

**Who Will Pay the Bills ?  
A Theory of Women's Welfare Dependency,  
Labor Supply, and Marriage\***

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## ABSTRACT

*This paper provides a rational choice model that simultaneously analyzes women's decisions about welfare dependency, labor supply, and marriage. While based on economic theory, the model expands far beyond most economic models by including e.g. cultural preferences for marriage, gender differences in willingness to perform household chores, the psychological costs of being on welfare, and the interaction between men's preferences and women's preferences. In addition to reproducing old insights about income effects and marriage market effects on welfare dependency, the model offers new insights regarding direct and indirect marriage market effects on welfare dependency and the effects of welfare benefits on labor supply and marriage. The value of the model is assessed in light of existing evidence about group differences in welfare dependency, labor supply, and marriage. Two group comparisons are made: black/white comparisons and comparisons between first baby-boomers, late baby-busters, and other birth cohorts in the United States. The model helps explain a number of differentials in welfare dependency and family formation, whether they are black/white differences or changes over time.*

### 1. Introduction

This paper offers a model that aims at improving our understanding the determinants of the welfare dependency of lone mothers. This model analyzes women's choices among three alternative 'careers' and 'life-styles': welfare dependency, labor force participation, and marriage. It is a rational choice model in the tradition of the New Home Economics (NHE) pioneered by Jacob Mincer (1962, 1963) and Gary Becker (1960, 1965).

As is apparent from empirical research by Bane and Ellwood (1983), O'Neill and et al. (1984), Ellwood (1986), Tienda (1990), and others, most exits from welfare dependency result from changes in marital status and not from changes in job status. The relevance of marriage choices to the analysis of welfare is also evident from a number of studies indicating that better marriage market conditions for women, measured in terms of higher sex ratios, decrease the likelihood of welfare dependency (see e.g. Fitzgerald (1991, 2003) and Winkler (1994)).

Rational choice models of welfare dependency rarely lead to predictions regarding the effect of marriage market conditions on welfare choices. In fact, many of these models do not even deal with the decision to marry. That is the case, for instance, of most welfare-work choice models such as Moffitt (1983) and most consumer choice models such as Nechyba (2001). As for the rational choice models of welfare dependency that deal with the decision to marry, such as Becker (1981), Danziger et al. (1982), Rosenzweig (1999), Neal (2002), and Fertig, McLanahan, and Garfinkel's (2003), these models either fail to take account of marriage market

conditions or they ignore choices between welfare dependency and labor supply. The model of welfare dependency and lone motherhood presented here incorporates both marriage market effects and choices between welfare and work.

Integrating three choices—labor force participation, welfare, and marriage—into one rational choice model requires simplifying assumptions. In addition to the assumptions typically found in most economic models of decision-making in the household, and following Grossbard (1976) the model also assumes:

1. *Individual control of time in marriage.* Most economic models don't specify who in the household decides on the allocation of a particular household member's time. The following model assumes that individuals are the decision-makers regarding the allocation of their own time before, during, and after marriage.

2. *Work-In-Marriage (WIM).* Some previous models of decision-making in households distinguish between leisure and household production (e.g Gronau 1977). This distinction is also made here. In addition, household labor is separated into work that benefits the spouse (called Work-In-Marriage or spousal labor) and work that benefits the decision-maker.<sup>1</sup> Women tend to supply more WIM than men. This is closely related to what anthropologists have called women's 'genetrical' power, i.e. their capacity to have children and to raise them (see Grossbard 1976). Genetrical power or human capital is possibly a large fraction of married women's human capital, especially in countries with high fertility.<sup>2</sup> WIM can be either a part-time or a full-time occupation. Full-time housewives and husbands only work in WIM and not in the labor force. Today in the West, a majority of WIM workers work part-time in WIM while being employed in the labor force.

3. *Quasi-wages.* It is assumed that Work-In-Marriage (WIM) can be compensated with an income transfer. Bargaining models of marriage such as Manser and Brown (1980) and McElroy and Horney (1981), and Chiappori's (1992) collective model also open the door to

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<sup>1</sup> Gronau does not distinguish between time-consuming activities benefiting the self and those benefiting the spouse. To Gronau it does not matter if I washed my own socks or if I washed those of my husband.

<sup>2</sup> Using data from a polygamous society with practically no LFP (labor force participation), Grossbard (1986) estimates empirically the proportion of women's WIM demanded by men that consists of genetrical services and of services not related to reproduction and parenting.

the possibility that spouses compensate each other for doing certain forms of household production. Translating this transfer into an hourly rate implies that a quasi-wage for Work-In-Marriage has been established. In contrast to other models of decision-making related to household formation, it is assumed that those aspiring at marriage and willing to supply WIM are aware of the level of quasi-wage they can possibly obtain from a prospective spouse. This quasi-wage could have been established in a market, and various individuals participate in different markets for WIM. Market conditions possibly vary according to a number of characteristics, including gender, education, and ethnicity.

These assumptions enable us to analyze work in the household in a manner similar to paid work for an employer and to conceive of marriages as non-profit firms. This opens the door for borrowing analytical tools from labor economics. This analysis can help explain black/white differences in women's welfare dependency, labor supply and marriage. It can also help explain cohort differences in welfare dependency, and therefore help explain time trends.

## **2. An Individual Optimization Model**

*Four careers.* The decision-maker is a rational individual who has not yet made any commitments to a career. The individual compares costs and benefits of four different groups of future activities that can be termed a 'career' or 'occupation': self-reliance, and three forms of making a living: working for a firm, depending on the state by becoming a welfare recipient, or marriage to a spouse who pays the bills. That people may not need any outside source of income or that they make a living by working for firms is self-evident. What needs elaboration is why the other two sources of income can be likened to a career.

*Welfare dependency as a career.* Welfare dependency as a life-style is a choice that is generally easier for women than for men. Even today, after welfare reform, it is not very difficult for a young woman in the United States to plan for her income and living expenses to be covered by government agencies for a substantial fraction of her immediate future.<sup>3</sup> If she has a baby and is sufficiently poor, she will qualify for government support in the form of cash income, housing privileges, health care and other possible in-kind benefits.

Welfare dependency involves benefits and costs.<sup>4</sup> The time costs include the opportunity

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<sup>3</sup> The idea that single poor women may have chosen to have children as a career is also found e.g. in Murray (1984) and Nechyba (2001).

<sup>4</sup> On costs of being on welfare, see also Moffitt (1983) and Nechyba (2001)

cost of time-consuming requirements established by welfare agencies. There also are direct costs of giving up certain freedoms. For instance, in the US the state limits welfare recipients' freedom to negotiate mutually agreeable arrangements with a sexual partner (see Brito 2000). The cost of qualifying for welfare also involves the stigma associated with welfare dependency.

*A career in marriage.* This alternative is also more available to women than to men. Women can plan on getting income from a man who wants a wife and is willing to pay for that. For simplicity, the man will be called husband, the woman will be called wife, and the term 'marriage' will be used to describe all forms of coupleship that involve income transfers from husband to wife.<sup>5</sup>

*Who will pay for my baby?* The rational decision-maker chooses between any of these four careers or life-styles, or combinations thereof. The following model focuses on women. Women have genetricial human capital, capital that is possibly valued by either the state—if they become welfare moms<sup>6</sup>—or by a husband/partner. In the tradition of labor economics and following Grossbard (1976) transactions involving women's human capital in marriage are modeled as an exchange of income for a flow of services.<sup>7</sup>

Few individuals may simultaneously be at the margin between all four careers. For some, the main choice is between "occupation: wife" and a career in the labor force (see Grossbard-Shechtman 1984).<sup>8</sup> The younger the decision-maker and the less they have made any career commitment, the more choices are feasible.

Marriage (coupleship) is conceived as a form of firm. Even though this firm may be owned as an equal partnership, some members of the couple tend to be the workers, and some members of the couple tend to be the employers. If men are the employers and women the workers, men transfer income to women. Income transfers in coupleship are then expressed in men's willingness to pay for the bills that provide goods and services used by the woman. If women are the employers and men the workers, women transfer income to men. An individual's willingness to pay bills is expected to be a function of the other's production in Work-In-Marriage (in turn a function of her productivity) as well as market conditions that establish a quasi-wage for such work (see below). For instance, the more a society values children, the higher men's demand for women's WIM and the higher their willingness to pay for a given amount of women's WIM. For instance, the more men appreciate that

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<sup>5</sup> The term 'coupleship' is borrowed from Sharon Wegscheider-Cruse (1988). Marriage does not need to involve such income transfers.

<sup>6</sup> In the same vein, Clarke and Strauss (1998) consider children born to lone mothers as 'income producing assets.'

<sup>7</sup> In contrast to how labor economists traditionally analyze human capital, Edlund (2002) models a transfer of rights over the child as a one-time sale of human capital.

<sup>8</sup> The term spousal labor was used in the 1993 version of the model (Chapter 3 in Grossbard-Shechtman 1993). The original 1984 version used the term household labor.

their wife takes the kids to soccer, the more husbands will be willing to pay bills benefiting the wife. If it is the women paying men for investing time in their child, the more they appreciate such father's input, the more they will be willing to pay a man for acting as a father to their children. In the more formal presentation that follows, it is assumed that men pay women and not vice-versa.

**The time constraint.** Women of childbearing age are assumed to solve the following maximization program for a representative day in their future. If  $l$  denotes time allocated to labor,  $m$  spousal labor or Work-In-Marriage (WIM),  $s$  self-oriented time, and  $a$  is time on welfare, then the time constraint is

$$(1) \quad T = l_i + m_i + a_i + s_i,$$

where subscript  $i$  is an individual woman and  $T$  is the maximum time available (e.g., 24 hours on a representative day). It is assumed that while married, a person continues to keep control of the use of her time, and therefore *all Work-In-Marriage (WIM) has an opportunity cost*: the value of time spent on leisure defined as an activity that is a person's preferred use of time.<sup>9</sup>

It is assumed that these four uses of time are exclusive, i.e. that time spent at work in the labor force is not spent working in marriage or qualifying for welfare, time spent qualifying for welfare is not spent working in marriage or working in the labor force, and time spent working in marriage is not spent working in the labor force or qualifying for welfare. The incompatibility between welfare dependency and marriage was clearcut when the major welfare program in the United States was Aid for Families with Dependent Children (AFDC), a program that was available mostly to unmarried mothers. Since 1996 AFDC has been replaced by TANF (Temporary Assistance for Needy Families) and it is easier for couples to qualify for state assistance. Therefore currently the choice between welfare dependency and coupleship (including marriage) is not as drastic as it used to be before 1996. Nevertheless, this choice continues to be relevant to poor women, e.g. because lone mothers are more likely to qualify for public housing. An institutional expression of the substitutability between marriage and state can be found in welfare laws requiring that child support payments by fathers of children on welfare be used to reimburse the state.

**Utility function.** Individual women are assumed to maximize a utility function  $U$  that includes the four uses of time mentioned above. Furthermore individual women  $i$  derive utility from the goods and services that they purchase: services they obtain from a spouse (spousal labor  $m$  supplied by man  $j$ ) and all other goods and services  $x$  (commercial goods). Individual women

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<sup>9</sup> The model can be extended to include household produced goods consumed jointly by husband and wife.

accordingly have utility functions:

$$(2) \quad U(s_i, l_i, m_i, a_i, m_j, x_i) = U_i(l_i, m_i, s_i, a_i, m_j, x_i),$$

Assuming monogamy is legally imposed, spousal labor can only be obtained from one spouse and hence only a single  $m_j$  appears in the utility function.

The marginal utility of labor and spousal labor (WIM) can be either positive or negative (it is positive e.g. if people derive satisfaction from contributing to others' well-being). Restrictions imposed by welfare programs, the direct costs of welfare dependency and the stigma involved in being on welfare create disutility from this use of time. It is assumed that the unpleasant aspects of labor, spousal labor, and time on welfare dominate and that these activities generate disutility. This implies that the first derivatives of  $U$  according to  $l$ , own  $m$ , and  $a$ , are negative.

Relaxing the assumption of exclusivity will lead to a higher marginal utility of work. For instance, if time on welfare can be combined with enjoyable leisure, the total marginal utility of time on welfare could be positive. Likewise, if time in WIM can be combined with enjoyable leisure, this raises the total marginal utility of WIM.

**The budget constraint.** It is assumed that each type of work involves a material compensation, and that the expected compensation for each type of work is established exogeneously. For example, wages are given to the individual. Likewise, it is assumed that the quasi-wage that a prospective spouse  $j$  can be expected to pay per hour of  $i$ 's spousal labor is also given. The next section will present a marriage market analysis that leads to the establishment of quasi-wage levels. Furthermore, it is assumed that the payoff to a unit of time spent qualifying for welfare is also given. Prices are given too.

On the expenditure side individual  $i$  can spend her income either on spousal labor supplied by spouse  $j$  or on commercial goods and services. The individual thus maximizes utility function 2 subject to time constraint 1 and a monetary budget constraint:

$$(3) \quad w_i l_i + y_i m_i + b a_i + V_i = p_i x_i + y_j m_j,$$

where  $w$  is market wage for labor,  $y$  is quasi-wage for spousal labor,  $b$  is the welfare benefit translated into an hourly payment,  $V$  is other income, and  $p$  is a price vector for

commercial goods and services. The left-hand side of the budget constraint indicates that possible sources of individual income consist of labor earnings, spousal labor 'earnings', welfare benefits, and other income sources unrelated to the three income-earning activities in the model. The right-hand side consists of the individual's expenditures on commercial goods and services and WIM supplied by a spouse.

**Optimality condition.** Maximizing utility function 2 subject to constraints 1 and 3 yields first-order conditions. Assuming  $p = 1$ , we derive the following optimality conditions from the first order conditions:

$$(4) \quad w_i + \frac{M U_{l_i}}{M U_{x_i}} = y_i + \frac{M U_{m_i}}{M U_{x_i}} = b + \frac{M U_{a_i}}{M U_{x_i}} = \frac{M U_{s_i}}{M U_{x_i}},$$

optimality conditions reminiscent of the optimality conditions obtained in traditional occupational choice models. Equation 4 indicates that in equilibrium the individual expects to derive equal amounts of dollar equivalents from each kind of work: work for firms and WIM (spousal labor) and these compensations for work be equal to the total value of being on welfare. The dollar equivalents generated by each kind of work consists of a given 'wage' plus the dollar value of the marginal psychic benefits that the individual woman derives from that activity (its marginal utility divided by the marginal utility of goods). The total hourly welfare compensation consists of welfare benefits translated into an hourly benefit plus the value of marginal disutility from being on welfare. In equilibrium, the value of each type of work to the person also has to equal the marginal rate of substitution between time for self and goods (the term on the right side of equation 4). Note that if we ignore the two terms in the middle of equation 4 and assume that labor in the LF does not carry any marginal utility (as is assumed in the Robbins model), optimality condition 4 collapses into the well-known leisure/goods trade-off.<sup>10</sup> Next, we derive testable predictions from optimality condition 4.

### 3. Deriving predictions regarding welfare dependency

A rational individual woman making a life-style/occupational choice compares the pay-off to welfare with the pay-offs to marriage and to work according to optimality condition 4. From this condition we can derive reservation wages for welfare dependency. Two such reservation wages can

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<sup>10</sup> Robbins (1930) assumes that the only reason why people work is to obtain a wage so they can purchase goods.

be defined: one comparing welfare to marriage and one comparing welfare to work in the labor force. If welfare and marriage are compared, the marriage-based reservation wage for welfare,  $ya^*$ , is equal to the quasi-wage for spousal labor *plus* the difference in value of marginal utilities of time on welfare and spousal labor. This is shown in equation 5:

$$(5) \quad ya^* = y + \frac{MU_m}{MU_x} - \frac{MU_a}{MU_x},$$

If welfare and labor are compared, the reservation wage for welfare,  $wa^*$ , is equal to the wage in the labor force *plus* the difference in value of marginal utilities between time on welfare and work. An equation for  $wa^*$  looks like equation 5 except that it is based on the wage and the difference between the value of the marginal utility of work and of being on welfare. Given that both marriage and work are alternatives to welfare, the relevant trade-off for the decision-maker will be a comparison either between the hourly welfare benefit and the marriage-based reservation wage  $ya^*$ , or a comparison either between the hourly welfare benefit the labor-force-based reservation wage  $wa^*$ , depending on which is highest. The decision to be on welfare or not is thus modeled as a function of the double comparison shown in function 6:

Welfare dependency is a function of parameters  $b$ ,  $w$ , and  $y$ , as is evident from expressions 5 and 6.

It is also a function of (6)  $A = A(b > or < ya^*, b > or < wa^*)$  parameters that influence all the relevant marginal utilities.

*Effect of welfare benefits.* Rational choice models of welfare dependency or lone motherhood tend to focus on how the level of welfare benefits influences welfare dependency (e.g. Moffitt 1993 and Nechyba 2001). As is the case with own wage effects in labor supply models, the effect of welfare benefits on welfare dependency includes both an income effect and a substitution effect. It is assumed that all income effects are negative. All substitution effects are expected to be positive, the substitutes being the various sources of income. We derive a well-known proposition: to the extent that the substitution effect dominates the income effect, the partial effect of  $b$ , hourly welfare benefit on  $a$ , time spent qualifying for welfare, is expected to be positive. In other words, we

obtain the familiar prediction that the higher the obtainable welfare benefits, the more women are likely to become welfare mothers. According to a recent survey of the literature, there is mixed evidence that more generous welfare benefits attracted more welfare dependency via lone motherhood (Nechyba 2001).

It follows from this analysis that in addition to the level of welfare benefits many other factors are expected to influence a rational woman's propensity to choose welfare dependency as a life-style.

*Work and marriage opportunities.* Next, let us consider the effect of compensation levels for the each form of work (work for a firm or work for a husband) on a woman's propensity to become a welfare dependent. It follows from the substitute nature of the various types of work that the compensated cross-wage effects will be negative. The higher the pay-off to one life-style relative to another, the higher the proportion of one's lifetime that will be spent in that life-style, and the smaller the proportion of time spent in the other life-styles. The higher the compensation for labor  $w$  or for spousal labor  $y$  that can possibly be obtained if one chooses those occupations, the higher the reservation wages for welfare dependency in terms of labor force or marriage, and the less the individual is likely to participate in welfare programs. In terms of participation function 6, this implies a smaller propensity to allocate time to qualifying for welfare,  $a$ .

*Effect of income not from work and price effects.* Another parameter that influences welfare dependency is income from sources other than work,  $V$ . Individuals with higher income from other sources  $V$  are expected to work less, to be less dependent on welfare, and to work less in marriage. This follows from the assumption that goods and leisure are normal and have a positive income elasticity. The effect of  $V$  is a pure income effect.

If prices for goods and the value of men's quasi-wages for spousal labor are higher, the higher cost of items on which women spend their income implies a lower real income and this leads to an increase in the supply of work and increased propensity to become dependent on welfare. Furthermore, the level of quasi-wages that women are expected to pay in order to obtain men's WIM will also affect a woman's choice of occupation due to possible complementarity or substitution between the two types of spousal labor. The more complementary these two forms of spousal labor, the more there are benefits to marriage as a lifestyle and the less welfare dependency is likely to be selected.<sup>11</sup>

*Effect of desire for children.* An individual woman's desire for children will influence her

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<sup>11</sup> see Grossbard-Shechtman (2003) for a more detailed discussion of the relationship between male and female WIM.

own utility function 2 in terms of willingness to supply spousal labor, willingness to demand spouse's spousal labor, and willingness to demand goods and services related to children. The more she wants children, the more she will organize herself to become a mother. If she is poor, she is more likely to want to become a welfare mom than a comparable poor woman with less desire for children. In terms of participation function 6, higher value of own children raises a woman's marginal utility of time on welfare  $a$ , and therefore lowers both shadow wages  $ya^*$  and  $wa^*$  and is likely to increase her supply of time on welfare.

*Effect of value of father in her eyes.* The more a woman considers it important that her child be raised by a father, the higher her marginal utility from supplying own spousal labor and from consuming the spousal labor of a man acting as her child's father. This leads to an increase in shadow wage  $ya^*$ , the shadow wage comparing welfare to marriage, and therefore to a reduction in the propensity for welfare dependency. Conversely, the more doubts a woman has about the value of (potential) husbands acting as fathers, the less she will be attracted by the option of spousal labor. If a woman grows up in an environment where 40% of all men have been incarcerated and many men can be expected to be jailed again, as is the case among the black respondents in the Fragile Families study (see Fertig, Garfinkel and McLanahan 2003), women are not very likely to expect men to be effective at co-parenting their children. The higher the incarceration rate of men in a young woman's neighborhood, the more she is likely to rationally opt for becoming a welfare mom. However, this assumes that welfare and coupleship are incompatible. Were welfare dependency and coupleship to be compatible, this prediction about the effect of a higher value of fathers does not hold.

*Effect of own education.* Own education is expected to be associated with lower female welfare dependency for at least two reasons. First, it raises the wage a woman can obtain in the labor market, leading to a higher work-based reservation wage for welfare dependency. Second, education is also expected to raise the quasi-wage a woman can obtain for her spousal labor if she marries, to the extent that education makes people more productive as spousal workers.<sup>12</sup> Indirect evidence that education raises women's quasi-wages in spousal labor can be found *inter alia* in the finding that educated women are less likely to divorce after marriage (Lehrer 2003), more likely to be in a married couple versus in an unmarried couple (Grossbard-Shechtman 1993), weaker effects of sex ratios on the labor force participation of more educated married women (Grossbard-Shechtman and Neideffer 1997, Grossbard-Shechtman and Amuedo-Dorantes 2003), and lower likelihood to share a husband with co-wives where polygamy is observed (Grossbard 1976).

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<sup>12</sup> Here it is possible that a year of high school education contributes more to the quasi-wage than a year of graduate school, i.e. that there is a non-linear relationship between education and quasi-wage for women's spousal labor (see Grossbard-Shechtman 1993).

So far it was assumed that quasi-wages for spousal labor or WIM,  $y$ , were given, and there was no discussion of how they may be established. The next section assumes that these quasi-wages are influenced by marriage market conditions and examines marriage market effects on welfare dependency. Here it is not only the characteristics of an individual woman that enter into consideration, but also the characteristics of all other men and women interacting in the same markets.

#### **4. Marriage market effects on welfare dependency.**

We concentrate on women's life-style choices and are not presenting markets for men's WIM. Quasi-wages  $y$  are possibly established at the intersection of aggregate demand and supply in the relevant market for wife-services.<sup>13</sup> We now perform a comparative statics analysis of the type that economists routinely perform in many areas of economics, including labor market analysis. A market for WIM is similar to other labor markets, given that marriage was defined as a particular kind of firm and WIM as a particular kind of labor. A demand and supply for women's WIM are pictured in Figure 1.

The aggregate supply of spousal labor is the sum of the individual supplies by all those women who participate in the same market. The aggregate demand is the sum of all individual demands for WIM by the men who participate in that market. Formally, both the supply and the demand for WIM by men and women can be derived from a rational choice model such as the one that was presented in the previous section.<sup>14</sup>

*Competitive market?* The justification for a standard market analysis lies in the assumptions underlying competition on the demand side, the supply side, or both. In line with Becker's (1973, 1981) competitive theory of marriage it is assumed that competitive marriage markets exist. Note that the degree of competitiveness in a marriage market is correlated with the ease of divorce: the more divorce is accepted in a society, the freer agents are to choose their mates, the lower the costs of exit and the more the assumption of competition applies. Furthermore, the expectation of high divorce costs in case a potential marriage runs into trouble

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<sup>13</sup> This assumption is the second major distinction between Grossbard's (1976) and Becker's (1973, 1981) theories of competitive marriage markets (the other major distinction being that in Grossbard (1976) each individual continues to control their own time allocation after marriage).

<sup>14</sup> This is done in Grossbard-Shechtman (1984) for a model with only two occupations: work in the labor force and WIM.

will cause high costs of entry into marriage.<sup>15</sup> Some institutional features of marriage can be interpreted as men's attempts to use political power to prevent the market value of women's quasi-wages for WIM from rising to its equilibrium level.<sup>16</sup> It is assumed here that even if markets for WIM are not free, market forces operate to some degree and therefore shifts in demand or supply in markets for WIM are expected to lead to fluctuations in quasi-wages in directions consistent with supply and demand analysis.

Standard labor market analysis teaches us that wages decrease when aggregate supply of labor increases or aggregate demand for labor decreases. Likewise, quasi-wages for WIM are expected to decrease when aggregate supply of WIM increases or aggregate demand for WIM decreases. Testing implications of demand and supply analysis is straightforward in the case of labor markets: we have plenty of evidence about wages that are reported in monetary terms. Labor market analysis is so prevalent that many of us know viscerally that when there is an excess demand for a particular occupation at existing wage levels, market forces are likely to bring wages up. In contrast, we don't have direct evidence about quasi-wages for WIM/spousal labor. A graph such as Figure 1 is an abstract concept that does not appeal to us viscerally, the way that regular labor markets can.

Nevertheless, the concept of marriage market as a market for WIM is useful if it can help us explain variations in welfare dependency. Even though we can't measure quasi-wages for WIM,  $y$ , we can use the concept to infer theoretical insights on the effects of measurable factors  $X$  that are likely to influence  $y$ , and therefore welfare dependency, a function of  $y$ .

More formally, the reasoning is as follows: according to function 6, welfare dependency is a function of the marriage-based welfare reservation wage,  $ya^*$ . In turn, the reservation wage  $ya^*$  is a function of  $y$ , the quasi-wage that women can obtain for supplying spousal labor, and  $y$  is a function of factors  $X$  that cause shifts in the demand or supply of WIM. Therefore we can write welfare dependency as a function of  $X$ , the factors affecting a market for WIM, as follows:

$$(7) \quad A = g[y(X)] = h(X)$$

This circumvents measurement problems: we can measure welfare dependency  $A$  and we can consider measurable factors  $X$  related to marriage market conditions. So even if we can't measure marriage market conditions, we can assess whether factors related to marriage market conditions possibly impact welfare dependency in the directions predicted from a competitive

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<sup>15</sup> This point was also made by Freiden (1974).

<sup>16</sup> Guttentag and Secord (1983) have led the way in pointing out that the relative value of women in society is likely to vary with men's manipulation of the political and legal system.

marriage market model.

*Analogy with marriage market effects on labor force participation (LFP).* In analyzing marriage market effects on women's propensity to become dependent on welfare it is useful to explore analogies with marriage market effects on women's LFP. It follows from the optimality conditions 4 that the same quasi-wage for WIM,  $y$ , is expected to influence an individual woman's decision to participate in either a welfare program or the labor force, and therefore the same factors  $X$  are expected to influence both welfare dependency and labor force participation in the same direction, although not necessarily to the same degree.

The analogy can be illustrated using the example of the derivation of a predicted effect of men's income. In the case of  $y$ , the quasi-wage for WIM, we can write (see Grossbard-Shechtman and Neuman (1988):

$$(8) \quad y = k(X) \cdot I,$$

i.e. quasi-wage  $y$  is a function  $k$  of potential husbands' income  $I$ . In turn, that function  $k$  varies with factors  $X$  that affect demand and supply in markets for WIM. Given that LFP (especially after marriage) is based on a comparison between quasi-wage and wage, it follows that

$$(9) \quad LFP = k'(X).$$

Equation 7 and 9 are very similar: they indicate that marriage market factors  $X$  are expected to have an impact on both a woman's likelihood of being in the labor force and her likelihood of becoming dependent on welfare. The better material opportunities a woman has in marriage, the less she is likely to either become a welfare mom or become committed to a career in the labor force. Therefore, existing evidence that marriage market factors appear to affect married women's LFP can possibly shed light on our understanding of how marriage opportunities affect welfare dependency. This can be useful given that there are few research findings currently available to confirm the prediction of marriage market effects on either women's LFP or welfare dependency. We are now ready to examine a number of factors that belong in the vector  $X$ , how these factors are expected to affect women's propensity to go on welfare and whether the existence evidence supports the prediction.

***Markets and Spatial Concentration.*** Markets are spatially segmented, and marriage market

analysis helps explain why welfare-dependent populations of lone mothers would concentrate spatially. This analysis complements Nechyba's (2001) cultural explanation for that spatial concentration. According to Nechyba illegitimacy rates in Harlem are considerably higher than in Long Island due to the fact that if illegitimacy was slightly higher originally, higher levels of illegitimacy trigger more social acceptance of illegitimacy and therefore lead to increasing numbers of women choosing illegitimacy as a state-supported life-style.

The marriage market argument made here provides an alternative explanation for the concentration of welfare recipients in areas such as Harlem: such areas are characterized by bad conditions in markets for women's spousal labor, leading to low reservation wages for welfare and therefore more welfare dependency. This market explanation can be empirically distinguished from Nechyba's cultural explanation to the extent that factors  $X$  can be measured and when they are included in empirical analyses of welfare dependency this eliminates the explanatory power of location. To examine this possibility more in detail, let us first examine individual factors expected to affect conditions in markets for women's WIM. This includes factors affecting supply, factors affecting demand, and factors affecting both demand and supply.

*Factors affecting the supply of women's WIM.* Women's WIM markets are influenced by any factor that causes a shift in either men's aggregate demand for this WIM or in women's aggregate supply of WIM. The factors influencing women's aggregate supply of WIM include all the factors likely to influence individual women's supply of welfare dependency that were discussed in the previous section: work opportunities, marriage opportunities, non-work income, prices, value of children, value of a father in a prospective woman's eyes, and education. These and other factors are expected to affect not only a woman's propensity to chose welfare dependency, but also to affect her propensity to chose marriage, and therefore to affect the market supply of women's WIM in a given market for WIM.<sup>17</sup> Note that the same factors will also affect women's demand for WIM supplied by men, such as fatherhood services. The following WIM supply-shifting factors are considered: aggregate female income, aggregate female education, and sexual norms.

- The likelihood that a woman of given characteristics joins the welfare rolls and acts in ways that facilitate welfare dependency (such as having a child on her own before she has accumulated much human capital) is a function of the income of the other women who participate in the same markets for labor and marriage. When the other women residing in her proximity have lower real incomes, aggregate supply shifts to the right in the market for women's spousal work (and in the labor markets in which

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<sup>17</sup> The terms market supply and aggregate supply are used interchangeably.

that woman participates). *Lower aggregate female incomes reduce market-clearing quasi-wages for WIM, thereby lowering a given woman's welfare reservation wage in terms of marriage ( $y_a^*$ ). In turn, lower welfare reservation wages encourage welfare dependency.* So welfare dependency is not simply a function of a woman's own income. It is also a function of the income of other women affecting a given woman's market value in markets for labor and marriage. A woman will be hurt directly by her own limited opportunities in the labor market. She is hurt indirectly by the fact that if most women are doing poorly in the labor market and have low incomes in a given marriage market, marriage-based reservation wages are lower. The more desperate the competition among women for a given number of men eligible to become partners and fathers, the less it is likely that a given woman will find a suitable partner and/or father and the lower equilibrium quasi-wages for women's WIM. Her own low income from labor and other women's low income from labor push a given woman into the same direction: increased dependency on welfare.<sup>18</sup> This offers a first explanation for the concentration of welfare mothers in places like Harlem, where job opportunities for women are limited.

- *Education* may enhance both productivity in the labor force and productivity in marriage. To the extent that education primarily enhances productivity at work, the more educated the women in a particular woman's marriage market, the lower the aggregate supply in that market for WIM. This implies higher quasi-wages for WIM for those women interested in supplying WIM. This could help prevent welfare dependency among poor women aspiring for a family of their own. However, to the extent that women's education primarily enhances their productivity in WIM and therefore raises men's demand for WIM, locations with more educated women will be detrimental to the market conditions faced by aspiring mothers who are poor and uneducated. Their market value will be lower where there are more educated women competing for the same men. Higher availability of educated women lowers the aggregate demand for the WIM of uneducated women and therefore leads to a reduction in the quasi-wage that a poor and uneducated woman can expect to obtain if she opts for marriage. The reservation wage being lower, her chances that she will

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<sup>18</sup> Also, as far as demand for men's WIM is concerned, lower women's incomes will decrease the demand for men as partners and fathers. This also lowers men's equilibrium quasi-wages for WIM.

become a welfare mom are higher. The spatial concentration of welfare mothers in places like Harlem can also be explained in terms of the low education of women in Harlem. High concentration of welfare dependents among women with low education suggests that marriage markets penalize women with low education.

*Factors affecting men's aggregate demand for women's WIM.* The likelihood that an individual woman chooses welfare depends on equilibrium levels of quasi-wage, and therefore depends as much on men's demand for women's WIM as on women's supply of that WIM. Furthermore, if men also supply WIM, their supply of WIM and women's demand for men's WIM will also play a role. The following demand-side factors are considered next: aggregate male income, men's valuation of children, and norms.

- That a woman's propensity towards welfare dependency will vary with *men's incomes* in that woman's marriage market is a well-known insight (see, for instance, Wilson (1987)). Women are more likely to participate in welfare programs where and when fewer high-income men participate in marriage markets, or when men's average income declines. This assumes that women's WIM is normal in the sense that its demand by men varies positively with men's income. *Declining male incomes lower the demand for women's WIM, lower market-clearing quasi-wages for this WIM, lower the shadow reservation wage based on marriage,  $y^*$ , and therefore increase the likelihood of welfare dependency.* The high concentration of poor income men in places like Harlem offers another economic explanation for the spatial concentration of welfare recipients.

*Factors affecting Demand or Supply: sex ratios.* Some factors affect both demand and supply. This includes sex ratios and institutional factors such as norms about sexual behavior, reproduction, and contraception, and laws regulating male/female relationships. In spousal labor markets with large numbers of men relative to the number of women, i.e. high *sex ratios*, quasi-wage  $y$  for women are expected to be higher, and therefore when sex ratios are high one expects less welfare dependency (and less participation of women in the labor force, see above).<sup>19</sup> Using the terms 'marriage markets' and 'markets for women's spousal labor' interchangeably, it follows that *women are less likely to depend on welfare where and when there are more men participating in marriage markets for a given number of women, i.e when sex ratios are higher.* A number of scholars have derived this insight in the past and empirical evidence for sex ratio

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<sup>19</sup> Heer and Grossbard-Shechtman (1981) is one of the first publications that attributed the rise in illegitimacy in the late 1960s to a drop in the sex ratio.

effects on women's welfare dependency is available. For example, negative sex ratio effects on welfare dependency were found using individual data on entry and exit of AFDC and city variation in sex ratios (e.g. Fitzgerald 1991,2003; Winkler 1993). We can also learn from evidence regarding sex ratio effects on women's LFP. Sex ratios, i.e. the ratio of men to women in marriage markets seem to be negatively associated with married women's labor supply (see Grossbard-Shechtman and Neideffer 1997, Chiappori, Fortin and Lacroix 2000). Note that the evidence supports the predictions that higher sex ratios be associated with both lower LFP and lower welfare dependency for women, but that theoretically and empirically welfare dependency rates and LFP rates are inversely related.

*Factors affecting Demand or Supply: norms and laws.*

- As recognized by Heer and Grossbard-Shechtman (1981) and Akerlof, Yellen, and Katz (1996), marriage markets are affected by prevailing *reproductive technology and sexual norms*. The fewer alternatives to coupleship are available and the more costly they are (e.g. because good contraceptive methods are not easily accessible), the more women are likely to resort to marriage and coupleship in order to satisfy their sexual needs (as opposed to sex without commitment and partnership) and the less it is likely that women will chose to be lone mothers. This effect is on the supply side. The *more the men participating in a particular marriage market value children*, the higher women's quasi-wages for WIM are expected to be and therefore the higher reservation wage  $ya^*$  and the lower welfare dependency is expected to be. We are not talking solely about how many children men want, but also about their demand for quality children. It is possible that where welfare moms concentrate more both men and women place more value on having children. The more important it is to poor people to experience parenthood, the larger the gap between how many children men and women can afford to have and how many children they want to have, the more likely women are to go on welfare.
- The availability of *abortions and contraceptives* will influence not only the supply of WIM by women, but also the demand for WIM by men. The more there are alternatives to sex in marriage/coupleship, the lower men's aggregate demand for WIM is expected to be (see also Akerlof, Yellen and Katz 1996). This will lower the *reservation wage  $ya^*$  and increase expected welfare dependency*.
- Also influencing men's demand for women's spousal labor are men's preferences for *a traditional division of labor* and their willingness to pay for it. The more traditional

men are, the higher men's demand for WIM and the higher the quasi-wages that men are willing to pay if quasi-wages are allowed to fluctuate according to market forces. This will draw women away from welfare dependency. It will also draw them away from LFP, especially if they are married.

- Nechyba's explanation for the spatial concentration of welfare mothers in places like Harlem is that norms there are more accepting of alternatives to coupleship. That begs the question of why? Economic analysis can also possibly help explain the emergence of norms regarding reproductive behavior, as argued in Grossbard-Shechtman and Mincy (2003).
- Men's aggregate demand for female spousal labor is expected to be lower where laws prohibit *polygamy*. When polygamy is found, it mostly consists of men marrying more than one wife. It was predicted in Becker's (1973) theory of competitive marriage markets that women's value in marriage will be higher in polygamous societies. However, if political economy is taken into consideration, as suggested by Guttentag and Secord (1983), a higher demand for wives does not necessarily translate into higher values of what is called here the higher quasi-wage for WIM. When demand is strong relative to supply there are extra incentives for men to manipulate the political system to set equivalents of minimum quasi-wages in markets for women's WIM. To the extent that informal polygamy is found in the U.S. and that it varies by ethnic group, preferences regarding informal polygamy could help explain variations in welfare dependency, coupleship, marriage, and LFP. More specifically, where both men and women are more tolerant of polygamy, the relative value of having a child in marriage will be lower and welfare dependency among the poor is more likely to be observed. Again, this can offer an explanation for concentration of welfare dependency in certain areas of the US, where cultural norms may be more accepting of *de facto* polygamy.
- Also relevant to equilibrium conditions in markets for WIM are *divorce laws*. For example, as argued in Grossbard-Shechtman, Ekert-Jaffe and Lemennicier (2002), legal regimes ruling on property division in the tradition of common law tend to offer lower quasi-wages for women's WIM than legal regimes offering division rules based on community property. It is possible that in the U.S. welfare dependency is a function of whether a state has community property rules or not. The prediction is that relative to a common law state, in a state with community property where

women can expect more protection in case of marriage and subsequent divorce, women are more likely to have children in couple and less likely to be lone mothers on welfare.

***Application: Harlem versus Long Island. .***

We saw a number of ways by which marriage market analysis leads to the unobservable prediction of lower quasi-wages for female WIM workers in Harlem than on Long Island, and therefore to the observable prediction that welfare dependency will be higher in Harlem than in Long Island. Harlem is predominantly African American, and Long Island is predominantly Caucasian. To make it simple, let us use the terms black and white. Marriage market analysis can help explain many black/white differentials in welfare dependency.<sup>20</sup> The following factors lead to the prediction that welfare dependency will be higher for blacks than for whites: black women's lower expected wage incomes, black men's lower expected wage incomes, lower non-labor incomes for blacks, and lower sex ratios for blacks.<sup>21</sup>

There are at least three reasons why on average black women in the United States may be faced with less favorable marriage market conditions than their white counterparts. First, there is a tendency for intra-group marriage (endogamy) and a relatively small number of marriageable black men per marriageable black woman in comparison to the number of marriageable white men per marriageable white woman, due e.g. to large numbers of young black men who are either incarcerated or on parole. Second, there is a tendency for endogamy and black men have lower incomes than white men. Third, there are considerably higher rates of inter-group marriages (exogamy) involving a black man and a white woman in comparison to marriages between black women and white men: according to Michael et al. (1995) there were four times more intermarriages between black men and white women than among black women and white men. More recent data indicates that black men/White women marriages are about twice as popular as black women/White men marriages (Cose 2003). The demand by black men for white women's spousal labor thus appears to exceed white men's demand for black women's spousal labor. These three reasons imply higher equilibrium quasi-wage values for white women's spousal labor than for black women's spousal labor, and therefore higher welfare dependency rates are expected among black women than among white women.

Indeed, it has been documented that ceteris paribus black women are more likely to

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<sup>20</sup> The theory also leads to predictions in black/white differences in marriage and labor supply (see Grossbard-Shechtman 1995).

<sup>21</sup> Robert Cherry (1998) assumes that the equivalent of what I call the quasi-wage for women has a negative value. Many of his examples relate to the marriage market for blacks in the U.S.

participate in welfare programs than white women (Ellwood and Bane 1985, Moffitt 1992, Hoffman, Duncan and Mincy 1991, Keane and Moffitt 1995). Explaining the difference between Harlem and Long Island in terms of different marriage market conditions, as is done here, is more appealing than Nechyba's cultural explanation for spatial concentration in illegitimacy and welfare dependency implying cultural differences between blacks and whites in America that lie beyond the realms of economics. Nechyba's reliance on the concepts of networking and informational cascades begs the question as to why the women who start trends in Harlem, eventually spreading their message via networking and cascades, are different from the trend setters in Long Island.

***Application: changes in welfare dependency over time.***

Changes in sex ratio over time can help explain fluctuations in welfare dependency over time. Much of the rational choice literature on welfare dependency has dealt with historical evidence on welfare benefits and rates of welfare dependency. It is clear that the two time series do not fluctuate parallelly during most of the period we have data for. Cohort differences in marriage market conditions can help explain why simply juxtaposing fluctuations in the real value of welfare benefits with fluctuations in welfare dependency rate does not necessarily lead us very far (see Heer and Grossbard-Shechtman 1981 and Guttentag and Secord 1983): one also needs to control for changes in sex ratio over time, changes that have been quite substantial since 1965.

Cohort variations in sex ratios over time follow from two facts: (1) that men are typically older than the women they date and marry, apparently the result of a preference women have for marrying older men as well as a preference of men for marrying younger women, and (2) fluctuations in number of births over time. On average the age difference at first marriage in the United States stands at 2 years and has not changed much in the last 50 years.

First baby-boom women seem to have experienced lower sex ratios than previous or later cohorts. Let us define first baby-boom women as those born in the years 1946 to 1950, right after World War II. Assuming a fixed age difference at marriage of two years, US census data indicate that for every 100 women born in the years 1946 to 1950, there were 87 men born in the years 1944 to 1948, implying a shortage of 13 men for every 100 women (see Grossbard-Shechtman 2000). Given such shortage of men, it is expected that women born in those years have lower quasi-wages for WIM. This leads us to predict that first baby-boom women would have experienced a higher welfare dependency than other cohorts with more balanced sex ratios, comparing women at ages most prone to welfare dependency at different points in time. Conversely, women born in the cohort with the highest sex ratio (women born in the years 1971 to 1975: there were 107 men born in 1969

to 1973 for every 100 women born in 1971-1975) are expected to benefit from high quasi-wages relatively to other cohorts with more balanced sex ratios and therefore to have experienced unusually low increases and possibly decreases in welfare dependency when at ages most prone to giving birth and becoming dependent on welfare.

These cohort differences in sex ratio help explain some of the time trends in welfare dependency in the U.S. It also helps explain the simultaneous increase in women's labor supply and welfare dependency observed in the mid-sixties. A very large increase in welfare dependency and out-of-wedlock births started in the U.S. around 1965: the percentage of all births occurring out of wedlock increased from 5.3 percent in 1960 to 14.3 percent in 1975 (U.S. National Center for Health Statistics, 1976). The increase in the proportion of all births occurring out of wedlock coincided with an increase in the proportion of children receiving AFDC payments (Heer and Grossbard-Shechtman 1981): the proportion of all children under 18 receiving AFDC payments increased from 3.5 percent in 1960 to 11.9 percent in 1975 (U.S. Bureau of the Census 1976). Moffitt (1992 Figure 1) also shows that AFDC caseloads, after having grown slowly from the inception of AFDC in 1935 until the mid-1960s, exploded around 1965.

Low sex ratios leading to low quasi-wages for the WIM of women born in the baby-boom help explain the rapid increase in AFDC participation in the late 1960s. It is then that first baby-boomers (born in the years 1946 to 1950) reached age 20 and entered markets for dating and marriage.<sup>22</sup> Framing women's propensity to go on welfare as a three-way choice between labor force, welfare, and marriage, helps explain why these early baby-boomers experienced such dramatic changes in welfare dependency. Lower sex ratios led to lower quasi wages relative to women born in earlier cohorts (let us say ten years earlier) thus lowering marriage-based reservation wages for welfare dependency. This leads to the prediction that women born in cohorts with low sex ratios (as a result of a baby-boom) will experience faster increases in welfare dependency. This explains the fast increases after 1965, when first baby-boomers were reaching the right age for childbearing. Furthermore, the same reasoning also leads to the prediction after marriage first baby-boom women would join the labor force in greater numbers than their predecessors. Indeed, it has been shown that when married these generations of women also experienced rapid increases in labor force participation (Grossbard-Shechtman and Granger

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<sup>22</sup> Their immediate predecessors, born during World War II, may also have experienced increased welfare dependency rates in terms of a marriage market analysis. There had actually also been a baby-boom from 1937 to 1943, and the sex ratio dropped for the generations of women born during World War II, relative to the women born before the end of the depression. However, in absolute terms, these were small cohorts. Even though their marriage market conditions had changed, their numbers may not have been large enough to cause a change in norms.

1998, Grossbard-Shechtman and Amuedo-Dorantes 2003). Here is thus one powerful explanation accounting for two dramatic changes in the behavior of American women observed after 1965: rapid increases in welfare dependency and just as rapid increases in labor force participation.

The same reasoning leads to the expectation that as sex ratios moved back up and marriage markets regained more balance, increases in welfare dependency and labor force participation of women would either reverse themselves or occur at a lower pace. As far as married women's LFP is concerned, Grossbard-Shechtman and Amuedo-Dorantes (2003) found that women born in cohorts with high sex ratios, such as the women born in the years 1971-75, have experienced very slow increases in their LFP after marriage, and sometimes decreases in that LFP. We also observe decreases in welfare dependency for these cohorts, but the enactment of welfare reform during these years makes it difficult to separate the effect of an improvement in marriage market conditions from the effect of a policy change.

Most previous explanations of trends in welfare dependency have focused on the effects of welfare benefits, choices between work and welfare, and changes in sexual norms. These explanations help explain particular turning points in welfare dependency, but they don't explain the simultaneous dramatic increases in welfare dependency of single women and LFP of married women that were observed in the late 1960s and early 1970s. Theoretical models that focus on the choice between welfare and work can't explain this at all. But this makes clear sense in terms of the theory of welfare/work/marriage trade-offs presented here.

Furthermore, the theoretical perspective presented here throws new light on more recent developments such as the effect of welfare reforms implemented in the US in the mid 1990s. These dramatic reforms were expected to make many women and children homeless, but that did not happen. The success of the welfare reform—large reductions in welfare dependency without noticeable increases in homelessness—can possibly be attributed at least in part to the fact that at that time conditions in the marriage markets influencing young women of childbearing age were favorable to women. Men born in cohorts of high sex ratios, with relatively few women to choose from, may have filled some of the gaps left by government agencies, and by increasing their willingness to marry their babies' mothers. Men may also have increased their commitment as co-parents outside of marriage, as the period during which welfare reform was enacted witnessed some rapid growth in alternative institutions for co-parenting (see Mincy XXX).

Marriage market changes by cohort could also influence time series analyses of effects of child support enforcement programs. If we observe that tougher programs are apparently effective in getting more men to support their children, this result may be spurious, i.e. not reflecting that such

policies are successful. It could be that just around the time that tougher policies were enforced the high sex ratio cohorts born in the 1970s were replacing earlier cohorts of women. Favorable marriage market conditions (high quasi-wages for WIM) may have led increasing proportions of fathers to agree to pay child support both while living with their child's mother and after the couple separated.

***Application: Combined effect of Sex Ratios and Men's Income***

Different marriage market conditions can also influence the effect of men's income on women's welfare dependency. In a marriage market characterized by a strong demand for women's spousal labor, one expects to see high average quasi-wages for women's WIM. Given that men pay for these quasi-wages out of their income, this implies that where quasi-wages for women's spousal labor are high (for a reason other than high men's income), married men share a relatively high proportion of their income with their wife. The more income men share with their wife in a marriage market, the more women's quasi-wages are expected to vary with men's incomes, the more the marriage-related reservation wage of welfare will vary with men's income, and therefore, *women's participation in welfare programs is more likely to vary with men's income where and when marriage market conditions are relatively favorable to women.*

Applied to black/white comparisons, this hypothesis leads us to predict that white women's welfare dependency will be more sensitive to changes in men's income than black women's welfare dependency. Fitzgerald (1991) documents evidence for this hypothesis in his study of cross-city comparisons in women's welfare dependency and men's income, performed separately for blacks and whites and controlling for a number of other variables as well.<sup>23</sup>

Applying this insight to explain changes over time, one expects that men's income would explain more variation in women's age-specific welfare dependency for women born during a baby-bust than for women born during a baby-boom.<sup>24</sup>

***Application: Combined Effect of Sex Ratios and Women's Education***

Where markets for women's spousal labor establish low quasi-wages for all women (educated or not), quasi-wages for women's spousal labor are not expected to vary as much with education than in markets where quasi-wages are high. Assume that a year of education increases a

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<sup>23</sup> One can interpret in a similar vein Fitzgerald's (1991) finding that cross-city variation in sex ratios had more impact on white women's welfare dependency than on black women's.

<sup>24</sup> A similar prediction can be made regarding the effect of husband's income on wife's participation in the labor force. Comparisons of aggregate labor force participation rates for married women across cities in the U.S. indicate a stronger effect of married men's earnings on married women's labor force participation in 1960, before the massive entry of first-baby-boom wives into the labor force, than in 1970, after their entry (Bowen and Finegan 1969, Fields 1976). A recent time series analysis indicates strong male income effects (see Grossbard-Shechtman and Amuedo-Dorantes 2003).

woman's value in spousal labor. One expects a year of education to increase the marriage-based shadow wage for welfare dependency more in the strong marriage market than in the weak marriage market. Therefore to the extent that there is a marriage/welfare choice, the negative effect of education on welfare dependency of women will be stronger where average women's quasi-wages are high. It follows that to the extent that education improves marriage pay-offs, *education is more likely to prevent women from participating in welfare programs where and when marriage market conditions are relatively favorable to women.*

To the extent that overall weak conditions in markets for black women's spousal labor translate into lower pay-offs to marriage for educated black women, it follows that black/white differences in welfare dependency will be more pronounced for educated women than for less educated women. Evidence from the fragile families study indicates that black women with a college education are much more likely to give birth to children out of wedlock than white women with a college education (see Usdansky and McLanahan 2003).

Likewise, one expects differences in welfare dependency between babyboomers and babybusters to be stronger for educated women than for uneducated women. More educated women generally are less likely to go on welfare, but one expects that relatively more educated women will have children outside marriage at a time when low sex ratio cohorts populate the relevant age groups than when high sex ratio cohorts are at the prime age for welfare dependency via lone motherhood. This helps explain why in recent years marriage rates for educated women have increased relative to marriage rates for uneducated women.

There is evidence for a parallel prediction regarding the effect of women's own education on the labor force participation rates of married women. If black women really have lower quasi-wages for spousal labor than white women, it follows from this theory that they will experience stronger own education effects on labor supply. Evidence shows that black married women's labor force participation is more sensitive to years of schooling than white married women's (Carliner 1981 and Lehrer 1992). There is also evidence of such interaction between marriage market conditions and education in a study of the labor force participation of married women belonging to different ethno-religious groups in Israel (Grossbard-Shechtman and Neuman 1998).

***Application: Combined effect of Sex Ratios and Number of Children.***

One expects that the quasi-wage for single childless women will exceed that obtainable by single women who already had a child, to the extent that men would rather not take care of another man's child. Each additional child is expected to lower a woman's market quasi-wage for spousal labor. In a strong market for women's spousal labor the quasi-wage premium a woman may obtain

for having fewer children is expected to be higher than in a weak marriage market. It follows that the *more favorable marriage markets are to women, the more number of previous children born out-of-wedlock is likely to increase a woman's likelihood to become welfare dependent.*<sup>25</sup>

To the extent that overall weak conditions in markets for black women's spousal labor translate into lower quasi-wage premia for having fewer children, it follows that black/white differences in welfare dependency will be more pronounced the fewer children a single mother has. In other words, it is expected that additional children will have more of an impact on the welfare dependency of white women than on that of black women. Evidence for the last prediction can be found in Fitzgerald (1991, 2003). It follows from the same theoretical concepts that number of children will have less impact on black married women's labor supply than on that of white married women's. This has been found by Bell (1974), Carliner (1981), and Lehrer (1992).

This theoretical implication also implies that number of children would have more of an impact on the welfare dependency of women belonging to baby-bust cohorts than on that of women born at the onset of the baby-boom. One would therefore expect that baby bust women will make more an effort to avoid outofwedlock childbearing than baby boom women.

## **5. Marriage Markets and Effects of Welfare Benefits on Labor Supply and Marriage.**

The theoretical framework presented here can also help explain differences in the effects of welfare benefits on women's labor supply and marriage.

*Effects on Labor Supply.* The effect of a given change in welfare benefit on labor force participation has a direct component (based on the work/welfare choice) and an indirect component (based on the work/marriage and marriage/welfare choice). Consider two groups of women: in group 1 no women are married and the only choice is one between work and welfare, and in group 2 half the women are married. Some of the married women in group 2 may get quasi-wages so high that welfare is not a relevant choice for them.

Under such assumptions, a given increase in welfare benefits will have a larger effect on labor force participation in group 1, where everybody is sensitive to relative payoffs to welfare and work, than in group 2, where some of the women are insensitive to changes in the payoff to welfare due to high quasi-wages. Furthermore, even if one considers a sub-population of married women, married women's labor supply is more likely to respond to variation in welfare benefits in the case of women participating in a weak marriage market where quasi-wages for spousal labor are relatively

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<sup>25</sup> A full theoretical treatment of this hypothesis requires an examination of the effect of children on wages, of the work/welfare trade-off, and of the effect of children on quasi-wages for spousal labor.

low so that a relatively high proportion of married women are at the margin of indifference between marriage and welfare. In other words, it is predicted that *women's labor supply (especially married women's labor supply) will be more sensitive to changes in welfare benefits when and where marriage market conditions are relatively less favorable to women*. Applying this prediction to cross-cohort comparisons, one expects the labor force participation of first baby-boomers to have been more sensitive to changes in welfare benefits than that of women belonging to earlier or later cohorts benefiting from higher sex ratios. It is also predicted that black women's LFP is more sensitive to changes in welfare benefits than is the case with white women's LFP.

This prediction is related to analyses of the labor supply effects of experimental programs such as the Negative Income Tax experiments, which in some ways are similar to welfare programs. One can also examine the effects of the generosity and standards of eligibility for housing and health benefits. In light of this analysis and given that we expect quasi-wages of black women to be lower than those of white women, it is not surprising that analyses of the NIT experiments indicated that black women's labor supply was more sensitive to changes in NIT benefit levels than that of white women (Rees 1974, Stephenson and McDonald 1979).

*Effects on Marriage Rates.* Likewise, marriage market conditions are expected to influence the degree to which marriage rates respond to changes in welfare benefits. It is predicted that *women's likelihood of being married will be more sensitive to changes in welfare benefits when and where marriage market conditions are relatively less favorable to women*.

A comparison between black and white women is applicable here too. Given lower average quasi-wages for black women's spousal labor, one expects that more black women than white women are at the margin between marriage and welfare. Therefore, a given change in welfare benefits is expected to induce a larger response in terms of encouraging or discouraging marriage among blacks than among whites. Evidence for a stronger response of black women's marriage propensity to changes in welfare benefits can be found in Hoffman, Duncan and Mincy (1991), Moffitt (1992) and Winkler (1994). In a recent study based on the Fragile Families study, Mincy and Huang (2002) find that the amount granted in welfare benefits increases the odds that a father lives with his child's mother whether the mother is black or white. They also find that amount granted raises the odds that formal marriage is chosen for blacks while reducing these odds for nonblacks (but neither effect is statistically significant).

Observed black/white differences in the effect of welfare benefits on marriage and partnership are related to black/white differences in the effect of Negative Income Tax experiments on marriage and divorce. Evidence for a stronger response of black women's marriage propensity to

changes in NIT benefits can be found in Groeneveld, Tuma and Hannan (1980), Keeley (1987), and Grossbard-Shechtman and Keeley (1993). Also, marriage and female headship are inversely related: Hoynes (1997) found that black women's headship probability responded more to a given change in welfare benefits than white women's headship probability.

Evidence for this prediction can also be obtained by comparing women with low and high education, given that the latter seem to experience more favorable marriage market conditions. It is expected that the effects of welfare benefits on marriage and female headship probabilities will be stronger for women with low education than for women with high education. Women with low education presumably receive low quasi-wages for spousal labor if they marry and are therefore more likely to view welfare as an alternative to marriage. Welfare benefits indeed appear to influence headship rates more among lower education groups (Winkler 1994). This finding can be linked to a parallel finding regarding education and sex ratio's effect on the LFP of married women: cross-city variations in sex ratio seem to affect the labor force participation of married women with low education more than that of married women with a college education (Grossbard-Shechtman and Neideffer 1997). The same is true of cross-cohort variations in sex ratio effects on married women's LFP: uneducated women appear more sensitive to changes in sex ratio over time than is the case with educated women (Grossbard-Shechtman and Amuedo-Dorantes 2003).

This prediction can also be applied to cross-cohort comparisons. One expects changes in welfare benefits to have more of an impact on age-specific welfare dependency of first baby-boom women than on that of women who were born during a baby-bust. This implies a reduction in the sensitivity of young women's labor force participation to changes in welfare benefits as one moves from the late 1960s and early 1970s into the 1980s.

## **6. Conclusions and Suggestions for Further Research**

This paper provides a rational choice model that simultaneously analyzes women's choice between welfare dependency, labor supply, and marriage or coupleship. In contrast to most other economic models of marriage in the Beckerian tradition, this model explicitly recognizes the individual opportunity costs involved in performing household tasks such as giving birth and parenting, even if a person is not employed in the labor force. That cost includes the foregone opportunity of own leisure defined as an individual's preferred use of time. Marriage markets are conceived as labor markets, the work being mostly women's work benefiting men who pay household bills.

This model is a static model: the women are comparing a representative day in coupleship relative to a representative day outside marriage. The model could be expanded to a dynamic multi-period model that incorporates education as well as choice of occupation. For instance, if a woman chooses welfare dependency and has a child on her own, this may reduce her value in the market for spousal labor, to the extent that men prefer not to bring up other men's children. The ensuing lower  $y$  may then encourage further welfare dependency. A career in the labor force incorporates the early stages of training and the later stages of production and expected layoffs or retirement.<sup>26</sup> Likewise, a career as a supplier of WIM may involve a training stage, a peak production stage, and a retirement stage.

This theory leads to the derivation of well-known predicted effects on welfare dependency, such as the effect of welfare benefits, income effects, and marriage market effects measured as the effect of sex ratios on welfare dependency. In addition, new insights are offered regarding (1) direct and indirect marriage market effects on welfare dependency, and (2) the effect of welfare benefits on married women's labor force participation and marriage.

This theory implies that more of observed black/white differences in welfare dependency can be attributed to differences marriage market conditions than has been implied from previous economic analyses such as Nechyba's (2001). Black women's prospects of finding men who will help pay the bills for them and their children may very well substantially lower than those of white women. We don't have measures of marriage market conditions, what is called 'quasi-wages' in this theory, but we have evidence on a number of facts that can be explained by black/white differences in sex ratios. The picture that is drawn is consistent: every single comparison between black and white women that was reported here, whether it pertains to welfare dependency, labor force participation or marriage, can be interpreted within a framework that assumes marriage market conditions for black women in the US that are considerably worse than those of white women. These sex ratio differences and the theory help explain why relative to white women, black women are more likely to depend on welfare, black women's welfare dependency is less likely to vary with men's income, black women's welfare dependency is less likely to vary with education, and black

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<sup>26</sup> I first presented this view of 'occupation: wife' in Grossbard (1976), a model applied to a society where women did not participate in the labor force, women's choices were limited to either remaining single (and die..) or accepting a career in occupation-wife. The expression 'occupation: wife' is inspired by Helen Lopata's (1971) book "Occupation: housewife." A housewife is defined as a full-time wife. Here wives can also work in marriage on a

women's welfare dependency is less likely to vary with number of children born out of wedlock. The theory also explains why welfare benefits seem to have different effects on marriage and labor force participation of black women and white women.

The theory can also help explain temporal changes in women's welfare dependency, labor force participation and couple formation. The mechanism for that explanation lies in tying changes over time to changes in cohorts reaching the same age at different times. More specifically, the low sex ratios experienced by baby-boomers may help explain the big boom in welfare dependency in the early 1970s, when post-World-War II baby-boomers reached the age for marriage and childbearing. This theory also helps explain more recent changes in women's choices regarding welfare dependency, labor supply after marriage, and couple formation.

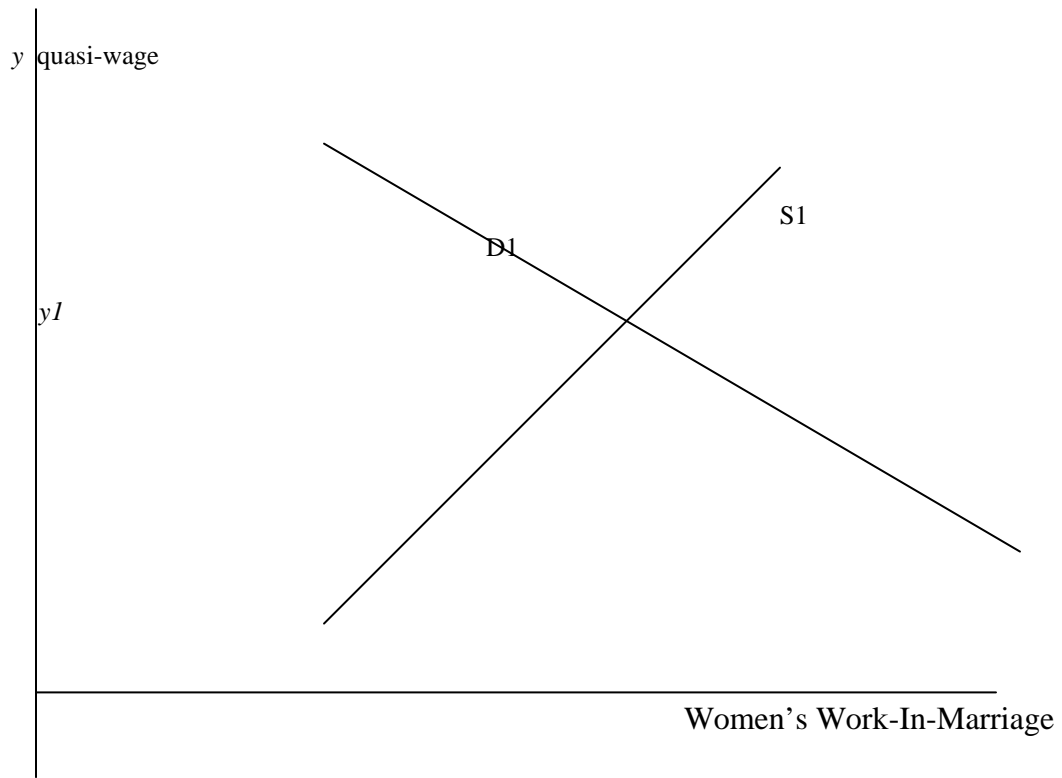
It is hoped that the theory presented here will motivate econometric models to follow the direction suggested here and design ways to incorporate the interdependencies between labor supply, welfare, and marriage. Such models can be applied to micro-data of various sorts, including data on welfare dependency, out-of-wedlock births, labor supply or cohabitation. Potential applications include not only black/white differences in the US and changes over time, as discussed at length in the paper, but also international comparisons and other spatial comparisons, such as inter-state or inter-city comparisons for a particular country.

Most women have children, and most of them don't raise their children alone. They rely on individual partners and governments to finance the expenses involved in having children, and to help children benefit from the time inputs they need. It appears that more behavior in this area can be scrutinized with economics than most people think. Even though a rational choice model presenting young women as calculating costs and benefits of having a child alone or in marriage seems to be far from a description of any particular person we know, include ourself, this model appears to have intriguing and testable implications. It is hoped that at least some more economists will pursue the route proposed here. This may necessitate paying less attention to the romantic concepts that cloud our collective vision of motherhood and marriage, but in the process we may get a better understanding of what causes poverty and inequality.

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part-time basis.

**Figure 1. Market for Women's Work-In-Marriage**



$S_1$ , supply by women

$D_1$  demand by men

## References

- Akerlof, George A., Janet L. Yellen, and Michael L. Katz. "An Analysis of Out-of-Wedlock Childbearing in the United States." *Quarterly Journal of Economics* 111 (may 1996): 277-317.
- Bane, Mary Jo and David Ellwood. "The Dynamics of Dependence." Cambridge, MA: Urban Systems Research and Engineering, 1983.
- Becker, Gary S. "An Economic Analysis of Fertility." In *Demographic and Economic Change in Developed Countries*, a Conference of the Universities--National Bureau Committee for Economic Research. Princeton, N.J.: Princeton University Press, 1960.
- \_\_\_\_\_. "A Theory of Marriage: Part I." *Journal of Political Economy* 81 (1973):813-846.
- \_\_\_\_\_. *A Treatise on the Family*, 1st edition. Cambridge: Harvard University Press, 1981.
- Bell, Duncan. "Why Participation Rates of black and white Wives Differ." *Journal of Human Resources* 9 (1974): 465-479.
- Bowen, William G. and T. Aldridge Finegan. *The Economics of Labor Force Participation*. Princeton, N.J.: Princeton University Press, 1969.
- Brito, Tonya. "The Welfarization of Family Law; the Case of Child Support." *Focus* 21 (2000) : 67-71.
- Carliner, Geoffrey. "Female Labor Force Participation Rates for Nine Ethnic Groups." *Journal of Human Resources* 16 (1981): 286-293.
- Cherry, Robert. "Rational Choice and the Price of Marriage." *Feminist Economics* 4 (1998) :27-49.
- Chiappori, Pierre-Andre, "Collective Labor Supply and Welfare", *Journal of Political Economy* 100 (1992) : 437-67.
- Chiappori, Pierre-Andre, Bernard Fortin and Guy Lacroix. "Marriage Market, Divorce Legislation, and Household Labor Supply." *Journal of Political Economy*, 2002, 110, pp. 37-71.
- Clarke, George R. G. and Robert P. Strauss, "Children as Income-Producing Assets: the Case of Teen Illegitimacy and Government Transfers." *Southern Economic Journal* 64 (1998): 827-56.
- Cose, Ellis. "The black Gender Gap." *Newsweek* March 3, 2003
- Danziger, Sheldon, George Jakubson, Paul Schwartz, and Eugene Smolensky. "Work and

Welfare as Determinants of Female Poverty and Household Headship." *Quarterly Journal of Economics* 97 (1982) : 519-34.

Edlund, Lena. "Marriage." Working paper, Columbia University, November 8, 2002.

Ellwood, David. "Targeting Would-Be Long Term Recipients of AFDC." Princeton: Mathematica Policy Research, 1986.

Fields, Judith M. "A Comparison of Intercity Differences in the Labor Force Participation Rates of Married Women in 1970 with 1940, 1950, and 1960." *Journal of Human Resources* 11 (1976) :568-577.

Fertig, Angela R., Sara S. McLanahan, and Irwin Garfinkel, "Child Support Enforcement and Domestic Violence among Non-Cohabiting Couples." Paper presented at the American Economic Association Meetings, January 2003.

Fitzgerald, John. "Welfare Durations and the Marriage Market: Evidence from the Survey of Income and Program Participation." *Journal of Human Resources* 26 (1991):545-562.

\_\_\_\_\_. "Marriage Prospects and Welfare Use." In *Marriage and the Economy*, ed. Shoshana Grossbard-Shechtman. Cambridge and New York: Cambridge University Press, 2003.

Freiden, Alan. "The U.S. Marriage Market." In *Economics of the Family*, edited by T.W. Schultz. Chicago: University of Chicago Press, 1974.

Groeneveld, Lyle P., Nancy Brandon Tuma, and Michael T. Hannan). "The Effect of Negative Income Tax Programs on Marital Dissolution." *Journal of Human Resources* 15 (1980): 654-674.

Gronau, Reuben , "Leisure, Home Production, and Work--The Theory of the Allocation of Time Revisited." *Journal of Political Economy*. 85 (1977) :1099-124.

Grossbard, Amyra (Shoshana). "An Economic Analysis of Polygamy: The Case of Maiduguri." *Current Anthropology* (December 1976) 17:701-7.

Grossbard-Shechtman Amyra (Shoshana). "A Theory of Allocation of Time in Markets for Labor and Marriage." *Economic Journal* 94 (December 1984):863-82.

\_\_\_\_\_. "Economic Behavior, Marriage and Fertility--Two Lessons from Polygyny." *Journal of Economic Behavior and Organization* 7 (1986) :415-24.

Grossbard-Shechtman, Shoshana A. *On the Economics of Marriage*. Boulder, Co.: Westview Press, 1993.

\_\_\_\_\_. "An Integrated Analysis of Labor and Marriage and Explanation of black/white Differences in Marriage, Labor, and Welfare Participation." Paper Presented at the Conference on Economics and Sociology in Honor of Gary Becker and James Coleman, San Diego, July 1995.

\_\_\_\_\_. "Marriage Market Imbalances and Trends in Women's Labor Supply in the U.S." Presented at the Journées de Micro-Economie Appliquée, Quebec City, Quebec, June 2000.

\_\_\_\_\_. "A Consumer Theory with Competitive Markets for Work in Marriage." *Journal of Socio-Economics*, 31(2003): 609-645.

Grossbard-Shechtman, Shoshana and Catalina Amuedo-Dorantes. "When are Husbands more Likely to Pay the Bills? Marriage Market Effects on the Aggregate Labor Supply of Married Women." Ms, San Diego State University, February 2003.

Grossbard-Shechtman, Shoshana, Olivia Ekert-Jaffe and Bertrand Lemennicier. "Property Division at Divorce and Demographic Behavior." Paper presented at the American Economic Association, January 2002.

Grossbard-Shechtman, Shoshana and Clive W.J. Granger. "The Baby-Boom and Time Trends in Women's Labor Force Participation." Presented at the American Economic Association meeting in Boston, January 1994.

Grossbard-Shechtman, Shoshana and Michael C. Keeley. "A Theory of Divorce and Labor Supply." In S. Grossbard-Shechtman *On the Economics of Marriage*. Boulder, Co.: Westview Press, 1993 (Chapter 10).

Grossbard-Shechtman, Shoshana and Neideffer, Matthew. "Women's Hours of Work and Marriage Market Imbalances," in *Economics of the Family and Family Policies*, edited by Inga Persson and Christina Jonung, London: Routledge, 1997.

Grossbard-Shechtman, Shoshana A. and Shoshana Neuman. "Labor Supply and Marital Choice." *Journal of Political Economy* 96 (1988):1294-1302.

\_\_\_\_\_. "The Extra Burden of Moslem Wives: Clues from Israeli Women's Labor Supply" *Economic Development and Cultural Change*, 46 (April 1998): 491-518.

Grossbard-Shechtman, Shoshana A. and Ronald Mincy. "Markets for Co-parenting and Family Structure", paper presented at the McArthur Network on Family and Economy, November 2003, Chicago.

Guttentag, Marcia and Secord, Paul F. *Too Many Women: The Sex Ratio Question*. Beverly Hills: Sage Publications, 1983.

Heer, David M. and Amyra Grossbard-Shechtman. "The Impact of the Female Marriage Squeeze and the Contraceptive Revolution on Sex Roles and the Women's Liberation Movement in the United States, 1960 to 1975." *Journal of Marriage and the Family* 43 (1981):49-65.

Hoffman, Saul D., Greg J. Duncan, and Ronald Mincy. "Marriage and Welfare Use Among Young Women: Do Labor Market, Welfare and Neighborhood Factors Account for Declining Rates of Marriage Among black and white Women?" Paper Presented at the Annual Meetings of the Population Association of America, March 1991.

Hoynes, Hilary Williamson. "Does Welfare Play Any Role in Female headship Decisions?" *Journal of Public Economics* 65 (August 1997): 89-117.

Keane, Michael and Robert Moffitt. "A Structural Model of Multiple Welfare Program Participation and Labor Supply." Ms, University of Minnesota, September 1995.

Keeley, Michael C. "The Effects of Experimental Negative Income Tax Programs on Marital Dissolution: Evidence from the Seattle and Denver Income Maintenance Experiments." *International Economic Review* 28 (1987): 241-57.

Lehrer, Evelyn L. "The Impact of Children on Married Women's Labor Supply. Black-White Differentials Revisited." *Journal of Human Resources* 27 (1992): 422-444.

\_\_\_\_\_. "The Economics of Divorce." In *Marriage and the Economy* edited by Shoshana Grossbard-Shechtman. New York and Cambridge: Cambridge University Press, 2003.

Lopata, Helen. *Occupation: Housewife*. London: Oxford University Press, 1971.

Manser, Marilyn and M. Brown "Marriage and Household Decision Making: a Bargaining Analysis." *International Economic Review*, 21 (1980): 31-44.

McElroy, Marjorie B. and Mary Jean Horney. "Nash Bargained Household Decisions: Toward a Generalization of the Theory of Demand." *International Economic Review* 22 (1981):333-49.

Mincer, Jacob. "Labor Force Participation of Married Women: a Study of Labor Supply." In *Aspects of Labor Economics* edited by H. Gregg Lewis. Princeton, N.J.: Princeton University Press, 1962.

\_\_\_\_\_. "Market Prices, Opportunity Costs, and Income Effects." In *Measurement in Economics* edited by C. Christ. Stanford, CA: Stanford University Press. Reprinted in Mincer (1993).

Mincy, Ronald B. and Chien-Chung Huang. "The "M" Word: the Rise and Fall of Interracial Coalitions on Fathers and Welfare Reform." Working Paper #02-07-FF, Center for Research on Child Wellbeing, May 2002.

Moffitt, Robert. "An Economic Model of Welfare Stigma." *American Economic Review* 73 (1983): 1023-1035.

\_\_\_\_\_. "Incentive Effects of the U.S. Welfare System: A Review." *Journal of Economic Literature* 30 (1992):1-61.

Murray, Charles. *Loosing Ground: American Social Policy, 1950-1980*. New York, Basic Books, 1984

Nechyba, Thomas J. "Social Approval, Values, and AFDC: A Reexamination of the Illegitimacy Debate." *Journal of Political Economy* 109 (2001) : 637-672.

O'Neill, June et al. "An Analysis of Time on Welfare." Washington, DC: The Urban Institute, 1984.

Rees, Albert . "An Overview of the Labor Supply Results." *Journal of Human Resources* 9 (1974): 158-80.

Robbins, Lionel. "On The Elasticity of Demand For Income in Terms of Efforts." *Econometrica* 10 (1930):123-29.

Rosenzweig, Mark R. "Welfare, Marital Prospects, and Nonmarital Childbearing." *Journal of Political Economy* 107 (1999) : S3-S32.

Stephenson, Stanley P. Jr., and John F. McDonald. "Disaggregation of Income Maintenance Impacts on Family Earnings." *The Review of Economics and Statistics* 61 (1979): 354-60.

Tienda, Marta. "Welfare and Work in Chicago's Inner City." *American Economic Review* 80 (May 1990):372-76.

Usdansky, Margaret L. and Sara S. McLanahan "Looking for Murphy Brown: An Analysis of College-Educated, Single Mothers", Working Paper, Office of Population Research, Princeton University, February 10, 2003.

U.S. Bureau of the Census. *Statistical Abstract of the United States*. Washington, D.C.: U.S. Government Printing Office, 1976.

Wilson, William J. *The Truly Disadvantaged*. Chicago: University of Chicago Press, 1987.

Wegscheider-Cruse, Sharon. *Coupleship*. Deerfield Beach, Florida: Health Communications Inc., 1988.

Winkler, Anne E. "The Determinants of a Mother's Choice of Family Structure: Labor Market Conditions, AFDC Policy or Community Mores?" *Population Research and Policy Review* 13 (September 1994):283-304.