

*UNIVERSITY OF NOTTINGHAM*



Discussion Papers in Economics

---

Discussion Paper  
No. 00/27

**GENDER BIASED REDISTRIBUTION AND INTRA-  
HOUSEHOLD DISTRIBUTION**

by Indraneel Dasgupta

---

2000

DP 00/27

ISSN 1360-2438

*UNIVERSITY OF NOTTINGHAM*



Discussion Papers in Economics

---

Discussion Paper  
No. 00/27

**GENDER BIASED REDISTRIBUTION AND INTRA-  
HOUSEHOLD DISTRIBUTION**

by Indraneel Dasgupta

Indraneel Dasgupta is Lecturer, School of Economics, University of  
Nottingham

---

November 2000

# Gender Biased Redistribution and Intra-Household Distribution

Indraneel Dasgupta<sup>#</sup>

School of Economics, University of Nottingham, Nottingham NG7 2RD, UK

## Abstract

This paper examines the implications of income redistribution from men to women for the welfare of married women and children. We develop a Cournot model of a two-person household where agents provide market labor and allocate their spending between a private consumption good and goods for children. We show that, under plausible restrictions on individual preferences, small redistributions to married women reduce their welfare. This happens because the income redistribution induces men to reduce their own spending on children by *more than* the amount redistributed. A relative increase in women's independent earnings may however improve

*JEL Classification:* H23; H31; I38; J16

*Key Words:* Cournot model of household; Intra-household distribution; Inter-gender redistribution

## 1. Introduction

A growing body of literature in recent years has drawn attention to the existence of considerable disparity in resource allocation inside the household, especially along gender lines.<sup>1</sup>

---

<sup>#</sup> Phone: 44(0115)9514297; fax: 44(0115)9514159; e-mail: [indraneel.dasgupta@nottingham.ac.uk](mailto:indraneel.dasgupta@nottingham.ac.uk)

Recognition of such disparity, and of the fact that women often constitute a disproportionate part of economically vulnerable sections of society, has motivated the search for policy measures that can reduce overall gender disparity and target welfare programs and anti-poverty measures specifically towards women. This issue has acquired particular urgency in both developing and developed countries, due to the necessity of installing appropriate social safety nets to minimize the negative impact of structural adjustment in the former, and that of maintaining social support for vulnerable individuals in the face of budgetary restraint and welfare cutbacks in the latter.

It is a common view that a relative increase in women's independent access to resources will improve their welfare. Measures suggested for targeting welfare programs towards women, and, more generally, for altering intra-household allocation of resources in their favor, usually involve transferring resources directly to them. Child support policies such as the one introduced in the UK in the late 1970s, which provided for direct cash payments to the mother funded by taxes on the father's income, provide a straightforward example. Free medical treatment and supply of vitamins and nutrients to pregnant and lactating mothers in many developing countries are typical examples of interventions targeted towards women effected through in-kind transfers. Perhaps the form of intervention that has received most attention in this context involves increasing women's access to independent income through improved labor market opportunities. In developed countries, policies intended to promote this goal have typically taken the form of equal pay legislation and positive discrimination/affirmative action programs. In developing countries in recent years, additionally, training, marketing support and micro-credit programs targeted towards women have received a lot of attention. Increasing state support for female

---

I am grateful to Francois Bourguignon, Richard Disney, Keith Griffin, Prasanta K. Pattanaik, R. Robert Russell, Kunal Sengupta and two anonymous referees for their valuable comments on earlier drafts of this paper.

<sup>1</sup> See, for example, Sen (1984), Apps and Savage (1989), Haddad and Kanbur (1990), Harriss (1990), UN (1995) and UNDP (1995).

farmers and “women’s crops” has been suggested, especially in the context of sub-Saharan countries. Expansions in female labor participation rates and reductions in the male-female wage differential are often taken as evidence of a relative improvement in women’s welfare.

The purpose of this paper is to examine the robustness of the standard view. We show that, paradoxically, policies that lead to a relative increase in independent income of married women may actually *reduce* their welfare. However, such policies may improve the welfare of children. Thus, children may benefit from increased economic independence of their mothers, *at the cost of the mothers themselves*.

Policies intended to increase relative independent earnings of women often involve, in effect and in the aggregate, some income redistribution from men. Average wages earned by male workers may be expected to be higher in the absence of effective affirmative action programs and anti-discrimination legislation, while that of female workers, lower. If welfare and anti-poverty programs transfer resources to women, then independent earnings of men are lower than what they could have been, had the programs transferred resources to men instead. A reduction in male income, combined with an increase in female income, may however have a negative effect on male contribution to common household expenses (in particular, those incurred on children). If husbands reduce their own voluntary spending on domestic public goods by *more* than the amount their wives receive as additional income, then, clearly, the inter-gender redistribution will end up reducing the welfare of the latter.<sup>2</sup> However, women may respond by increasing their own spending on children. This increase may even be more than enough to compensate for the reduction by men. Consequently, children’s welfare may improve. We formalize and develop this intuitive argument in the paper.

---

<sup>2</sup> Lundberg and Pollak (1993) and Kanbur (1995) develop models where state-imposed lump-sum redistributions from husbands to wives “exactly crowd out” contributions from husbands, i.e. they are completely neutralized by an identical reduction in husbands’ voluntary transfers. A similar conclusion follows from Becker’s well-known

Our analysis is developed through a Cournot model of a two-adult household,<sup>3</sup> where each adult member consumes leisure, a private good and a domestic public good (interpreted as a composite of commodities consumed by children). Each member takes the other's spending on the domestic public good as given, and chooses own market labor supply and spending on the private and the public goods. We model inter-gender redistribution programs in terms of an income support to women funded by a tax on men, and consider combinations of a lump-sum tax/transfer and a wage tax/subsidy. The lump-sum tax/transfer is intended as a generic device for modelling those measures which have low price-altering consequences, while the wage tax/subsidy stands for measures which essentially impact on the labor market, altering average male-female wage differentials. We assume that (a) all goods are normal goods, (b) leisure and children's consumption are net substitutes and (c) the amount redistributed is smaller than the initial male contribution to children's expenses. We show that, under our restrictions, interventions which involve taxing men's wages to provide a wage subsidy or cash transfer to women actually reduce women's welfare while also increasing their market participation and independent cash income. This happens even if a wage subsidy to women is funded by a lump-sum tax on men. However, total household spending on children may go up when women receive a wage subsidy.

Section 2 sets up the model. Section 3 presents our results. We conclude in Section 4.

## 2. The Model

Assume a household with two adult members  $M$  and  $F$ . Each agent  $k$ , ( $k \in \{M, F\}$ ), derives utility from consumption of leisure  $l_k$ , a private consumption good  $x_k$  and a domestic public good  $y$ . The domestic public good comprises of a composite commodity consumed by

---

"rotten kid" theorem (Becker, 1981). These studies do not however show that a policy-induced transfer from husbands to wives can be *counterproductive* in terms of its impact on the welfare of wives.

<sup>3</sup> Earlier contributions include Ulph (1988), Woolley (1988), Lundberg and Pollak (1993) and Kanbur (1995).

children. Agent  $k$  has a preference ordering represented by a strictly quasi-concave utility function  $U^k(x_k, l_k, y)$ . Furthermore, this agent has some non-labor income  $I_k$ , a time endowment of 1, and faces a market wage rate  $w_k$ . For notational simplicity, we assume that the price of private goods, as well as that of the domestic public good, is unity. Given any agent  $k$ , we shall refer to the other agent as agent  $k$ . Each member  $k$ , taking the other's spending on the public good,  $y_{-k}$ , as given, chooses her labor supply and the allocation of her own total personal income between the private good and the public good. We assume that a Nash equilibrium exists in this game.<sup>4</sup>

Given any contribution  $y_{-k}$  by the other agent, agent  $k$ 's optimization problem is that of choosing the optimal levels of  $y$ ,  $x_k$  and  $l_k$  subject to (a) the budget constraint  $[I_k + w_k(1 - l_k) + y_{-k} = y + x_k]$ , and (b) the additional constraint  $[y \geq y_{-k}]$ . The solution to this problem, subject to the budget constraint (a) alone, yields the optimal levels of  $y$ ,  $x_k$  and  $l_k$  as functions of  $w_k$  and  $[I_k + y_{-k}]$ . Let these unrestricted individual demand functions be given by (i)  $y = g^k(w_k, I_k + y_{-k})$ , (ii)  $x_k = h^k(w_k, I_k + y_{-k})$  and (iii)  $l_k = j^k(w_k, I_k + y_{-k})$ . We impose the following restrictions on individual demand functions (and thus on individual preferences).

A1: For all  $k \in \{M, F\}$ ,  $g^k, h^k$  and  $j^k$  are increasing in  $I_k$ .

A2: For any  $k \in \{M, F\}$ , given  $y_{-k}$ , suppose an increase (decrease) in  $w_k$ ,  $\Delta w_k$ , is compensated by a reduction (expansion) in non-labor income,  $\Delta I_k$ , such that  $[\Delta I_k = -\Delta w_k L_k^*]$ , where  $L_k^*$  is  $k$ 's initial labor supply. Then,  $k$ 's demand for the domestic public good rises (falls).

A1, which requires that all goods be normal goods in the standard sense, suffices to ensure the uniqueness of the Nash equilibrium.<sup>5</sup> Then, the Nash equilibria yield the single-valued

---

<sup>4</sup> Bergstrom et al. (1986) show that the existence of a differentiable single-valued demand function for the public good for each agent is sufficient to ensure the existence of a Nash equilibrium.

<sup>5</sup> See Bergstrom et al. (1986).

household demand functions  $x_k^N = \bar{x}^k(w_k, w_{-k}, I_k, I_{-k})$  and  $y^N = y_k^N + y_{-k}^N = \bar{y}(w_k, w_{-k}, I_k, I_{-k})$ , as well as the household labor supply functions  $L_k^N = \bar{L}^k(w_k, w_{-k}, I_k, I_{-k})$ ;  $k \in \{M, F\}$ .

We shall assume that both agents spend a positive amount on the domestic public good in the original (pre-intervention) Nash equilibrium. If this is the case in any Nash equilibrium, then, in that Nash equilibrium, we must have:

$$\bar{y}(w_k, w_{-k}, I_k, I_{-k}) = g^k(w_k, I_k + y_{-k}^N) \quad \text{for all } k \in \{M, F\}. \quad (1)$$

Our key assumption, A2, is simply that cash spending on children and leisure are net substitutes for both agents.

### 3. Results

Income losses suffered by men due to gender-specific interventions need not, in general, be exactly equal to income gains by women, either at the aggregate level or at the level of the individual household. The redistribution process may involve some leakage, so that income losses are larger than income gains. The interesting issue however is whether the redistribution can reduce women's welfare *even without any leakage*. We shall therefore assume that any income loss by men is exactly balanced by an income gain for women.<sup>6</sup>

First consider the case where a lump-sum cash transfer to  $F$  is effectively associated with a fall in  $M$ 's wage rate. Let the initial, pre-intervention, value of the wage rate for any agent  $k$  be  $w_k^*$ , and let the initial non-labor income be  $I_k^*$ . Suppose that the state raises a 'small' amount  $T$  from a wage tax on  $M$ , and passes it on to  $F$  as a cash transfer. The intervention scheme is small

---

<sup>6</sup> For analytical purposes, it is useful to think of such leakage as a tax on women's income subsequent to an exact redistribution. In general, this 'leakage tax', by itself, can be expected to reduce women's welfare, which would only strengthen our results.



in that it does not change the prices facing the household, except by the proportion given by the tax rate,  $t_M$ . The tax reduces  $M$ 's wage rate to  $w_M \cdot (1 - t_M)$ ,  $t_M \in (0,1)$ . It is obvious that the redistribution must necessarily improve  $F$ 's welfare if  $T$  is more than  $M$ 's contribution to children's expenses in the pre-intervention equilibrium. The next assumption is made to rule out this analytically trivial case.

$$\text{A3: } 0 < T < y_M^N(w_M \cdot (1 - t_M), w_F \cdot, I_M \cdot + T, I_F \cdot).$$

It can be shown that A1-A3 together ensure that  $M$  must necessarily be spending more than the amount of the transfer, i.e., more than  $T$ , on children's goods in the pre-intervention equilibrium.

**Proposition 1:** *Suppose that the state taxes  $M$ 's wage and provides the tax revenue,  $T$ , as a cash transfer to  $F$ . Then, given A1-A3, this tax-transfer policy will:*

- (a) *reduce  $M$ 's spending on children by more than  $T$ ,*
- (b) *reduce household expenditure on children; and*
- (c) *reduce  $F$ 's consumption of leisure and her welfare.*

**Proof:** See the Appendix.

The key assumption driving Proposition 1 is that leisure and children's consumption are net substitutes for  $M$  (A2). The income effect of the wage tax is exactly the same as that of a lump-sum redistribution of  $T$  from  $M$  to  $F$ . Given the restriction imposed on the size of  $T$  by A3, it follows from the well-known neutrality property of Cournot games with public good(s) that  $M$  would reduce his spending on children by exactly the amount redistributed, i.e. the tax revenue  $T$  (while  $F$  would increase hers by exactly this amount).<sup>7</sup> However, by A2, the substitution effect of a fall in  $M$ 's wage rate also reduces his demand for the domestic public good. Therefore, the total

---

<sup>7</sup> See Bergstrom et al. (1986).

effect is a reduction in  $M$ 's spending on children by more than the tax revenue  $T$ . Hence, effectively,  $F$ 's total non-labor income from all sources falls, which reduces both her welfare and total household spending on children. Note that the fall in  $F$ 's welfare occurs alongside an increase in her market participation and independent cash income (both labor and non-labor). Thus, Proposition 1(c) shows that such increases cannot be interpreted as necessarily implying an improvement in women's well-being.<sup>8</sup>

Note that the impact of the redistribution on  $M$ 's welfare is ambiguous. If  $F$  kept her contribution invariant, then, due to its distortionary nature, the impact of the wage tax on  $M$ 's welfare would be equivalent to that of a lump-sum tax on him of more than  $T$ . However, it can be shown that  $F$  will necessarily increase her own spending on children by *more than*  $T$  as well. Thus, the intervention will also effectively increase  $M$ 's non-labor income from all sources by more than  $T$ . Consequently, it is possible (though not necessary) that  $M$ 's welfare will improve.

The next case we consider is where measures that increase returns to market labor for women simultaneously involve a lump-sum reduction in male income. As before, we assume that  $M$  spends more than the tax revenue on children's goods in the pre-intervention equilibrium.

**Proposition 2:** *Suppose that the state imposes a lump-sum tax  $T$  on  $M$  and transfers it as a wage subsidy to  $F$ , and suppose that  $[0 < T < y_M^N(w_M^\bullet, w_F^\bullet, I_M^\bullet, I_F^\bullet)]$ . Then, given A1-A2, this policy will:*

- (a) *reduce  $M$ 's spending on children by more than  $T$ ,*
- (b) *increase household expenditure on children; and*
- (c) *reduce  $F$ 's consumption of leisure and her welfare.*

---

<sup>8</sup> A number of empirical studies have found that labor market participation by women often increases in developing countries in times of economic stress due to a fall in male wage rates and the consequent reduction in male contribution to household expenditures (see, for example, Kabeer (1991)). This is quite in line with our results, which also suggest that, in such cases, women and children may be worse off even if the state intervened to maintain total household income through cash/in-kind welfare payments to mothers.

**Proof:** See the Appendix.

If women receive a wage increase, their spending on children increases by more than the amount redistributed due to the substitution effect. This increases, in effect, total male non-labor income from all sources, allowing men to increase their consumption of both leisure and the private good, thereby reducing women's welfare. Obviously, the welfare of men must necessarily go up in this case.

The neutrality property mentioned earlier implies that individual consumption bundles would remain identical regardless of whether a wage subsidy to  $F$  is funded by a lump-sum tax on  $M$  or one on  $F$  herself. Hence, Propositions 1 and 2 can be directly combined to analyze measures, such as affirmative action programs, equal pay and anti-discrimination legislation, which reduce male-female wage differentials by altering both male and female wage rates, thereby redistributing income as well.

**Proposition 3.** *Suppose that the state taxes  $M$ 's wage and provides the tax revenue,  $T$ , as a wage subsidy to  $F$ . Then, given A1-A3, this tax-transfer policy will:*

- (a) reduce  $M$ 's spending on children by more than  $T$ , and*
- (b) reduce  $F$ 's consumption of leisure and her welfare.*

In this case, the overall effect on household spending on children is indeterminate, as is that on the welfare of men.

Note that, in case of a relative increase in their wage rate, since women's market participation increases as well, their independent cash income must necessarily rise, and their consumption of the private good may also go up. Yet, by Proposition 2(c) and 3(b), even if children's consumption also increases as a consequence of improved relative market opportunities for their mothers, the mothers' own welfare must necessarily fall. Clearly, this happens essentially due to a fall in their consumption of leisure.

It can be shown that income redistributions from men to women of the type discussed above will *necessarily* increase the welfare of women only if leisure and spending on children are net complements for *both* agents. The standard view is robust only for this case. Otherwise, there will exist situations where such redistributions make women worse off. Thus, a weaker version of A2, where the two goods are assumed to be net substitutes only for women, can also generate qualitatively similar (though weaker) results. On the other hand, if leisure and expenditure on children are net complements for women, then a wage subsidy to women funded by a lump-sum tax on men will reduce household spending on children, while increasing women's labor supply. Thus, in this case the consequence of a reduction in the gender-based wage differential (and increased market participation by women) for household spending on children is such as to contradict much empirical evidence.<sup>9</sup> This fact seems to provide some grounds for assuming that leisure and expenditure on children are indeed more likely to be net substitutes for women.

Note that the results are independent of, and compatible with, assumptions about differences in male and female preferences which may differentiate their labor supply and/or spending patterns, as well as assumptions about differences in magnitudes of market participation. Note further that we do not make any assumption about the size of the male-female wage differential either. This differential enters the model only indirectly, by influencing the size of male spending on the domestic public good, and thereby the upper bound on income redistributions for which the results will hold. Changes in the wage gap change this upper bound, but do not affect the results qualitatively.

---

<sup>9</sup> For recent surveys, see Thomas (1997) and Hoddinott et al. (1997). Leslie (1988) surveys studies that find a positive relationship between women's market earnings and household spending on children's health and nutrition.

The model can be extended to incorporate domestic labor by assuming that the domestic public good is produced from monetary inputs and domestic labor, and that members take each other's labor and monetary contributions as given and choose their own contributions. If, in addition, one assumes that the male wage rate is sufficiently higher than the female one, this extension can generate the traditional gender-based division of labor: the male member would provide only money for the public good. Another version would be one where the intra-household allocation mechanism is modeled as a Stackelberg game with one leader. Propositions 1 and 2 can be sustained in these alternative versions of the model as well.

#### 4. Concluding Remarks

In this paper, we have shown that an income redistribution from men to women may induce men to cut down their contribution towards household expenditure on children (or, more generally, on domestic public goods) by more than the amount redistributed, thereby making women worse off. The existing empirical literature on intra-household distribution typically neglects measurements of male crowding out. The theoretical analysis in this paper points to the need for such empirical investigation.

If intra-household decision-making is modelled as a cooperative bargaining game with the outcome given by the cooperative Nash or Kalai-Smorodinsky bargaining solution,<sup>10</sup> our basic conclusion, that an income redistribution from men to women may reduce married women's welfare, will hold, so long as the threat points are interpreted as individual utility levels in the non-cooperative Cournot-Nash equilibrium.<sup>11</sup>

---

<sup>10</sup> See Bergstrom (1996) and Ott (1992) for overviews of this literature.

<sup>11</sup> The threat points in such models have usually been identified with individual utilities in case of divorce. Lundberg and Pollack (1993) justify the identification of the threat points with the non-cooperative Nash equilibrium instead by arguing that the divorce option is costly and may be dominated by sharing of domestic public goods in a formally intact household. McElroy (1997) also notes that the divorce threat is not credible in

Studies often find evidence that a relative increase in women's independent income is associated with a change in the pattern of household consumption of goods and services, and in fertility decisions. In particular, a relative increase in women's market earnings has been found to increase total household expenditure on children (and other domestic public goods). These studies are often cited as providing justification for expanding women's relative market participation and independent earnings through policy interventions.<sup>12</sup> We have shown that, even if improved relative market participation and wages for women in general are found to be associated with a rise in the consumption of purchased commodities by both mothers and their children, this cannot, by itself, be construed as evidence that such improvements would necessarily have the effect of improving the *welfare* of mothers as well. That the existing literature on intra-household policy targeting often draws such a conclusion is largely due to its neglect of the impact of increased time burden on women that larger market participation may entail.<sup>13</sup> Our results show that this neglect is not innocuous.

Anthropological studies identify goods as essentially "male" in many traditional societies. Alcohol, cigarettes, status goods, "female companionship" are all noted as male goods in these studies (Alderman et al., 1995, p. 11). Our results suggest that taxing male goods and subsidizing children's goods (or domestic public goods in general) may be more beneficial to married women and children than measures to reduce wage differentials or direct state provisioning of goods targeted towards the latter.

---

the context of day to day decision-making. Note however that, even if divorce is costless, and the divorce threat credible, the non-cooperative Nash equilibrium can still be considered the relevant threat point, if, in case of divorce, continuing to contribute to children's expenses (irrespective of custody rights) dominates non-contribution for both parents.

<sup>12</sup> For arguments to this effect, see, for example, Lundberg et al. (1997, p. 479)) and UNDP (1995).

<sup>13</sup> Alderman et al. (1997, p. 286) note this gap in passing.

The results can be interpreted as supporting a ‘trickle-down’ or growth-oriented view of intra-household distribution. To the extent that a reduction in the gender-based wage differential has improved the welfare of married women, this may be largely due to an increase in overall wage rates, rather than inter-gender income redistribution per se. The real beneficiaries of measures to reduce gender-based wage differentials appear to be single women (including divorced mothers with non-contributory ex-spouses), and, probably, children. Paradoxically enough, married men may have benefited from such measures as well.

An interesting extension would be to examine whether our welfare conclusions continue to hold with long run marriage market effects under alternative assumptions about marital contracts.

## **Appendix**

### **Proof of Proposition 1:**

(a) A cash transfer to  $F$  funded by a wage tax on  $M$  can be decomposed into (i) a cash transfer  $T$  to  $M$  funded by the wage tax on him, and (ii) a lump-sum redistribution of  $T$  from  $M$  to  $F$ . We shall first show that  $M$ 's spending on children must fall under (i). Suppose not. Since leisure and the domestic public goods are net substitutes for  $M$  by A2, and all goods are normal goods by A1, this is possible only if  $y_F^N$  falls in the new Nash equilibrium. A1 implies that this can happen only if  $y_M^N$  increases, which, given A1, implies that  $y^N$  must increase as well (since (1) must be satisfied initially for  $F$ ). Now, since (1) must be satisfied for  $M$  in the new Nash equilibrium by A3, A1 and A2 together imply that  $y^N$  can increase only if  $y_F^N$  rises. This contradiction establishes that  $y_M^N$  must be lower under the income compensated wage tax on  $M$ .

Given A3, the neutrality property of Cournot games with public goods implies that  $M$  will reduce his contribution by exactly  $T$  under (ii) if  $y_F^N > 0$  in the Nash equilibrium under (i). Hence, since  $y_M^N$  must be lower than its pre-intervention value in the Nash equilibrium under (i),

to establish Proposition 1(a), it suffices to show that  $y_F^N$  is indeed positive in the Nash equilibrium under (i).

Suppose  $y_F^N = 0$  in the Nash equilibrium under the income compensated wage tax on  $M$ . Then, since, by assumption,  $F$  was contributing a positive amount towards children's expenses in the pre-intervention Nash equilibrium, it must be the case that her consumption of the private good, or of leisure, has gone up. But since all goods are normal goods by A1, this is possible only if  $y_M^N$  increases. This contradiction establishes that  $y_F^N > 0$  in the Nash equilibrium under the income compensated wage tax on  $M$ , and thereby, Proposition 1(a).

Parts (b) and (c) of Proposition 1 follow immediately from Proposition 1(a) and A1.  $\diamond$

**Proof of Proposition 2:**

(a) First compare  $M$ 's spending on children initially to that under a lump-sum transfer of  $T$  to  $F$ . Given the restriction on the size of  $T$ , since  $F$  contributes a positive amount in the pre-intervention Nash equilibrium, it follows from the neutrality property that  $M$ 's contribution will fall by exactly  $T$ . Hence, we only have to show that a wage subsidy to  $F$  funded by a lump-sum tax on her must reduce  $M$ 's spending on the domestic public good. An argument symmetric to that used to establish Proposition 1(a) establishes that  $y_F^N$  must be higher under the wage subsidy to  $F$ , as compared to a cash transfer to her. But, as leisure and private consumption are both normal goods for  $M$  by A1, this implies that  $M$ 's spending on the public good must be less under the wage subsidy to  $F$  than under the cash transfer to her.

(b) First note that, since, by assumption,  $M$ 's contribution in the pre-intervention Nash equilibrium is greater than  $T$ , and that of  $F$  positive, it follows from the neutrality property that (1) must hold for both agents under a cash transfer to  $F$ . Now recall that  $y_F^N$  must be higher under the wage subsidy to  $F$ , as compared to a cash transfer to her. Then, since (1) must hold for  $M$



under the cash transfer to  $F$ , A1 implies that household spending on children under the wage subsidy to  $F$  must be higher than that under the cash transfer to her. Noting that, by the neutrality property, household spending on children under a cash transfer to  $F$  is the same as that in the pre-intervention equilibrium, the required result is immediate.

(c) By the neutrality property,  $F$ 's consumption of leisure in the pre-intervention equilibrium would be the same as that under a cash transfer to her. Hence, we only need to show that her labor supply rises when she receives a wage subsidy rather than a lump-sum. The compensated wage increase would increase  $F$ 's labor supply through the substitution effect. Hence, for her to consume more leisure in equilibrium, given A1, it is necessary that  $M$ 's contribution increase under the wage subsidy. However, we have already established in the Proof of Proposition 2(a) that  $M$ 's contribution must in fact decrease under the wage subsidy to  $F$ . Hence,  $F$ 's labor supply must increase. The welfare conclusion follows immediately from Proposition 2(a) above.  $\diamond$

### References:

- Alderman, H., Chiappori, P., Haddad, L., Hoddinott, J. and Kanbur, R., 1995. Unitary versus collective models of the household: Is it time to shift the burden of proof? The World Bank Research Observer 10, 1-19.
- Alderman, H., Haddad, L. and Hoddinott, J., 1997. Policy issues and intrahousehold resource allocation: Conclusions. In: Haddad, L., Hoddinott, J. and Alderman, H. (Eds), Intrahousehold Resource Allocation in Developing Countries. The Johns Hopkins University Press, Baltimore.
- Apps, P. and Savage, E., 1989. Labour supply, welfare rankings, and the measurement of inequality, Journal of Public Economics 39, 335-364.
- Becker, G., 1981. A Treatise on the Family. Harvard University Press, Cambridge, Mass.

- Bergstrom, T., 1997. A survey of theories of the family. In: Rosenzweig, M. R. and Stark, O. (Eds), *Handbook of Population and Family Economics*. Elsevier, Amsterdam.
- Bergstrom, T., Blume, L., and Varian, H., 1986. On the private provision of public goods, *Journal of Public Economics* 29, 25-49.
- Haddad, L. and Kanbur, R., 1990. How serious is the neglect of intra-household inequality? *Economic Journal* 100, 866-81.
- Harriss, B., 1990. The intrafamily distribution of hunger in South Asia. In: Sen, A. K., and Dreze, J. (Eds) *The Political Economy of Hunger Vol. I*. Oxford University Press, New York.
- Hoddinott, J., Alderman, H. and Haddad, L., 1997. Testing competing models of intrahousehold allocation. In: Haddad, L., Hoddinott, J. and Alderman, H. (Eds), *Intrahousehold Resource Allocation in Developing Countries*. The Johns Hopkins University Press, Baltimore.
- Kabeer, N., 1991. Gender dimensions of rural poverty: Analysis from Bangladesh, *The Journal of Peasant Studies* 18, 241-262.
- Kanbur, R., 1995. Children and intra-household inequality: A theoretical analysis. In: Basu, K., Pattanaik, P. K., and Suzumura, K. (Eds), *Choice, Welfare and Development: A Festschrift in Honour of Amartya K. Sen*. Oxford University Press, New York.
- Leslie, J., 1988. Women's work and child nutrition in the third world, *World Development* 16, 1341-62.
- Lundberg, S. and Pollak, R., 1993. Separate spheres bargaining and the marriage market, *Journal of Political Economy* 101, 988-1010.
- Lundberg, S., Pollak, R. and Wales, T., 1997. Do husbands and wives pool their resources? Evidence from the United Kingdom child benefit, *The Journal of Human Resources* 32,

463-480.

- McElroy, M., 1997. The policy implications of family bargaining and marriage markets. In: Haddad, L., Hoddinott, J. and Alderman, H. (Eds), *Intrahousehold Resource Allocation in Developing Countries*. The Johns Hopkins University Press, Baltimore.
- Ott, N., 1992. *Intrafamily Bargaining and Household Decisions*. Springer-Verlag, Berlin.
- Sen, A. K., 1984. Family and food: Sex bias in poverty. In: Sen, A. K. (Ed.), *Resources, Values, and Development*. Blackwell, Oxford.
- Thomas, D., 1997. Incomes, expenditures, and health outcomes: Evidence on intrahousehold resource allocation. In: Haddad, L., Hoddinott, J. and Alderman, H. (Eds), *Intrahousehold Resource Allocation in Developing Countries*. The Johns Hopkins University Press, Baltimore.
- Ulph, D., 1988. General noncooperative Nash model of household consumption behaviour. Mimeo, Department of Economics, University of Bristol, UK.
- United Nations, 1995. *The World's Women: Trends and Statistics*. United Nations, New York.
- United Nations Development Programme, 1995. *Human Development Report*. Oxford University Press, New York.
- Woolley, F., 1988. A non-cooperative model of family decision making. Working Paper, No.TIDI/125, London School of Economics, UK.

