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"Double Burden" of Market and Household Work

Natalie Chen, Paola Conconi and Carlo Perroni

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Women's Earning Power and the "Double Burden" of Market and Household Work*†

Natalie Chen
University of Warwick and CEPR

Paola Conconi
Université Libre de Bruxelles (ECARES) and CEPR

Carlo Perroni
University of Warwick

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Abstract

Bargaining theory predicts that married women who experience a relative improvement in their labor market position should experience a comparative gain within their marriage. However, if renegotiation possibilities are limited by institutional mechanisms that achieve long-term commitment, the opposite may be true, particularly if women are specialized in household activities and the labor market allows comparatively more flexibility in their labor supply responses. Evidence from the German Socio-Economic Panel indeed shows that, as long as renegotiation opportunities are limited, comparatively better wages for women exacerbate their "double burden" of market and household work.

Keywords: Marriage, Bargaining, Renegotiation.

JEL Classification Codes: D1, J2, J3.

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†Correspondence should be addressed to Natalie Chen, Department of Economics, University of Warwick, Coventry CV4 7AL, UK. E-mail: N.A.Chen@warwick.ac.uk

1 Introduction

Recent decades have witnessed an increase in women's participation in the labor market and an erosion of the wage gender gap in most countries.[1] The question we address in this paper is whether a comparative improvement in women's labor market opportunities translates into an improvement of intra-household outcomes in their favor.

The question of how economic resources are distributed within households is central to the economic literature on marriage (Becker, 1974). This has stressed the idea that marriage can be thought of as a contract that coordinates the actions of the partners in order to maximize joint surplus and establishes a division of this surplus between them, depending on the comparative bargaining strength of each partner, i.e. on the value of his or her outside option (Nash, 1950). In a frictionless marriage market, the value of a spouse's outside option, given other individual characteristics, always increases if his or her labor market opportunities improve. Thus, we should expect that a comparative improvement in women's labor market position—e.g. a reduction in the extent of gender-based wage discrimination—should improve the relative position of married women within households.

However, economic theory also suggests that marriage can be an insurance device (e.g. Cochrane, 1991; Hayashi *et al.*, 1996; Dercon and Krishnan, 2000).[2] In this context, the possibility of continuously renegotiating the terms of the contract may lead to inefficiencies, since insurance agreements will not be honored ex post if individuals are able to renegotiate once uncertainty has been resolved. It may thus be mutually beneficial—and economically efficient—to agree to a certain course of action ex ante, even when ex post this course of action does not result in a gain for both spouses and is therefore not robust to the possibility of renegotiation. In order to achieve ex-ante efficiency, individuals may rely on long-run commitment mechanisms, which may take the form of legal institutions or social norms that are enforced through repeated interactions in groups. Indeed, in many societies marriage is formalized as a long-term arrangement supported by legal and social sanctions.

Commitment mechanisms that limit renegotiation weaken the impact of changes in the spouses' outside options, including changes in their relative wages. With limited renegotiation, an ex-ante efficient marriage contract would dictate that any comparative increase in a spouse's wage should translate into a relative increase in his or her market effort, which, holding household income constant, would have an adverse effect on that individual. Moreover, systematic gender asymmetries arising from specialization within households

[1] See Altonji and Blank (1999) for a survey on employment and gender gaps for the US, Blundell *et al.* (2007) for an analysis of the evolution of wages in the UK, and Blau and Kahn (2003) and Olivetti and Petrongolo (2006) for international comparisons of wage gender gaps.

[2] This view of marriage as an insurance mechanism is reflected in the traditional vows, in which couples promise to remain together "for better or for worse, for richer, for poorer, in sickness and in health."

mean that these labor supply responses, and the associated welfare effects, will be different across genders. In particular, as suggested by many sociological studies, traditional gender roles within households may imply that an improvement in labor market opportunities for women simply leads them to increase their market effort, without releasing them from their household duties, resulting in a "double burden" or "second shift" (Hochschild, 1990).

To explore these questions, we construct a simple theoretical model of intra-household bargaining that is able to generate testable predictions about gender-specific outcomes for married couples where both spouses work. Our theoretical specification is based on existing models of intra-household bargaining (e.g. Becker, 1974; McElroy and Horney, 1981; Bourguignon and Chiappori, 1992), but extends these constructs to account for the possibility of long-run renegotiation-proof arrangements, enabling us to analyze dynamic bargaining choices within households in the presence of commitment mechanisms. According to this framework, the impact of a wage increase on a married individual depends on the extent to which renegotiation is constrained: if the contract is renegotiable, a comparative improvement in the outside option of a married individual—due to a comparative wage increase—will always skew the outcomes in that individual's favor. However, if renegotiation is not feasible, changes in outside options become irrelevant, and, to the extent that the choice of working hours is flexible, an ex-ante optimal arrangement may result in higher market effort and comparatively lower surplus for the spouse whose wage has increased in relative terms. We show that the traditional division of labor within the family—with women specialized in housework and childcare—makes it more likely for married women to suffer from the adverse effect of an own-wage improvement in comparison with their husbands.

The model's predictions are tested using survey data from the German Socio-Economic Panel (GSOEP). This is a representative longitudinal study of private households in Germany since 1984, which gives detailed information on a wide range of topics concerning households (household composition, number and age of children, annual household income) and household members (their employment status, earnings, education, health, self-reported satisfaction). Pooling all observations on all couples over years, we try to uncover the factors that influence the relationship between relative wages within households and spouses' reported satisfaction.

When looking at spouses in general, we find a pattern that is in line with the predictions of standard bargaining models that abstract from commitment: a comparative improvement in a spouse's market position always works in this spouse's favor, leading to a higher level of reported satisfaction. However, when focusing on women, the relationship is reversed: a woman's share in total household income is negatively related to her reported satisfaction. Moreover, the negative effect of a compensated own-wage increase is stronger for women who face stricter social norms (e.g. they are more religious and belong to more tightly-knit communities) or higher rematching costs (e.g. they are older and have more children, particularly younger ones). We take these patterns as supportive of the hypothesis that

renegotiation opportunities for married women are weak, and that, because of gender-based specialization, comparative wage improvements for women translate into an increase in their market effort, with little relief from household activities. Our analysis thus supports the view that a comparative improvement in women's earning power tends to exacerbate women's "double burden" of market and household work.

2 Theory

In this section we outline a simple theoretical framework that delivers predictions about the relationship between the characteristics of the marriage contract and the intra-household distribution effects of relative wage changes.

We shall restrict our theoretical discussion, as well as our empirical analysis, to the case of couples in which both spouses work, thus abstracting from participation decisions and from the possible effects that labor market participation has on human capital formation/depreciation.[3]

2.1 Bargaining and Renegotiation

We will consider a two-period model of sequential intra-household bargaining and renegotiation. Perhaps surprisingly, the theoretical literature on this problem is somewhat sparse (Lundberg and Pollak, 2003; Ligon, 2002; Basu, 2004).

As noted by Lundberg and Pollak (2003), lack of commitment under sequential bargaining within households can lead to inefficient outcomes, which is possibly why we often observe institutional arrangements that limit possibilities for renegotiation (without ever being able to fully prevent it). These include legal, religious and social norms that sanction marriage as a long-term contract and prescribe certain behaviors within it. One modeling approach for capturing the effects of institutions that achieve an intermediate degree of commitment is to represent the bargaining problem as an ex-ante optimization problem subject to certain continuation constraints (interim participation constraints) that are affected by opt-out penalties.[4] A limitation of this approach is that it simply defines a range

[3]Early studies on the impact of the labor market participation decisions of married individuals on their level of human capital include Mincer and Polachek (1974) and Becker (1975).

[4]These constraints require that ex-ante choices must be such that no party would choose to opt out of the agreement at any node given the continuation disagreement payoffs and any additional penalties incurred. The penalties can be thought of as a reduced-form representation of some (unmodeled) continuation game in which some additional form of punishment is supported by sustainable strategies under repeated interaction. Such setup would be an extension of the concept of cooperative bargaining under a sequential Pareto condition as formulated by Ligon (2002).

of allowable choices, and if the ex-ante optimum falls strictly within this range, continuation constraints have no bite. Thus, this specification implies discontinuity in the effects of parameter changes (such as those that determine disagreement payoffs) on bargaining outcomes, making predictions difficult to test empirically.

An alternative modeling strategy which we will follow in this paper is to explicitly allow for the possibility of renegotiation, linking individual interim participation constraints with ex-post collective rationality as represented by an explicit renegotiation option. Let us denote with N a couple's bargaining objective. Suppose that partners are able to renegotiate in each period, "re-optimizing" the bargaining objective, but that if they do so, they incur a penalty λ which lowers their payoff. This implies that, at any node, renegotiation will not occur if the choices prescribed by earlier bargaining rounds provide continuation payoffs to each partner that are at least equal to those they would each obtain by renegotiation, once renegotiation penalties are incurred.

We apply this idea of renegotiation to a two-period bargaining problem. This can be formalized as follows. In a given household there are two spouses, denoted by A and B. The utility, u^i, of each spouse, $i = A, B$, depends on household choices, X. Households face uncertain outcomes. At time 0, before a certain state s is realized, at time 1, with probability π_s, they enter into a contract specifying the utility each spouse obtains in each possible state. After a given state is realized (time 1), the spouses can renegotiate the terms of the original agreement. Let $\tilde{X}_s$ represent household choices upon renegotiation in state s. The ex-post bargaining outcome at time 1 in state s can then be written as

$$\tilde{X}_s = \arg\max_{X_s} \; N\left(u^A(X_s) - \bar{u}_s^A + \mu^A,\; u^B(X_s) - \bar{u}_s^B + \mu^B\right), \tag{1}$$

s.t.

$$u^A(X_s) \geq \bar{u}_s^A - \mu^A, \quad u^B(X_s) \geq \bar{u}_s^B - \mu^B, \quad \forall s, \tag{2}$$

where $\bar{u}_s^A$ and $\bar{u}_s^B$ are the values of outside options in state s, and μ^A and μ^B are parameters that capture the extent of the costs for rematching for each spouse. The value of the outside options in each state, $\bar{u}_s^i$, derives from a matching equilibrium in the marriage market—a process which we need not explicitly model here. The only relevant property of this process for our purposes is that in such an equilibrium individuals with better characteristics—such as a higher market wage—obtain a higher-value match (Legros and Newman, 2007). Note that if the μ's are very large, the solution to the above problem will become insensitive to changes in the outside options.[5]

[5]Also notice that, in the opposite case of a frictionless marriage market (i.e. $\mu^i = 0, i = A, B$), outside options cannot be Pareto dominated by outcomes within the marriage; in this case, there is no feasible marriage contract and the bargaining problem becomes degenerate.

At time 0, however, the spouses can commit to some extent to future choices. Formally, they select actions for all future states in order to maximize

$$N\left(\sum_s \pi_s u^A(X_s) - \bar{u}_0^A,\ \sum_s \pi_s u^B(X_s) - \bar{u}_0^B\right) \tag{3}$$

subject to

$$u^A(X_s) \geq u^A(\tilde{X}_s) - \lambda^A, \quad u^B(X_s) \geq u^B(\tilde{X}_s) - \lambda^B, \quad \forall s, \tag{4}$$

where $u^A(\tilde{X}_s)$ and $u^B(\tilde{X}_s)$ are the renegotiation utility levels in each future state s, and $\lambda^A > 0, \lambda^B > 0$ are the renegotiation penalties that must be incurred by each party for reneging on the course of action previously agreed upon. If utility is concave in its arguments (reflecting risk aversion), then any ex-ante opportunity (arising from a positive penalty) to tie down ex-post choices will be exploited to achieve smoothing of outcomes across periods (insurance).

When λ^A and λ^B are sufficiently small, the no-renegotiation constraints (4) will become binding. In the limit, with $\lambda^i = 0, i = A, B$, this problem will degenerate into a set of unlinked ex-post bargaining problems, i.e. no meaningful ex-ante agreement will be feasible (as in Lundberg and Pollak, 2003). As the λ's become larger, ex-ante bargaining will be able to prescribe choices that guarantee a continuation level of N at future nodes that deviates from that which would result from ex-post optimal renegotiation choices. For λ^A and λ^B approaching infinity, full ex-ante commitment will be feasible, and renegotiation possibilities will effectively have no influence on choices. Thus, in this framework, any change in the economic environment that affects the value of the outside options, $\bar{u}_s^i, i = A, B$, will only have an effect on bargained outcomes if the λ's and μ's are not too large.

In general, we could expect rematching costs and penalties to vary across individuals; however, as discussed below, it is also plausible that there might be a systematic difference between genders: social norms may impose different penalties on men and women, and rematching costs may also be different for the two spouses.

2.2 Wages and Intra-household Outcomes

The specific focus of our analysis is the relationship between a spouse's relative earning power and the surplus she obtains within the marriage. In a bargaining framework, wages affect intra-household outcomes through two separate channels: they determine the combined earning power of the couple, and thus the couple's total surplus; and they determine the value of each spouse's outside option.

Suppose that spouses $i = A, B$ have a total time endowment equal to unity, which they can use for market activities (l^i), or leisure ($h^i = 1 - l^i$). Each individual is characterized

by a given market productivity—w^i (the market wage rate). Utility of spouse i depends on consumption, c^i, and leisure, h^i:

$$u^i = U(c^i, h^i), \tag{5}$$

where U is strictly concave and

$$c^A + c^B = w^A l^A + w^B l^B. \tag{6}$$

We shall focus on scenarios where the only uncertainty a couple faces is about ex-post market wage outcomes, w_s^A, w_s^B, where s identifies a certain ex-post realization (a wage state), and π_s denotes the associated probability. As noted above, individual wages are also positively correlated with the value of an individual's outside option in a given state, i.e. $\partial \bar{u}_s^i / \partial w_s^i > 0$.

Uncertainty about wages implies that spouses have insurance motives to be in a marriage; i.e., at time 0, before a wage state s is realized, the spouses would wish to enter into a contract that specifies effort levels and utility outcomes in all possible states.

Consider first the case in which μ^i and λ^i are small enough that the no-rematching and no-renegotiation constraints (2) and (4) for state s are binding for i. Then, in any bargaining outcome as defined in the previous section, an individual's welfare will be positively related to his or her wage ($\partial u_s^i / \partial w_s^i > 0$), implying that a comparative improvement in a spouse's market position will always result in a comparative improvement for her. This is the standard prediction that a bargaining framework would generate in the absence of pre-commitment mechanisms and frictions.

But this conclusion neglects the possible presence of constraints to renegotiation in long-term marriage relationships. Let us consider the case in which the λ's and μ's are sufficiently large that the no-renegotiation constraints are not binding. Focusing on the case of utilitarian bargaining (N additively linear), and omitting arguments from utility functions, the bargaining objective can be written as

$$\sum_s \pi_s u_s^A + \sum_s \pi_s u_s^B = \sum_s \pi_s \left(u_s^A + u_s^B \right), \tag{7}$$

so that optimal choices are fully separable across states. Then, ex-ante optimum choices for state s coincide with the solution to the problem of maximizing

$$u_s^A + u_s^B. \tag{8}$$

Adopting a dual representation of preferences, the resource constraint for the above problem can be written as (omitting s for simplicity)

$$E^A(w^A, u^A) + E^B(w^B, u^B) = w^A + w^B, \tag{9}$$

where $E^i(w^i, u^i)$ is the expenditure function for i—a function of prices (the opportunity cost of leisure (w^i) and of the price of consumption, equal to unity) and of the utility level. Note that a strictly concave utility function translates into a strictly convex expenditure function. The first-order conditions for an interior optimum are then

$$E^A_u - E^B_u = 0, \tag{10}$$

where subscripts denote partial derivatives, and

$$E^A + E^B - w^A - w^B = 0. \tag{11}$$

Suppose we totally differentiate the above with respect to u^A, u^B and w^A, while at the same time adjusting w^B so as to hold household earnings constant. This exercise isolates the compensated effect of a change in w^A from the associated income effects; the compensated effect is what corresponds to the effect we examine in our empirical analysis (where household income is separately controlled for). Totally differentiating (11) we obtain a relationship between changes in w^A and w^B that leave the budget unchanged:

$$\frac{dw^B}{dw^A} = -\frac{E^A_w - 1}{E^B_w - 1} = -\frac{l^A}{l^B}. \tag{12}$$

Totally differentiating (10) and (11) with respect to u^A, u^B and w^A, and using (12), we obtain

$$E^A_{uu}du^A - E^B_{uu}du^B + \left(E^A_{uw} + E^B_{uw}(l^A/l^B)\right)dw^A = 0; \tag{13}$$

$$E^A_u du^A + E^B_u du^B + \left(l^A - l^B(l^A/l^B)\right) = E^A_u du^A + E^B_u du^B = 0. \tag{14}$$

Combining these, we obtain an expression for the compensated effect of a wage change:

$$\frac{du^A}{dw^A}\,\frac{w^A}{u^A} = -\frac{w^A E^B_u}{u^A l^B}\,\frac{E^A_{uw}l^B + E^B_{uw}l^A}{E^A_{uu}E^B_u + E^B_{uu}E^A_u}. \tag{15}$$

Since $E^i_u > 0$, $E^i_{uu} > 0$, and $E^i_{uw} > 0$, the above effect is negative.[6] Thus, if renegotiation is not feasible, a compensated increase in the relative earning power of a household member will adversely affect that individual. The intuition for this result is simply that, if commitment is feasible, it is ex-ante optimal to prescribe that individuals with comparatively higher earning power should work more; and since consumption and leisure are complements—implying that the marginal utility of consumption is comparatively lower

[6]When N is not additively linear, optimality conditions are not independent across states. However, for λ approaching infinity, the optimality condition for state s can be written as $\omega^A(s)E^A_u - \omega^B(s)E^B_u = 0$, where $\omega^i(s) = \pi_s \partial N/\partial(\sum_j \pi_s u^i(j))$, and is therefore locally equivalent to a weighted utilitarian solution.

for individuals working more—and to the extent that individuals are not too risk-averse ex ante, higher effort should not be compensated with higher consumption.

To illustrate, we can specialize preferences to obtain a simple relationship between the size of this negative effect and preference parameters. Suppose the utility function is

$$U(c^i, h^i) = \frac{1}{1-\rho}\left((1-\theta)^{1/\sigma}(c^i)^{(\sigma-1)/\sigma} + \theta^{1/\sigma}(h^i)^{(\sigma-1)/\sigma}\right)^{(1-\rho)\sigma/(\sigma-1)}, \tag{16}$$

where σ is the elasticity of substitution between consumption and leisure (constant in this specification), θ is a labor share parameter, and ρ is the coefficient of relative risk aversion (also constant). The dual representation of the above is as follows:

$$E(w^i, u^i) = \left((1-\rho)u^i\right)^{1/(1-\rho)} e(w^i), \tag{17}$$

where

$$e(w^i) = \left(1 - \theta + \theta(w^i)^{1-\sigma}\right)^{1/(1-\sigma)}, \tag{18}$$

and $\phi > 0$. Then, for $w^A = w^B = 1$ (and $l^A = l^B = l = 1 - \theta$), we have

$$\left(\frac{du^i}{dw^i}\frac{w^i}{u^i}\right)_{w^A=w^B=1} = -\theta\,\frac{1-\rho}{\rho}. \tag{19}$$

Thus the negative effect of an own-wage increase under limited renegotiation is larger the smaller is the level of labor supply ($l = 1 - \theta$) and, for $\rho < 1$, is decreasing in the degree of risk aversion, ρ.[7]

2.3 Intra-household Specialization and Labor Market Constraints

With limited renegotiation, specialization in market and nonmarket activities between spouses may generate asymmetries in the compensated own-wage effects across genders. Comparative specialization by women in household production will, other things equal, reduce the labor market supply of a woman relative to that of her husband. If labor supply choices are fully unconstrained, this will tend to reduce the own-wage effect for a woman relative to that of her husband. To see this, suppose we take the extreme case where there exists a fixed requirement of household production output, and the only input required in household production is an amount k of spouse A's time—spouse B having zero productivity in such activities. This amounts to a reduction in A's time endowment from 1 to $1 - k$. Assuming identical utility functions for the two spouses and $w^A = w^B$ (implying a common shadow price of leisure), an optimum in which $E_u^A = E_u^B$ will be characterized by

[7]Note: for $\rho > 1$ we have $U < 0$, and so a positive elasticity implies a negative effect.

$h^A = 1 - k - l^A = h^B = 1 - l^B$, and hence $u^A = u^B$. In other words, higher nonmarket supply by A will be fully offset by a corresponding higher market supply by B. Then the only difference between expression (15) for A and the corresponding expression for B will be in the level of labor supply: other things equal, the own-wage effect will be comparatively larger (in absolute value) for the spouse comparatively more specialized in market activities (the effect for A is proportional to $1/l^B$).

However, when operating in conjunction with institutional constraints on labor supply, gender-based specialization within the household can generate a very different picture: individuals engaged in full-time market activities have typically little scope for adjusting their level of labor supply at the margin, whereas part-time workers enjoy more working-hours flexibility—as evidenced by the common empirical finding that the labor supply elasticity for full-time workers is smaller than that for part-time workers.[8] In households where both spouses work full-time, there will be little scope for upward labor adjustments;[9] there is instead more flexibility in situations where there is a full-time working primary earner (often the husband) and a part-time working secondary earner (often the wife, who engages more in household production).

Suppose that there is an upper bound, $\bar{l}$, on the hours that can be supplied in the market, and that this is binding only for B, the spouse comparatively specialized in market activities ($l^B > l^A$). Then the shadow price of leisure for A will exceed that for B even if market wages are the same for A and B;[10] consequently, an optimum in which $E^A_u = E^B_u$ will be characterized by $h^A < h^B$ and $u^A < u^B$. Thus, specialization in household production by A and working-hours constraints for B can result in a greater combined work burden for A—a "double burden" of market and nonmarket work. In turn, a comparatively lower u^A means that the own-wage effect could be larger, in relative terms, for the spouse who is more specialized in household production and whose market supply is comparatively smaller.[11] A binding upper bound on labor supply for A, in conjunction with full labor supply flexibility for B, would produce the exact opposite effect; however, with a common upper bound, this cannot occur if A specializes comparatively more in household production ($l^B > l^A$).

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[8]Recent empirical labor literature (e.g. Stewart and Swaffield, 1997) has stressed the importance of institutional constraints on hours worked. Bonin *et al.* (2003) focus on the German labor market and find that the own-wage elasticity regarding participation and hours worked is positive for both men and women, but is larger for wives than for husbands. The empirical link between gender-based specialization, employment status, and labor supply elasticities is also documented in Blundell *et al.* (2000).

[9]Notice that, if both spouses are in full-time work and the upper bound, $\bar{l}$, is binding for both, the compensated own-wage effects will be zero.

[10]This is the value $\tilde{w}^B(u^B, \bar{l})$ for which $E^B_{uw}(u^B, \tilde{w}^B) = 1 - \bar{l}$.

[11]Expression (15) is decreasing in u^A. A binding upper bound on labor supply by B will reduce the size of the right-most ratio in expression (15), but this effect would be common to A and B.

Moreover, working hour constraints are more likely to be binding in this way the larger is the household production requirement, k. If we think of k as being positively related to the number of children in a marriage, then women with more children are more likely to experience the adverse effect of an improvement in their wages relative to their husbands.

There is also evidence that workers face lower bounds on hours worked—with desired hours of work reported being often less than actual hours worked (Stewart and Swaffield, 1997). In the bargaining framework we have described, these constraints can also act to increase the size of the compensated own-wage effect for the spouse specialized in nonmarket production. If there is a lower bound, $\underline{l}$, on the hours that can be supplied in the market, and if this is binding only for A, the spouse comparatively specialized in household production activities ($l^A < l^B$), the shadow price of leisure for A will again exceed that for B even if market wages are the same for A and B, and an optimum will again be characterized by $h^A < h^B$ and $u^A < u^B$. And if there are lower bounds on hours supplied for individuals in full-time work, a wage increase for A, the spouse who specializes in household production, can force a switch from part-time to full-time status accompanied by a large compensated welfare change and resulting in an outcome where $h^A < h^B$ and $u^A < u^B$.

Thus, when renegotiation possibilities are limited, labor market constraints can cause a compensated own-wage increase to be particularly adverse to women. In addition to causing part-time spouses to experience comparatively stronger effects for adjustments on the intensive margin, working-hours constraints on full-time work (lower bounds) will also be responsible for adjustments on the extensive margin—discrete switches from part-time to full-time work. This asymmetry between genders is a direct result of gender-biased intra-household specialization—which in turn can be attributed to some (real or perceived) relative productivity differential between genders in market and nonmarket activities (e.g. childrearing).

2.4 Renegotiation and Rematching Costs

In our discussion so far, we have focused on the intra-household effects of relative wage changes for the extreme cases of no commitment and full ex-ante commitment. In the first case, in line with the predictions of a standard bargaining model, an individual's welfare will always be positively related to his or her wage; in the second case, we have shown instead that an increase in a spouse's relative earning power will tend to affect his or her ex-post position adversely.

For *intermediate* degrees of renegotiation and rematching costs, both effects will be present—the positive effect coming from an improvement in the value of the spouse's outside option and the negative effect associated with the insurance motive. The stronger the degree of commitment and the smaller the degree of risk aversion, the more likely it is for an increase in a spouse's relative wage to translate into a relative fall in his or her utility.

If a marriage is characterized by full commitment for both spouses (as in the case considered in Section 2.3 above) asymmetries in the welfare effects of relative wage changes—with wives being more likely to suffer from an own-wage increase compared to their husbands—can arise from a combination of traditional gender roles and institutional labor market constraints. In cases of less-than-full commitment, asymmetric welfare effects across genders can also arise because of systematic differences in rematching costs and/or renegotiation costs across genders. For example, a greater involvement by women in childrearing implies that the rematching costs associated with having children from a previous marriage can be larger for women. Indeed, several studies have found that childless women are more likely to remarry than other women, and do so more quickly.[12]

Asymmetries in the degree of commitment across genders can even cause own-wage effects to have opposite signs for the two genders. In the extreme case where these costs are large for A and zero for B, a compensated own-wage increase for A would always hurt A and benefit B, whereas an own-wage increase for B would have the symmetrically opposite effect, i.e. it would benefit B and hurt A.

The overall conclusion from the analysis presented in this section is that an adverse own-wage effect ($du^A/dw^A < 0$) is more likely to occur the larger are the rematching costs (μ^A) and the renegotiation costs (λ^A). Moreover, we should expect an own relative wage increase to be more likely to affect women adversely in comparison with men, because women are more involved in household production—which makes the own-wage effect proportionally larger—and in part-time work—which allows more labor supply flexibility at the margin. Finally, the compensated own-wage effects (du^A/dw^A and du^B/dw^B) are more likely to diverge in size and/or sign the larger the difference between the rematching and renegotiation costs incurred by A and B.

3 Empirical Evidence

3.1 Data and Variables

We rely on a dataset from the German Socio-Economic Panel (GSOEP), a yearly survey-based representative longitudinal study of private households in Germany since 1984. The survey collects information on all household members, and covers a wide range of topics, including household composition, employment, earnings, education, health.

[12]E.g. Bumpass *et al.* (1990); Chiswick and Lehrer (1990). Several researchers have also shown a negative effect of children under the age of six on their mother's propensity to remarry (e.g. Martinson 1994; Duncan and Hoffman 1985; Koo *et al.* 1984).

We use a sample covering the period 1984 to 2005 (the most recent available data). Since we are interested in within-household effects, we only include married couples, i.e. individuals who were married to one another at the date of each interview; using information on the year of an individual's first marriage, we exclude couples in which one (or both) of the spouses married more than once. The dataset includes a total of 6,031 couples. We pool all observations on all married couples over years, and investigate the effects of within-household relative wage differentials on self-reported satisfaction by men and women.

The names and definitions of all variables used in our estimations are listed in Table 1. To measure intra-household outcomes for men and women, we focus on self-reported satisfaction—our dependent variable. This is obtained as the response to the following survey question: "How satisfied are you with your life today, all things considered?" The answer ranges from 0 (completely dissatisfied) to 10 (completely satisfied). Self-reported satisfaction is a subjective measure of utility, since people are asked to evaluate their level of well-being with regard to actual and past experience, and in comparison to others.[13]

The use of self-reported satisfaction in empirical work has been widely criticized on the grounds that people's subjective feelings are unreliable. As a result, cross-sectional regressions on happiness are usually thought of as being biased whenever unobservable characteristics, such as a person's cheerfulness, are correlated with observed variables included in the regressions, such as education. One advantage of the GSOEP lies in its panel structure, as the same people can be followed over time. Panel regressions can therefore be estimated, with a separate dummy variable included for each person in the sample. This allows to eliminate the bias that is suspected to affect cross-sectional regressions.[14]

Using self-reported satisfaction as a proxy for welfare also raises a problem of interpretation. The question is whether self-reported satisfaction should be interpreted as reflecting a subjective ranking within the whole population or as reflecting a subjective ranking within a peer group with which the individual identifies. In the latter interpretation, which we believe to be more plausible, reported changes should be taken as relative utility changes ($\Delta u/u$)—i.e. reflecting elasticities (as derived in (15) and (19)) rather than level effects.

A number of studies have reported how subjective satisfaction depends on nonpecuniary aspects and events of an individual's life to a larger extent than it does on market-related factors. In particular, changes in marriage status and the death of a spouse are strong predictors of self-reported satisfaction (Di Tella *et al.*, 2001). However, given that we

[13]For a thorough discussion about this measure, see Frey and Stutzer (2002).

[14]Clark and Oswald (2002) compare panel to cross-sectional regressions of happiness and find that the results obtained from using both methodologies are very similar, suggesting that the bias in cross-sectional analysis may not be as severe as expected. In this paper, we report the results obtained from panel regressions. We also ran the same regressions in cross-section, i.e. excluding person fixed effects, and the main results remained unchanged. Those results are available upon request.

restrict our attention to married couples where both spouses are alive, these changes are ruled out.

As we anticipated in our previous theoretical discussion, the main explanatory variable of interest is an individual's relative earning power. We measure this as the log of the ratio of his or her wage (per hour) and of the sum of the two spouses' hourly wage. This ratio (denoted as *w share*) is meant both as a measure of the individual's contribution to household income and of his/her comparative bargaining strength. Our dataset contains information on monthly gross earnings (including overtime payments) and on the number of hours worked per week during the last month. The wage we calculate for each spouse is thus gross monthly earnings divided by the number of hours worked per week, further divided by 4.3 to obtain gross earnings per hour (Dustmann and van Soest, 1997).

A number of controls are included in the regressions. These refer to (standard) individual characteristics considered in the happiness literature (see, among others, Ferrer-i-Carbonell and Frijters, 2004): years of education, health status (which is an ordinal score on the answer to self-reported satisfaction with health)—both for the individual in question and his or her spouse—age, age squared, as well as household characteristics (household income, number of household members, number of children, a dummy for having children and a dummy for having children younger than ten years of age). The income measure we use is total annual household income. This variable is probably a better measure of economic well-being than monthly household income since it includes irregular income components (such as Christmas bonuses). In order to compare income over time, household income is deflated to 2000 prices. Year, German Länder and individual fixed effects are also included. As we estimate panel regressions, individual characteristics that do not vary over time are dropped from the regressions.

The main predictions of the theoretical analysis presented in Section 2 are: (i) the sign and magnitude of the welfare effects of a comparative own-wage improvement depend on the extent of commitment to the original marriage contract; in turn, this depends on the size of the renegotiation and rematching costs incurred by the spouses; (ii) women are more likely to be affected adversely than men, both because they are more involved in household production and in part-time work—implying more flexibility in their labor market responses—and because they tend to face higher rematching and renegotiation costs.

To test these predictions, we first interact the explanatory variable *ln w share* with a female dummy, denoted by *Fem*, in order to check whether women are indeed more negatively affected than men by an improvement in their relative wages. We then further interact female relative wages with three sets of variables. The first set of variables are meant to capture the degree of intra-household commitment. This is to verify that the extent to which spouses can renegotiate the terms of their marriage contract affects the relationship between relative wages and self-reported satisfaction. Two of these variables relate to social norms limiting the extent of renegotiation (the λ's in the theoretical model described

above): the variable *Religion* captures the importance of religion for a spouse, which may be positively related to religious and cultural sanctions associated with marriage; the variable *Community* captures the importance of ties to the community an individual belongs to, with the idea that more tightly-knit communities are endowed with comparatively stronger social norms.[15] Other commitment variables relate to the extent of rematching costs (the μ's in our theoretical model). Especially for women, rematching costs are known to be increasing with age, as well as with the number of children, particularly younger ones. We thus interact the wage share with the *Age* variable and several variables associated with having children: being a parent (a dummy for having children, *Child*); number of children (*#Children*); and having children younger than ten years of age (captured by a dummy variable, *Child10*). In all cases, we express the variables in a way such that an increase in the value of the variable indicates stronger commitment (i.e. stricter social norms and higher rematching costs).

The second set of variables that we interact with the female wage share are meant to capture the degree of flexibility of labor supply responses. This is to verify that a possible adverse effect of a relative wage increase for a woman is associated with an increase in her labor market effort. To measure flexibility on the extensive margin, we construct a variable, denoted by *Full-time*, capturing changes from part-time to full-time work status that are positively associated with wage increases. To measure flexibility on the intensive margin, we use *Overtime* work—measured as the weekly number of overtime hours divided by the number of hours "agreed" with the employer. We also use the variable *Flex*, which is defined as the ratio of agreed working hours to desired hours as reported by the respondents (for a more detailed description of these variables, see the next subsection).

The last set of interactions involve variables that relate to the burden of household work for married women. These include the following: time spent by the wife on childcare per weekday relative to her husband, denoted with *Rel Childcare*; a variable capturing whether external household help is regularly used or not (denoted by *No cleaner*); a variable stating how often people visit family and relatives or receive visits (*No visits*); and two dummy variables, *Until 85* and *Until 91* capturing changes in maternity legislation in Germany.[16]

[Table 1 here]

[15]This variable is used to proxy for the extent of social controls, in a similar way in which population density is used in many sociological studies (see, among many others, Sampson and Groves, 1989).

[16]In Germany, maternity leave legislation consists of three parts: maternity protection, protected maternity leave, and maternity benefits (see Schonberg and Ludsteck, 2006). In 1986 and 1992 important changes were introduced in the legislation, making it more favorable to women: since 1986, all mothers receive maternity benefits for at least six months, regardless of their employment status before birth; since 1992, women are entitled to a total of three years of protected leave.

In some cases, we interact the female wage share with some of the variables that are used as controls in all regressions (age, having children, number of children and children younger than ten years of age). In other cases, we interact the wage share variable with a variable that is not included in the standard set of controls (e.g. the variables *Religion* and *Community*); in these cases, the same variable is also included in the controls.[17] A complete description of the variables used can be found in Table 1. The full correlation matrix for the controls included in the regressions is reported in Table 2.

[Table 2 here]

Table 3 gives descriptive statistics for some key variables. Overall, women report a slightly higher level of satisfaction. In comparison with men, women are significantly less educated, are paid lower wages per hour, are younger, spend more time per day on childcare and housework and consider religion as being more important for their well-being and satisfaction. The wage share is on average larger for men. There is no significant difference between genders in the amount of overtime work they provide, their leisure time, their self-reported health status, and their ties to the local community.

[Table 3 here]

3.2 Empirical Findings

Since the dependent variable on self-reported satisfaction varies between 0 and 10, albeit discretely, in what follows we present results from OLS estimations. Similar results are obtained using ordered probit estimations. In order to account for the survey design of the data, observations are weighted using sampling weights and standard errors are adjusted for clustering across voting districts.

As in our theoretical discussion, we restrict our attention to those couples in which both spouses work—3,768 couples[18]—and initially run a specification that includes, in addition to all the standard controls, the relative wage share, *ln w share* (column 1 of Table 4). Despite the various controls included, the observed variation in the relative share cannot be attributed to a single, clearly identifiable source—and we cannot therefore exclude that

[17] It is not possible to include all variables both as interactions and as controls because not all of them are available for the same individuals, as indicated by the different number of observations we can use in each regression. When attempting to include all variables as controls, we were indeed left with no observations.

[18] As discussed below, as a robustness check, we have also performed estimations with a sample that also includes couples where one or both of the two spouses do not work, constructing potential hourly wages for non-working spouses using Heckman's two-step procedure.

some of this variation may occur endogenously (results from a separate set of regressions attempting to isolate an "exogenous" source of variation are presented in the next subsection). On the other hand, the inclusion of individual fixed effects allows us to control for any differences in match quality across individuals, which could be systematically correlated with wages.

The positive and statistically significant coefficient on the relative wage share seems to lend support to the prediction of standard bargaining models that abstract from intra-household commitment, i.e. the compensated effect of a relative improvement in labor market opportunities is always beneficial for the spouse who experiences it. However, when we run a regression for a specification that also includes the interaction between *ln w share* and the female dummy *Fem* (column 2 of Table 4),[19] the results are strikingly different: while the coefficient on the wage share (for men) is still positive and significant, the interaction between the wage share and the female dummy is negative and highly significant—which means that we can reject (at the 1 percent level) the hypothesis that the effect of the own-wage share variable on self-reported satisfaction is the same for men and women. Thus, for women, improvements in the comparative value of their outside options—which is positively associated with their comparative earning power—appear to have little effect on outcomes.

Our theoretical model predicts that this pattern should be associated with large renegotiation and/or rematching costs for women. To examine this prediction, we run regressions including interactions between the relative wage share variable for women and the various commitment variables described in the previous section. These are reported in the remaining columns of Table 4.

[Table 4 here]

The interactions with the importance given to religion and with the strength of the ties with the local community—which can be viewed as being positively related to renegotiation penalties—are negative and highly significant (columns 3-4). The interaction with age (column 5) is also negative and highly significant, suggesting that becoming older increases the costs of rematching for women. Columns 6-8 report results for specifications where the female wage share is interacted with variables associated with having children—variables that may be interpreted as capturing both childcare costs as well as limited renegotiation opportunities. Estimated coefficients for these interactions are highly significant and have the expected negative sign.

[19] This specification implies that the total effect for women is given by the sum of the coefficient on the non-interacted wage share and the coefficient on the interaction term with the female dummy.

The controls included in the regressions tend to have effects as expected. In particular, richer and smaller households with good health (both own health and health of the partner) tend to be more satisfied with their life. Being more educated, and having many children or young children are not significant in explaining own well-being. Finally, consistently with the findings of previous literature, the partial correlation between own age and life satisfaction is U-shaped.

Our theoretical analysis also suggests that, with weak renegotiation, a negative own-wage impact should be associated with a positive labor supply adjustment. To test this prediction, taking into account the presence of working hours constraints, we separately look at flexibility on the intensive margin and on the extensive margin. The results of these estimations (reported in Table 5) indicate that the negative effect experienced by women from a relative own-wage increase is indeed associated with a positive labor supply adjustment.

[Table 5 here]

In order to capture labor supply adjustments on the extensive margin, we look at changes in participation from part-time to full-time status that are positively associated with wage increases. This is done as follows. The dataset tells us, for each spouse: (i) the month of the survey; (ii) whether the spouse worked part-time or full-time in each month of the year; (iii) the wage in the previous month. Suppose that an individual answered the survey in May 2000 and in August 2001. We first compare the employment status for that individual in April 2000 and July 2001 (as those are the months for which employment status and wages are reported); if the individual worked part-time in April 2000 and full-time in July 2001, we assign a value of 1 to a dummy variable that indicates a switch from part-time to full-time status. We then multiply this dummy with the growth in wage per hour between April 2000 and July 2001. When the female wage share is interacted with the variable so obtained (*Full-time*; column 1 of Table 5), we obtain a negative and significant effect, as expected. One interpretation of this finding is that lower bounds on working hours for full-time work are inducing discrete adjustments in market supply (and in the overall work burden).

To capture labor supply adjustments on the intensive margin, we interact the wage share variable with the ratio of agreed working hours to *desired* hours as reported by respondents (denoted by *Flex*), which we take as a symptom of lower bounds on working hours; and with *Overtime* work, which we take as an indication of the degree of upward flexibility in marginal labor supply responses. The interaction with *Flex* (column 2 of Table 5) is negative and highly significant. In addition, when included as a control, it appears that working longer than desired is further associated with a lower level of reported satisfaction. The interaction with *Overtime* (column 3 of Table 5) is negative and significant, suggesting that the adverse effect of a wage share increase on women's reported satisfaction is stronger

the larger is the proportion of overtime hours worked. Note that working overtime is further associated with a lower level of reported satisfaction, as can be seen from the negative and significant coefficient on overtime work (when included as a control).

Our theoretical model also predicts that those women who are more specialized in household activities are more likely to be negatively affected by an improvement in their relative wages, since this would only exacerbate the double burden of household and market work they must bear. To test this prediction, we interact *ln w share* with variables capturing how involved women are in household activities and how costly these are (Table 6).

[Table 6 here]

In column 1, we interact the wife's wage share with the number of hours she spends per weekday on childcare relative to her husband. We might expect that the more time the wife spends on childcare relative to her husband, the stronger the negative effect of increases in the own-wage share should be. The estimated coefficient on the interaction term is indeed negative and significant. This indicates that childcare duties and lack of opportunities for shared childcare with family members strengthen the negative effect of increases in the own-wage share on women's reported satisfaction.

Also, not receiving or giving regular visits from family and relatives increases the negative impact of an increase in the wage share for women (column 2), a finding that can be interpreted as reflecting fewer opportunities for married women to share the burden of household work with relatives and friends.

In column 3, we interact the female wage share with a variable that indicates whether external household help is regularly used or not (denoted by *No cleaner*). If women indeed suffer from a double burden of market and household work, then we might expect those women who do not receive external help to report lower levels of satisfaction following a relative own-wage increase. The interaction with *No cleaner* is indeed negative and significant, lending further support to the above interpretation.

Finally, we investigate whether changes in maternity legislation in Germany have altered the impact of changes in relative wages on women reported satisfaction (columns 4-5 of Table 6). As mentioned above, maternity leave legislation has become more generous for women since 1986—when all mothers were granted maternity benefits for at least six months, regardless of their employment status before birth—and then again since 1992—when all women were entitled to a total of three years of protected leave. Our empirical findings show that the negative effect of an own-wage increase on the well-being of women was stronger before 1986, suggesting that more generous maternity benefits have allowed to decrease the double burden experienced by women. No significant change can be noticed, however, since 1992.

3.3 Robustness Checks

Our preceding panel estimations exploit any observed variation in relative wages within couples, independently of the source of such variation. Despite the rich set of controls included in the regressions, the suspicion remains that at least some of this variation may not be exogenous. A commonly used strategy to identify an exogenous source of variation is to focus on changes stemming from a well-defined event—a "natural experiment". The case of Germany offers something that comes close to this ideal, as reunification amounted to a true labor market "shock therapy" for the East (Hunt, 2002).[20] Changes included the adoption of anti-gender-discrimination laws, such as the constitutional guarantee of equal rights, and clauses requiring equal pay and prohibiting unequal hiring, firing and promotion practices. As documented in the literature, these changes led to a reduction in the gender wage gap: East German couples were first interviewed in the GSOEP in June 1990, just before these changes occurred; for the same couples, in the two years that followed, the dataset shows an increase in mean hourly wages from 8.32 to 14.98 DM (in real terms) for the husbands, while the corresponding increase for their wives was from 7.16 to 13.91 DM. It seems reasonable then to conjecture that the source of any variation in the female wage share experienced by East German couples during unification is more likely to be exogenous.

The empirical strategy we employ to isolate this exogenous variation is as follows. We restrict our sample to a subperiod starting in 1990, the first year in which we observe East Germans, and ending in 2000. The sample includes West and East German couples, and among the latter, a subsample of East German couples who first appear in the panel in June 1990. The variation in the wage share that we wish to isolate is that reported by couples within this subsample between 1990 and 1992; those couples can be considered as our "treatment group" and are captured by a dummy denoted by $East^*$. Since the rest of the sample—the "control" group—includes both East and West German couples, while the treatment only includes East Germans, we also need to separately isolate effects that may be the result of systematic differences between East and West German couples. For this purpose, the specification we use includes further interactions of the wage share and the female wage share with a dummy for East Germans, $East$.[21]

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[20] Monetary, economic and social union between West and East Germany occurred on 1st July 1990 and was followed by political union on 3rd October of the same year; as East Germany was formally joining the Federal Republic of Germany, all western institutions were immediately adopted. See Hunt (2007) and Burda and Hunt (2001) for a detailed discussion of the reforms that followed reunification.

[21] This specification is similar to a difference-in-differences approach: there are here two control groups, the West Germans and the non-treated East Germans; the interaction with the treatment dummy $East^*$ is meant to capture differences between the treatment and control groups that cannot be attributed to a systematic difference between East and West German households—the latter difference being captured by

Regression results are presented in Table 7.[22] In column 1 the treatment group is defined over the period 1990-1991, while column 2 extends the period to 1990-1992. The first two rows (*w share*) refer to all Germans between 1990 and 2000. The third and fourth rows refer to all East Germans between 1990 and 2000. The results of interest are the coefficients reported in the fifth and sixth rows (East Germans in 1990-1991 and 1990-1992, i.e. the treatment). For both specifications, these have the expected sign and are highly significant. The pattern we found in our previous regressions is thus even more strongly apparent when we focus on variation in the wage share that is more likely to be exogenous.

[Table 7 here]

We have also performed a number of other robustness checks.[23] As we have already mentioned, we have performed ordered probit estimations, obtaining similar results to those reported in Tables 4-6 above. We have also considered the number of hours spent per weekday on leisure as an alternative measure of a spouse's welfare other than self-reported satisfaction. This variable is regressed on the whole set of controls, the wage share, together with the wage share interacted with the female dummy. The results are consistent with our previous findings in that an increase in the comparative earning power of women is associated with a decrease in their leisure. To exclude the possibility that our findings may be due to temporary morale effects associated with labor market shocks, including involuntary changes in employment—changes that might be correlated with the wage share variable—we have also explored specifications that include controls for short-run wage dynamics, namely the growth rate from one year to the next in the own hourly wage and in that of the individual's spouse, up to two lags. The effect of a higher wage share on the reported satisfaction of women remains negative and highly significant.

As a final robustness check, we have further performed estimations with a sample that also includes couples where one or both of the two spouses do not work. To do so, we first predicted the potential hourly wage of the non-working spouses using a standard Heckman's two-step selection model (Heckman, 1979), using individual health status, number of children and a dummy for being married as exclusion restrictions. The results are broadly in line with the ones reported here.

Overall, the results of our empirical analysis show that the effect of an own-wage share

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the East German dummy interaction.

[22]For these regressions, we have used as a control monthly net household income in real terms, instead of real annual income as in previous regressions, as this variable is missing for East Germans in 1990; as in all other regressions, year, German Länder, and person fixed effects are included.

[23]The results of these regressions are available upon request.

increase on the well-being of a spouse is positive for men, but negative for women.[24] As discussed in Section 2, this pattern can be attributed to differences in rematching and renegotiation costs across spouses, in conjunction with traditional gender roles leading to female specialization in household activities and with the presence of labor market constraints.

4 Summary and Conclusion

If married women experience an increase in their labor market opportunities relative to their husbands, bargaining theory suggests that they should experience comparatively more favorable outcomes. However, economic theory also suggests that, if renegotiation possibilities are limited, the opposite may be true: a relative improvement in labor market opportunities for women may only induce them to exert higher market effort, with little relief from household activities. In conjunction with traditional gender roles (a comparative advantage of wife in childcare/household productions) and working hours constraints in the labor market, limited renegotiation also implies a stronger negative own-wage effect for married women than for married men. Asymmetries in the welfare effects of relative wage changes across genders can also result from differences in the extent of the renegotiations and rematching costs faced by the two spouses.

The results of our empirical analysis suggest that improvements in women's labor market opportunities do not translate into an improvement of intra-household outcomes in their favor. Instead, in line with many sociological studies that have stressed the importance of traditional gender roles within households, higher relative wages for women appear to only increase the "double burden" they must bear, inducing them to increase their market effort and decrease leisure time. We also find that this negative welfare effect is stronger for women whose renegotiation possibilities are more limited, i.e. women who face stricter social norms and/or higher rematching costs.

This is not to say that married women do not benefit from higher wages, as higher wages will raise household income:[25] what our findings indicate is that, if higher wages benefit married women, it is not because of the comparative improvement in their outside options relative to those of their partners.

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[24]The results reported in Tables 4-7 suggest markedly different own-wage effects for men and women. If we perform similar regressions for men as those we report for women in Tables 4-7—including the corresponding interaction terms for men, we obtain results (not reported) that are symmetrically analogous, i.e., the same interactions that feature significantly negative coefficients for women give rise to significantly positive effects for men.

[25]Comparatively higher earnings for women can also produce other indirect benefits. Neeman, Newman and Olivetti (2007) show that higher earnings for women affect the extent to which wives can transfer surplus to their husbands, thus decreasing divorce rates.

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Table 1: List of Variables Used as Controls and/or Interactions

Variable	**Definition**
Satisfaction	Response to "How satisfied are you today with your life, all things considered?"
	Varies between 0 (completely dissatisfied) to 10 (completely satisfied)
w share	Ratio of hourly wage share of each spouse to sum of spouses wages
HH income	(Real) annual household income (DM)
Fem	Dummy equal to 1 for Female
Yrs education	Education or training (years)
Health	Response to "How satisfied are you today with your health?"
	Varies between 0 (completely dissatisfied) to 10 (completely satisfied)
Age	Age of respondent (years)
Age Sq/1000	Age of respondent (years), squared/1000
#HH members	Number of persons in household
Child	Dummy for having children
#Children	Number of children in household
Child10	Dummy for having children younger than 10 years of age
Religion	Response to "Is religion important for your well-being and satisfaction?"
	Very important [4], Important [3], Less important [2] and Very unimportant [1]
Community	Response to "To what extent do you feel connected with the place and the area that you live in?"
	Very strong [4], Strong [3], Not Much [2] and Not at all [1]
Leisure	Number of hours spent per weekday on hobbies
Housework	Number of hours spent per weekday on housework
Rel childcare	Number of hours spent per weekday on childcare, relative to the spouse
No visit	Response to "In your free time, how often do you visit or receive visits from family and relatives?"
	Daily [1], Weekly [2], Monthly [3], Less frequently [4], Never [5]
No cleaner	Response to "Do you regularly or occasionally employ household help?"
	Regularly or Occasionally [0] and Never [1]
Full-time	Dummy equal to 1 for switching from part-time to full-time status from one year to the next, times the yearly growth rate of the hourly wage (positive change only)
Flex	Number of hours of work "agreed" with the employer divided by the desired number hours of work per week
Overtime	Number of hours worked overtime per week divided by the number of hours "agreed" with the employer
Until 85/Until 91	Dummy equal to 1 until 1985/1991

Source: GSOEP

Table 2: Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Satisfaction	1	–	–	–	–	–	–
(2) ln w share	0.0100	1	–	–	–	–	–
(3) ln w share×Fem	-0.0269	0.7372	1	–	–	–	–
(4) ln HH income	0.1474	-0.0388	-0.0458	1	–	–	–
(5) Age	-0.0142	0.0573	0.1184	0.2927	1	–	–
(6) Age Sq/1000	-0.0059	0.0567	0.1175	0.2758	0.9926	1	–
(7) #HH members	-0.0493	-0.0163	-0.0268	0.1153	-0.2120	-0.2446	1
(8) Child	-0.0261	-0.0071	-0.0115	-0.0917	-0.4664	-0.4889	0.6487
(9) #Children	-0.0137	-0.0116	-0.0207	-0.0695	-0.4411	-0.4604	0.7587
(10) Child10	0.0205	-0.0069	-0.0128	-0.1152	-0.4705	-0.4569	0.4323
(11) Yrs education	0.0310	0.0967	0.0987	0.4043	0.0865	0.0818	0.0087
(12) Yrs education, partner	0.0207	-0.1268	-0.0805	0.4044	0.0541	0.0483	0.0087
(13) Health	0.4639	0.0163	0.0063	0.0513	-0.1703	-0.1669	0.0523
(14) Health, partner	0.2815	-0.0122	-0.0152	0.0512	-0.1658	-0.1618	0.0518
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(8) Child	1	–	–	–	–	–	–
(9) #Children	0.8399	1	–	–	–	–	–
(10) Child10	0.5039	0.6508	1	–	–	–	–
(11) Yrs education	0.0285	0.0289	0.0162	1	–	–	–
(12) Yrs education, partner	0.0284	0.0287	0.0159	0.6332	1	–	–
(13) Health	0.0893	0.0948	0.1056	0.0721	0.0470	1	–
(14) Health, partner	0.0890	0.0944	0.1055	0.0472	0.0721	0.3037	1

Table 3: Descriptive Statistics

	Women	Men	Women - Men
Satisfaction [0,10]	7.28	7.22	0.059^a (0.024)
(Real) wage (DM/hour)	21.00	28.03	-7.020^a (0.188)
Hourly wage share	0.43	0.57	-0.139^a (0.002)
Overtime	0.14	0.13	0.008 (0.009)
Yrs education	11.89	12.39	-0.501^a (0.038)
Health [0,10]	6.98	6.97	0.014 (0.030)
Age	42.18	44.81	-2.632^a (0.131)
Childcare	2.31	0.73	1.578^a (0.050)
Leisure	1.38	1.41	-0.025 (0.019)
Housework	2.94	0.67	2.269^a (0.020)
Religion	2.28	2.14	0.147^a (0.037)
Community	3.09	3.09	-0.001 (0.018)

Notes: ^{a} denotes significance at the 1 percent level. Standard errors in parenthesis.

Table 4: Satisfaction and Relative Wages

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln w share	0.030^a (0.005)	0.083^a (0.017)	0.612^a (0.042)	0.047^a (0.019)	0.083^a (0.017)	0.086^a (0.017)	0.085^a (0.017)	0.085^a (0.017)
ln w share×Fem	–	-0.079^a (0.028)	-1.093^a (0.115)	0.088 (0.071)	0.034 (0.066)	-0.033 (0.027)	-0.049 (0.032)	-0.066^b (0.030)
ln w share×Fem×Religion	–	–	-0.202^a (0.031)	–	–	–	–	–
ln w share×Fem×Community	–	–	–	-0.100^a (0.019)	–	–	–	–
ln w share×Fem×Age	–	–	–	–	-0.003^a (0.001)	–	–	–
ln w share×Fem×Child	–	–	–	–	–	-0.075^a (0.012)	–	–
ln w share×Fem×#Children	–	–	–	–	–	–	-0.028^a (0.006)	–
ln w share×Fem×Child10	–	–	–	–	–	–	–	-0.024^a (0.006)
Religion	–	–	-0.106^a (0.029)	–	–	–	–	–
Community	–	–	–	0.008 (0.016)	–	–	–	–
Age	-0.052^a (0.003)	-0.052^a (0.003)	0.000 (0.000)	0.817^a (0.016)	-0.054^a (0.004)	-0.051^a (0.003)	-0.051^a (0.003)	-0.051^a (0.003)
Child	0.117^a (0.028)	0.117^a (0.028)	-0.083 (0.106)	-0.073^c (0.003)	0.117^a (0.028)	0.083^a (0.026)	0.117^a (0.028)	0.117^a (0.028)
#Children	-0.026 (0.017)	-0.026 (0.017)	-0.270^a (0.019)	0.245 (0.038)	-0.026 (0.017)	-0.027 (0.017)	-0.039^b (0.018)	-0.027 (0.017)
Child10	0.013 (0.008)	0.012 (0.008)	0.083^a (0.009)	-0.181^a (0.033)	0.012 (0.008)	0.012 (0.008)	0.012 (0.008)	0.001 (0.007)
ln HH income	0.445^a (0.022)	0.441^a (0.021)	0.327^a (0.065)	0.103^a (0.057)	0.441^a (0.021)	0.441^a (0.021)	0.441^a (0.021)	0.440^a (0.021)
Age Sq/1000	0.174^a (0.043)	0.177^a (0.042)	-2.789^c (1.422)	-0.031^a (0.020)	0.192^a (0.045)	0.169^a (0.043)	0.170^a (0.042)	0.169^a (0.042)
#HH members	-0.142^a (0.013)	-0.142^a (0.013)	0.037 (0.024)	0.050^a (0.004)	-0.141^a (0.013)	-0.142^a (0.013)	-0.142^a (0.013)	-0.142^a (0.013)
Yrs education	0.007 (0.005)	0.007 (0.005)	-0.552^a (0.015)	-0.054^a (0.003)	0.007 (0.005)	0.007 (0.005)	0.007 (0.005)	0.007 (0.005)
Yrs education, partner	-0.077^a (0.008)	-0.078^a (0.008)	-0.155^a (0.014)	-0.023^a (0.002)	-0.077^a (0.008)	-0.078^a (0.008)	-0.078^a (0.008)	-0.078^a (0.008)
Health	0.198^a (0.003)	0.198^a (0.003)	0.056^a (0.007)	0.194^a (0.003)	0.198^a (0.003)	0.198^a (0.003)	0.198^a (0.003)	0.198^a (0.003)
Health, partner	0.066^a (0.002)	0.066^a (0.002)	0.006 (0.007)	0.057^a (0.003)	0.066^a (0.002)	0.067^a (0.002)	0.067^a (0.002)	0.067^a (0.002)
R^2	0.633	0.633	0.871	0.716	0.633	0.633	0.633	0.633
Observations	25480	25480	2072	6456	25480	25480	25480	25480

Notes: ^{a}, ^{b}, and ^{c} denote significance at 1, 5, and 10 percent levels respectively. Standard errors in parenthesis. Observations are weighted using sampling weights, standard errors are adjusted for clustering across voting districts. Individual, year, and German Länder fixed effects are included in all cases.

Table 5: Satisfaction and Relative Wages (continued)

	(1)	(2)	(3)
ln w share	0.246^a (0.029)	0.183^a (0.023)	0.007 (0.035)
ln w share×Fem	-0.445^a (0.047)	-0.211^a (0.041)	0.043 (0.058)
ln w share×Fem×Full-time	-0.282^a (0.083)	–	–
ln w share×Fem×Flex	–	-0.255^a (0.025)	–
ln w share×Fem×Overtime	–	–	-0.215^a (0.023)
Full-time	0.307^a (0.059)	–	–
Flex	–	-0.134^a (0.018)	–
Overtime	–	–	-0.536^a (0.024)
Age	-0.047^a (0.004)	-0.035^a (0.004)	-0.039^a (0.006)
Child	0.034 (0.026)	0.077^a (0.023)	0.079^b (0.039)
#Children	0.071^a (0.020)	-0.019 (0.015)	-0.015 (0.015)
Child10	0.013 (0.009)	0.048^a (0.011)	0.016 (0.013)
ln HH income	0.500^a (0.019)	0.474^a (0.019)	0.509^a (0.020)
Age Sq/1000	0.240^a (0.048)	0.030 (0.053)	-0.039 (0.071)
#HH members	-0.268^a (0.022)	-0.114^a (0.012)	-0.112^a (0.013)
Yrs education	0.013^b (0.006)	-0.001 (0.004)	-0.020^a (0.005)
Yrs education, partner	-0.081^a (0.006)	-0.100^a (0.008)	-0.065^a (0.011)
Health	0.188^a (0.004)	0.185^a (0.004)	0.190^a (0.004)
Health, partner	0.072^a (0.003)	0.067^a (0.003)	0.061^a (0.003)
R^2	0.654	0.652	0.645
Observations	16958	19475	20744

Notes: See notes to Table 4.

Table 6: Satisfaction and Relative Wages (continued)

	(1)	(2)	(3)	(4)	(5)
ln w share	0.233^a (0.016)	0.062 (0.044)	0.083^a (0.017)	0.083^a (0.017)	0.083^a (0.017)
ln w share×Fem	-0.090^a (0.028)	-0.932^a (0.056)	-0.081^a (0.028)	-0.195^a (0.037)	-0.082^a (0.031)
ln w share×Fem×Rel Childcare	-0.018^a (0.003)	–	–	–	–
ln w share×Fem×No visit	–	-0.249^a (0.019)	–	–	–
ln w share×Fem×No cleaner	–	–	-0.069^a (0.003)	–	–
ln w share×Fem×Until 85	–	–	–	-0.124^a (0.013)	–
ln w share×Fem×Until 91	–	–	–	–	-0.004 (0.010)
Rel Childcare	-0.012^a (0.003)	–	–	–	–
No visit	–	-0.055^a (0.012)	–	–	–
No cleaner	–	–	-0.010 (0.007)	–	–
Age	0.088^a (0.012)	-0.156^a (0.018)	-0.052^a (0.003)	-0.037^a (0.003)	-0.044^a (0.004)
Child	-0.128^a (0.053)	0.203^a (0.028)	0.117^a (0.028)	0.115^a (0.028)	0.117^a (0.028)
#Children	-0.027 (0.029)	-0.090^c (0.047)	-0.026 (0.017)	-0.026 (0.017)	-0.026 (0.017)
Child10	0.033^a (0.008)	-0.055^b (0.026)	0.012 (0.008)	0.012 (0.008)	0.012 (0.008)
ln HH income	0.314^a (0.031)	0.176^b (0.089)	0.441^a (0.021)	0.440^a (0.021)	0.441^a (0.021)
Age Sq/1000	-1.414^a (0.187)	1.169^a (0.192)	0.176^a (0.042)	0.155^a (0.043)	0.175^a (0.043)
#HH members	-0.198^a (0.022)	-0.145^a (0.067)	-0.142^a (0.013)	-0.144^a (0.013)	-0.142^a (0.013)
Yrs education	-0.055^a (0.005)	-0.082^a (0.009)	0.007 (0.005)	0.007 (0.005)	0.007 (0.005)
Yrs education, partner	0.022^a (0.009)	-0.022^c (0.012)	-0.077^a (0.008)	-0.078^a (0.008)	-0.078^a (0.008)
Health	0.203^a (0.002)	0.192^a (0.011)	0.198^a (0.003)	0.198^a (0.003)	0.198^a (0.003)
Health, partner	0.075^a (0.003)	0.078^a (0.011)	0.067^a (0.002)	0.067^a (0.002)	0.066^a (0.002)
R^2	0.678	0.867	0.633	0.633	0.633
Observations	10249	4615	25480	25480	25480

Notes: See notes to Table 4.

Table 7: Satisfaction and Relative Wages – East and West Germans

	(1)	(2)
ln w share	0.166^{a} (0.028)	0.150^{a} (0.028)
ln w share×Fem	-0.205^{a} (0.049)	-0.184^{a} (0.049)
ln w share×East	0.041 (0.027)	0.024 (0.027)
ln w share×East×Fem	-0.079^{b} (0.048)	-0.125^{a} (0.047)
ln w share×East*	0.646^{a} (0.027)	0.515^{a} (0.015)
ln w share×East*×Fem	-0.153^{a} (0.005)	-0.010^{a} (0.003)
Age	-0.039^{a} (0.006)	-0.047^{a} (0.006)
Child	0.141^{b} (0.064)	0.136^{b} (0.064)
#Children	-0.016^{a} (0.017)	-0.016 (0.017)
Child10	0.036^{b} (0.015)	0.034^{b} (0.014)
ln HH monthly income	0.537^{a} (0.020)	0.526^{a} (0.019)
Age Sq/1000	0.072 (0.076)	0.140^{c} (0.077)
#HH members	-0.159^{a} (0.054)	-0.144^{a} (0.053)
Yrs education	0.020^{c} (0.011)	0.022^{b} (0.011)
Yrs education, partner	-0.055^{a} (0.012)	-0.052^{a} (0.013)
Health	0.195^{a} (0.003)	0.195^{a} (0.003)
Health, partner	0.078^{a} (0.004)	0.078^{a} (0.004)
Period	1990-2000	1990-2000
Period for treatment group	1990-1991	1990-1992
R^2	0.698	0.699
Observations	11452	11452

Notes: ^{a}, ^{b} and ^{c} denote significance at 1, 5 and 10 percent levels respectively. Standard errors in parenthesis. East* denotes the treatment group.