor markets interact in ways that most studies of labor supply ignore. An alternative explanation of a negative association between sex-ratios and married women's labor force participation is that unobserved characteristics are explaining both sex-ratio and hours of work. For instance, some cities may have excellent job opportunities for women which would attract a lot of women compared to men (low sex-ratios) and cause women to work many hours. If this was the causality, one would expect the wage and unemployment rate effects to capture this. Further work is needed to develop better measures of aggregate labor market conditions for men and women and degree of segmentation between male and female jobs. As discussed in the theoretical part of this paper, degree of segmentation by gender will affect the direction of a sex-ratio effect and the magnitude of such an effect.

The present empirical study improves on previous research. Previous studies by Grossbard-Shechtman have shown evidence for a marriage squeeze effect on women's labor supply, based on cross-city comparisons and time series. The present analysis was based on microdata. This allowed us to

reproduce methods that have widely been applied to the study of women's labor supply. Also, microdata help us avoid some of the pitfalls involved in analyzing aggregate data. However, there is still plenty of room for improving the data analysis. As discussed in the data section, there are many flaws involved in the use of census data. We hope to pursue this work with more appropriate data-sets, such as the National Longitudinal Surveys or the Panel Study of Income Dynamics. Also, research on the United States could be expanded to include (1) blacks as well as whites, especially in view of the low sex-ratios observed for blacks in the US, and (2) more SMSAs. Finally, it is hoped that tests of the marriage squeeze hypothesis and other hypotheses relating marriage markets to labor supply will be performed using data from other countries as well.

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### NOTES

- 1 In contrast to most other applications of Becker's (1973, 1981) theory of marriage - which have focused mostly on aspects of marriage and divorce - Grossbard-Shechtman's (1984) primary focus was labor supply of married women.
- 2 Game-theory models also allow the integration of marriage market conditions into labor supply decisions (see the discussion in the chapter by Lundberg and Pollak in this book). Bargaining theories can, for example, be applied to analyze the effect of divorce on labor supply by married women. The major problem with bargaining models of marriage, however, is that they take the existence of a marriage as given and focus on effects of post-marriage eventualities on behavior within a marriage. This theory cannot serve as an integrative framework from which we can derive hypotheses regarding the relationship between aspects of marriage markets prior to marriage and various labor market outcomes such as labor force participation. Furthermore, Pierre-André Chiappori (1988, 1991) has effectively criticized some of the technical aspects of bargaining models of marriage.
- 3 In Grossbard-Shechtman's model the household labor found in other Beckerian models (e.g. Gronau 1977 and Hersch 1991) is subdivided into activities benefiting oneself and activities benefiting one's spouse, i.e. spousal labor. Spousal labor may also include time spent listening to a husband's problems with an employer and time accompanying a wife to the doctor. In the following discussion spouses include cohabiting partners.
- 4 This discussion follows Grossbard-Shechtman (1984). Symbols were changed to make the model more compatible with standard labor supply models.

- 5 Fixed costs of marriage imply that small amounts of spousal labor will not translate into marriage. How quasi-wages are determined is discussed below.
- 6 This is one of many possible spousal labor arrangements in marriage. An increasingly common arrangement is the egalitarian marriage in which there is no net transfer of spousal labor and no income from spousal labor.
- 7 A similar assumption can be found in game-theory models.
- 8 Commonly called "opposite sex." We prefer to use terms that are less emotionally loaded.
- 9 One reason that the competitive market model may not be completely applicable is that people of certain classes, races or religions may be forbidden to intermarry. In such cases, separate markets need to be considered for each group of spouses. In that sense, spousal labor markets are not intrinsically different from other labor markets.
- 10 Gary Becker contributed this insight.
- 11 A spouse's traits influence an individual reservation wage to the extent that they influence the portion  $k$  by which a spouse-employer  $j$  shares income with the spousal worker  $i$ . Compensating differentials in marriage will be observed to the extent that spousal employers can trade-off monetary compensations  $kI_j$  with non-monetary compensations such as spouse  $j$ 's health, good looks and wits. Behavioral traits also matter. The more lovingly  $j$  acts to  $i$ , the more  $i$  will be willing to work at  $m$  for  $j$  at a given quasi-wage  $y_j$ , or the lower the required  $y_j$  for a given level of  $m$ . In other words,  $j$ 's behavior can compensate for lack of  $k$  or  $I_j$ .
- 12 The regression which does not include sex-ratio is available upon request.
- 13 Empirical studies of migration have indicated that job opportunities for married women are not a major reason why couples move.

# PREMARITAL COHABITATION, CHILDBEARING AND THE CREATION OF ONE- PARENT FAMILIES

*John Ermisch*

## INTRODUCTION

During recent years, the proportion of one-parent families headed by never-married mothers has been increasing in Britain. In 1981, 19 percent of one-parent families were headed by a never-married mother, but by 1992 that proportion had increased to one-third. This increase has helped foster a policy backlash, particularly proposals to reduce state benefits which might encourage young women to become single mothers. Little has been known, however, about the demographic factors which are primarily responsible for the rise, much less the underlying social and economic factors behind them. The present paper focuses on these demographic factors.

The increase in the number of one-parent families headed by never-married mothers reflects a combination of factors. In particular, more women are spending some time before marriage in cohabitational unions, and are having children in such unions. Thus, when such unions break up, one-parent families are created. Of course, such families are also created by first births outside of partnerships. This paper investigates the relative importance of these two sources of one-parent families headed by never-married women and how it has changed.

It first examines the dramatic rise in cohabitation among never-married women. The paper goes on to estimate the chances of becoming a never-married mother while cohabiting, and then examines how many one-parent families are created by the dissolution of the union. The analysis uses the only British data with which these issues can be addressed for more than one cohort: the life histories collected in the second wave of the British Household Panel Study (BHPS) during the last quarter of 1992.<sup>1</sup>

## COHABITATION OR MARRIAGE?

Before bringing births into the picture, the type and timing of first partnership is studied. Such analysis is of interest in itself because other sources of data