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## A THEORY OF ALLOCATION OF TIME IN MARKETS FOR LABOUR AND MARRIAGE\*

*Amyra Grossbard-Shechtman*

Economists have long recognised that the nature of the household plays a role in determining the supply of factors of production and the demand for goods and services. However, it was not until the 'new home economics' developed by Mincer (1962), Becker (1965) and Lancaster (1966) that household structure was given a significant role in economic theory. Today labour economists regularly write about the value of married women's time,<sup>1</sup> and marital status enters economic analyses of consumption.<sup>2</sup> However, no allowance has been made for potential changes in the character of the household: single persons do not marry and married couples do not divorce. In each case the contact of the couple or the individual with the outside world is limited to exchange in goods, factor or asset markets. We have no theory analysing the interdependence between labour and marriage markets. This universally accepted assumption of a predetermined marital status is puzzling in the light of more than a decade of contributions to the economics of marriage, e.g. Becker (1973; 1981), Freiden (1974), Grossbard (1978*a*; 1980; 1982*a*), Keeley (1979), Papps (1980) and an even older sociological literature on marriage markets (e.g. Rosenthal (1970), Heer (1962), Henry (1975)).

It is argued here that market conditions regarding marriage influence the value of time in the home. For instance, the value of the time of a married woman varies according to the number of single men and women surrounding the household. *Ceteris paribus*, she is better off in a town with numerous single men than in a city disproportionately inhabited by single women. Generally, marriage-related market mechanisms create a mutual dependence between men and women who want to work, buy or reproduce. The prevalent assumption of households independent of marriage market conditions has led labour economists to overlook important factors of relevance to the study of labour supply.

Accordingly, in this paper marriage and labour markets are viewed as mutually related. To simplify the discussion and emphasise interdependence, marriage is assumed to be an exchange of household labour between spouses. Analysis of markets for female and male labour and household labour leads to

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<sup>1</sup> The derivation of value of time in the home, also called the shadow wage, followed the economic theory of allocation of time. For a review of the influence of this theory see Becker and Michael (1973).

<sup>2</sup> Marital status obviously counts in economic analyses of fertility (see Becker, 1960, for instance).

interesting insights regarding labour supply, consumption, fertility and marriage. The theory predicts, for instance, that income changes influence wives' labour supply more than they do husbands', that the labour force participation of married women varies with the sex ratio of eligible partners and that women's labour supply is more backwardbending than men's.

The results which are demonstrated imply a critique of Willis's (1974) influential conclusions regarding the effect of male income on the fertility of families with working and non-working wives. More generally, significant re-interpretations are provided for previous empirical observations.

### I. THEORY

The economic view of marriage to be adopted in this paper should not be regarded as necessarily descriptive of actual behaviour or attitudes in any particular society. The general caveat applicable to more traditional price theory holds here too. The intent is not to make a philosophical statement about Economic Man, but to present a theory with testable applications. The theory is developed along the following lines.

To stress the mutual dependence between labour and marriage, marital decisions are translated into labour terms. Marriages are viewed as exchanges of 'household labour',<sup>1</sup> i.e. labour which benefits one's (actual or potential) spouse such as cooking, child care, counselling or gardening, and is performed for a longer time than one would spend on such activities if living alone.<sup>2</sup> Women demand male household labour, and supply female household labour as well as labour in the ordinary sense of the word (henceforth simply labour), and similarly for men. In all, transactions take place in four interrelated labour markets, those for male and female household labour, and male and female labour. The gender distinction is based on the assumption that from the employers' perspective workers of different sex often serve as poor substitutes for one another. As a prerequisite to investigating the various interconnections among these four different labour markets, individual supply and derived demand schedules are needed. It is initially assumed that equilibrium prices have been established in product and factor markets. Subsequently, market equilibria are established via aggregation over individual agents.

#### (i) *Individual Supplies and Demands*

It is assumed that each individual makes a separate decision according to the same general principles of optimisation. Decisions are made *ex ante* for different equilibrium market prices. The planning horizon consists of one period.

Individuals devote their time to three kinds of activity: labour, household labour, and self-oriented time. Both categories of labour benefit others (employers or spouses) and can provide direct utility or disutility to the worker.

<sup>1</sup> For the purpose of this discussion, no distinction is made between formalised marriage and living together arrangements. It is assumed that spouses are heterosexual.

<sup>2</sup> A similar distinction between work at home and leisure is made in Gronau (1977).

Individuals accordingly have utility functions:

$$U_i = U_i(l_i, h_i, s_i, h_j, x_i), \quad (1)$$

where  $i, j = f, m$  ( $m = \text{male}, f = \text{female}, i \neq j$ )

$l_i$  denotes time allocated to labour

$h_i$  is household labour

$s_i$  is self-oriented time,<sup>1</sup> and

$x$  denotes commercial goods.

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

The marginal utility of the two kinds of labour can be positive or negative. Although labour is often unpleasant, people may derive satisfaction from contributing to others' wellbeing. Both forms of labour create non-pecuniary rewards, and these rewards may vary across forms of labour, amount of time devoted to an activity, and individual preferences.

To the extent that the marginal utility of labour is negative, one can term the function relating compensation level and amount of labour a supply function. It is assumed that both labour and household labour generally have a negative marginal utility, especially after a person is already engaged in a certain amount of labour. For instance, if labour is measured in hours per day, a person's marginal utility of labour could become negative after one hour of labour per day. If that person enjoys working for a spouse more than for an employer, the marginal utility of household labour could become negative after 2 hours.<sup>2</sup>

The individual maximises the utility given by (1) subject to the time constraint

$$T = l_i + h_i + s_i, \quad (2)$$

and a monetary budget constraint

$$w_i l_i + w_i^* h_i + V_i = p_i x_i + w_j^* h_j, \quad (3)$$

where  $T$  is maximum of time available (e.g. 24 hours per day);  $w$  is market wage for labour;  $w^*$  is market wage for household labour;  $V$  is non-wage income, and  $p$  is the price vector for commercial goods normalised such that for each good the price is unity.

The left-hand side of the budget constraint indicates that sources of individual income consist of labour, household labour, and income sources unrelated to work. If all income is spent, the left-hand side equals the right-hand side, the individual's expenditures on commercial goods and labour supplied by a spouse. It is seen that all individuals depend on the equilibrium conditions in the markets for household labour by both men and women to the extent that their income from such labour depends on  $w_i^*$ , the market-determined compensation for own household labour, and their expenditures are a function of  $w_j^*$ , the

<sup>1</sup> The same activity could be either work or self-oriented time, depending on the circumstances or the person. Because no distinction is made between consumption and production, the time single persons devote to activities such as cooking or cleaning generates positive utility.

<sup>2</sup> A person supplying labour in the range of negative or zero wages, is performing volunteer work.

equilibrium compensation for their spouse's work. All individuals interested in either supplying or demanding household labour affect these market wages for such labour (as shown in the next subsection). This includes married people who, by assumption, can costlessly recontract through divorce and remarriage.<sup>1</sup>

The compensation for household labour is not as readily observable as that for labour. In the case of a housewife married to a husband who works outside only, part of her compensation is that portion of his income from which she benefits via such purchases as food, lodging, or clothing. If both husband and wife supply labour to each other, barter will occur, the net income transfer possibly cancelling out.

Maximising the utility function (1) subject to constraints (2) and (3) yields supplies of labour and own household labour, as well as derived demands for self-oriented time, other's household labour, and commercial goods. From the first-order conditions we have:

$$w_i = \frac{MU_{si}}{MU_{xi}} + \frac{-MU_{hi}}{MU_{xi}} \quad (4)$$

and

$$w_i^* = \frac{MU_{si}}{MU_{xi}} + \frac{-MU_{hi}}{MU_{xi}}, \quad (5)$$

hence indicating that the real wage per hour of work is equal in equilibrium to the sum of the monetary equivalent of the value of that hour in self-oriented activities and of the absolute (monetary) value of the disutility of work.

Combining (4) and (5) yields the trade-off between the two kinds of work

$$w_i^* = w_i + \frac{MU_{hi}}{MU_{xi}} - \frac{MU_{hi}}{MU_{xi}}. \quad (6)$$

Expression (6) indicates that time is allocated between two occupations so that the wage in one occupation equals the wage in the other occupation, *plus* the monetary equivalent of the difference in marginal utility produced by these occupations. In contrast, since Robbins (1930) labour supply schedules are derived from leisure demands. Except in studies of occupational choice, economists assume that work generates (i) disutility and (ii) income to obtain useful goods. Consequently, in equilibrium the value of workers' time equals their wage, and equation (6) takes the simplified form

$$w_i^* = w_i, \quad (6')$$

assuming participation in the labour force. For a person who does not work outside the home, the value of time in the home  $w^*$  exceeds the wage rate.

Using (2) and (6) the income constraint can be rewritten as a full income constraint.<sup>2</sup>

$$w_i T + V_i = S_i = x_i + w_j^* h_j + w_i s_i + \frac{MU_{hi} - MU_{hi}}{MU_{xi}} h_i \quad (7)$$

where  $S$  = full income.

<sup>1</sup> If costs of such recontracting are positive, this could make divorce prohibitively costly and lead to a discrepancy between a married person's actual  $w^*$  and the  $w^*$  that person could receive on the market. Likewise, 'on-the-job' training occurring during marriage could cause such discrepancy (see subsection (iii)).

<sup>2</sup> The concept of full income was developed by Becker (1965). It is assumed that  $w_i$  exceeds  $w_i^*$ .

The left-hand side consists of the sources of  $i$ 's full income, time being valued at the market wage for labour. The right-hand side indicates all the uses of that full income, expenditures on goods, household time, self-oriented activities and the excess in marginal utility obtained from spending time in household labour instead of other labour.

From this one can derive the supply of labour and household labour, as well as the demand for other's household labour. In reduced form, these variables are solely dependent on exogenously determined parameters, as in

$$h_i = h_i(w_i, w_i^*, w_j^*, V_i) \quad (8)$$

$$l_i = l_i(w_i, w_i^*, w_j^*, V_i) \quad (9)$$

$$h_j = h_j(w_i, w_i^*, w_j^*, V_i). \quad (10)$$

Panels *a* and *b* in Fig. 1 describe individual supplies of both kinds of labour. It is assumed that initial hours of work produce positive utility, thereby causing the supply curves to start at negative wage levels. The individual whose labour supplies are depicted in Fig. 1 enjoys the first hours of household labour more than the first hours of labour.

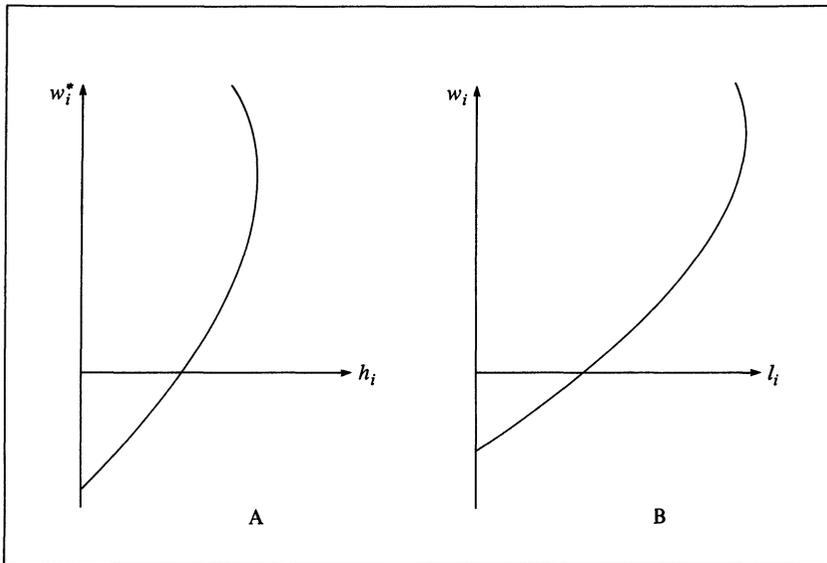


Fig. 1. Individual supplies of household labour and labour. (A) Individual supply of household labour (B) Individual supply of labour.

Both supply functions are assumed to have the characteristics giving rise to the standard backward bending form, i.e. the substitution effects of increases in the real wage ( $w_i^*$  in panel *a* and  $w_i$  in panel *b*) initially dominate the income effects, but eventually the income effects come to dominate. The equivalent of non-leisure in conventional models is here the sum of labour and household labour. Although this latter sum is predicted to decrease when income rises, this does not necessarily mean that both  $l_i$  and  $h_i$  decrease with higher income.

The demand for  $h_j$  could possibly be a downward sloping function of real wage  $w_j^*$  for the usual reasons determining the slope of derived demands.

Each productive individual in a society can be viewed as having such supplies of  $l_i$  and  $h_i$ , and such demand for  $h_j$ . Individual women demand male labour whereas individual men demand female labour.

(ii) *Market Equilibria*

All men and women acting as if wages had been established in competition will actually determine those equilibrium wages. This occurs in the respective markets once all individual demands and supplies are aggregated. Our previous analysis leads to derivation of individual demands and supplies in the markets for male and female household labour. It is assumed initially that there are no costs of divorce and remarriage and that there is one kind of woman and one kind of man.

Aggregate demand and supply functions for women are presented in equations (11)–(13), and for men in equations (14)–(16). Superscripts  $d$  and  $s$  denote whether a function is a supply or a demand. Capital letters are used to denote aggregate hours of work.

$$H_f^s = H_f^s(w_f^*, w_f, w_m^*, p_f, V_f, \beta_f, N_f) \quad (11)$$

where

$\beta_f$  = factor describing tastes or productivity

$N_f$  = number of women married or eligible for marriage

$$L_f^s = L_f^s(w_f, w_f^*, w_m^*, p_f, V_f, \beta_f, N_f), \quad (12)$$

$$H_m^d = H_m^d(w_m^*, w_f^*, w_f, p_f, V_f, \beta_f, N_f). \quad (13)$$

The equations for men are analogous, subscripts  $f$  now being replaced by subscripts  $m$ .

$$H_m^s = H_m^s(w_m^*, w_m, w_f^*, p_m, V_m, \beta_m, N_m), \quad (14)$$

$$L_m^s = L_m^s(w_m, w_m^*, w_f^*, p_m, V_m, \beta_m, N_m), \quad (15)$$

$$H_f^d = H_f^d(w_f^*, w_m, w_m^*, p_m, V_m, \beta_m, N_m). \quad (16)$$

Markets for household labour are reminiscent of traditional labour markets. Market forces are relatively difficult to identify because of the absence of physically visible institutions, rigidities in compensation levels and hours of work, limitations on the relative proportion of pecuniary to non-pecuniary compensation, etc. Participants in markets for household labour face an additional restriction that prohibits polygamy, thereby forcing one-to-one matches. Even in societies allowing polygamy, specific rules limit the kinds and numbers of marriages.<sup>1</sup>

In the real world, populations are heterogeneous, and laws and norms determining marriage substitutability also set limits to the operation of markets for household labour. People of certain classes, races, or religions may be forbidden to intermarry, or divorce and remarriage may be illegal or expensive. In such cases, separate markets could be considered, one for each group of substitutable potential spouses.<sup>2</sup> In the rest of this discussion, we will assume only two markets

<sup>1</sup> For an economic analysis of polygamy see Becker (1973; 1981) and Grossbard (1980).

<sup>2</sup> Such separation is done in Grossbard-Shechtman (1983).

for household labour, one for women, and one for men, and the assumption of identical men and women will be dropped. The equilibrium conditions in all these labour markets are interdependent. Wages in labour markets affect marital behaviour and conditions in the markets for household labour influence labour supply. Given the traditional focus of economics and the measurement problems involved in empirical studies of  $w^*$ , the remainder of this paper deals primarily with this theory's implications for labour supply. The way in which the existing state of the art in labour economics can be enriched by taking account of conditions in household labour markets, even though  $w_f^*$  or  $w_m^*$  cannot directly be measured, is shown in the next section. But first it is necessary to summarise the results obtained so far and to question the assumption of competition.

### (iii) *Competition and Monopoly*

It was assumed that each person participates in three separate labour markets, as supplier of own labour and household labour, and as employer of household labour. In a sex-differentiated society this implies the existence of four inter-related markets for male and female labour and household labour. As in the theory of the competitive firm, this analysis has taken two steps: individual maximisation assuming competitive equilibrium prices were established, and aggregation of individual schedules that leads to the derivation of these equilibrium prices. Similarly to a firm an individual has to decide on (i) whether to marry (equivalent to being in business), and (ii) level of inputs, including household labour.

Despite regulations imposed on participants in marriage markets, the competitive model seems to be as relevant in household labour markets as it is in traditional labour markets, especially in densely populated areas where actual and potential spouses are substitutable. People have some freedom in deciding whether to become, or remain, married, and in establishing—often implicit—reciprocal spousal employment contracts. Single persons looking for marriage partners respond to market forces and decide accordingly whether to marry and how much work to invest and employ in the framework of marriage. Married people are also often responsive to markets for household labour.

In a monogamous society marriage tends to occur when at the equilibrium  $\bar{w}_f^*$  and  $\bar{w}_m^*$  a man demands the amount of household labour a woman wants to supply and that woman demands the amount of labour supplied by the man. A married couple in equilibrium experiences no excess demand for, or supply of, household labour at the competitive  $w^*$ 's. Exchanges of such labour are egalitarian if the market value of her services  $w_f^* h_f$  is identical to  $w_m^* h_m$ , the market value of his services. To the extent that  $w_f^* h_f$  exceeds  $w_m^* h_m$ ,  $m$  transfers goods (or means to purchase goods) to  $f$  (or vice versa).

This view of marriage may sound strange. As a description of attitudes it is probably not much more controversial than what economists write about decision-making by firms. But then our goal is not to describe but to derive testable hypotheses. Feelings are not necessarily absent from this theory. Personal liking can formally be incorporated in the form of a higher demand curve for

the household labour of a particular person (or a shift to the right in the supply of such labour to that person).

This view of marital relations differs from previous economic analyses in its emphasis on the time spouses devote to each other's service. Changing outside factors can lead not only to changes in income redistribution between the spouses or to marital break-up (as in Becker 1973, 1981), but also to new marital labour relations. Thus a married woman's sudden realisation that attractive labour market opportunities are open to her could possibly lead to a new spousal employment contract, the wife reducing her burden of household labour and using some of her additional wage income to obtain substitutes for her household labour, including perhaps her husband's household labour.

At the same time, however, monopolistic elements enter into an existing marital relationship to the extent that divorce and marriage are costly (e.g. due to search costs). In that case one could find divergence between the market  $w^*$  and the terms of trade prevailing in a particular couple. Bilateral monopoly could often operate. Partners experiencing higher divorce and remarriage costs are likely to absorb more consequences of monopolistic exploitation. The following section studies implications for labour supply derived from the interdependence between competitive labour and household labour markets. The obstacles to competition mentioned above will be ignored for most of the discussion.

## II. IMPLICATIONS FOR LABOUR SUPPLY

The major divergence between the traditional theory of labour supply and the one presented here lies in the way  $w^*$ , the value of time in the home, is determined. Traditionally,  $w^*$  is derived assuming a predetermined marital status. Households are either single persons or husband-wife teams with no options to marry or divorce. The value of a person's time depends only on household characteristics, and households are interdependent only to the extent that work is supplied to the same markets and goods are bought from the same sellers. In the case of a married woman, the assumptions common to the previous literature translate into an individual supply of time for home production in the form of a transposed  $L$ , horizontal at the wage level she would receive if working in the market sector and vertical as soon as the time constraint is reached. There exists no market for household labour.

By using households as their decision-making units and by assuming that men and women are permanently bound into families, economists have lost sight of some important determinants of labour supply. The realisation that the supply of labour can shift following changes in a market determined wage for household labour,  $w^*$ , opens new directions for research in labour economics and in particular, for studies of female labour supply. The sexual differentiation assumed in the rest of this discussion follows observed patterns of division of labour, wives being generally responsible for most household production. It is also assumed that both men and women differ in productivity, tastes, and income. Theoretical implications are now derived regarding sex ratio effects, group differences in

marriage opportunities, income and wage effects, and the backwardbending supply of labour.

(i) *Sex Ratio Effects*

Demographers have defined sex ratios as the number of males divided by the number of females. Standard theory implies that changes in sex ratio will affect labour force participation in general, and female labour force participation in particular. Let us assume that the sex ratio among the population of marriageable age rises, due to a wave of all-male immigration. Such increase in  $N_m$ , the number of males, affects the system of equations (14)–(16), men's aggregate supplies of labour and demand for wife labour. The net effect on female labour supply can be approximated by dividing the analysis into two stages: (1) initial effect on wages and (2) secondary effects on the amount of female labour supplied.<sup>1</sup>

An increase in  $N_m$  causes function (16) to shift to the right to  $D'$  in panel *A* of Fig. 2, thereby leading to an increase in  $\bar{w}_f^*$ . A decrease in male equilibrium wages  $\bar{w}_m^*$  and  $\bar{w}_m$  originates from shifts in supply in panels *B* and *D* (downward rigidity in wages may impede adjustment in both labour markets).

(2) These wage changes affect other curves in the following directions. Lower average male income due to reductions in both male wages tend to push the aggregate demand for female household labour,  $H_f$ , back down.<sup>2</sup> Moreover, a lower male household wage  $w_m^*$  also tends to lead to a reduction in demand for  $H_f$  due to a substitution effect in home production and consumption (assuming male and female household labour are substitutes). If it is assumed that such leftward shift in the demand for  $H_f$  from  $D'$  to  $D''$  is smaller than the original rightward shift to  $D'$ , the equilibrium wage  $w_f^*$  increases in comparison to its pre-immigration level, for instance to post-immigration wage for wife labour  $\bar{w}_f^*$  in Fig. 2 (panel *A*).

In turn, the rise in wage in one occupation, household labour, affects the supply curve to the other occupation. Women's supply of labour is expected to shift leftwards to  $S'$  in panel *C* due to substitution and an income effect.<sup>3</sup> In addition, lower wages for male workers induce substitution away from female workers, leading to a downward shift of  $D$  in panel *C*.

Total female employment is pushed downward unambiguously as a result. However, female wages could go up or down, depending on the relative size of the shifts in demand and supply.<sup>4</sup> The aggregate employment levels in Fig. 2 do not determine the division between total number of workers and hours of work per worker. The effect of a change in sex ratio is likely to act on both these dimensions: it will (1) increase the proportion of women who marry (corre-

<sup>1</sup> It is assumed that the influx of men does not affect the aggregate demand for total labour and the level of non-wage income.

<sup>2</sup> This will be true as long as the goods and services produced with the help of women's household labour have a positive income elasticity. Note that part of the reduction in demand comes from men who were already married.

<sup>3</sup> Women with higher income will generally choose to work less, implying in most cases a smaller propensity to supply household labour (see the next section on income effects).

<sup>4</sup> In addition, there could also be shifts in women's demand for male household labour and supply of own household labour as a result of changes in income and in  $w_m^*$ , leading to further ripple effects. These and other presumably small ripple effects are ignored.

sponding to a higher  $H_f$  in panel *A* and consequently work less outside the home, and (2) decrease the number of hours individual women work outside the home, reflecting the rise in the relative attractiveness of household labour.

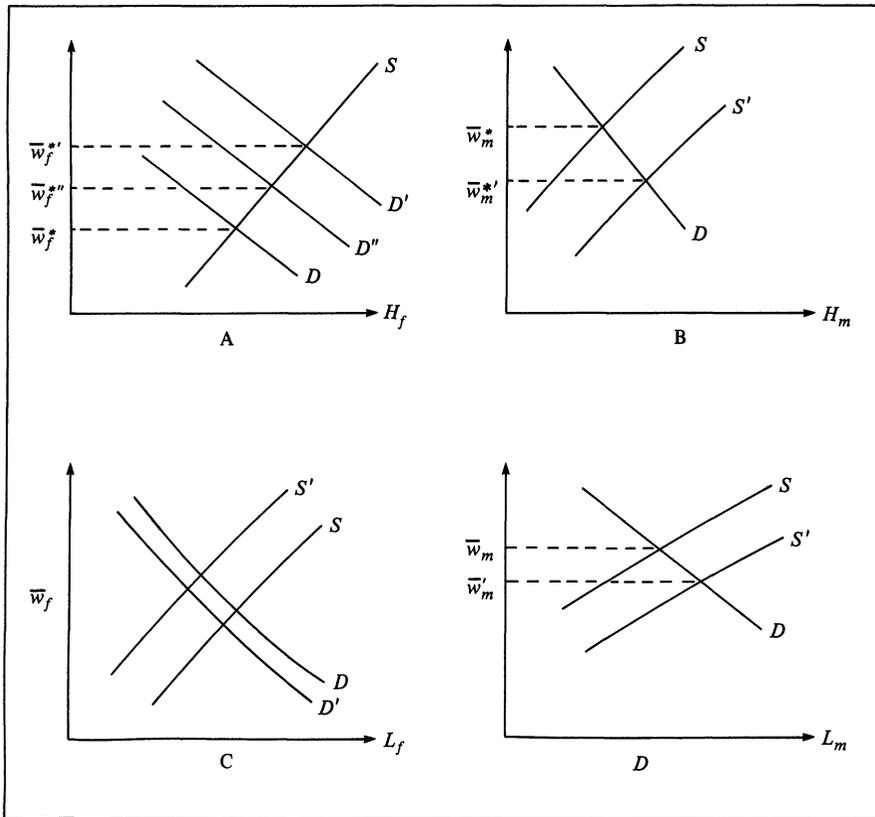


Fig. 2. Effects of sex ratio increase. (A) Female household labour. (B) Male household labour. (C) Female labour. (D) Male labour.

The effect of variations in sex ratio on female labour force participation depends on the size of the various curve shifts and on the elasticities of the relevant demand and supply schedules. In particular, the more elastic the supply of female household labour at the initial equilibrium, the smaller the impact on the equilibrium  $w_f^*$  in panel *A* and therefore the smaller the shift in the supply of female labour in panel *C*.

Changes in sex ratio could therefore affect the labour supply of women with particular characteristics more than others. For instance, if a distinction is made between women supplying household labour of high and low quality, the former are likely to get married first, and equilibrium in the market for high quality household labour is probably reached where the supply curve is inelastic. The presence of unmarried women of low quality could mean that equilibrium in their market is established at a point where the supply of household labour is elastic. Therefore, a change in sex ratio that shifts the demand for both kinds of household labour is likely to cause more of a rise in  $w_f^*$  among women with more

desirable traits than among women with less desirable traits, and consequently the labour supply of the former will be affected more than that of the latter.<sup>1</sup> For instance, it is predicted that a wave of male immigrants will have more of a discouraging effect on the labour force participation of the daughters of well-to-do families.<sup>2</sup>

Recent trends in the sex ratio of those eligible for marriage and in female labour force participation tend to support the hypothesis that higher sex ratios are associated with lower female labour supply. As pointed out in Glick *et al.* (1963), sex ratios vary over time because (1) on average, women marry men who are generally somewhat older, and (2) the number of births fluctuates from year to year. In the early 1950s there were more men than women in most western countries as a result of declining numbers of births during the late 1920s and early 1930s. Conversely, in the mid-sixties, when the baby-boom generation started to reach marriageable age, women in the United States and other countries with similar demographic trends, began to experience a shortage of men. Heer (1978) and Heer and Grossbard-Shechtman (1981) show that this was true in the United States by 1964.<sup>3</sup> Since the U.S. birth rate started a renewed downward trend from 1961, young men can be expected to find too few marriageable women in the 1980s.

Consistent with the hypothesis stated above is the dramatic upsurge in the employment of U.S. women that occurred in 1967, soon after the sex ratio dipped under 1.00. Perry (1977) found that the trend in labour force participation of young American women rose significantly after 1967, this acceleration being a strikingly large 3.4 % per annum for women aged 25–34.<sup>4</sup> The acceleration of labour force participation among women aged 20–44 was largely due to the changed behaviour of married women (Smith, 1977).

Moreover, women's labour force participation rates have continued to increase after 1967 'despite a significant slowing of the growth in real wages and dramatic acceleration of the rate of inflation. In fact, between 1973 and 1975, real wages fell in two successive years, yet women's labour force participation continued to grow' (Niemi and Lloyd, 1980). Moreover, the observed trend in female wages may overestimate the wage levels relevant from the perspective of human capital theory (Becker, 1964), namely the wage defined for a given occupation and training level, and observed female wages have increased over time in part as a consequence of women's increased career commitment. Increased participation despite stagnant wages supports the hypothesis stated here whereby a reduction in sex ratio pushes the supply of labour rightwards, and therefore causes lower wages. A popular alternative explanation for the growth

<sup>1</sup> This contrast could be exacerbated by employers' substitution of relatively cheaper labour supplied by women with less desirable traits for labour supplied by more desirable women. Differential effects of male income on household labour supplied by women of varying characteristics could complicate the analysis.

<sup>2</sup> This will also depend on the characteristics of immigrants in comparison to those of natives.

<sup>3</sup> Heer and Grossbard-Shechtman (1981) compared the number of unmarried males aged 20–29 to unmarried females aged 18–29 years. The dividing line between the two kinds of marriage squeeze was set at 1.00.

<sup>4</sup> Participation rose by 3.8 % per annum for women aged 16–19, 2.3 % for women aged 20–24, 1.8 % for women aged 35–44, and a decrease occurred for women aged 45 and more.

in female labour supply, namely an increase in the demand for female workers, implies increasing wages.<sup>1</sup>

Additional evidence for the theory is provided by comparisons between blacks and whites in the United States. Black women have generally been found to have higher rates of participation in the labour force than white women (for instance, in a study of labour force attachment soon after pregnancy – Mott and Shapiro (1978)), even after statistical control for income, education, marital status and other important variables. This can be explained by the sex ratio hypothesis stated here, for among U.S. blacks the sex ratio of those eligible for marriage is significantly lower than among whites, due to lower sex ratio at birth, higher mortality, and higher rates of imprisonment. Moreover, black males show a much higher tendency to intermarry with whites than do black females, which adds to the shortage of men experienced by black women (see Spanier and Glick (1980)).

(ii) *Effects of Individual or Group Differences in Marriage Opportunities*

As can be seen from equation (6) variation in labour force participation can be a consequence of variation either in wages or in the value of time in the home. In their empirical studies economists have looked solely at household characteristics (such as number and age of children or number of adults) as determinants of the value of women's time and thus of labour supply. (See, for instance, Gronau (1973), Heckman (1974).)<sup>2</sup> It follows from this theory that individual or group differences in marriage opportunities are also related to the value of time in the home, and therefore labour supply.

First, comparison of the individual characteristics of husband and wife can provide some of the missing information regarding a person's productivity as a spouse. For instance, a woman's ability to marry into a wealthier family (judging from a comparison of wealth or income in the bride's and the groom's family), or her relative number of previous marriages, might be an indicator of her  $w^*$  (holding other characteristics constant).<sup>3</sup>

Second, the present theory can shed new light on ethnic and racial differences in the elasticity of labour supply. Racial or ethnic origin can shift not only the constant term in labour supply regressions – it can also influence slopes. A case in point is the finding by Gronau (1981) that in Israel the labour force participation of women of Asian–African origin is more sensitive to changes in wage

<sup>1</sup> An additional explanation for a possible rightward shift in the supply of female labour has been attributed to changes in female ideology following the surge of the feminist movement. Such explanation is hard to differentiate from the marriage squeeze explanation given the data available. However Heer and Grossbard-Shechtman (1981) view the feminist movement in part as another consequence, of the female marriage squeeze.

<sup>2</sup> Household characteristics such as household size and labour force participation have been analysed as jointly determined for instance by Cain and Dooley (1976) and Carliner *et al.* (1980).

<sup>3</sup> As argued in Grossbard-Shechtman (1982*a*) in certain societies formalisation of marriage can also indicate a woman's higher  $w^*$ . In Ladino villages in Guatemala women with more schooling and coming from better homes were found more likely to be married formally rather than to be living consensually. This can be connected with Da Vanzo's (1972) finding that in Chile, women cohabitating without a formal marriage are more likely to participate in the labour force than women married formally. Since Da Vanzo analysed labour supply, marriage type and wages simultaneously, an alternative explanation – that working women prefer cohabitation – is not so likely.

(actual or potential) than that of European–American women. Gronau's explanation is that the former women react more to pecuniary rewards. The present theory leads to an alternative explanation based on ethnic differences in the division of household labour. Stricter adherence to traditional spouse roles among Asian–African Jews (documented for instance by Yogev and Ayalon (1982)), implies a lower correlation between  $w$  and  $w^*$  and therefore a more

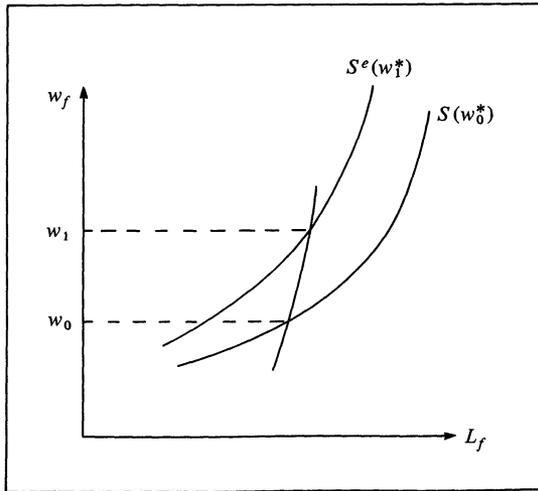


Fig. 3. Labour supply elasticity for two groups of women.

elastic supply of labour. This is explained with reference to Fig. 3, wherein  $S$  represents the supply of two women, one from each group, with identical opportunities  $w_0$  and  $w_0^*$  in the two relevant labour markets. We can compare these two women with women who are offered a higher wage,  $w_1$ . The *observed* elasticity of labour supply could differ across ethnic groups due to varying shifts in the supply schedule which could result from varying correlations between  $w$  and  $w^*$ . If there is no link between  $w$  and  $w^*$ , the *observed* elasticity is also the *true* elasticity. However, if  $w$  and  $w^*$  are positively correlated, for instance because the same unmeasured characteristics – such as ability – raise opportunities in both labour markets, an increase in wages from  $w_0$  to  $w_1$  leads to both a movement along the supply curve and a leftward shift of the supply curve (due to a substitution effect and an income effect away from work).

Stricter rules of division of household labour among Asian–African Jews imply a greater conflict between the two kinds of labour in this group. This leads to a more bimodal distribution of the population according to  $w$  and  $w^*$  and a lower observed correlation between  $w$  and  $w^*$  than among European–American women. For instance, if the correlation is zero among Asian–African Jews and positive among European–American Jews, the observed elasticity and the true elasticity coincide in the case of Asian–African women, whereas in the case of European–American women the supply schedule shifts leftwards to  $S^e$ , implying a lower observed elasticity of labour supply.

Available evidence suggests that whereas all Israeli women succeeding more

in marriage are less likely to work, this is more so among women of Asian–African origin. For instance, Matras and Selby (1981) found that all women who married men whose father had a higher occupation than their own father (an indicator of higher  $w_f^*$ ) were less likely to participate in the labour force, but that a high  $w_f^*$  had a much more discouraging effect on the labour–force participation of Asian–African women. This could indicate that  $w_f$  and  $w_f^*$  are correlated less positively in that group than among European–American Jews. This alternative explanation of group differences in the elasticity of labour supply thus seems to be applicable to Israel.<sup>1</sup> It could also explain Hall’s (1973) finding that whereas working wives usually show a positive elasticity of substitution, a sample of U.S. black wives showed a negative elasticity of substitution. Hall’s finding is consistent with taste for less familism among blacks than among whites, implying more of a positive correlation between the  $w$  and  $w^*$  of various women among blacks than among whites. In turn this difference in conceptions of marriage could be related to the unbalanced sex ratio black women have to deal with (see above).

### (iii) *Income and Wage Effects*

The present theory leads to new insights regarding income and wage effects on labour supply. First, these effects depend on the extent to which a person is engaged in household labour and therefore they will be different for husbands and wives. Second, simultaneous changes in the income of husbands and wives can lead to marital conflicts, and the couple’s method of resolving such conflicts will in turn affect labour supply.

For instance, assume independent increases in the non-wage income of a couple initially in equilibrium at the market wages for household labour  $\bar{w}_f^*$  and  $\bar{w}_m^*$  (see Fig. 4). Assuming that the other spouse’s labour is a ‘normal input’ in the utility function (1), higher incomes lead to rightward shifts in each spouse’s demand for the other’s labour. If the shifts are proportional to the existing amount of household labour supplied, in most cases the shift in demand for the wife’s labour will be larger. However, the willingness to supply one’s own labour is most likely to decrease as a result of higher incomes, i.e.  $S$  shifts leftwards in both panels of Fig. 4, and probably by a larger absolute amount in the case of female household labour than in that of male spousal labour. Assuming market wages for household labour have not changed (e.g. because large numbers of people are not facing a similar increase in income), this couple is now facing a conflict expressed by excess demands for household labour, the excess demand for the wife’s labour being generally the largest. The existence of substitutes for household labour alleviates the conflict, but a downward sloping demand for such labour indicates imperfect substitution.

One solution is to maintain the marriage and reduce the excess demands for household labour, e.g. by increasing it at the expense of labour outside the home. To the extent that there existed an initial division of labour associated with larger amounts of the wife’s household labour, this adjustment will require a

<sup>1</sup> Another alternative explanation consists of viewing women from the two ethnic groups on the same supply schedule, but at different points corresponding to different wage levels.

larger reduction in the wife's labour supply than in her husband's. The better the substitutes for household labour, the less additional income will be translated in increased demand for household labour, and the smaller the marital conflict.

A compensated decrease in own wage ( $w$ ) affects a woman's supply of labour outside the home through substitution of both labour inside the home and time for herself for labour outside the home. The (compensated) supply of (outside) labour by married women will be more elastic than that of married men in view of the larger possibilities of substitution between the kinds of work married people engage in.<sup>1</sup>

An uncompensated wage ( $w$ ) increase includes (1) a positive income effect leading people to work less in general, and most likely also less outside the home, and (2) a positive compensated wage effect leading to substitution of outside labour for household labour and time for self.

A negative Income Tax (NIT) programme, that transfers income as a function of earnings, includes both a positive income effect and a negative compensated wage effect. It follows from the theory that both these effects will have a stronger discouraging influence on the labour supply of wives than of husbands, if couples stay married. The increase in household labour resulting from the negative wage effect will help the couple in bridging the gap between demanded and supplied household labour that originated from the income transfer to both wife and husband.

Results from NIT experiments confirm the theoretical implications. Keeley (1980) found that among wives and husbands who stayed married, eligibility for a Negative Income Tax (NIT) programme tended to induce more of a negative response in the labour supply of wives than of husbands.<sup>2</sup>

An alternative way for couples to readjust to income and wage changes can be derived theoretically if it is assumed that men and women differ in their demand and supply of household labour, as a result of differences in productivity, income opportunities or utility preferences, and that costs of divorce and remarriage are positive. The theory suggests that a married couple can also readjust to higher individual incomes by means of divorce and remarriage.

The husband could obtain more household labour, and the wife would work less not only through a drastic reduction in the wife's labour supply outside the home, but also through divorce and remarriage with appropriate partners. The wife would find a new husband demanding fewer hours of labour in the home, whereas the (original) husband would find a new wife willing to supply more hours of labour in the home. This theory is also consistent therefore with the finding that the Denver and Seattle NIT experiments were associated with a rise in divorce (Hannan *et al.* (1977)).

<sup>1</sup> This part of the argument could also be inferred from Mincer (1962). However, he did not make a distinction between supply and demand for labour in the home, nor did he separate a compensated wage effect.

<sup>2</sup> A more detailed theory on this issue can be found in Grossbard-Shechtman and Keeley (1981).

(iv) *The Backward-bending Supply of Labour*

The reasoning behind ethnic or racial differences in the elasticity of labour supply can also provide an additional rationale for backward-bending supply curves, beyond the traditional explanation whereby a negative income effect dominates a positive substitution effect. The backward-bending supply of labour could also result from a positive correlation between  $w$  and  $w^*$ . Higher wage levels could cause leftward shifts of the supply of labour if  $w^*$  and  $w$  are positively correlated (e.g. due to lack of control for ability). If the ensuing shift in supply is large enough in comparison to the slope of the supply function defined at a given  $w^*$ , the *observed* supply schedule could have a negative slope (see Fig. 4).

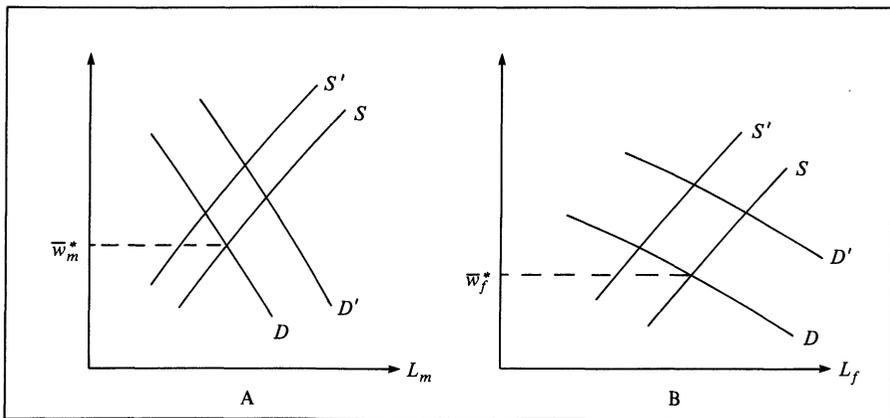


Fig. 4. Income effects on labour supply.

In view of the larger importance of household labour in the work history of women, it follows that this explanation is more applicable to women, and therefore that a backward-bending supply curve is more likely to be observed among women than among men. It should not come as a surprise, therefore, that one of the few cross-sectional studies finding a backward-bending supply of labour used a sample of nurses (Link and Settle (1981)).<sup>1</sup>

### III. OTHER IMPLICATIONS

This section briefly mentions some additional implications of this theory of allocation of time in markets for labour and marriage regarding consumption, fertility and marriage.

As has been mentioned by Becker (1973; 1981), the relative position of husbands and wives in their respective marriage markets will have implications for their *consumption* patterns. In terms used here, the higher  $w_f^*$  relatively to  $w_m^*$ , the higher the wife's wellbeing compared to the husband's. One of the means by which this could be expressed is through a large share of household expenditures, benefitting

<sup>1</sup> Relying on data from time series, some have viewed secular declines in hours of work as evidence for a backward-bending supply curve (e.g. Cain and Watts (1973)). However, these studies did not isolate factors other than wages and incomes such as technological change.

the wife rather than the husband. Variation in relative compensations for household labour could also explain related trends in gender differentiation regarding health, longevity, or time spent on recreational activities.

The study of *fertility* is another area that could benefit from this theory. It follows from the theory presented above that there will be no strong contrast between male income effects on the fertility of full-time wives and those effects on married women working outside the home, a contrast derived theoretically by Willis (1971; 1974). According to Willis (1974) and others following his approach, an increase in male income will not affect the time cost of children of a woman employed in the labour force unless she is induced to stop working outside the home. From their point of view, so long as a woman is working outside the home, the value of her time equals her wage and is unaffected by changes in male income (equation (6')). But if male income rises and the wife is not working outside, the demand for household labour shifts upwards, her value of time in the home and cost of children rise, which attenuates the impact of an income effect. This leads Willis to predict that the absolute value of a male income effect on fertility will be larger if the wife works outside the home than if she does not.

In contrast, it follows from this model that a woman's value of time in the home is determined in a market for household labour. Consequently, a rise in the aggregate demand for women's household labour resulting from an overall increase in male income will be associated with an increase in the value of time in the home ( $w^*$ ), even for women working outside the home. However, it remains true that a shift in demand at a point where the supply is closer to vertical will cause a larger increase in  $w^*$  than an upward shift in demand at a point where the supply curve is more elastic, and the latter may be less likely when no women work outside the home. But according to the present approach, it is impossible to predict that the male income effect on fertility will be stronger if labour force participation by married women is more widespread, an implication stated in Willis (1974). It is therefore not surprising that Ermisch's (1979) analysis of British time series of fertility and Butz and Ward's (1979) analysis of such series for the United States did not show that male income had a stronger positive effect if women participated in the labour force.

Estimating the value of time in the home is interesting not only for the study of fertility but also for such subjects as the determination of alimony or life insurance benefits. Whatever one's source of interest it is important to appreciate that according to equation (6) the value of someone's time in the home does not need to be equal to their wage in the labour market (assuming they work). People showing much higher productivity in the labour market than in marriage, which would be reflected in a  $w^*$  much lower than  $w$ , will probably devote small amounts of time to a spouse. For example, the successful female executive with an average market  $w^*$  may spend few but very enjoyable hours working for her spouse (including time she devotes to their children beyond the amount of work she would contribute being a single parent).

One can use some of the ideas presented here in determining optimal methods for property and income distribution at divorce. The emphasis on household

employment and market-established values of household labour implies (1) less emphasis on the number of hours a person works outside the home than is presently the case: wives (or husbands) who work outside the home should not necessarily be deprived of a compensation at the time of divorce, nor should full-time housewives necessarily receive a large compensation; (2) less emphasis on income unrelated to household labour; (3) a return to the more individualised divorce settlements which many jurisdictions have recently replaced by simplified procedures. Marriages involve a great variety of (often implicit) reciprocal employment contracts, and at dissolution each case needs to be studied separately.

Finally this theory has many insights to offer regarding our understanding of variations in marriage and divorce rates, preference for cohabitation versus formal marriage, acceptance of polygamy, intermarriage, or age at marriage. These are pursued further in Grossbard (1978*a*; *b*), and Grossbard-Shechtman (1982*a*; *b*, 1983).

#### IV. SUMMARY AND CONCLUSIONS

This paper has presented a theory of interrelated labour and marriage markets. Demand and supply schedules for labour and household labour were derived based on a theory of allocation of time and on the assumption that individuals can enter and discontinue marriage contracts. Particular emphasis was given to the theory's implications for the study of labour supply. Among the major insights derived from the model are the hypotheses that labour force participation of married women varies with the sex ratio of those eligible for marriage, that income changes influence wives' labour supply more than husbands', that group differences in patterns of division of household labour influence the elasticity of female labour supply, and that a positive correlation between achievement in markets for labour and household labour can provide an additional explanation for the backward-bending supply of labour. The theory also offers interesting insights regarding consumption, fertility, and marriage.

Further research ought to refine the theoretical apparatus presented here, test it against further empirical evidence, and to explore its implications for public policy. Numerous laws and government programmes affect women's labour force participation, marriage, fertility, and divorce, as well as the relative welfare of men and women, whether married or not. This theory will perhaps provide a useful framework for analysing the consequences of public policy for production, reproduction, and the distribution of wealth.

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