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A theoretical analysis of the effects of legislation on marriage, fertility and participation.

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Whatever happened to the domestic division of labour? A theoretical analysis of the effects of legislation on marriage, fertility and participation.

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Abstract

We derive the behavioural implications of legislation on the subject of marriage, divorce, de-facto unions, domestic violence, and labour market discrimination, within a game-theoretical framework. The predictions are consistent with two empirical observations. One is that, while the prevalent pattern in development countries is for the father to specialize completely in market work, the tendency in developed countries is towards mother and father sharing market work and care of the children more or less equally between them. The other is that the sign of the cross-country correlation between fertility and female labour market participation, negative worldwide until the mid-1970s, remains negative across developing countries, but has turned positive where developed countries are concerned. We show that domestic division of labour is efficient, while equal sharing is not. But we also argue that efficiency is bought, in developing countries, at the expense of women, and discuss ways in which efficiency could be restored in developed countries without setting the clock back.

Key-words: gender, fertility, domestic division of labour, civil partnership, marriage, divorce, alimony, community property, dowry, bride-price, domestic violence, labour market discrimination, skill premium.

JEL classification: D13, J12, J13, J16, J24, K30.

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1 Introduction

The present paper is inspired by three broad facts. The first is that marriage, still the prevalent form of union in the developing part of the world, is losing ground to de-facto union where developed countries are concerned.¹ The second is that the traditional division of labour (father goes out to work, mother looks after the children), still the prevalent domestic arrangement in developing countries, is losing ground, in developed ones, to equal-sharing arrangements.² Indeed, that a substantial minority of women (up to one in five) in some developed countries earn more than their male partners,³ suggesting that at least some of these couples may be practicing the liberated division of labour (mother goes back to work as soon as she possibly can, leaving father in charge of the children). The third broad fact is that the cross-country correlation between fertility and female labour market participation, negative worldwide until the mid-1970s, remains negative across developing countries, but has turned positive across developed ones.⁴ Note that, while a negative correlation is an obvious implication of the traditional division of labour, a positive one is consistent with equal sharing of domestic and market work only if the couples practicing this arrangement tend to have more children (given the same skill premium) than couples practicing the traditional one. Following in the footsteps of Mnookin and Kornhauser (1979), and others after them, we use a game-theoretical approach to explain these broad facts in terms of differences in the legal framework within which couples and individuals are called upon to make their decisions. We look, in particular, for the effects of (a) rules concerning marriage, dotal goods, property of assets acquired in the course of marriage, divorce and alimony; (b) legal treatment of unmarried couples; (c) existence and effective enforcement of rules prohibiting discrimination against unmarried couples; (c) existence and effective enforcement of laws protecting women from discrimination in the labour market, and from moral or physical pressure by parents and male partners within the home.

In much of the game-theoretical literature on the family, the nature of the game is taken as given. In the wake of Manser and Brown (1980), and McElroy and Horney (1981), most of the contributions assume that it will be cooperative. An exception is Lundberg and Pollak (1994), where the assumption is that the partners will behave non-cooperatively.

¹For a review of the evidence, see Stevenson and Wolfers (2007).

²See Sanchez (1993) for developing countries, and Burda *et al.* (2006) for developed ones.

³See Bureau of Labor (2004), Drago *et al.* (2004), and Stancanelli (2007).

⁴See, for example, Brewster and Rindfuss (2000).

In Del Boca and Flinn (2005), the game may be either cooperative or non-cooperative depending on the exogenously given transactions-cost of cooperation. In Zhang and Chan (1999), this cost is lower in the presence of a bride-price contract. We let the choice of game be determined by the extent to which the legal system would shelter the main childcarer from the main earner's opportunistic ex-post bargaining in the event of domestic division of labour. This approach allows us to associate different types of domestic equilibrium with different types of decision environment. Like Lundberg and Pollak (2003), and Basu (2006), we endogenize the threat-point of the cooperative game by making the reserve utility of each player depend on the player's own actions.⁵ In those papers, however, it is assumed that the actions in question do not have lasting consequences. If the action stops, the consequence disappears. In principle, therefore, the game could be played over and over again from the same initial conditions. Here, by contrast, actions may have lasting effects. Once born, a child cannot be sent back. If a person withdraws even temporarily from the labour market, his or her career prospects will be permanently impaired.

The analytical part of the paper derives individual responses to stylized legal systems. One of our results is that both marriage, and the traditional division of labour, are more likely in the legal environment which is typical of a developing country, while cohabitation without marriage, and either equal sharing of domestic and market work or the liberated division of labour, are more likely in the one which characterizes developed countries. Another result is that share-alike couples are likely to have more children (given the same skill premium) than traditional couples do. Both these results are consistent with the broad facts mentioned. The remaining results concern the efficiency of different domestic arrangements. Depending on the couple's initial endowments, efficiency requires division of labour of either the traditional or the liberated kind. Share-alike arrangements are inefficient, because the partners have the wrong (likely too high a) number of children, and spend too little of their time on each child. These findings cast doubt on the empirical literature inspired by the so-called collective model of household decisions, which seeks to recover the domestic sharing rule under the assumption that the domestic allocation of resources will always be efficient. Especially since the children are among the victims of inefficiency, these results raise also questions about the social desirability of legal frameworks which discourage domestic cooperation.

In the closing section, we make the point that the legal system which

⁵The second of these papers goes beyond Nash-bargaining by providing a general characterization of household equilibrium.

makes the traditional pattern of domestic specialization still the norm in the developing part of the world puts the woman in a position of inferiority with respect to the man, but contains checks and balances which allow her to reap some of the surplus generated by domestic cooperation. This pattern is on its way out in developed countries because the legal system has changed drastically in the cultural climate of the 1960s and 1970s. Those legislative reforms gave women the same dignity as men both in the household and in the market place, but removed also some of the checks and balances. In more than one sense, therefore, they threw out the baby with the bath water. We argue that legislative innovations such as the abolition of the dowry institution, the introduction of no-fault divorce, the prohibition of gender discrimination in the labour market, and the end of legal discrimination against de-facto couples, highly desirable for other purposes, are a cause of the flight not only from the traditional division of labour, but also from conventional marriage. We discuss ways to restore some of the efficiency incentives without putting women back in a position of legal and social inferiority.

2 Assumptions

The focus of the present paper is on the interaction between fertility (as distinct from adoption) and domestic division of labour in heterosexual couples which have established a stable relationship ("union"). Consider the union formed by a woman, f , and a man, m . When the union was formed, $i = f, m$ was endowed with b_i units of a tradeable asset ("money"), h_i units of home-specific human capital, and k_i units of market-specific human capital. Both kinds of human capital endowment will be partly a reflection of i 's native talent, and partly the outcome of previous educational investment. From this moment on, however, human capital will accumulate only with experience,⁶ at the rate αk_i ($\alpha > 0$) per unit of labour supplied if it is of the market-specific kind, at the rate βh_i ($\beta \geq 0$) per unit of domestic (child-care) work provided if it is of the home-specific one. This formulation implies that the more talented, or better educated, learn from experience more quickly than the less talented, or less well educated.

As in Cigno (1991), we shall assume that a child requires at least t_0 units of specifically maternal time. Above that minimum, the father's time is a substitute for the mother's. Assuming that the total amount of time each partner devotes to domestic and market work is a given constant,⁷ and normalizing this constant to unity, f 's labour supply is

⁶Nothing of substance changes if we assume, instead, that human capital depreciates with lack of experience.

⁷This assumption is made to allow us to focus on division of labour, but has some

then given by

$$L_f = 1 - (t_0 + t_f) n, \quad (1)$$

and m 's by

$$L_m = 1 - nt_m. \quad (2)$$

where n is the number of children, and t_i the amount of time other than t_0 which i spends with each child. Since L_i cannot be negative, n and t_i must be such that

$$(t_0 + t_f) n \leq 1$$

and

$$nt_m \leq 1.$$

We shall assume that these constraints are never binding (i.e., that the opportunity-cost of t_i is sufficiently high for i not to want to spend more than one unit of time looking after children).

A child's maximized lifetime utility is given by $v(c, t)$, where c is the amount of money or tradeable goods, and t the *effective* amount of attention over and above t_0 , which the child receives from his or her own parents. The indirect utility function $v(\cdot)$ is increasing and concave. Since c may include the services of professional child minders, this implies that bought-in child care is not a perfect substitute for parental attention. Following Becker (1981), we shall refer to n as the "quantity", and $v(c, t)$ as the "quality" of children. Assuming that the period of time for which the mother cannot be replaced by the father is relatively short,⁸

$$t_0 < t.$$

In general, the amount of effective attention received by a child will be a concave function of the skill-weighted time contributions made by the parents. In the special case where (t_f, t_m) are perfect substitutes, this function reduces to

$$t = [1 + \beta(t_0 + t_f) n] h_f t_f + (1 + \beta nt_m) h_m t_m, \quad (3)$$

which further simplifies to

$$t = t_f + t_m \quad (4)$$

empirical justification. Using data from Germany, Italy, the Netherlands and the USA, Burda *et al.* (2006) show that the partners put in the same total number of work hours. This total varies across countries. Within the same country, however, the only difference across couples is in the allocation of the total between domestic and market work

⁸How short depends on school of pediatric thought (from as little as three months, to as much as three years), and national legislation.

if f and m have the same endowment of home-specific human capital, and this form of human capital does not increase with experience,

$$h_i = 1 \text{ and } \beta = 0. \quad (5)$$

In the absence of gender discrimination (an assumption to be relaxed later), i 's wage rate will be

$$w_i = (1 + \alpha L_i) k_i \omega, \quad (6)$$

where ω is the rate of remuneration of market-specific human capital. Since ω determines the wage spread between workers with high and low working ability, we shall refer to it as the skill premium. Notice that withdrawing from the labour market for one unit of time reduces i 's lifetime earnings not only by the current wage rate, but also by the earnings growth potential forgone. Since the size of these losses is increasing in (k_i, α, ω) , it is clear that career interruptions are less damaging if the worker has little market-specific human capital, the opportunities for promotion are restricted, or the skill premium is low.

Consistently with the assumption that total work time is constant, we write the utility of partner i as

$$U_i = u(a_i) + \delta nv(c, t), \quad 0 < \delta < 1, \quad (7)$$

where a_i denotes i 's consumption, and $u(\cdot)$ is increasing and concave. The constant δ is a measure of i 's love of children. By using the same value of this parameter for both partners, we are in effect saying that fathers love their children as much as mothers do. Since children are not differentiated by sex, we are also saying that parents love daughters as much as sons. Assuming the contrary would only reinforce our results. Since the term $nv(c, t)$ is common to both partners, quantity and quality of children are local public goods. The opportunity to produce these goods is one of the gains from forming a union.

3 Efficiency

An efficient allocation $(a_f, a_m, t_f, t_m, c, n)$ maximizes some weighted average of f 's and m 's utilities,

$$\Lambda = \lambda U_f + (1 - \lambda) U_m, \quad 0 \leq \lambda \leq 1, \quad (8)$$

where U_i is given by (7), and λ is the woman's domestic welfare weight, subject to the couple's combined budget constraint,

$$\sum_i [y_i^F - a_i - (c + z)n] = 0, \quad (9)$$

where

$$y_i^F \equiv b_i + k_i(1 + \alpha)\omega. \quad (10)$$

is i 's full income, and z the opportunity-cost of a child. Assuming for the moment (4),

$$z = ((t_0 + t_f) [1 + \alpha (1 - n (t_0 + t_f))] k_f + t_m [1 + \alpha (1 - nt_m)] k_m) \omega. \quad (11)$$

Since U_i is independent of t_i , we can carry out the optimization in two steps. First, we find the (t_f, t_m) pair which minimizes z for each possible (n, t) . Second, we look for the allocation $(a_f^*, a_m^*, c^*, n^*, t^*, t_m^*)$ which maximizes Λ for an arbitrarily given λ . The solution to the cost-minimization problem is illustrated in Figure 1. The straight line with absolute slope equal to unity is an isoquant. The convex-to-the-origin curves with absolute slope

$$-\frac{dt_m}{dt_f} = \frac{1 + \alpha [1 - 2n(t_0 + t_f)] k_f}{1 + \alpha (1 - 2nt_m) k_m},$$

diminishing as t_m is substituted for t_f , are isocosts. Convexity implies that the cost-minimizing solution will be at a corner. For any (k_f, k_m, n, t) satisfying

$$\frac{k_f}{k_m} \leq \frac{1 + \alpha}{1 + \alpha [1 - 2n(t_0 + t)]}, \quad (12)$$

the opportunity-cost of parental time is minimized by the traditional division of labour,

$$t_f = t, \quad t_m = 0. \quad (13)$$

Condition (12) says that, unless f has a sufficiently more market-specific human capital than m , it will be efficient for her to be the main child-carer, and for him to be the main earner. Since the RHS of (12) is higher than unity, this is the most likely case. If it is, f may end up with less market-specific human capital than m , even if she started out with as much or more. If (12) is not satisfied, the opportunity-cost of children is minimized by the liberated division of labour,

$$t_f = 0, \quad t_m = t. \quad (14)$$

Notice that the woman cannot specialize in market work as far as the man can, because she must give each child at least t_0 units of her time.

If we retain the assumption that t_m is a perfect substitute for t_f , but relax (5), the isoquants remain straight lines, but with absolute slope

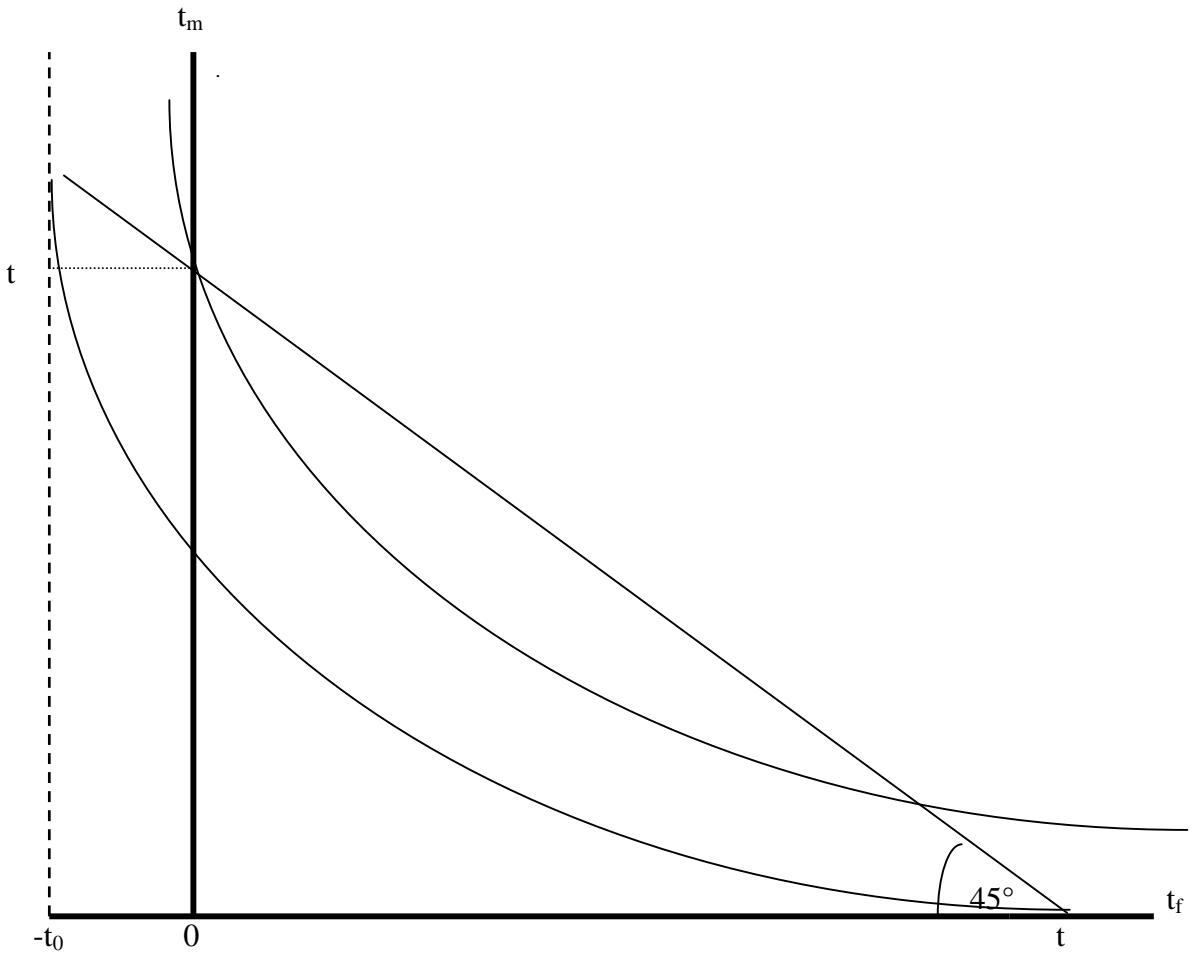


Figure 1. Efficient division of labour

(k_f/k_m) . Then (12) is replaced by

$$\frac{k_f}{k_m} \leq \frac{1 + \alpha}{1 + \alpha [1 - 2n(t_0 + t)]} \frac{h_f}{h_m}.$$

Plausibly assuming that market and home-specific human capital endowments are negatively correlated (if for no other reason, because both require costly investments), this condition is less stringent than (12). If we relax also the perfect-substitutability assumption, the isoquants become convex to the origin, and the cost-minimizing solution may then be at an interior point. Provided that there is sufficient substitutability, however, efficiency will still require some degree of specialization. If the elasticity of substitution is greater than unity, the efficient time allocation may still be at a corner. It does seem, therefore, that little generality is lost by assuming (4).

Under this assumption, an efficient allocation $(a_f^*, a_m^*, c^*, t^*, n^*)$ satisfies

$$\lambda u'(a_f) = \beta n v_c(c, t) = (1 - \lambda) u'(a_m), \quad (15)$$

plus *either* (12),

$$\frac{v_t(c, t)}{v_c(c, t)} = (1 + 2\alpha [1 - (t_0 + t)n]) k_f \omega \quad (16)$$

and

$$\frac{v(c, t)}{v_c(c, t)} = c + (t_0 + t) (1 + 2\alpha [1 - (t_0 + t)n]) k_f \omega, \quad (17)$$

or

$$\frac{v_t(c, t)}{v_c(c, t)} = [1 + 2\alpha (1 - nt)] k_m \omega \quad (18)$$

and

$$\frac{v(c, t)}{v_c(c, t)} = c + [1 + 2\alpha (1 - nt_0)] t_0 k_f \omega + [1 + 2\alpha (1 - nt)] t k_m \omega. \quad (19)$$

Since $u'(\cdot)$ is decreasing, (15) implies that, the higher is λ , the greater will be a_f^* relative to a_m^* . Since λ does not figure in (16)–(19), (a_f^*, a_m^*) is independent of (c^*, t^*, n^*) . Since the RHSs of (17) and (19) are increasing in ω , and given diminishing MRS, n^* is decreasing in ω .

Proposition 1. Efficient allocations are characterized by division of labour. If the woman's endowment of market-specific human capital is sufficiently larger than her partner's, it will be efficient for her to be the main earner, and for him to be the main childcarer. Otherwise, it will be efficient for her to

be the main childcarer, and him the main earner. The second possibility is more likely than the first. The efficient number of children is in any case decreasing in the skill premium.

Corollary 1. In an efficient allocation, the woman may end up with less market-specific human capital than the man even if she started out with as much or more.

This is a gender result.

4 Equilibrium

Developing an idea in Becker (1981), Lam (1988) demonstrates the existence and stability of equilibria characterized by either positive or negative assortative mating on wage rates and conventional assets. In the more recent literature, the assumption is generally that partners are matched by income or wealth.⁹ In our context, however, wage rates and wealth are endogenous. What is exogenous, for partner i , is the endowment vector (b_i, k_i) , and thus his or her full income, y_i^F . In what follows, we shall assume that

$$y_i^F = y^F, \quad i = f, m, \quad (20)$$

which allows for either positive or negative assortment on both endowments (but rules out the possibility that one partner is superior to the other on all scores).

4.1 Cooperation

Suppose that f and m decide to cooperate, and that the equilibrium is reached by Nash-bargaining.¹⁰ If the bargaining takes place before the union is formed ("ex-ante bargaining"), the equilibrium maximizes

$$\Pi = (U_f - R_f)(U_m - R_m), \quad (21)$$

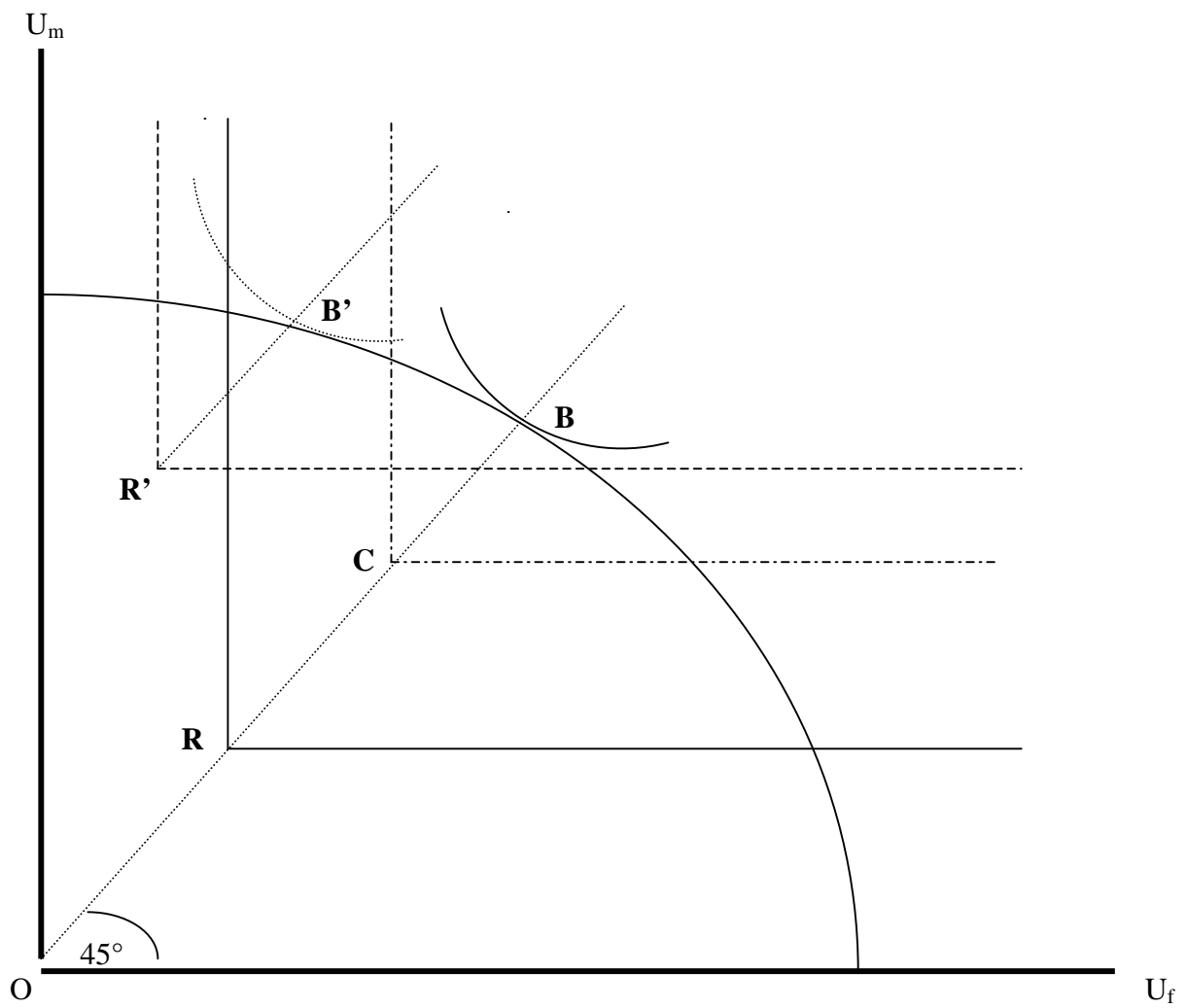
where R_i is i 's ex-ante reserve utility, subject to (9). Assuming that the best alternative to the prospective union is singlehood,

$$R_i = u(y^F) \equiv R, \quad i = f, m. \quad (22)$$

The equilibrium is illustrated in Figure 2. \mathbf{R} , with coordinates (R, R) , is the threat-point of the game. The concave-to-the-origin curve is the utility-possibility frontier, defined by (7) and (9). The continuous,

⁹Peters and Siow (2002) demonstrate the existence and stability of wealth-matching equilibria.

¹⁰Analogous results are reached if we adopt the more general characterization of cooperative equilibrium proposed by Basu (2006).



**Figure 2. Ex-ante bargaining, ex-post bargaining and non-cooperative equilibria:
If ex-ante agreements are not enforceable, the union is non-cooperative.**

convex-to-the-origin curve is a contour of Π . All points of the utility-possibility-frontier, including the equilibrium point \mathbf{B} with coordinates (U_f^B, U_m^B) , are efficient. In view of (22), f and m have the same equilibrium utility,

$$U_i^B = U^B, \quad i = f, m.$$

Drawing up a contract which specifies (at least in broad terms) each party's rights and duties before the union is formed need not be prohibitively costly. The problem is rather that the contract may be costly to enforce. If this cost is prohibitively high, there may come a moment when it is in either f 's or m 's interest to renege on the agreement, and renegotiate from a stronger position. Let j be the partner who, in an efficient division of labour, would be the main childcarer, and k the one who would be the main earner ($j, k = f, m$). Since specialization reduces j 's earning capacity relative to k 's, it is clear that the only party with a possible interest in renegotiating is the main earner. Since k 's bargaining power reaches its maximum when the child-rearing season is over, it is also clear that any ex-post bargaining will occur when the children have ceased to be economically dependent on their parents. When that time comes, (n, c, t_f, t_m) will be fixed at (n^*, c^*, t_f^*, t_m^*) , and the bargaining will then be about rebalancing (a_f, a_m) .

The ex-post bargaining equilibrium maximizes

$$\Pi' = (U_f - R'_f)(U_m - R'_m), \quad (23)$$

where R'_i is i 's ex-post reserve utility, subject to the couple's ex-post budget constraint,

$$c^* n^* = \sum_i [b_i - a_i + L_i^* (1 + \alpha L_i^*) k_i \omega], \quad (24)$$

where

$$L_f^* = 1 - (t_0 + t^* - t_m^*) n^*$$

and

$$L_m^* = 1 - t_m^* n^*.$$

Assuming, for the time being, that the union can be dissolved at no cost to either party, and that children retain their local public good nature even after dissolution,¹¹ i 's ex-post reserve utility will be given by

$$R'_i = u(b_i + L_i^* (1 + \alpha L_i^*) k_i \omega) + \delta n^* v(c^*, t^*). \quad (25)$$

¹¹Otherwise, the ex-post reserve utilities would depend on custody arrangements; see Weiss and Willis (1985), and Del Boca and Flinn (1995, 2005). We shall later argue that, in our perfect information framework, separation can occur only when the children are no longer dependent on their parents, and there is then no question of custody.

Let j be the main childcarer, and k the main earner ($j, k = f, m$). It can be easily checked that

$$R'_j < R'_k \quad (26)$$

and, therefore,

$$U_j^{B'} < U_k^{B'}$$

if $j = f$, but not necessarily if $j = m$. This is another gender result.

For the case where $j = f$, the equilibrium is again illustrated by Figure 2. \mathbf{R}' , with coordinates (R'_f, R'_m) , is the ex-post threat-point. The dotted, convex-to-the origin curve is a contour of Π' . \mathbf{B}' , with coordinates $(U_f^{B'}, U_m^{B'})$, is the ex-post bargaining equilibrium. \mathbf{B}' lies on the utility-possibility-frontier like \mathbf{B} . As \mathbf{R}' lies above the 45° line, however, \mathbf{B}' is located North-West of \mathbf{B} .

Proposition 2. Cooperation is efficient irrespective of whether the distribution of adult consumption is bargained ex ante or ex post. In the first case, consumption is the same for both partners. In the second, consumption is higher for the main earner if this is the man, but not necessarily if it is the woman.

In view of Proposition 1 and Corollary 1, and given (6), the first part of Proposition 2 implies the following.

Corollary 2. Cooperation may lead to either the traditional or the liberated division of labour. In either case, the number of children will be decreasing in the skill premium.

4.2 Non-cooperation

Alternatively, suppose that f and m play a non-cooperative game. Now each party retains control over his or her own earnings and assets, and decides how much time and money to spend on the children taking the other party's actions as parameters. The equilibrium is Cournot-Nash. Realistically assuming that the woman has ultimate control over her fertility, f chooses (c, t, n) to maximize her own utility, still given by (7), subject to her own budget constraint,

$$a_f + (c - c_m) n = y_f, \quad (27)$$

where c_m is the amount of money that m spends on each child, and

$$y_f = b_f + [1 - (t_0 + t - t_m) n] [1 + \alpha (1 - (t_0 + t - t_m) n)] k_f \omega$$

is her actual income. The solution will satisfy

$$u'(a_f) = \delta n v_c(c, t), \quad (28)$$

$$\frac{v_t(c, t)}{v_c(c, t)} = (1 + 2\alpha [1 - (t_0 + t - t_m) n]) k_f \omega \quad (29)$$

and

$$\frac{v(c, t)}{v_c(c, t)} = c - c_m + (t_0 + t - t_m) (1 + 2\alpha [1 - (t_0 + t - t_m) n]) k_f \omega. \quad (30)$$

The man chooses (c_m, t_m) to maximize his own utility, also given by (7), subject to his own budget constraint,

$$a_m + n c_m = y_m \quad (31)$$

where

$$y_m = b_m + (1 - n t_m) [1 + \alpha (1 - n t_m)] k_m \omega$$

is his actual income. The solution will satisfy

$$u'(a_m) = \delta n v_c(c, t) \quad (32)$$

and

$$\frac{v_t(c, t)}{v_c(c, t)} = [1 + 2\alpha (1 - n t_m)] k_m \omega. \quad (33)$$

Let a superscript C denote the value of a variable in the Cournot-Nash equilibrium. In view of (28) and (32),

$$a_i^C = a^C. \quad (34)$$

Since the quantity and quality of children are local public goods, (34) implies that f and m enjoy the same utility,

$$U_i^C = U^C. \quad (35)$$

Notice that (34) and (35) are true irrespective of whether the partners have the same or different endowments.

In view of (27) – (31) and (34), the partner with the larger money endowment bears the larger part of c ,

$$c_m^C n^C - (c^C - c_m^C) n^C = b_m - b_f. \quad (36)$$

If f and m happen to have the same money endowment ($b_f = b_m$), they will then take equal shares in the monetary cost of the children,

$$c_i^C = \frac{c^C}{2}. \quad (37)$$

In view of (29) and (33), f and m have the same opportunity-cost of children,

$$(1 + 2\alpha L_f^C) k_f \omega = (1 + 2\alpha L_m^C) k_m \omega. \quad (38)$$

If they happen to have the same endowment of market-specific human capital ($k_f = k_m$), f and m will then supply the same amount of labour, and the same amount of child-care time,

$$t_i^C = \frac{t_0 + t^C}{2}. \quad (39)$$

Since the RHS of (30) is increasing in ω , n^C is decreasing in ω .

Comparing the RHSs of (29) and (33) with those of (16) and (18), we can see that the marginal opportunity-cost of children is inefficiently high. Given diminishing MRS of c for t , it then follows that the couple will spend too little time (relatively too much money) on each child,

$$t^C < t^*. \quad (40)$$

The intuition is straightforward. As the partners do not exploit their comparative advantages in the use of time, the marginal opportunity-cost of child-care time is inefficiently high. Comparing the RHS of (30) with that of (17), we can also see that the woman equates the marginal benefit of n to her own, rather than to the couple's marginal cost. The number of children is thus wrong, but we cannot yet say which way. Since the woman's marginal opportunity-cost is exactly half the couple's in view of (38), but her marginal monetary cost may be more or less than half the couple's in view of (34), the RHS of (30) may in fact be lower or higher than that of (17). Given diminishing MRS of c for n , it then follows that n^C may be larger or smaller than n^* . If the partners have the same endowment vectors, however, we can definitely say that

$$n^C > n^*. \quad (41)$$

Proposition 3. Non-cooperation is inefficient. The partners spend too little time on each child. If they have the same endowment vectors, they share market work and child care equally between them, and have too many children. In any case, the number of children will be decreasing in the skill premium.

5 Choice of game

Lundberg and Pollak (1996) assume that the partners will play a co-operative game, and stay together come what may. Having ruled out

separation, those authors cannot then identify a person's ex-post reserve utility, as we do, with his or her utility in the event of separation. Instead, they identify it with his or her equilibrium utility in the Cournot-Nash game that the couple could have played as an alternative to Nash-bargaining. In our framework, however, this alternative ceases to be available the moment a child is born, and cannot thus affect the ex-post Nash-bargaining equilibrium. It is relevant nonetheless because it helps determine the nature of the game that will be actually played.

Each party will be willing to cooperate if and only if his or her utility is at least as large in the ex-post bargaining as in the Cournot-Nash equilibrium,

$$U_i^{B'} \geq U^C, \quad i = f, m. \quad (42)$$

In view of the third part of Proposition 2, this condition is more likely to be satisfied if the man is the main childcarer, because he is less likely than the woman to be at the receiving end of opportunistic bargaining. Irrespective of sex, (42) is more likely to be satisfied if the main childcarer is relatively better endowed with money than market-specific human capital. Using (10) and (20), we do in fact find that

$$\frac{\partial R'_j}{\partial L_j^*} = \frac{y^F - b_j}{1 + \alpha} (1 + 2\alpha L_j^*) u' \left(b_i + \frac{y^F - b_j}{1 + \alpha} (1 + \alpha L_j^*) L_j^* \right)$$

is positive, but

$$\frac{\partial^2 R'_j}{\partial L_j^* \partial b_j} = \frac{1 + 2\alpha L_j^*}{1 + \alpha} \left(-u' + (y^F - b_j) \frac{1 - L_j^* + \alpha [1 - (L_j^*)^2]}{1 + \alpha} u'' \right)$$

is negative because L_j^* is less than unity. Division of labour will thus reduce the main childcarer's bargaining power, but the size of this effect is decreasing in his or her money endowment. Intuitively, that is because market-specific human capital accumulates with labour market experience, but money does not. Therefore, the greater b_j , the less j has to fear from k 's opportunistic bargaining. This result can be illustrated with the help of Figures 2 and 3. Condition (42) is satisfied in latter, but not in the former. Why? In both pictures, \mathbf{R} lies on, and \mathbf{R}' above, the 45° degree line, implying that the woman would be the main childcarer in the event of cooperation. The only difference between the two pictures is in that the horizontal distance between \mathbf{R}' and \mathbf{R} is greater in Figure 2 than in Figure 3. Since f and m have the same preferences, and the same full income, a possible reason for this difference (we shall find others in the rest of the section) is that k_f is larger, and b_f consequently smaller, in the former than in the latter.

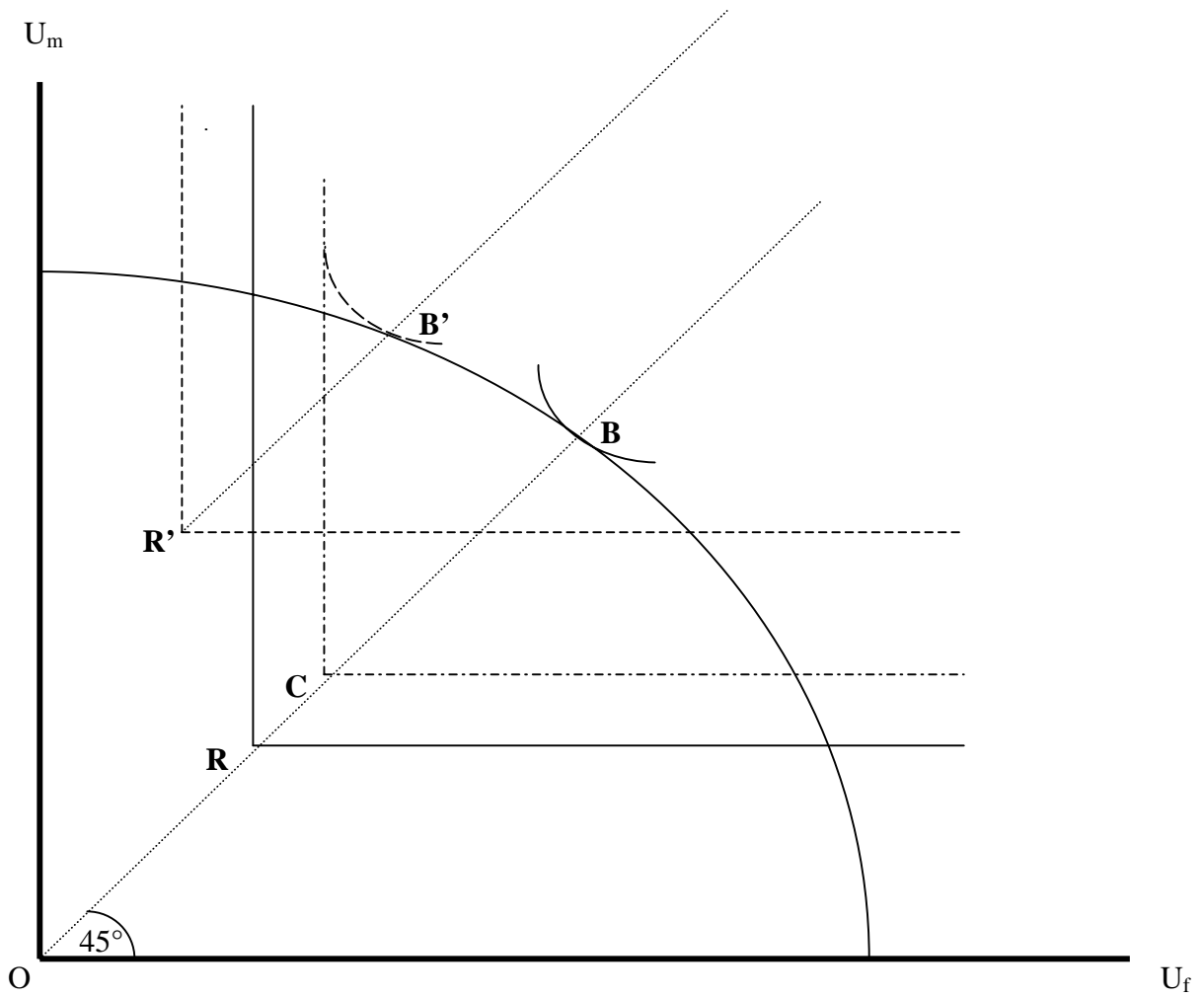


Figure 3. Ex-ante bargaining, ex-post bargaining and non-cooperative equilibria: The union is cooperative even if ex-ante agreements are not enforceable.

Assuming heterogeneous endowments, and given that the woman is more likely than the man to come-off the loser from ex-post bargaining in view of Propositions 1 and 2, we can summarize our findings as follows.

Proposition 4. The probability that a union will be cooperative is increasing in the main childcarer's money endowment, and will be higher if the main childcarer would be the man rather than the woman.

Since the probability that f would be the main childcarer is increasing in b_f , this proposition has the following gender implication.

Corollary 4. The probability that a union will be cooperative is increasing in the woman's money endowment.

5.1 Labour market discrimination

If the labour market discriminates against women, m 's wage rate will still be given by

$$w_m = (1 + \alpha L_m) k_m \omega,$$

but f 's will be

$$w_f = [1 + (\alpha - \epsilon) L_f] k_f (\omega - \eta), \quad (\epsilon, \eta) > 0.$$

A positive η implies that a woman is paid less, per unit of time worked, than a man of the same ability. A positive ϵ implies that women have more limited access to positions of responsibility than men of the same ability. If either of these is the case, the cost of a career interruption will be lower for a woman than for a man with the same endowment of market-specific human capital. The condition for f to be the main childcarer in the event of cooperation will then be

$$\frac{k_f}{k_m} \leq \frac{\omega}{\omega - \eta} \frac{1 + \alpha}{1 + (\alpha - \epsilon) [1 - 2n(t_0 + t)]}, \quad (43)$$

obviously easier to satisfy than (12).

Proposition 5. Labour market discrimination against women raises the probability that cooperation will lead to the traditional division of labour.

Since R'_f will be lower than R'_m and, consequently, $U_f^{B'}$ lower than $U_m^{B'}$, the condition for the union to be cooperative, (42), also *may* be less stringent with than without discrimination, but not necessarily because U^C will be lower too.

5.2 Marriage and divorce

So far, we have assumed that a union can be dissolved at no cost to either party, and that neither expects to receive any compensation if it is. That is not true, however, if the couple is legally married. Let γ denote the legal cost of obtaining a divorce, and θ the lump sum, or the present value of the stream of periodical payments ("alimony"), that the main childcarer expects to receive from the main earner in the event of divorce. While γ is necessarily positive because a marriage cannot be dissolved without court intervention, θ may take either sign. In real life, divorce is often a consequence of imperfect information (about the present partner, or about the availability of alternative ones). That being the case, marriages tend to break up while the parties are still relatively young, and their children still economically dependent on them. In our perfect-information framework, however, divorce (or, rather, the threat of it) can have only one purpose, namely to deter opportunistic bargaining. The only party with a potential interest in using this weapon is consequently the main childcarer, and the only time he or she may want to brandish it is when the children have ceased to be economically dependent. With the children out of the way, θ cannot then constitute child support.¹² If positive, however, it may be construed as compensation for the damage suffered by the main childcarer's career prospects as a result of domestic specialization. The expectation that such compensation would be forthcoming makes the main childcarer's threat of divorce more credible, and thus strengthens his or her hand in domestic negotiations.

If the couple is married, the main childcarer's ex-post reserve utility will be given by

$$R'_j = u(L_j^* (1 + \alpha L_j^*) k_j \omega - \gamma + \theta) + \delta n^* v(c^*, t^*), \quad (44)$$

and the main earner's by

$$R'_k = u(L_k^* (1 + \alpha L_k^*) k_k \omega - \theta) + \delta n^* v(c^*, t^*). \quad (45)$$

We can then express their ex-post bargaining equilibrium utilities as functions of γ and θ ,

$$U_j^{B'} = V^j(\gamma, \theta), \quad V_\gamma^j < 0, \quad V_\theta^j > 0 \quad (46)$$

and

$$U_k^{B'} = V^k(\gamma, \theta), \quad V_\gamma^k > 0, \quad V_\theta^k < 0. \quad (47)$$

¹²For an economic analysis of the effects of child-support orders on the behaviour of divorced parents with dependent children, see Del Boca and Flinn (1995).

The condition for the partners to want to cooperate remains (42). But will they want to marry?

The necessary and sufficient condition for f and m to marry is

$$\max [V^i(\gamma, \theta), U^C] \geq \max [V^i(0, 0), U^C] - \xi, \quad i = f, m, \quad (48)$$

with ξ positive if cohabitation without marriage attracts legal discrimination or social stigma, zero otherwise. Condition (48) is satisfied in only four cases,

1. $V^i(\gamma, \theta) > U^C$, $V^i(0, 0) > U^C$ and $V^i(\gamma, \theta) \geq V^i(0, 0) - \xi$,
2. $V^i(\gamma, \theta) > U^C$ and $V^i(0, 0) < U^C$,
3. $V^j(\gamma, \theta) < U^C$, $V^j(0, 0) > U^C$ and $U^C \geq V^i(0, 0) - \xi$

and

4. $V^j(\gamma, \theta) < U^C$ and $V^i(0, 0) < U^C$.

The marriage will be cooperative in the first and second case, non-cooperative in the third and fourth. In the first, the union would have been cooperative even without marriage, and the only reason for marrying is that ξ is positive. In the second, the union would have been non-cooperative without, but will be cooperative with marriage; the couple marries whatever the value of ξ , implying that the surplus generated by cooperation is large. In the third, by contrast, the union would have been cooperative without, but will be cooperative with marriage; the couple marries because ξ is large enough to compensate for the loss of the surplus that would have been generated by cooperation. In the fourth, the partners would not have cooperated anyway.¹³

It is thus clear that a positive ξ will induce some couples to marry, but also that it will make some otherwise cooperative unions to behave non-cooperatively.

Proposition 6. The probability that a couple will marry is higher, and the probability that a union will be cooperative lower, if the law favours married over unmarried couples, or if cohabitation without marriage attracts social stigma.

¹³In this case, the parties are actually indifferent between marrying and cohabiting. They are predicted to do the former only because of our tie-breaking convention.

5.3 Dowries and bride-prices

In a legal environment where a married woman can own property, Corollary 4 provides a rationale for giving a daughter money instead of an education. In one where a married woman cannot own property, it provides a rationale for giving her a dowry. The latter is a transfer by the bride's parents to the groom, subject to legal restrictions (e.g., that the assets must be returned intact in the event of marital dissolution, or that they can be alienated only with the woman's explicit consent, delivered before a judge) which give the woman or her parents some degree of control over it.

A bride-price is a payment by the groom to either the bride or her parents ahead of marriage. Suppose that it would be efficient for f to be the main childcarer if she married m . If $U_m^{B'}$ is higher than U_m^C , m will be willing to pay up to φ_m , implicitly defined by

$$u\left(a_m^{B'} - \varphi\right) = u\left(a_m^C\right) + \delta\left[n^C v\left(c^C, t^C\right) - n^* v\left(c^*, t^*\right)\right], \quad (49)$$

in return for f 's cooperation. The least f would be willing to accept is φ_f , implicitly defined by

$$u\left(a_f^{B'} + \varphi\right) = u\left(a_f^C\right) + \delta\left[n^C v\left(c^C, t^C\right) - n^* v\left(c^*, t^*\right)\right]. \quad (50)$$

Assuming competition among potential brides and grooms,

$$\varphi_i = \frac{a_m^{B'} - a_f^{B'}}{2} \equiv \varphi, \quad i = f, m. \quad (51)$$

If f could credibly commit to delivering the efficient amount of child-care time, $(t_0 + t^*) n^*$, in exchange for half the difference between f 's and m 's consumption in the ex-post bargaining equilibrium, a mutually beneficial deal would then be struck, and the allocation would be efficient. In terms of Figure 2, the deal would have the effect of shifting \mathbf{R}' horizontally to the right until \mathbf{B}' lies perpendicularly above \mathbf{C} . The problem is that bride-price contracts are generally not enforceable through a court of law. Could they be self-enforcing? Once φ is paid, f has no incentive to deliver her side of the deal, because she can enhance her domestic bargaining power by providing less than the efficient amount of child-care time, and earning correspondingly more in the labour market. If φ were to be handed to f , the deal would then go through only if m could press his claim by extra-legal means. The enforcement problem would be less severe if a married woman were not allowed to own assets, and the bride-price were thus paid to her father, who might have both an interest in (*e.g.*, because he has other daughters to marry, or for other

reputational reasons), and the means of (e.g., by passing the money on to the bride in the form of a dowry, conditional on her complying with the contract) ensuring that the contract is honoured.

As there is no equivalent for men of either the dowry or the bride-price, and given that both are available only in connection with marriage, we can state the following.

Proposition 7. The probability that a couple will marry, that the marriage will be cooperative, and that the woman will be the main childcarer are all higher if married women cannot own property, and dowries are legally protected, or if bride-price contracts are enforceable by extra-legal means.

6 Discussion

Our results may be summarized as follows. Cooperation leads to an efficient allocation of resources. An efficient allocation of resources is characterized by either the traditional, or the liberated division of labour. In the former, mother looks after the children, while father goes out to work. In the latter, mother returns to work as soon as she possibly can after each pregnancy, leaving the care of the child to father (Propositions 1 and 2). Non-cooperation leads to an inefficient allocation of resources. Non-cooperative partners spend too little time on each child, and may have too many children. If they started out with the same amount of human capital, they share child care and market work equally between them, and will have too many children (Proposition 3). Nonetheless, cooperation may not come about because the associated division of labour would give the main earner the opportunity to renegotiate the distribution of consumption from a position of strength once the children are no longer economically dependent. Cooperation is more likely if the couple's endowments are such that it would be efficient for the man to be the main childcarer, because he has less to fear from the main earner's opportunistic bargaining than the woman would (Proposition 4). Lack or ineffective enforcement of legislation preventing labour market discrimination against women makes it more likely that, in the event of cooperation, the domestic division of labour will be the traditional one (Proposition 5). A couple is more likely to marry if the law favours married over unmarried couples, or if cohabitation without marriage attracts social stigma, but the marriage is then more likely to be non-cooperative (Proposition 6). A couple is more likely to marry, the marriage more likely to be cooperative, and the division of labour more likely to be the traditional one, if married women cannot own property, but dowries are protected by law, or bride-price contracts are enforceable by extra-legal

means (Proposition 7). Other things being equal, fertility is higher if the skill premium is low, or if women are discriminated against in the labour market (Propositions 2, 3 and 5).

The assumptions driving these results are that a new child requires at least a certain amount of specifically maternal time, and that earning ability increases with experience. Much of the analysis assumes that, after an initial period in which the mother's presence is indispensable, the father's time is a perfect substitute for the mother's in the care of a child. But the substance of the argument does not change if substitutability is less than perfect (all that happens, in such a case, is that specialization may be less than complete). We make also three common simplifying assumptions, but these are not crucial for the results. The first is that the partners are altruistic towards their children but not towards each other, the second that people do not care where their money comes from, and the third that they are indifferent between domestic and market work. Allowing for reciprocal affection makes no qualitative difference to the results so long as each partner cares for his or her own consumption at least a little more than for the other's. Allowing for people to derive more satisfaction from their own earnings than from a transfer, or to have preferences over the allocation of their total work time between money and child raising activities, reduces the advantage of specialization, but does not make any qualitative difference to the results so long as a child requires at least a certain amount of specifically maternal time, and mother and father have the same preferences.

The intuitive explanation of the effects of the legal environment is as follows. In our perfect-information framework, divorce (or, rather, the threat of it) has only one possible role, namely to deter opportunistic bargaining by the main earner when the children cease to be dependent, and the main childcarer's bargaining power is consequently at a minimum. The threat of divorce is credible, however, only if a judge is expected to grant the main childcarer compensation for the damage suffered by his or her career prospects, and only on condition that the amount of the compensation is sufficiently large relative to the cost of obtaining the divorce.¹⁴ The main childcarer's interests can be protected also in other ways. As conventional assets do not appreciate like market-specific human capital if their owner enters the labour market, a relatively large endowment of such assets will make the main childcarer less vulnerable to opportunistic bargaining on the main earner's part. This presupposes, however, that the main childcarer can own assets. If the couple is mar-

¹⁴Clark (1999) also examines the possibility that alimony might constitute compensation for the main childcarer. In that paper, however, the emphasis is on the probability of divorce.

ried, the main childcarer is a woman, and a married woman cannot own assets, her interests will be protected only to the extent that any assets a man receives from his wife's father can be constituted into a dowry, and that dowries are protected by the law.¹⁵ A bride-price contract pre-empts ex-post bargaining by giving the woman her share of the surplus generated by cooperation at front. Given, however, that the contract is not legally enforceable, and that a woman's incentive to cooperate disappears once she gets the money, this contract will appeal to a man only if the cost of enforcing it by extra-legal means is not too high or if the bride-price is paid to her father, who may have both an interest in (e.g., because he has other daughters to marry) and the means of (e.g., by passing the bride-price on his daughter, conditional on her delivering the agreed amount of child care) seeing that the contract is honoured. The latter will be easier if a married woman cannot own assets, and money can then be given to a married daughter only indirectly, in the form of a dowry.

The extent to which the factors predicted to affect the probability of marriage and domestic cooperation are present in a country reflects, in large measure, the country's level of development. Labour market discrimination against women, either in the sense of less pay for same ability, or in the sense that women are barred from jobs with good career prospects, is typical of developing countries. In developed ones, the first form of discrimination was legislated away in the 1950s, and the second is gradually disappearing. Domestic violence is illegal almost everywhere, but effectively tolerated in those developing countries where it is socially acceptable for a man to use force against his wife in pursuit of a perceived right, such as the one which comes from the stipulation of a bride-price contract. Legal norms giving special status to dotal goods are the counterpart of legal norms which put the wife in a position of inferiority with respect to the husband. Such norms were repealed in those developed countries where they still existed in the 1970s,¹⁶ but remain in force in many developing ones. Another important difference between developing and developed countries is over

¹⁵Confusingly, the expression "dowry protection" is used in some developing countries to indicate protection of a woman from ill treatment, or even murder, at her husband's hand if the promised dowry is not forthcoming, rather than protection of dotal goods. In India, for example, the 1961 Dowry Prohibition Act, prohibiting the extraction of a dowry (*dahei*) from the bride's family, has gone largely unheeded, and dowry-related murders have continued to escalate despite a 1986 Penal Code amendment which introduced severe penalties for such outrages.

¹⁶In Italy, for example, the 1975 reform of family law introduced community property (with the alternative of opting for separate property) and, contextually, prohibited the earmarking of any part of this property as dowry.

social and legal attitudes towards de-facto unions. In the former, unmarried couples do not usually enjoy the same rights as legally married ones and, in many cases, face also social disapproval. In the latter, by contrast, cohabitation without marriage is socially acceptable at least since the 1960s, and the legislative trend is towards giving unmarried couples the same rights as married ones in matters such as tax treatment, inheritance, adoption, housing tenure, recognition of one partner as next of kin if the other is hospitalized, and so on. Any residual forms of legal discrimination have disappeared in several European countries with the introduction of legislation which enables de-facto couples to acquire the same rights as married ones by simply recording their union in a public register.¹⁷ The name given to these publicly recognized, non-marital partnerships varies from country to country (civil partnership in the UK, *Eingetragene Lebenspartnerschaft* in Germany, *pact civil de solidarité et du concubinage* in France, etc.), but the substance is the same. Unlike a marriage, they can be terminated by either party at zero cost, and without any legal obligation towards the partner (unless there are dependent children).¹⁸

The link between level of development on the one hand, and legislation or jurisprudence regarding divorce and the assignment of property rights over assets acquired in the course of marriage on the other, is weaker – and this goes some way towards explaining cross-country differences in the incidence of domestic cooperation and marriage within the developed camp. In the latter, however, the general trend is towards granting alimony only for child maintenance purposes. Since the 1970s, many developed countries have introduced "no-fault" divorce legislation, which effectively entitles either spouse to unilaterally end a marriage by simply saying so before a court. This innovation has reduced the cost of obtaining a divorce, because the petitioner no longer needs to expend resources gathering or fabricating evidence of misdemeanour on the respondent's part. In the absence of legislation or jurisprudence establishing that the main childcarer has a right to be compensated for

¹⁷ Attempts to introduce similar legislation elsewhere are running into opposition from conservative (especially Roman Catholic) quarters, largely because the proposed legislation does not make a distinction between heterosexual and homosexual unions, and gets confused in some people's minds with homosexual marriage. The latter, however, is irrelevant to the present discussion carries exactly the same legal implications as heterosexual marriage, and is thus irrelevant to the present discussion. What matters, for our purposes, is not whether the parties are of the same or of different sex, but whether the union can or cannot be dissolved at zero net cost to either party.

¹⁸ In some legislations, a court can mandate support for a former partner in financial distress. But this is unrelated to the amount of childcare the latter might have provided.

loss of career prospects, no-fault divorce should also mean that no compensation is due to either party because the breakdown of marriage is nobody's fault. This is indeed the case in separate-property jurisdictions. In community-property ones, however, any assets acquired in the course of marriage are the couple's joint property, and must be divided-up in some way in the event of divorce. Some legal systems prescribe equal shares. Others give the judge some discretion over the matter, which he may use to compensate the main childcarer. Even so, however, the amount of assets held in common may be too small to permit adequate compensation. In a community-property jurisdiction, the introduction of no-fault divorce *may* thus reduce both the probability of marriage, and the probability of domestic cooperation conditional on marriage. It *will* reduce both these probabilities in a separate-property jurisdiction, where there is obviously no scope for reapportioning assets. In such a jurisdiction, marriage in the presence of no-fault divorce differs from legally recognized, non-marital union in only one respect, namely that the cost of dissolution is zero in the latter, but still positive in the former. Given the alternative, the introduction of no-fault divorce is then likely to discourage marriage.¹⁹ Given that opportunistic bargaining is less likely if the main earner is the woman rather than the man, the abandonment of the traditional recipes for protecting the main childcarer's interests makes it more likely that, if a union is cooperative, it will practice the liberated division of labour.

These considerations imply that both marriage and the traditional division of labour are more likely in a developing country, while cohabitation without marriage, and either equal sharing of domestic and market work or the liberated division of labour, more likely in a developed one. This is consistent with evidence surveyed by Stevenson and Wolfers (2007) that marriage is losing ground to de-facto union in the developed part of the world, and with evidence reported by Gray (1998) that the introduction of no-fault divorce legislation in the US did not raise the divorce rate as some were expecting, but did encourage married women to supply more labour, and may have discouraged marriage. It is consistent also with evidence reported by Sanchez (1993) that the traditional division of labour is still the predominant domestic arrangement where developing countries are concerned, by Burda et al. (2006) that the tendency in the developed part of the world is towards share-alike arrangements, and by Bureau of Labor (2004), Drago et al. (2004),

¹⁹Edlund and Pande (2002) take the more extreme view that modern legislation has lowered the women's interest in marriage because it has reduced their ability to use this institution as a means for obtaining resources from men in exchange for sex and recognition of paternity.

and Stancanelli (2007) that a substantial minority of women in the US, Australia and France earn more than their male partners.

In view of our theoretical prediction that, given the skill premium, a non-cooperative couple is likely to have more children than a cooperative one, these considerations offer also a possible explanation for evidence reported in Brewster and Rindfuss (2000), and elsewhere, that the cross-country correlation between fertility and female labour market participation, negative worldwide until about 1975, has turned positive since that date in the developed,²⁰ but not in the developing part of the world. Fertility is nonetheless higher in the developing than in developed world because the skill premium is lower in the former than in the latter, and the difference is increasing as a result of globalization and skill-biased technical progress. Of course, fertility and female participation are affected also by factors other than those emphasized here. Fertility may be higher in developing than in developed countries not only because a union is more likely to be cooperative, and the skill premium lower, but also because infant mortality is higher. The latter would simply widen the fertility differential between the two parts of the world. Within the developed camp, fertility and female participation are lower in countries where tenure and seniority rules make it difficult for a person to re-enter the labour market after a period of absence (for any reason, including raising a child), or where rigid work hours make it difficult to reconcile parenthood with employment.²¹ This provides another possible explanation, in addition to that offered in the present paper, of why fertility and female participation are positively correlated across developed countries. But it does not explain the trend towards equal-sharing arrangements, or why the sign of the correlation turned positive when it did.

Our explanation of the emergence and persistence of institutions such as the dowry and the bride-price is essentially that they facilitate domestic cooperation by either deterring or preempting opportunistic ex-post bargaining. A different explanation is given in Becker (1981), where the bride-price is viewed as the price paid by a man for a bride, and the dowry as the price paid by a woman for a groom. Were that the case, we should observe bride-prices if there is an excess supply of grooms, dowries if there is an excess supply of brides. In reality, however, we ob-

²⁰As pointed out in Kögel (2004), this cross-country correlation should not be interpreted as a reflection of time-series correlation. Consistently with the line of reasoning followed in the present paper, that author finds that the change in the sign of the cross-country correlation observed in OECD countries is imputable, at least in part, to country heterogeneity.

²¹See Adserà (2004), and Burda *et al.* (2006).

serve dowries and bride-prices in the same place and at the same time, even in conjunction with the same match. As pointed out in Zhang and Chan (1999), that is because the dowry is not a negative bride-price. If it is paid to the bride's father rather than to the bride herself, the former may decide to hand it down to the latter (strictly speaking to her husband) in the form of a dowry. With regard to the dowry, Botticini and Siow (2003) argue that the rationale for transferring wealth to a daughter in this form, rather than in the form of bequest, is related to the virilocal culture traditionally associated with family farming. As sons remain within the family of origin, while daughters join the husband's family upon marriage, promising sons and daughters a share of the estate would in fact reduce the incentive for the former to contribute to the production of family wealth. Giving daughters a dowry at an early stage, by contrast, would leave that incentive intact.²² This is not incompatible with our explanation, but does not explain the change of domestic arrangements that is taking place in developed countries, and does not tell us why the correlation between fertility and female participation changed sign, in that part of the world, at a time when agriculture had long ceased to be a major sector of employment. In any case, the argument applies to transfers at the time of marriage, not necessarily in the form of dowry.

The finding that the domestic allocation of resources may not be efficient – indeed, that it is unlikely to be so in the economic, social and legal environment which is characteristic of a developed country – casts doubt on the empirical literature inspired by the collective model of household decisions, which seeks to recover the domestic sharing rule from the observation of activities or items of consumption unambiguously attributable to either one or the other partner, under the assumption that the domestic allocation of resources will always be efficient.²³ Particularly since the children are the first victims of inefficiency, it raises also the question whether the legislative changes that triggered or accentuated the trend towards equal sharing of domestic and market work were desirable. In the developing world, efficiency is the fruit of a legal system which puts the woman in a position of inferiority relative to the man, but contains also checks and balances which allow her reap some of the efficiency gain. Consistent with the observation that the sign of

²²Rammohan and Robertson (2006) offer a similar explanation. The matter of concern, there, is not the incentive for sons to contribute to wealth production and accumulation in the family of origin, but the desire to preserve lineage. The paper establishes theoretically, and finds evidence, that the probability of moving away from the parental home reduces transfers (in the form of educational expenditure) to daughters, but not to sons.

²³See Bourguignon and Chiappori (1994) for an overview.

the correlation between fertility and female participation changed from negative to positive across developed countries around the middle of the 1970s, we would argue that the traditional division of labour is on its way out in these countries *because* the legal system changed drastically in the cultural climate of the late 1960s and early 1970s. The change gave women the same dignity and rights as men both in the home and in the market place, but did not take account of the fact that their special role in the reproductive process still puts them in a weak bargaining position vis-a-vis men if they agree to specialize according to comparative advantages, unless the latter put them in the main earner's role.

To some an extent, the market is finding its own solution. As reported in Stevenson and Wolfers (2007), pre-union contracts setting out rights and duties for both parties, and specifying how any assets held in common should be divided-up in the event of separation, are becoming more common in developed countries. Drawing up such a contract need not be too costly,²⁴ but the enforcement cost is high, because court litigation is expensive, and usually entails separation. It is difficult to imagine, therefore, that pre-union contracts would appeal to everybody. A policy-based alternative is to offer parents pension benefits increasing in the opportunity-cost of raising children (i.e., crediting them with fictitious contributions reflecting this cost). Something of the sort exists already in some public pension systems.²⁵ Where, as in Japan and much of continental Europe, compulsory pension contributions absorb a substantial share of a worker's wage, and pension benefits provide the bulk of a pensioner's income, the policy in question would go some way towards encouraging domestic specialization according to comparative advantages.²⁶ A more radical alternative would be to enshrine in matrimonial law the principle that, in the event of divorce, the main earner must compensate the main childcarer (in a lump sum if there are sufficient assets, otherwise by a stream of regular payments) for loss of earnings potential. Unlike the fault principle, this would induce division of labour within and between couples, instead of wasteful expenditure on the collection of evidence of fault. By uncoupling the incentive issue from the gender one, it may thus be possible to help restore efficiency without putting women back in a position of legal inferiority.

²⁴Pro-formas can be freely downloaded from the Internet.

²⁵For a survey of the existing institutional arrangements, and an analysis of the proposed scheme, see Cigno and Werding (2007).

²⁶For ways of dealing with the attending moral hazard problem and adverse selection problems, see Cigno and Pettini (2003), and Cigno et al. (2003, 2004).

7 References

Adserà, A. (2004), "Changing Fertility Rates in Developed Countries. The Impact of Labor Market Institutions", *Journal of Population Economics* 17, 17–43

Basu, K. (2006), "Gender and Say: A Model of Household Behaviour with Endogenously Determined Balance of Power", *Economic Journal* 116, 558-580

Becker, G. S. (1981), *A Treatise on the Family*, Cambridge, Mass.: Harvard University Press

Botticini, M. and A. Siow (2003), "Why Dowries?", *American Economic Review* 93, 1385-98

Bourguignon, F. and P. A. Chiappori (1994), "The Collective Approach to Household Behavior" in Blundell, R. and I. Walker (eds.), *The Measurement of Household Welfare*, Cambridge: Cambridge University Press

Brewster, K. L. and R. J. Rindfuss (2000), "Fertility and Women's Employment in Industrialized Countries", *Annual Review of Sociology* 26, 271-287

Burda, M., D. Hamermesh and P. Weil (2006), The Distribution of Total Work in the EU and US, IZA DP 2270

Bureau of Labor (2004), *Women in the Labor Force: A Databook*. Washington DC: US Department of Labor

Cigno, A. (1991), *Economics of the Family*, Oxford and New York: Clarendon Press and Oxford University Press

——— and A. Pettini (2003), "Taxing family size and subsidizing child-specific commodities?", *Journal of Public Economics* 87, 75-90

———, A. Luporini and A. Pettini (2003), "Transfers to Families with Children as a Principal-Agent Problem" , *Journal of Public Economics* 87, 1165-1172

———, A. Luporini and A. Pettini (2004), "Hidden Information Problems in the Design of Family Allowances", *Journal of Population Economics* 17, 645-655

———, and M. Werding (2007), *Children and Pensions*, Cambridge (Mass.): MIT Press

Clark, S. (1999), "Law, Property, and Marital Dissolution", *Economic Journal* 109, C41-C54

Del Boca, D. and C. Flinn (1995), "Rationalizing Child Support Orders", *American Economic Review* 85, 1241-1262

——— (2005), Modes of Spousal Interaction and the Labor Market Environment, CHILD WP N° 12/2005

Drago, R., S. Black and M. Wooden (2004), Female Breadwinner Families: Their Existence, Persistence and Sources, IZA DP N° 1308

Edlund, L. and R. Pande (2002), "Why Have Women Become Left-Wing: The Political Gender Gap and the Decline in Marriage", *Quarterly Journal of Economics* 117, 917-961

Gray, J. S. (1998), "Divorce Law Changes, Household Bargaining, and Married Women's Labor Supply", *American Economic Review* 88, 628-642

Kögel, T. (2004), "Did the Association between Fertility and Female Employment within OECD Countries Really Change its Sign?", *Journal of Population Economics* 17, 45-65

Lam, D. (1988), "Marriage Markets and Assortative Mating with Household Public Goods: Theoretical Results and Empirical Implications", *Journal of Human Resources* 23, 462-487

Lundberg S. and Pollak R. A. (1994) "Noncooperative Bargaining Models of Marriage", *American Economic Review* 84, 132-137

————— (1996), "Bargaining and Distribution in Marriage", *Journal of Economic Perspectives* 10, 139-158

————— (2003), "Efficiency in Marriage", *Review of Economics of the Household* 1, 153-167

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

McElroy, M. B. and M. J. Horney (1981), "Nash-Bargained Household Decisions", *International Economic Review* 22, 333-349

Mnookin, R. H. and L. Kornhauser (1979), "Bargaining in the Shadow of the Law: The Case of Divorce", *Yale Law Journal* 88, 950-997

Pencavel, J. (1998), "Assortative Mating by Schooling, and the Work Behavior of Wives and Husbands", *American Economic Review* 88, 326-329

Peters, M. and A. Siow (2002), "Competing Premarital Investments", *Journal of Political Economy* 110, 592-608

Rammohan, A. and P. E. Robertson (2006), "Kinship Norms and Gender Bias in Education: Theory, and Evidence from Indonesia", University of Sydney, Department of Economics Working Papers

Sanchez, L. (1993), "Women's Power and the Gendered Division of Domestic Labor in the Third World", *Gender and Society* 7, 434-459

Stancanelli, E. (2007), Marriage and Work: An Analysis for French Couples, OFCE Working Paper N° 207

Stevenson, B. and J. Wolfers (2007), Marriage and Divorce: Changes and their Driving Forces, IZA Discussion Paper N° 2602

Weiss, Y. and R. J. Willis (1985), "Children as Collective Goods and Divorce Settlements", *Journal of Labor Economics* 3, 268-292

Zhang, J. and W. Chan (1999), "Dowry and Wife's Welfare: A Theo-

retical and Empirical Analysis", *Journal of Political Economy* 107, 786-808