

Marriage, Housework and Fairness*

Frida Widmalm*

24 November 1998

ABSTRACT

I explore the effects of a preference for fairness in the division of housework between two spouses in two different models of household time allocation. Both in the model with agreeing spouses and the model with noncooperative spouses, such a preference has an equalising effect on the division of labour between the partners. In the noncooperative setting, the wife gets better off and the husband worse off in terms of private consumption. I also argue that both the allocation process and the degree of fairness consideration matter for policy outcomes and discuss three policy measures in relation to these two factors.

JEL codes: C72, D13, D63

Keywords: fairness, housework, unpaid work, household production, household time allocation

* I want to thank Jonas Agell, Martin Browning, Katarina Richardson, Laura Larsson, participants at the Nordic Seminar on Intra-Household Distribution, Copenhagen, 1998, and Out of the Margin 2 /IAFFE Summer Conference, Amsterdam, 1998. Financial support from the Jan Wallander and Tom Hedelius Foundation is gratefully acknowledged.

* Department of Economics, Uppsala University, P-O Box 513, S-751 20 Uppsala, Sweden.
Phone: +46 18 471 76 35, facsimile: +46 18 471 14 78, e-mail: Frida.Widmalm@nek.uu.se.

1 Introduction

The purpose of this paper is to integrate two important and distinct literatures: that of household allocation and that of fairness considerations. In two simple models of household time allocation, I introduce a wife's preference for fairness over the division of housework. The term "fairness" is used to indicate a subjective judgement/preference over the division of housework. It is modelled so that the utility of a person who has such a preference for fairness cares about the *shares* of housework performed by themselves and their spouse. It is shown that a fairness preference alter couples' time allocation and has implications also for consumption patterns. I will argue that if such a preference for fairness is prominent in household behaviour, policy implications based solely on comparative advantages may be misleading, or wrong altogether.

Mainstream economic models of the household have emphasised the role of comparative advantages in the determination of the division of work. For a prominent example see Gary S. Becker (1981). In these models, the wage differential and the spouses' productivities in housework determine who does the paid work and who does the housework. Such economic aspects are no doubt parameters in couples' decision about the division of work, but they may also be counteracted by other, non-economic preferences, like for instance a preference for "fairness" over the division of housework.

Although it is probably part of human nature to value one's own position relative to others', very few economic theories feature agents whose well-being depend on relative as well as absolute resources. A well-known exception is the "non-economic" efficiency wage models of George A. Akerlof (1982), Robert Solow (1983), and Akerlof and Janet L. Yellen (1990), in which workers have a preference for a wage rate on par with that of a comparison group. In personnel management texts, such a preference for a "fair wage" is

even considered self-evident¹, and experimental evidence also indicate that workers care about what other workers receive (Akerlof and Yellen p. 258). Furthermore, Andrew E. Clark and Andrew J. Oswald (1996) present interview results to the effect that workers whose wages are on par with a comparison wage are much more satisfied with their job.

But it is not only in the labour market that people may compare themselves to others. Also in the private sphere inter-personal comparisons are common.² Research in sociology of intra-household interaction gives evidence that especially the division of unpaid housework affect spouses' well-being. Specifically, wives' perception of fairness of the household division of housework seems to be vital for their marital satisfaction, see e.g. Joyce Robinson and Glenna Spitze (1992), Sampson Lee Blair and Michael P. Johnson (1992), Linda Thompson (1991), and Mary Holland Benin and Joan Agostinelli (1988). These studies confirm that married and/or cohabiting women feel less satisfied the less their partner's share of the housework, often even regardless of the division of paid work within the household. It is reasonable to assume that these psychological mechanisms have an impact on households' division of labour.

In this paper I explore the effects of the presence of a fairness preference in two mainstream economic models of household allocation. The first one is a version of the model of Paul A. Samuelson's (1956), in which the two spouses agree on a household welfare function to maximise. Because the relevance of such a unitary model has been empirically challenged, I also explore the introduction of a fairness preference in a noncooperative household model. In this model, the spouses fail to agree on a common welfare function. Apart from a private consumption good, the models include a household public good, produced with the spouses' household labour. The wife is assumed to have a lower wage and

¹ Akerlof and Yellen (1990), p. 263.

² People with brothers or sisters probably agree that fairness in the division between siblings is vital!

a preference for equality in the division of housework. Therefore, in my models, two forces are at work in determining the spouses respective contribution to each kind of work: comparative advantages and a wife's preference for a more equal division of housework. This set-up recognises the economic and social content of market and household labour, argued by Elisabeth Bergen (1991) and others.

With a fairness preference, the household allocations of work and consumption that emerge are different from the ones that would be obtained should the models feature economic incentives only. The more important the fairness issue is, the more equal is the division of market and housework in both models. A strong preference for fairness also implies less household public good in both models. However, whereas the two partners always have identical consumption bundles in the first best model, a wives' fairness consideration makes noncooperative husbands worse off because they get less private consumption. Wives, on the other hand, get more private consumption. In the Samuelsonian, first best, model, a *wife's* preference for fairness is synonymous with the *couple's* preference for fairness. Therefore, the relative importance of the fairness preference can be used to capture different households' different degrees of gender equality orientation. That there are different types of households in this respect will prove important for policy analysis. Because policies often rely on economic incentives, I argue that fairness oriented agreeing couples react differently than other couples to certain policy measures.

I am aware that the two household models I use may well be overly simple, but they serve the useful purpose of illumination the importance of the fairness preference in the clearest possible way. However, in future work, I plan to make use of more elaborate models incorporating endogenous leisure, explicit bargaining and/or market substitutes for the household good.

The rest of the paper is organised as follows. Section 2 briefly reviews theory and evidence on household allocation and evidence on people's preferences for fairness. In section 3, I present the first best household allocation model with agreeing spouses. The model in section 4 is a Cournot-Nash noncooperative model where the spouses do not agree on a common objective function. Section 5 summarises and concludes the paper.

2 The household division of labour

2.1 Economic theory

Economists' view of the family as an institution has varied over time. The classical economists considered the household as an institution (that should be) guided solely by non-economic forces such as morality and altruism (Jean Gardiner, 1997). Also many of the early neoclassical economists shared this view and therefore argued forcefully for legislation against women's employment in their days (Michèle Pujol, 1995). A notable exception was John Stuart Mill who wrote on the household division of labour:

[E]ven when no more is earned by the labour of a man and a woman than would have been earned by the man alone, the advantage to the woman of not depending on a master for subsistence may be more than equivalent.³

His statement stands in sharp contrast not only to the views of his contemporaries, but also to the analysis of the new neoclassical family theory. Becker (1981) was among the first economists to theorise about the division of labour within households as guided by foremost economic forces, like the gains from specialisation. According to this theory, a married couple allocate the wife's and husband's time analogously to the famous butter and gun example in trade theory. By specialisation of tasks, the couple benefit from the fact that they are

³ John Stuart Mill (1865), quoted in Gardiner (1997).

differently endowed and can trade with each other in different kinds of work. According to Becker, biology and gender-specific investment in human capital make the wife best suited for housework, and the husband for working for pay in the labour market. Total welfare from this arrangement will be greater than if the two spouses share the breadwinner role as well as the housework. This is because people who do both cooking and labour force participation cannot fully invest in the skills they are relatively better at. In other words, the potential gain from marriage is determined by the spouses' wage-ratio and their productivities in housework. Other models of household division of labour along these lines can be found in e.g. Yoram Weiss (1993), Shoshana A. Grossbard-Shechtman and Shoshana Neuman (1988), and Amyra Grossbard-Shechtman (1984).

As far as the intra-household distribution of consumption is concerned, the neoclassical marriage model treats the family as a single consumer. This can be achieved in two ways. Either the spouse who specialises in market work (who controls the money), dictates what the household's utility function looks like (this is the approach used by Becker)⁴, or the family maximises a common utility function (Samuelson, 1956) under a joint budget constraint. Under both constructions, a household's consumption pattern looks like that of a single person. These two models are therefore often referred to as the unitary model. No doubt, a common household utility function would be a useful simplification, but its validity has been rejected in several empirical studies, see e.g. Matz Dahlberg (1997), Martin Browning and Pierre-André Chiappori (1996), Shelley A. Phipps and Peter S. Burton (1995) and Martin Browning et al. (1994). But just because the unitary model has been rejected at an *aggregate* level, it does not preclude the possibility that *some* households behave in

⁴ The famous Rotten Kid Theorem makes selfish wives (and kids) behave according to the altruistic husband's preferences out of sheer self-interest.

accordance with it. It is therefore justified to explore models of agreeing couples along with other models.

Another strand of the economics literature on the household are the bargaining models. This approach assumes that the spouses have different views about what is best for the household. Marjorie B. McElroy and Mary J. Horney (1981) develop a Nash bargaining model, where the couple bargain over the allocation of consumption, leisure and a household public good. The spouses' fall back positions are their respective positions as single, i.e. a divorce scenario. A person's well-being in the case of a divorce depend on wages, non-labour income and "extrahousehold environmental parameters" (such as welfare policies, remarriage market opportunities etc.); therefore all these appear directly in all demand and supply functions.

More recent bargaining models use noncooperative behaviour within the marriage as a more plausible fall back position than a divorce. In the separate spheres bargaining model of Shelly Lundberg and Robert A. Pollak (1993), this entails automatic gender specific responsibilities. In other words, should the spouses fail to agree on the distribution, the woman takes on all the housework and her husband does only market work. There are still gains from joint consumption of the household public goods, but these are typically underprovided. Kaj Konrad and Kjell-Erik Lommerud (1995) explore the effects of alternative family policies in a somewhat different (and more realistic) noncooperative marriage model. Unlike Lundberg and Pollak, they model the noncooperative equilibrium as one where each partner works on the labour market and supplies some positive amount of household labour.⁵

⁵ A fourth school of marriage models are the so called "attitudinal models" (the term is used by Phipps and Burton, 1995). These models feature cooperative bargaining spouses with unequal power. The relative weights attached to the husband's and the wife's preferences could be thought of as reflections of societal norms that may differ over countries or different population strata.

A general feature of all cooperative bargaining models is that the strengthening of a spouse's fall back position improves her/his share of the gains from marriage. In all models where the couple somehow manage to reach an agreement, a Pareto optimal allocation is achieved, whereas under noncooperative behaviour, there is always a problem of underprovision of household public goods. What distinguishes the Pareto efficient bargaining models from the models of Becker and Samuelson is that the distribution is set according to bargaining power rather than a common utility function.

2.2 Evidence of a fairness consideration and the division of housework

To an economists' discussion list, on the topic whether "wage equals marginal product", the following contribution was made:

I have always been bitterly amused when academic economists argue fiercely with department heads, deans, and others for higher salaries. In my experience there is nary a mention of increased marginal products, but lots of mention of the salaries of other people and etc. Apparently the equation [wage = marginal product] does not work very well in the area we know best.⁶

Although the quotation suggests that also economists compare their reward to what others' receive, the phenomenon is rarely acknowledged in models of economic agents' behaviour. Two exceptions are Richard Layard (1980) and Akerlof and Yellen (1990). Layard discusses some implications from the assumption that all people care about their social ranking or "status". Akerlof and Yellen apply a similar idea to the labour market and present a model where workers put in a maximal work effort only if they are paid a "fair wage". Akerlof and Yellen assume that workers notion of a fair wage is based on what co-workers and others earn. Their (main) equilibrium features wage compression due to the fairness preference and conforms to many other stylised facts of unemployment. Clark and Oswald (1996) present

empirical support for this fair wage hypothesis in their quantitative examination of job satisfaction among British workers. They find an inverse relationship between workers' level of job satisfaction and a proxy for the fairness norm, a comparison wage. Also, interview surveys indicate that wage setting managers believe employees to care about fairness to a considerable extent, see e.g. Truman Bewley (1995) and Jonas Agell and Per Lundborg (1995). For more elaboration of the importance of fairness for the workings of the labour market, see Solow (1990).

A couple of other examples can be found in the taxation literature. Michael J. Boskin and Eytan Sheshinski (1978) and Mats Persson (1995) present models where people's preference for relative wages or consumption levels yields a negative externality so that everybody works too much. An income tax can then successfully be employed to reduce the excess labour supply of the individual worker. Agell and Lundborg (1992) present a model where workers are assumed to care about the wage-rental ratio. Also in this study, the classical results on tax incidence change with the introduction of a fairness consideration. Thus, in situations when fairness matters, many policy implications of the mainstream approach may be inadequate. A similar argument can be applied to household behaviour: if people are concerned with fairness within the household, policy implications may not be the same as in the mainstream utility specification.

Throughout the 20th century, the female labour force participation and women's earnings in Western countries has been rising steadily, both in absolute levels and relative to men.⁷ Women's rising incomes not only render the household more income, but also make the

⁶ Anne Mayhew, femecon-1 July 30, 1997.

⁷ Barbara R. Bergmann (1986, chapter 2) distinguishes three causes for the rise in female labour force participation. First, the trend of technological change has raised women's real market wages, implying a rising alternative cost of housework. Second, as more women choose market work, individual and societal attitudes regarding gender roles change. Third, falling fertility rates substantially reduce the need for time-intensive housework. The three explanations may also interact and reinforce each other.

wife gain more financial autonomy. There is evidence indicating that the more income a spouse contributes towards the family budget, the larger is her/his role in household decision making. An early example is Jan Pahl's (1989) study of intra-household resource distribution, where she finds that most women who are prominent in household decision making are engaged in paid work. Recognising this fact, exploring the effects of a female preference for a more equal distribution of paid and unpaid work seems well motivated.

Not surprisingly, such a preference on women's behalf has been detected in many sociological studies of married and cohabiting couples. Benin and Agostinelli (1988) report that among the 74 dual-earner couples they interviewed both men and women found a 50-50 split of the housework ideal. On average, however, men's self-reported amount of housework was far less than that of the women and, consequently, the women were less satisfied with the household division of housework. It also turned out that men in this study cared about the number of hours whereas the women cared for their husband's partaking in traditionally female housework. This result is confirmed by Robinson and Spitze (1992) who interviewed 600 women and men, and found that women are dissatisfied with the relative division of housework, not the total amount, and therefore report less marital happiness than men. Blair and Johnson (1992), find similar results. However, their 1000 married women sample also include full-time homemakers and it is surprising that also these wives' perception of fairness is strongly correlated with their husbands' contribution to traditionally female housework.⁸

The formation of a person's perception of fairness may be a rather complex process. In this paper, the word fairness, like in the fair wage literature, conforms to theories

⁸ Women's lower level of satisfaction has tangible implications. Ronald C. Kessler and James A. McRae (1982) and Catherine E. Ross, John Mirowsky and Joan Huber (1983) are concerned with spouses' mental health in relation to the division of housework. Both report that women whose husbands share the housework have a better mental health status than other married women.

of distributive justice. In other words, the term is used to indicate what people mean when they say things like: it is not fair that I should do all the laundry when I am working full-time! I do not use it in the technical sense as to mean "absence of envy" (which is a common definition in economics) or that a person is willing to give up material well-being in order to punish unfair behaviour (as for example in Matthew Rabin, 1993).

How do real-life households allocate their members' time to market and housework? A stylised fact of the present seems to be that men and women work about the same amount totally in most Western countries.⁹ Interestingly however, the distribution on paid and unpaid work depends very much on which country we study. Country specific factors that are believed to affect this distribution are: societal/religious attitudes to gender roles, labour market characteristics and public policy. Hettie Pott-Buter and Wouter Buitenhuis (1998) argue that these factors interact and that it has resulted in very low female labour force participation, especially among married women, in the Netherlands. Consequently, Dutch women on average work little in the labour market and do much more unpaid housework: just over 80% of all housework is performed by women in the Netherlands, see Tanja van der Lippe and Jacques J. Siegers (1994). In the Scandinavian countries women do about two thirds of all housework (Lennart Flood and Urban Gråsjö, 1995, Peter Rørmose Jensen (1995), Julie Aslaksen and Charlotte Koren, 1995).

Aggregate averages like these may be deceptive, though. The fact that *on average* men and women work the same amount of time may hide an underlying pattern of systematic overload on employed women. Bergmann (1986), classifies a 290-couple sample, interviewed in 1975-76, into five kinds of household arrangements. These are: *housewife* (44%), *semi-housewife* (the wife held a part-time job and remained with the full responsibility for the housework, 20%), *drudge-wife* (fully employed wife with most responsibility for

housework, 13%), *two-housekeepers* (both spouses were employed and shared the housework more or less equally, 6%) and *cash-paying* couples (where household related services were bought from others, 17%). In the housewife and semi-housewife categories, wives had a significantly smaller total work load, whereas in the drudge-wife and two-housekeeper households the opposite were true.

Myra Marx Ferree (1991) conducts a similar study more than a decade later, but concentrating on dual-earner couples only. Her results are in line with those of Bergmann: the total work loads of men and women are on average the same but with a greater variability in women's total work load. Over this time-span, equality between the spouses had both increased (the proportion of couples with "moderately egalitarian arrangements") and decreased as the proportion of drudge-wife household among dual-earners were larger in Ferree's study than in Bergmann's.

Harriet B. Presser (1994) presents somewhat diverging results concerning the distribution of work of 2000 American dual-earner married couples. Her results indicate that an employed married American woman does twice as much housework as her husband and together with her paid work, she works on average five hours more per week.¹⁰ Altogether, these studies seem to suggest the existence of a hierarchical decision order: many women are assigned the responsibility for the bulk of the housework *first*, and *then* they may choose how much paid work to engage in. This could of course still be coherent with spouses who agree on a common utility function and need not reflect conflict in all households.

⁹ See e.g. Lennart Flood and Anders Klevmarken (1990), chapter 10.

¹⁰ Another interesting finding in this study is that the less overlapping the couples' market working hours are, the larger share of the household work does the husband do, thus lending further support to the hypothesis that many people understands housework as primarily the responsibility of the wife.

3 A first best cooperative model

In this section, I explore the introduction of a preference for fairness in the distribution of household work in the Samuelson version of the unitary marriage model. A couple's behaviour is modelled as if the two members maximise a utilitarian welfare function where both spouses' utility carry the same weight, subject to a family budget constraint. The specification of the fairness component in utility is analogous to Akerlof and Yellen (1990) and conforms to the evidence of a fairness preference cited in the previous section. My model is inspired by Reuben Gronau (1977) in that the solution to the utility maximisation problem always involve both spouses in both paid and unpaid work. This is guaranteed by the assumption of decreasing returns in household production.¹¹

Unlike Gronau but in common with Konrad and Lommerud (1995), the labour-leisure choice is assumed to be exogenous so that the two partners are to allocate their total labour time T between market and housework. Spouse i spend H_i hours on unpaid household production ("housework") and $M_i = (T - H_i)$ hours on paid market work. The index $i = f, m$, where f stands for a female spouse and m denotes her male partner. The variable w_i is spouse i 's exogenously given labour market wage rate. Throughout the paper, I assume that the husband's wage is higher than his wife's: $w_f < w_m$. However, I assume that both spouses are equally productive in housework. The production function of the household public good is assumed to be: $h = \tilde{h}(H_f) + \tilde{h}(H_m)$ where $\tilde{h}'/H_i > 0$ and $\tilde{h}''/H_i^2 < 0$ for $i = f, m$ and $\tilde{h}''/H_i H_j = 0$ for $i \neq j$. The decreasing returns to each partner's time in housework are thought to be a reasonable assumption for short time periods (because of tiredness and the often monotonous character of housework). Furthermore, the specification I

¹¹ In a model with linear or even increasing returns, like that of Becker (1981), the solution is a fully specialised corner solution.

have chosen implies that one spouse's productivity in housework is independent of how much the other partner does, which cannot be considered too restrictive when housework is concerned. I further assume that there is no market substitute for the public good.

The individual utility functions include consumption of a private good, c , and a household public good, h . The members of the couple are assumed to have identical utility functions, hence $U(c_i, h)$ denotes the utility from consumption for spouses $i = f, m$. Along with the preference for private and household public consumption, the preference for fairness in the division of the two kinds of work, modelled as $V(H_m/H_f)$, is added.¹² U and V are assumed to be continuous and twice differentiable. The derivatives u_c , u_h and V' are assumed to be positive and u_{cc} , u_{hh} and V'' are assumed to be negative. Furthermore, V is negative for all ratios H_m/H_f less than one, reflecting that for any division of work involving more housework for the woman, the couple's utility is less than if they had not cared about fairness. I assume that when the ratio of the housework loads is one, the wife/couple is satiated in "equality" and that $V(1) = 0$ and $V'(1) = 0$. In other words, the wife is not interested in exploiting her husband in housework. Since this preference is assumed to exist for the person who has the comparative advantage in housework, a mirror preference on behalf of the *husband* would prevail for ratios H_m/H_f larger than one. The only distribution of housework for which neither spouse receives disutility from the housework distribution is when it is shared equally.

The relative importance of price signals and the fairness preference will prove vital in determining the couple's optimal time allocation. I use the parameter \mathbf{b} to indicate the weight of the fairness preference relative to the conventional entries in the couple's utility

¹² In this model the two spouses agree on the household's utility function. The inclusion of V along with the two conventional entries in the family social welfare function implies that the husband either shares his wife's

function. As we shall see, the preference for fairness alters the relative prices of the wife's and husband's household time, thereby altering the conditions for economic efficiency compared to a setting in which neither partner cares about the division of housework. The household maximises:

$$U(c_m, h) + U(c_f, h) + \mathbf{b}V\left(\frac{H_m}{H_f}\right) - \mathbf{I}\left[c_f + c_m - w_f(T - H_f) - w_m(T - H_m)\right] \quad (3.1)$$

where the first three terms are the utilities described above and the last expression within square brackets is the household's budget constraint saying that the expenditure on consumption of private goods, for which the price is normalised to one, must equal the household's total income. The first order conditions for the maximisation of (3.1) are:

$$u_{c_f} - \mathbf{I} = 0 \quad (3.2)$$

$$u_{c_m} - \mathbf{I} = 0 \quad (3.3)$$

$$2u_h \frac{\tilde{\eta}}{\eta H_f} - \mathbf{b}V' \frac{H_m}{H_f^2} - w_f \mathbf{I} = 0 \quad (3.4)$$

$$2u_h \frac{\tilde{\eta}}{\eta H_m} + \mathbf{b}V' \frac{1}{H_f} - w_m \mathbf{I} = 0 \quad (3.5)$$

$$c_f + c_m - w_f(T - H_f) - w_m(T - H_m) = 0. \quad (3.6)$$

Let us first look at the allocation that would result if there were no preference for fairness, i.e. the special case when $\mathbf{b} = 0$. First, because h is a public good the same amount must be enjoyed by both partners. Equations (3.2) and (3.3) then imply that the two must also consume the same amount of the private consumption good: $c_f = c_m = c^*$. Second, equations (3.4) and (3.5) give the condition for the division of housework as:

preference for an equal division of the housework, or at least endorses the preference of his wife. Note also that I abstract from "altruism", i.e. the partners' utility levels do not depend on each other's.

$$\frac{\mathfrak{H}/\mathfrak{H}_f}{\mathfrak{H}/\mathfrak{H}_m} = \frac{w_f}{w_m} \quad (3.7)$$

which leads to $H_f^* > H_m^*$, and consequently to $M_f^* < M_m^*$. This is the gains from specialisation result. The spouse with the comparative advantage in housework, here the wife, optimally does more of it than her spouse, who has his comparative advantage in market work. The total amount of household public good that will be provided is

$h^* = \tilde{h}(H_f^*) + \tilde{h}(H_m^*)$. Because we study a fully cooperative solution, the externality associated with a public good is internalised, i.e. the marginal rate of transformation equals the sum of the marginal rates of substitution:

$$2 \frac{u_h}{u_c} = \frac{w_f}{\mathfrak{H}/\mathfrak{H}_f} = \frac{w_m}{\mathfrak{H}/\mathfrak{H}_m} \quad (3.8)$$

3.1 A Preference for Fairness

Let us now turn to the case where $\mathbf{b} > 0$, that is, the wife gets disutility from doing more housework than her husband. Equations (3.2) and (3.3) remain unchanged, which implies that both partners still get the same amount of private consumption, even if one of them (or both) care for the division of housework. Equations (3.4) and (3.5) however, now state that the market prices must be corrected to arrive at the appropriate shadow prices of housework. This means that (3.7) becomes:

$$\frac{\mathfrak{H}/\mathfrak{H}_f}{\mathfrak{H}/\mathfrak{H}_m} = \frac{w_f u_c + \mathbf{b}V' \frac{H_m}{H_f^2}}{w_m u_c - \mathbf{b}V' \frac{1}{H_f}} \quad (3.7')$$

which is unambiguously larger than the wage ratio in (3.7), indicating a less specialised division of both housework and market work. In other words, the fairness consideration has a cost in terms of not fully utilised comparative advantages.

To see how the optimal time allocation, H_f^* , H_m^* , M_f^* and M_m^* , and also the consumption distribution, h^* and c^* , change when the preference for equal sharing in housework, \mathbf{b} , increases, I present some comparative statics (for the formal derivations, see Appendix 1):

$$\begin{aligned}
\text{(i)} \quad \frac{\partial H_f^*}{\partial \mathbf{b}} &< 0 & \text{(ii)} \quad \frac{\partial H_m^*}{\partial \mathbf{b}} &> 0. & (3.9) \\
\text{(iii)} \quad \frac{dh^*}{d\mathbf{b}} &= -2 \frac{\tilde{h} / \partial H_m}{w_m} \frac{dc^*}{d\mathbf{b}}
\end{aligned}$$

The comparative statics are evaluated at the point when $\mathbf{b} = 0$ and $u_{ch} = 0$. When the household starts to care about fairness in the distribution of housework, it re-adjusts its equilibrium allocation and consumption. (3.9 i) indicates that the wife decreases her housework in this fully cooperative household model. Because of the exogenous leisure choice, she therefore also increases her paid work M_f^* , (3.9 ii). The husband's optimal time allocation goes in the opposite direction: he increases his housework and decreases his market work M_m^* . The effect on the household's consumption mix of this time re-allocation, is given by (3.9 iii). Depending on the household production technology, the household either substitutes more private for household public consumption, or the other way round.

Because the wage gap between men and women has diminished in most Western countries over the last decades, it is interesting to see how a wife's wage raise, *ceteris paribus*, is expected to affect a household's time and consumption allocation. (3.7) directly implies that the relative division of the housework becomes more even. The comparative statics (evaluated at $\mathbf{b} = 0$) of a wife's wage raise are derived in Appendix 1. These are:

$$\begin{aligned}
\text{i)} \quad \frac{dH_m}{dw_f} &> 0 & \text{ii)} \quad \frac{dc^*}{dw_f} &> 0 & (3.10)
\end{aligned}$$

The two unambiguous effect of the wife's wage raise is that private consumption increases and the husband increases his housework. The effects on the wife's housework and the level of household public good are ambiguous due to conflicting income and substitution effects.

Therefore, falling national averages of women's housework shares are consistent with an increased preference for fairness, but also with closing gender wage gaps. The model I use in this section rests on the assumption that household arrangements are made by two agreeing spouses. This is of course not always certain. The spouses may disagree over what components to include in a household welfare function. Specifically, it is possible that the husband does not agree to consider the fairness argument in the household's utility function at all. If the spouses cannot agree on one joint utility function, they may have to bargain over the allocation or they may end the cooperation altogether, either by getting a divorce or by starting to behave selfishly within a continuing marriage. The relevance of a wife's preference for fairness in the latter option is explored in the next section.

4 A noncooperative Cournot-Nash model

Lundberg and Pollak (1993) argue that it is possible that spouses who fail to reach an agreement on the division of labour and resources, retreat to noncooperative behaviour *within* the marriage instead of getting a divorce. In such a marriage, each spouse maximises her own utility conditioned on her Nash-conjecture about her spouse's behaviour. The gains from this kind of marriage is restricted to the joint consumption of the household public good. The public good will be underprovided because neither partner takes the other's utility into consideration when they decide how much housework to provide. Other noncooperative marriage models are Jane Leuthold (1968), Peter Kooreman and Arie Kapteyn (1990), and Konrad and Lommerud (1995).

It is important to study the properties of a noncooperative marriage for a number of reasons. First, there are several decisions that people make without negotiating with their spouse. Education would be one good example, as well as certain other career related choices. Second, there is substantial evidence that people are willing to give up own utility in order to punish others who do not behave nicely. Even though both partners could do better by cooperating they may choose not to, simply to punish one another. Third, Ken Binmore, Ariel Rubinstein and Asher Wolinsky (1986) argue that "utilities during conflict" are the relevant threatpoints in cooperative bargaining models. In other words, the solution to the noncooperative game affects the cooperative bargaining outcome.

Here I will set up a simple static noncooperative model à la Cournot-Nash and examine the interaction between a preference for equal loads of housework, the distribution of paid and unpaid work that emerges, and the underprovision of the household public good. Everything except the decision process is modelled as in the first best model in the previous section, that is, utility and household production functions, wages rates, and the fairness preference are the same. The household allocation emerges as each partner maximises their own utility, where the other partner comes in only as providing some household time which leads to a contribution to the household public good.

The wife maximises her own utility in choosing her time in household labour, H_f conditioned on her estimate of her husband's contribution, H_m^e , where the superscript e indicates a conjecture. Her private consumption c_f then follows from the budget constraint. Equation (4.1) gives the wife's maximisation problem:

$$U(c_f, h^e) + bV\left(\frac{H_m^e}{H_f}\right) - I[c_f - w_f(T - H_f)], \quad (4.1)$$

where $h^e = \tilde{h}(H_f) + \tilde{h}(H_m^e)$ is the wife's conjecture of the total amount of household public good. The first order condition for a utility maximum is:

$$w_f u_c - \frac{\mathfrak{H}}{\mathfrak{H}_f} u_h + bV' \frac{H_m^e}{H_f^2} = 0. \quad (4.2)$$

The husband faces a similar maximisation problem but without the fairness preference, so the first order condition for his utility maximum is:

$$w_m u_c - \frac{\mathfrak{H}}{\mathfrak{H}_m} u_h = 0 \quad (4.3)$$

Equations (4.2) and (4.3) implicitly give the partners' reaction functions, $H_f(H_m^e)$ and $H_m(H_f^e)$, for given T , \mathbf{b} , and wage rates. In other words, (4.2) expresses the wife's supply of housework for different levels of (her estimate of) the husband's housework. The expressions for the slopes of these reaction functions are derived in Appendix 2. The husband's reaction function has a negative slope, which means that if his wife for some reason should increase her housework, the husband's response would be to contract his own. The slope of the wife's reaction function is also negative unless the preference for fairness, \mathbf{b} , is very large. I will restrict the analysis to small enough values of \mathbf{b} .

The Cournot-Nash equilibrium of this noncooperative game is the solution, denoted H_f^N, H_m^N , to the simultaneous equation system (4.2) - (4.3), where the Nash conjecture assumption $H_i^e = H_i$ for $i = f, m$ has been imposed, that is, in equilibrium, the partners are correct in their conjectures of the other's housework time.

If the model had had fixed productivities in household production, the Cournot-Nash solution would imply that the spouse with a comparative advantage in housework contributes more to the household public good than the other spouse.¹³ In my setting, with

¹³ For such a model, see Konrad and Lommerud (1995).

decreasing returns in household production, the equilibrium distribution of housework cannot be determined without further assumptions. We are interested in an equilibrium where the wife, who earns less, works more at home and less on the market than her husband:

$H_f^N > H_m^N$. It is shown in Appendix 2 that if $\mathfrak{H}_i / \mathfrak{W}_i < 0$, for $i = f, m$, the partner with the lower wage does more housework in equilibrium (still assuming that $u_{ch} = 0$). This requires that the spouses' Arrow-Pratt's relative risk aversion measure, $-c_i u_{c_i c_i} / u_{c_i}$, is larger than one for $i = f, m$.¹⁴ Therefore, in the following, I simply have to assume that the Arrow-Pratt measures are less than one.

4.1 The equilibrium

Let us first briefly look at the features of the equilibrium when $\mathbf{b} = 0$. We assume that the Arrow-Pratt's relative risk aversion measures above are fulfilled, which guarantees that $H_f^N > H_m^N$ and $M_f^N < M_m^N$. Together with the fact that the wife's wage is lower, this implies that the wife gets less private consumption than her husband, $c_f^N < c_m^N$. Furthermore, by combining (4.2) and (4.3) we obtain

$$\frac{\tilde{h} / \mathfrak{H}_f^N}{\tilde{h} / \mathfrak{H}_m^N} = \frac{w_f u_{c_f^N}}{w_m u_{c_m^N}}, \quad (4.4)$$

which implies that both housework and market work are more equally divided than in the first best world, cf. (3.7). In other words, there is some specialisation, but not to the economically efficient extent.

Because neither spouse take their spouse's utility of their housework into account, we know that too little of the household public good is provided: $h^N < h^*$.

¹⁴ Actually, the term risk-aversion is misleading in this context. In this non-stochastic model, the Arrow-Pratt measure has an interpretation in terms of income and substitution effects rather than actual risk. What I assume

Furthermore, we know that $H_f^N < H_f^*$. So the wife in a noncooperative marriage unambiguously works more in the market and less in household production than she would have done in a cooperative marriage (without a fairness preference). It is clear that the two partners' equilibrium utility levels may be rather unequal and that the wife gets lower utility. On the other hand, the larger engagement in the labour market makes the noncooperative wife financially more independent, i.e. her situation is less risky in case of dissolution of the marriage.

Let us now return to the case of a fairness preference. If the wife in the noncooperative model cares about fairness in housework, the equilibrium division of work is more equal. This can be seen by comparing (4.4') to (4.4):

$$\frac{\tilde{h}/\mathfrak{H}_f^N}{\tilde{h}/\mathfrak{H}_m^N} = \frac{w_f u_{c_f^N} + bV' \left(\frac{H_m^e}{H_f^2} \right)}{w_m u_{c_m^N}}. \quad (4.4')$$

The equilibrium effects of an increase in b , evaluated at the point where $b = 0$ are derived in Appendix 2. It is shown that:

$$\begin{aligned} \text{(i)} \quad \frac{\mathfrak{H}_f^N}{\mathfrak{b}} < 0 & \qquad \qquad \text{(ii)} \quad \frac{\mathfrak{H}_m^N}{\mathfrak{b}} > 0 & \qquad \qquad (4.5) \\ \text{(iii)} \quad \frac{h^N}{\mathfrak{b}} < 0. & \end{aligned}$$

In other words, when the wife increases her preference for fairness in housework, she reduces her own engagement in it. Both partners then consume less of the public good, and the husband responds to this by increasing his own time in housework. Assuming that both private and public consumption are normal goods, he does not compensate for the total amount withdrawn by the wife, however, so the entire amount of

about the Arrow-Pratt measure amount to that the substitution effect dominates the income effect.

public good available in the noncooperative household decreases as the preference for fairness increases. These results are qualitatively the same as in the first best model. However, the effects on private consumption of a change in \mathbf{b} go in opposite directions for the two spouses, which is different from the first best. Here, the woman gets more private consumption and the husband gets less:

$$(i) \frac{\mathcal{H}_f^N}{\mathcal{H}_b} > 0 \qquad (ii) \frac{\mathcal{H}_m^N}{\mathcal{H}_b} < 0. \qquad (4.6)$$

Because the woman originally enjoyed less private consumption than her husband, the increased preference for a fair housework division makes the partners more equal off in terms of consumption. However, with the fairness preference, the wife also experiences a disutility from the distribution of housework, $\mathbf{b}V(H_m^N / H_f^N)$, and she is still clearly worse off than her husband.

In the first best model, a rise in the wife's wage lead her to either increase or decrease her market work depending on the magnitudes of income and substitution effects. Here, in the noncooperative model, I have had to assume that the substitution effect dominates to ensure that the wife does more housework. Under this assumption, the comparative statics of a wife's wage raise, in the case of no fairness preference ($\mathbf{b} = 0$), are:

$$(i) \frac{\mathcal{H}_f^N}{\mathcal{W}_f} < 0 \qquad (ii) \frac{\mathcal{H}_m^N}{\mathcal{W}_f} > 0 \qquad (4.7)$$

$$(iii) \frac{\mathcal{H}_t^N}{\mathcal{W}_f} < 0.$$

The husbands reaction to the wife's wage raise consists of a pure income effect. When his wife decreases her housework, the husband compensates the loss by increasing his own. Because both goods are normal, he does not compensate up to the level prior to the wage

raise, so the effect on the equilibrium household good is negative. From (4.7 i and ii) it also follows that the wife gets more private consumption and her husband less:

$$(i) \frac{\partial E_f^N}{\partial w_f} > 0 \qquad (ii) \frac{\partial E_m^N}{\partial w_f} < 0 \qquad (4.8)$$

Therefore, in contrast to the first best where either spouse's wage raise leave both partners better off, a wife's wage raise in a noncooperative equilibrium leaves the husband unambiguously worse off. The female wage raise clearly serves to render the partners' utility levels more equal. If we see the noncooperative outcome as fallback positions in cooperative bargaining, we can conclude that in any bargaining marriage, men stand to loose from an increase in their wife's wage.

The presence of a fairness preference has been proved to alter time and consumption allocation both in this model and in the first best model of the previous section. Furthermore, the fairness preference have different implications in the noncooperative household model and the first best model. It seems natural to continue by discussing the empirical relevance of the two models and also how some policies will affect cooperative and noncooperative households with different degrees of fairness orientation.

5 Some possible implications for policy

In the noncooperative equilibrium, the household public good is underprovided. The government can improve the allocation by implementing policies that increase the partners' housework. On the other hand, the first best model of section 3 leaves no room for government intervention. There is simply no market failure to correct. In practice, however, governments have political agendas including for example measures to reduce unemployment and to redistribute consumption possibilities across and within households, whatever the

households' allocation processes are. To be able to evaluate different policies, it is important to acknowledge that households may have different allocation mechanisms. Here, I will discuss the implications of a few policy measures that have been proposed lately distinguishing households along two lines: whether the spouses agree or not and whether they care about fairness or not. At this stage, it is useful to recall the study by Bergmann (1986), that distinguished between five distinct types of households based on the gendered division of market, household and total work loads.

An attempt to describe Bergmann's household categories in terms of the parameters of my two models is found in Table 5.1. For example, some cooperative couples may pay no attention to the wage gap but choose to pursue two market careers and share the housework equally, whatever the labour market opportunities of the spouses. In terms of my model, this is the situation when b is very large and hence, the wage ratio is irrelevant. In terms of Bergmann's study, these households correspond either to the two-housekeeper households or the cash-paying households.¹⁵ In contrast, the housewife and semi-housewife households in her study can be thought of as couples who care relatively little for sharing, i.e. they have a low b . Note that Table 5.1 is only meant to be interpreted suggestively. For example, my models feature the same amount of leisure for both spouses, which is not true for housewife, semi-housewife and drudge-wife categories. It is only to present the general idea of categorising household along the two dimensions described above. My general point is that policies may affect these household categories differently.

¹⁵ What determines whether a fairness-oriented couple choose the cash-paying or two-housekeeper model? Empirically, the first category consists of young urban couples without children. In economic terms, this amounts to that they have less need for h relative to c , and/or that the price of market h relative to home produced h is low (proximity to fast-food outlets, restaurants, laundry services etc.).

Table 5.1. Suggestive description of Bergmann’s (1986) household categories related to the parameters of my models.

household type	Cooperative		noncooperative	
	b	w_f/w_m	wife’s b	w_f/w_m
housewife	low	$\ll 1$	low	$\ll 1$
semi-housewife	low	< 1	low/high	$(<) < 1$
cash-paying/ two-housekeepers	high	irrelevant	not compatible	
drudge-wife	not compatible		low	≈ 1

Based on results in their optimal taxation study Patricia F. Apps and Ray Rees (1997) suggest that a system of gender specific tax rates, higher for men and lower for women, may reduce the overall dead-weight loss of the tax system. The result rests on the stylised fact that the female labour supply is more wage-elastic than the male labour supply. Within my framework, this is not true for cooperative sharing-oriented couples. The spouses’ labours supplies only move together, so they will not respond to a gender relative wage change. For these households, the policy will then have no tangible effect apart from altering total income. For remaining couples, the policy will increase the female labour supply and decrease the male labour supply.¹⁶ However, this has different welfare effects depending on whether the couple agree or not. Within the cooperative couple, partners share a common consumption bundle, so they will be affected in the same way. In the noncooperative household, this policy amounts to redistributing welfare from the husband to the wife and the amount of household public good will be altered. Furthermore, because a smaller wage gap implies less specialisation of tasks, wives with a fairness preference will be more satisfied. To summarise,

¹⁶ With certain restrictions on the magnitudes of the cross-effects.

introducing gender specific tax rates may have substantial distributional side-effects unique to the different household types.

Another policy measure that has already been employed in a number of European countries is that of publicly subsidised market substitutes for home produced household public goods. The primary target of this kind of policy is to reduce unskilled unemployment, see Peter Birch Sørensen (1997) for an overview. In Sweden, the ongoing discussion about this kind of policy also includes a gender equity argument: employed women will be able to increase their market labour supply when they can buy market substitutes for their unpaid housework. Suppliers of these services are believed to be primarily unemployed unskilled women, which will also be a good thing for gender equality. Although my models do not include market substitutes for h , I think it is fair to say that, again, such a policy will affect household with different values of b differently. For some couples in the housewife category, the wife's wage may be so low that the proposed price change will not alter their time allocation. On the other hand, some of the cooperative semi-housewife households may substitute market bought h for some of the home produced h and allocate more of (primarily) the woman's time to market work. This will improve gender equality in these households in the sense that it reduces the financial risk wives are exposed to in case of divorce or widowhood. As far as the sharing oriented cooperative couples are concerned, they will experience a positive income effect. Cash-paying couples will be able to buy the service they demand at a lower price and also the two-housekeeper households may buy more services and supply more labour to the market. In noncooperative semi-housewife households, it is not straightforward to predict what the introduction of subsidised household services imply. My guess is that there will be such households where the husband but not the wife affords to substitute market services for their own time in housework. The wives in these households may find themselves worse off in terms of the fairness issue, if they are not prepared to view

the husband's purchase as a contribution to housework. This policy will probably be a good thing for drudge-wives, whose housework load can be reduced. In reality, it is not clear that she uses the time that has been made available to supply more market work, however.

Another issue discussed in many European countries concerns the effects of a shorter workday. Such policy measure will probably make some housewife households transform into semi-housewife households so that these households can maintain a certain level of private consumption. Within the framework of my model, there will be less specialisation of tasks for all households where one spouse (usually the husband) voluntarily works more in the labour market than the legislated maximum prescribes. In my specification with exogenous leisure, he will have to increase his housework. In reality, however, he may choose to take more leisure instead, leaving his wife with a *larger* work load than before the introduction of the policy. However, it is hard to believe that this would happen in agreeing households, so again the households' allocation process matters for policy outcomes. As far as the fairness oriented couples are concerned, this policy will either affect both spouses to the same extent or neither spouse, depending on their market labour supply before the policy is implemented.

6 Conclusion

In this study I argue that preferences concerning fairness of the division of labour between spouses are likely to influence households' allocation of paid and unpaid work. Nevertheless, to my knowledge, this fact has never been modelled in theories of household allocation. I explore the effects of such a preference for fairness on the equilibrium outcomes in the two different household allocation models, a model where the couple agree on a common family utility function and another model where the spouses do not agree and fail to cooperate. The

results of the fairness preference in the two models partly coincide and partly diverge. As far as the division of labour is concerned, the effects are the same for both models: the wife increases her market work and decreases her housework and the husband does the opposite. In the first best model, this can be thought of as a shift towards sharing bread-winner and home-maker responsibilities. In the noncooperative setting, the opposite is true: because the available amount of household public good declines, so does the overall gains from marriage. Therefore, although divorces are not explicitly modelled in this paper, I think it is reasonable to argue that if the wife's preference for equal shares of housework increases, so does the risk of a divorce for two noncooperative spouses.

The changes in consumption patterns are not the same in the two models. When the partners agree on a joint welfare function, the wife's preference for fairness induces a rearrangement of the shared consumption bundle. Whether this couple gets more private good and less household public good or the other way round depends on the housework technology. Apart from the reduction of the public good, the noncooperative marriage entails less private consumption for the husband and more for the wife. Because we only study a marginal increase in the fairness preference, the wife is still worse off than her husband as she enjoys less private consumption and also experiences some negative utility from the unequal shares of housework.

In the first best model, a female wage raise improves welfare for both partners whereas in the noncooperative model, it re-distributes welfare from the husband to the wife. These effects were derived when there was no fairness preference present. By continuity, these effects also hold when the fairness preference is small.

In section 5, I argued that it is important for policy makers to acknowledge that households have different allocation processes and also are concerned with fairness to different degrees. I suggested that these two dimensions influence policy outcomes. Even

though my modelling of a fairness preference has empirical underpinning, it becomes clear in the policy discussion that my models of household time allocation have their limits. Empirical work by Bergmann (1986) and others suggests that household members far from always get the same amount of leisure. It becomes clear that the so called drudge-wife household category does not fit very well into the framework I have built here. In future work on fairness, household allocation and public policy, I hope to cope with this in allowing for endogenous leisure.

In reality, one can think of a number of reasons why spouses fail to cooperate. It may be because they disagree about the fairness issue or they may disagree about their utility weights in a common welfare function. A further possibility (that needs not lead to conflict however), is that the spouses have different utility functions with respect to the two consumption goods. In fact, it is often argued that women have a stronger preference for a clean house, home-cooked dinners, and time with their children. In a sequel to this paper, I plan to look more into this, as well as to extend future analysis to include market substitutes for home production.

References

- Agell, Jonas and Per Lundborg (1992), Fair Wages, Involuntary Unemployment and Tax Policies in the Simple General Equilibrium Model, *Journal of Public Economics* 47, 299-320.
- Agell, Jonas and Per Lundborg (1995), Theories of Pay and Unemployment: Survey evidence from Swedish manufacturing Firms, *Scandinavian Journal of Economics* 97, 295-307.
- Akerlof, George A. (1982), Labor Contracts as Partial Gift Exchange, *The Quarterly Journal of Economics* 97(4), 543-569.
- Akerlof, George A. and Janet L. Yellen (1990), The Fair Wage-Effort Hypothesis and Unemployment, *The Quarterly Journal of Economics* 105, 255-283.
- Apps, Patricia F. And Ray Rees (1997), The Optimal Taxation of Couples, Center for Economic Studies, Working Paper 145, University of Munich.
- Aslaksen, Julie and Charlotte Koren (1995), Det ubetalte husholdsarbeidet - omfang og fordeling, Statistics Norway Reprint 84.
- Becker, Gary S. (1981), *A Treatise on the Family*. Cambridge, Mass: Harvard University Press.
- Benin, Mary Holland and Joan Agostinelli (1988), Husbands' and Wives' Satisfaction with the Division of Labor, *Journal of Marriage and the Family* 50, 349-361.
- Bergen, Elizabeth (1991), The Economic Context of Labor Allocation. Implications for Gender Stratification, *Journal of Family Issues* 12 (2), 140-157.
- Bergmann, Barbara R. (1986), *The Economic Emergence of Women*, Basic Books.
- Bewley, Truman (1995), A Depressed Labour Market Index as Explained by Participants. *American Economic Review* 85 (*Papers and Proceedings*), 250-254.
- Binmore, Ken, Ariel Rubinstein and Asher Wolinsky (1986), The Nash Bargaining Solution in Economic Modelling, *Rand Journal of Economics* 17, 176-88.
- Blair, Sampson Lee and Michael P. Johnson (1992), Wives' Perceptions of Fairness of the Division of Household Labor: The Intersection of Housework and Ideology, *Journal of Marriage and the Family* 54, 570-581.
- Boskin, Michael J. and Eytan Sheshinski (1978), Optimal Redistributive Taxation when Individual Welfare Depends upon Relative Income, *The Quarterly Journal of Economics*, 589-601.
- Browning, Martin and Pierre-André Chiappori (1996), Efficient Intrahousehold Allocations: A General Characterization and Empirical Tests, *Institute of Economics Discussion Paper 96-10*, Copenhagen.
- Browning, Martin et al. (1994), Income and Outcomes: A Structural Model of Intrahousehold Allocation, *Journal of Political Economy* 102 (6), 1067-1096.
- Clark, Andrew E. and Andrew J. Oswald (1996), Satisfaction and Comparison income. *Journal of Public Economics* 61, 359-381.
- Dahlberg, Matz (1997), *Essays on Estimation Methods and Local Public Economics*, Economic Studies 31, Department of Economics, Uppsala University, Essay V.

- Ferree, Myra Marx (1991), The Gender Division of Labor in Two-Earner Marriages. Dimensions of Variability and Change, *Journal of Family Issues* 12 (2), 158-180.
- Flood, Lennart and Urban Gråsjö (1995), Changes in Time Spent at Work and Leisure: The Swedish Experience 1984-1993, Memorandum 212, Department of Economics, School of Economics and Commercial Law, Göteborg University.
- Flood, Lennart and Anders Klevmarcken (1990), Arbete och fritid: Svenska hushålls tidsanvändning 1984, in Tid och Råd. Om hushållens ekonomi. Industriens Utredningsinstitut / Almqvist & Wiksell International.
- Gardiner, Jean (1997) *Gender, Care and Economics*. London: Macmillan Press.
- Gronau, Reuben (1977), Leisure, Home Production, and Work - the Theory of the Allocation of Time Revisited, *Journal of Political Economy* 85 (6), 1099-1123.
- Grossbard-Shechtman, Amyra (1984), A Theory of Allocation of Time in Markets for Labour and Marriage, *Economic Journal*, 863-882.
- Grossbard-Shechtman, Shoshana A. and Shoshana Neuman (1988), Women's Labour Supply and Marital Choice, *Journal of Political Economy* 96 (6), 1294-1302.
- Jensen, Peter Rørmose (1995), *En velfærdsindikator for Danmark 1970-1990. Forbrug, miljø, husholdningsarbejde og fritid*, Danmarks Statistik, København.
- Kessler, Ronald C. and James A. McRae (1982), The Effect of Wives' employment on the Mental Health of Married Men and Women, *American Sociological Review* 47, 216-227.
- Kooreman, Peter and Arie Kapteyn (1990), On the Empirical Implementation of Some Game Theoretic Models of Household Labor Supply, *Journal of Human Resources* 25, 584-598.
- Konrad, Kaj and Kjell-Erik Lommerud (1995), Family Policy with Non-Cooperative Families, *Scandinavian Journal of Economics* 97 (4), 581-601.
- Layard, Richard (1980), Human Satisfaction and Public Policy, *The Economic Journal* 90, 737-750.
- Leuthold, Jane (1968), An Empirical Study of Formula Income Transfers and the Work Decisions of the Poor, *Journal of Human Resources* 3, 312-323.
- Lundberg, Shelly and Robert A. Pollak (1993), Separate Spheres Bargaining and the Marriage Market, *Journal of Political Economy* 101 (6), 988-1010.
- McElroy, Marjorie B. and Mary J. Horney (1981), Nash-Bargained Household Decisions: Toward a Generalization of the Theory of Demand, *International Economic Review* 22 (2), 333-349.
- Pahl, Jan (1989), *Money and Marriage*, Macmillan, London.
- Persson, Mats (1995), Why Are Taxes So High in Egalitarian Societies?, *Scandinavian Journal of Economics* 97(4), December 1995, 569-80.
- Phipps, Shelley A. and Peter S. Burton (1995), Social Institutional Variables and Behavior within Households: An Empirical Test Using the Luxembourg Income Study, *Feminist Economics* 1 (1), 151-174.

- Pott-Buter, Hettie and Wouter Buitenhuis (1998) Twentieth Century Breadwinner Policies in the Netherlands, unpublished paper presented at the Out of the Margin 2/IAFFE Summer Conference, Amsterdam, June 1998.
- Presser, Harriet B. (1994), Employment Schedules Among Dual-Earner Spouses and the Division of Household Labor by Gender, *American Sociological Review* 59, 348-364.
- Pujol, Michèle (1995), Into the Margin! In *Out of the Margin*, eds. Edith Kuiper and Jolande Sap, Routledge, London and New York.
- Rabin, Matthew (1993), Incorporating Fairness into Game Theory and Economics, *American Economic Review* 83 (5), 1281-1302.
- Robinson, Joyce and Glenna Spitze (1992), Whistle While You Work? The Effect of Household Task Performance on Women's and Men's Well-Being, *Social Science Quarterly* 73.
- Ross, Catherine E., John Mirowsky and Joan Huber (1983), Dividing Work, Sharing Work, and In-Between: Marriage Patterns and Depression, *American Sociological Review* 48, 809-823.
- Samuelson, Paul A. (1956), Social Indifference Curves, *Quarterly Journal of Economics* 70(1), 1-22.
- Solow, Robert (1990), *The labour market as an social institution*, Basil Blackwell, Oxford.
- Sørensen, Peter Birch (1997), Public Finance Solutions to the European Unemployment Problem?, *Economic Policy* 25, 223-264.
- Thompson, Linda (1991), Family Work. Women's Sense of Fairness, *Journal of Family Issues* 12 (2), 181-196.
- van der Lippe, Tanja and Jacques J. Siegers (1994), Division of Household and Paid Labour between Partners: Effects of Relative Wage Rates and Social Norms. *Kyklos* 47, 109-136.
- Weiss, Yoram (1993) The Formation and Dissolution of Families: Why Marry? Who Marries Whom? And What Happens Upon Divorce? Working Paper 15-93, The Foerder Institute for Economic Research, Tel Aviv.

Appendix 1 The comparative statics in the first best model

The first order conditions (3.2) - (3.6) can be rearranged and written as:

$$w_f u_c - 2 \frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_f} u_h + \mathbf{b} \frac{H_m}{H_f^2} V' = 0 \quad (\text{A1.1})$$

$$w_m u_c - 2 \frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_m} u_h - \mathbf{b} \frac{1}{H_f} V' = 0 \quad (\text{A1.2})$$

$$2c - w_f (T - H_f) - w_m (T - H_m) = 0 \quad (\text{A1.3})$$

(A1.1) - (A1.3) are then differentiated with respect to c, H_f, H_m and \mathbf{b} . The resulting system can be written as:

$$\begin{bmatrix} w_f u_{cc} & A & B \\ w_m u_{cc} & B & C \\ 2 & w_f & w_m \end{bmatrix} \times \begin{bmatrix} dc \\ dH_f \\ dH_m \end{bmatrix} = \begin{bmatrix} -\frac{H_m}{H_f^2} V' \\ \frac{1}{H_f} V' \\ 0 \end{bmatrix} \times d\mathbf{b} \quad (\text{A1.4})$$

where:

$$A = -2 \left(\frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_f^2} u_h + \left(\frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_f} \right)^2 u_{hh} + \mathbf{b} \frac{H_m}{H_f^3} V' \right) - \mathbf{b} \frac{H_m^2}{H_f^4} V''$$

$$B = -2 \frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_f} \frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_m} u_{hh} + \mathbf{b} \frac{1}{H_f^2} V' + \mathbf{b} \frac{H_m}{H_f^3} V''$$

$$C = -2 \left(\frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_m^2} u_h + \left(\frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_m} \right)^2 u_{hh} \right) - \mathbf{b} \frac{1}{H_f^2} V'' .$$

A , B and C are positive evaluated at $\mathbf{b} = 0$. Furthermore, to keep computations as simple as possible, I assume that the cross derivative u_{ch} is zero.¹⁷ The system determinant of (A1.4)

equals:

$$\begin{vmatrix} w_f u_{cc} & A & B \\ w_m u_{cc} & B & C \\ 2 & w_f & w_m \end{vmatrix} = |I| = 2(AC - B^2) - w_f u_{cc}(w_f C - w_m B) + w_m u_{cc}(w_f B - w_m A),$$

which, utilising (3.7), equals:

$$8 \left(\frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_f^2} \frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_m^2} u_h^2 + \left(\frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_f^2} \left(\frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_m} \right)^2 + \frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_m^2} \left(\frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_f} \right)^2 \right) u_h u_{hh} \right) + 2 \left(w_f^2 \frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_m^2} + w_m^2 \frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_f^2} \right) u_h u_{cc}. \quad (\text{A1.5})$$

(A1.5) is strictly positive. Using Cramer's rule the comparative statics become:

$$\frac{dH_f^*}{d\mathbf{b}} = \frac{-\frac{V'}{H_f} \left(2 \left(B + \frac{H_m}{H_f} C \right) - w_m \left(w_f + \frac{H_m}{H_f} w_m \right) u_{cc} \right)}{|I|} < 0, \quad (\text{A1.6})$$

$$\frac{dH_m^*}{d\mathbf{b}} = \frac{\frac{V'}{H_f} \left(2 \left(A + \frac{H_m}{H_f} B \right) - w_f \left(w_f + \frac{H_m}{H_f} w_m \right) u_{cc} \right)}{|I|} > 0, \quad (\text{A1.7})$$

$$\frac{dc^*}{d\mathbf{b}} = \frac{2V'}{|I| H_f^2} \frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_f} w_m \left(\frac{H_f \left(\frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_f^2} \right)}{\frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_f}} - \frac{H_m \left(\frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_m^2} \right)}{\frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_m}} \right) u_h. \quad (\text{A1.8})$$

The sign of (A1.8) depends on the sign of the parenthesis on the right, which in turn depends on the household production technology. For example, for a technology $\tilde{h} = H_i^a$, $a < 1$, the expression within the parentheses equals zero so that the net effect on private consumption is zero. Furthermore,

¹⁷ It is sufficient to assume that u_{ch} is not too negative, that c and h are not too close substitutes in utility.

$$\frac{dh^*}{d\mathbf{b}} = \frac{\mathfrak{H}_{\tilde{h}}}{\mathfrak{H}_f} \frac{dH_f^*}{d\mathbf{b}} + \frac{\mathfrak{H}_{\tilde{h}}}{\mathfrak{H}_m} \frac{dH_m^*}{d\mathbf{b}} = \frac{4V'}{|I|H_f^2} \frac{\mathfrak{H}_{\tilde{h}}}{\mathfrak{H}_f} \frac{\mathfrak{H}_{\tilde{h}}}{\mathfrak{H}_m} \left(\frac{H_m \left(\mathfrak{H}_{\tilde{h}}^2 / \mathfrak{H}_m^2 \right)}{\mathfrak{H}_{\tilde{h}} / \mathfrak{H}_m} - \frac{H_f \left(\mathfrak{H}_{\tilde{h}}^2 / \mathfrak{H}_f^2 \right)}{\mathfrak{H}_{\tilde{h}} / \mathfrak{H}_f} \right) u_h. \quad (\text{A1.9})$$

Hence, $\frac{dh^*}{d\mathbf{b}} = -2 \frac{\mathfrak{H}_{\tilde{h}} / \mathfrak{H}_m}{w_m} \frac{dc^*}{d\mathbf{b}}$. Therefore, a rise in \mathbf{b} induces a re-mix of the household's consumption substituting some of the consumption of one good for more of the other good.

Differentiating (A1.1) - (A1.3) with respect to c, H_f, H_m and w_f renders a new system which can be written as:

$$\begin{bmatrix} w_f u_{cc} & A & B \\ w_m u_{cc} & B & C \\ 2 & w_f & w_m \end{bmatrix} \times \begin{bmatrix} dc \\ dH_f \\ dH_m \end{bmatrix} = \begin{bmatrix} -u_c \\ 0 \\ T - H_f \end{bmatrix} \times dw_f. \quad (\text{A1.10})$$

The system determinant of (A1.10) is also $|I|$. Using Cramer's rule, the comparative statics of a wife's wage raise are:

$$\frac{dH_f^*}{dw_f} = \frac{u_c (w_m^2 u_{cc} - 2C) - (T - H_f) u_{cc} (w_f C - w_m B)}{|I|}, \quad (\text{A1.11})$$

$$\frac{dH_m^*}{dw_f} = \frac{-u_c (w_f w_m u_{cc} - 2B) + (T - H_f) u_{cc} (w_f B - w_m A)}{|I|}, \quad (\text{A1.12})$$

and

$$\frac{dc^*}{dw_f} = \frac{4(T - H_f) \left(\frac{\mathfrak{H}_{\tilde{h}}^2}{\mathfrak{H}_f^2} \frac{\mathfrak{H}_{\tilde{h}}}{\mathfrak{H}_m^2} u_h^2 + \left(\frac{\mathfrak{H}_{\tilde{h}}}{\mathfrak{H}_f} \left(\frac{\mathfrak{H}_{\tilde{h}}}{\mathfrak{H}_m} \right)^2 + \left(\frac{\mathfrak{H}_{\tilde{h}}}{\mathfrak{H}_f} \right)^2 \frac{\mathfrak{H}_{\tilde{h}}}{\mathfrak{H}_m^2} \right) u_h u_{hh} \right) - 2w_f \frac{\mathfrak{H}_{\tilde{h}}^2}{\mathfrak{H}_m^2} u_c u_h}{|I|} \quad (\text{A1.13})$$

The wife's reaction to her own wage raise consists of an income effect and a substitution effect. These go in opposite direction so (A1.11) cannot be signed. (A1.12) describes the husband's reaction to his wife's wage change and it is strictly positive. As for the private

consumption, (A1.13) is also positive (using (3.7)). Because (A1.11) cannot be signed, the effect of a wife's wage increase on household public consumption is also ambiguous.

Appendix 2 The noncooperative model

(4.2) defines H_f as an implicit function of H_m^e and (4.3) likewise defines H_m as an implicit function of H_f^e . These implicit functions are the two partners' reaction function, indicating how a change in the (conjecture of the) spouse's housework time affect the own housework supply. Via the implicit function theorem we get can compute the slopes of the reaction functions. These are:

$$\frac{\mathfrak{H}_f}{\mathfrak{H}_m^e} = \frac{-\frac{\tilde{\mathfrak{h}}}{\mathfrak{H}_f} \frac{\tilde{\mathfrak{h}}}{\mathfrak{H}_m^e} u_{hh} + \mathbf{b} \frac{1}{H_f^2} V' + \mathbf{b} \frac{H_m^e}{H_f^3} V''}{w_f^2 u_{cc} + \frac{\mathfrak{h}^2}{\mathfrak{H}_f^2} u_h + \left(\frac{\tilde{\mathfrak{h}}}{\mathfrak{H}_f} \right)^2 u_{hh} + 2\mathbf{b} \frac{H_m^e}{H_f^3} V' + \mathbf{b} \left(\frac{H_m^e}{H_f^2} \right)^2 V''} \quad (\text{A2.1})$$

$$\frac{\mathfrak{H}_m}{\mathfrak{H}_f^e} = \frac{-\frac{\tilde{\mathfrak{h}}}{\mathfrak{H}_f^e} \frac{\tilde{\mathfrak{h}}}{\mathfrak{H}_m} u_{hh}}{w_m^2 u_{cc} + \frac{\mathfrak{h}^2}{\mathfrak{H}_m^2} u_h + \left(\frac{\tilde{\mathfrak{h}}}{\mathfrak{H}_m} \right)^2 u_{hh}} \quad (\text{A2.2})$$

where (A2.2) is unambiguously negative and (A2.1) is negative for $\mathbf{b} = 0$. \mathbf{b} has an ambiguous effect on (A2.1), so we cannot say what happens to the slope of the wife's reaction function when she becomes more aware about equality in the distribution of housework. Like in the first best model, this restricts the range of possible \mathbf{b} :s.¹⁸

¹⁸ As in the first best section, I have evaluated this slope and the comparative statics for the case where $u_{ch} = 0$.

A2.1 Comparative Statics

Differentiating the simultaneous equation system (4.2) and (4.3) and imposing the Nash equilibrium condition: $H_i^e = H_i$ for $i = f, m$, we obtain:

$$\begin{bmatrix} D & E \\ F & G \end{bmatrix} \times \begin{bmatrix} dH_f \\ dH_m \end{bmatrix} = \begin{bmatrix} -V' \frac{H_m}{H_f^2} \\ 0 \end{bmatrix} \times d\mathbf{b} \quad (\text{A2.3})$$

where

$$D = - \left(w_f^2 u_{c_f c_f} + \frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_f^2} u_h + \left(\frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_f} \right)^2 u_{hh} + 2\mathbf{b} \frac{H_m}{H_f^3} V' + \mathbf{b} \frac{H_m^2}{H_f^4} V'' \right)$$

$$E = - \frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_f} \frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_m} u_{hh} + \mathbf{b} \frac{1}{H_f^2} V' + \mathbf{b} \frac{H_m}{H_f^3} V''$$

$$F = - \frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_f} \frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_m} u_{hh}$$

$$G = - \left(w_m^2 u_{c_m c_m} + \frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_m^2} u_h + \left(\frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_m} \right)^2 u_{hh} \right).$$

D, E, F and G are all positive at $\mathbf{b} = 0$. The system determinant becomes:

$$\begin{vmatrix} D & E \\ F & G \end{vmatrix} = |J| = (DG - EF)$$

which equals:

$$\begin{aligned} & w_f^2 w_m^2 u_{c_f c_f} u_{c_m c_m} + w_f^2 \frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_m^2} u_{c_f c_f} u_h + w_f^2 \left(\frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_m} \right)^2 u_{c_f c_f} u_{hh} + w_m^2 \frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_f^2} u_{c_m c_m} u_h \\ & + w_m^2 \left(\frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_f} \right)^2 u_{c_m c_m} u_{hh} + \frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_f^2} \frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_m^2} u_h^2 + \left(\frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_f^2} \left(\frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_m} \right)^2 + \left(\frac{\mathfrak{H} \tilde{h}}{\mathfrak{H}_f} \right)^2 \frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_m^2} \right) u_h u_{hh} \end{aligned} \quad (\text{A2.4})$$

It is easily seen that this is positive. The comparative statics of an increased preference for fairness are (evaluated at $\mathbf{b} = 0$):

$$\frac{dH_f^N}{d\mathbf{b}} = \frac{V' \frac{H_m}{H_f^2} \left(w_m^2 u_{c_m c_m} + \frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_m^2} u_h + \left(\frac{\mathfrak{H}}{\mathfrak{H}_m} \right)^2 u_{hh} \right)}{|J|} < 0 \quad (\text{A2.5})$$

$$\frac{dH_m^N}{d\mathbf{b}} = - \frac{V' \frac{H_m}{H_f^2} \left(\frac{\mathfrak{H}}{\mathfrak{H}_f} \frac{\mathfrak{H}}{\mathfrak{H}_m} u_{hh} \right)}{|J|} > 0. \quad (\text{A2.6})$$

Because $\frac{\mathfrak{H}}{\mathfrak{H}_f} < \frac{\mathfrak{H}}{\mathfrak{H}_m}$, we can further conclude that (A2.5) is a larger adaptation than (A2.6).

These two effects have a bearing on the equilibrium amount of household good, h^N that is supplied, namely:

$$\frac{dh^N}{d\mathbf{b}} = \frac{\mathfrak{H}}{\mathfrak{H}_f} \frac{dH_f^N}{d\mathbf{b}} + \frac{\mathfrak{H}}{\mathfrak{H}_m} \frac{dH_m^N}{d\mathbf{b}} = \frac{H_m}{H_f^2} V' \frac{\mathfrak{H}}{\mathfrak{H}_f} \left(w_m^2 u_{c_m c_m} + \frac{\mathfrak{H}^2 \tilde{h}}{\mathfrak{H}_m^2} u_h \right). \quad (\text{A2.7})$$

Unlike in the cooperative model, this is unambiguously negative. Furthermore, because the wife increases her market work and the husband decreases his, the effects on private consumption of a change in \mathbf{b} go in the opposite directions so that the woman gets more private consumption and the husband gets less:

$$(i) \frac{dc_f^N}{d\mathbf{b}} > 0 \quad (ii) \frac{dc_m^N}{d\mathbf{b}} < 0. \quad (\text{A2.8})$$

The comparative statics of a wife's increased wage are developed in a similar fashion. These are:

$$\frac{dH_f^N}{dw_f} = \frac{\left(u_{c_f} + c_f u_{c_f c_f} \right) G}{|J|} \quad (\text{A2.9})$$

$$\frac{dH_m^N}{dw_f} = \frac{-\left(u_{c_f} + c_f u_{c_f c_f} \right) F}{|J|} \quad (\text{A2.10})$$

Like in the first best model, the wife's own wage effect consists of conflicting income and substitution effects. Unlike the first best, it is also obvious that the spouses' reactions go in opposite directions (because F and G are positive). It is here that the Arrow-Pratt's relative risk aversion measure comes in. If Arrow-Pratt's measure for the wife, $-\frac{c_f u_{c_f c_f}}{u_{c_f}}$, is larger than one, the own wage effect is negative, i.e. when the wife gets a raise, she reduces her time spent in housework, whereas her husband compensates this by increasing his housework. If the same is true for the husband's utility, the equilibrium must involve that the person with the lower wage does the more housework. Therefore, in my application here, I have to assume that Arrow-Pratt's measure is larger than one to ensure that $H_f^N > H_m^N$ when $\mathbf{b} = 0$. Again, we can conclude that the wife's reaction is larger than her husband's. Therefore, the total effect of the spouses' reactions on the total amount of household public good carries the same sign as the wife's own wage effect:

$$\frac{dh^N}{dw_f} = \frac{\tilde{h}}{\mathfrak{H}_f} \frac{dH_f^N}{dw_f} + \frac{\tilde{h}}{\mathfrak{H}_m} \frac{dH_m^N}{dw_f} = \frac{-(u_{c_f} + c_f u_{c_f c_f}) \frac{\tilde{h}}{\mathfrak{H}_f} \left(w_m^2 u_{c_m c_m} + \frac{\mathfrak{H}_f^2 \tilde{h}}{\mathfrak{H}_m^2} u_h \right)}{|J|}. \quad (\text{A2.11})$$

Therefore, given the assumption about the Arrow-Pratt measures, a wife's wage raise leaves the couple with less household public good. Equations (A2.9) and (A2.10) directly give that:

$$(i) \frac{dc_f}{dw_f} > 0 \quad (ii) \frac{dc_m}{dw_f} < 0. \quad (\text{A2.12})$$