Do private income transfers increase labor market risk?

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Abstract

In a two-stage model of private income transfers with a labor market, we find that the aggregate effect of such transfers induces labor market responses to the increase in moral hazard, thereby increasing the volatility of wages and lowering welfare. The equilibrium level of transfers exceeds the socially-optimum level. © 2000 Elsevier Science S.A. All rights reserved.

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1. Introduction

The literature on private income transfers shows that these transfers are large and important.\textsuperscript{1} Empirical research has suggested that altruism often plays a significant role in determining the size of such transfers.\textsuperscript{2} Despite this, we are aware of no models that examine how the labor market assesses risk and moral hazard that arise from altruistically-motivated transfers when recipients have private information, nor how these factors affect wages. In this paper, we develop a stylized model in which workers receive both wage and nonwage income. We show that wages depend on employers' expectations both of employees' nonwage income and the mechanism that determines the nonwage income. Our principal result is that altruism is not necessarily welfare-enhancing, because the

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\textsuperscript{1}Kotlikoff and Summers (1981) estimate that four-fifths of wealth comes through bequests or other transfers. Other estimates of bequests and other intergenerational transfers are smaller, though still significant. Cox (1987) gives an estimate of $63 billion in inter vivos transfers and $40 billion in bequests (in 1979 dollars).

\textsuperscript{2}See Laïtner and Juster (1996), among others.
expectation of widespread, altruistically-motivated income transfers, induces employers to shift risk from risk-neutral employers to risk-averse workers. Although individual workers are made better off by receiving nonwage income, given the structure of the labor market, the equilibrium distribution of wages depends on the aggregate level of nonwage transfers, so widespread transfers can make everyone worse off.

In an empirical study, Holtz-Eakin et al. (1993) found that bequests appear to affect labor market decisions. For individuals who receive bequests, labor supply falls as bequests increase. It seems reasonable to believe that the labor market recognizes this effect and that wage rates adjust accordingly. Previous theoretical work that viewed wage income as exogenous found bequests to be unambiguously welfare-enhancing (Bernheim et al., 1985; Becker, 1991; Cox, 1987; Coate, 1993). However, allowing the labor market to react, as we do, yields a different conclusion: transfers are a substitute for wages and consequently lower worker effort, yielding lower expected profits for firms. Nonmarket transfers, such as bequests or familial support, allow benefactors to provide income to transfer recipients that reduces the volatility of the recipients’ wages across states of nature. Because firms earn zero expected profits in equilibrium, the reduction in effort leads to lower wages, as well as higher wage volatility across states of nature. Transfers thus crowd out the insurance aspect of wages, suboptimally shifting risk from firms to individuals.

The model in our paper is couched in terms of private income transfers from an altruistic benefactor to a beneficiary. But our framework is a general one, applicable to a variety of nonmarket interactions, which include transfers between altruistically-linked spouses, partners or family members, or bequests and inter vivos transfers from parents to their children. In all of these cases, such transfers have the same type of effect on incentives and wages of the transfer recipients. For example, empirical studies have found that the ‘marriage premium’ – the higher wages that married men earn relative to their unmarried counterparts – declines as the wife’s income rises (Daniel, 1995), and that the quit rate for married men increases with the wife’s income (Shaw, 1987). Both observations are consistent with our model: as one spouse’s income rises, she has a greater ability to insure her spouse against bad outcomes in the labor market. This insurance induces men to substitute leisure, or more-satisfying but lower-paying jobs for traditional, full-time employment. Thus, transfers between spouses, in aggregate, provoke a labor market response.

We examine a model of private income transfers when the recipient’s labor market effort is private information. The structure of the model is as follows: altruistic benefactors provide transfers to beneficiaries, who also participate in a labor market. As a result of the private information on effort, there is moral hazard between the worker and his employer. We assume there are two states of nature, Good and Bad, with output High and Low, and introduce a competitive market for labor into this framework. Benefactors are purely altruistic toward beneficiaries, providing them with transfers to smooth consumption across states of nature. At the same time, transfer recipients enter the labor market and are paid according to the realized state of nature. A worker’s effort influences the likelihood that a particular state occurs. That effort is unobservable and hence noncontractable to the

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3 See also Bruce and Waldman (1990, 1991) for a discussion of the inefficiencies generated by such transfers, in the context of perfect and complete information.

4 Altig and Davis (1989) analyze the impact of nonmarket public transfers on the actions of altruistically-linked recipients in the presence of binding borrowing constraints.
firm and the benefactor, however, leads to moral hazard between the worker and his employer. As a result, while optimal risk-sharing between the risk-neutral firm and the risk-averse worker leads the firm to insure the worker against bad states of nature (Taylor, 1987), the moral hazard means that such insurance is only partial (Rees, 1987).

A nonmarket institution, such as the family, imposes a negative externality on the labor market, one that is not completely internalized by the market since the risk – i.e., which level of output occurs – is not exogenous. As a result, we are in a third-best world. Thus private income transfers, in our model, are dysfunctional, exacerbating the moral hazard between the worker and the firm.

2. Model

A large number of identical workers enter the labor market for a single period. Workers are risk-averse while firms are risk-neutral. Output $x$ can be high ($x_H$) or low ($x_L$). The probability that the low-output state occurs is $p(e)$, where $e$ is the worker’s effort and is unobservable to the firm; we assume $p’ < 0$ and $p” > 0$. Wages are $w_L$ in state L and $w_H$ in state H, where $w_L < w_H$. The difference in wages across states of nature reflects firms’ responses to the moral hazard in the labor market. Firms choose $w_L$ and $w_H$ to maximize expected profits, while competition drives expected profits to zero. Hence

$$E \pi(w_L, w_H; e) = p(e)x_H + (1 - p(e))x_L - [p(e)w_L + (1 - p(e))w_H] = 0.$$ (1)

Each worker has an altruistic risk-averse benefactor. Thus the benefactor’s utility, $U_B$, depends on the beneficiary’s utility, $U_w$: $$EU_B = u(c_B) + \beta EU_w$$

where $c_B = y_B - b$ is the benefactor’s net consumption, $y_B$ is his (exogenous) income, and $b$ is the transfer to the beneficiary. If $y_B$ is small, the equilibrium transfer is zero. As $y_B$ grows, at some point the benefactor can increase his expected utility by consuming one dollar less himself and transferring that dollar to the beneficiary, thereby receiving the value of the beneficiary’s marginal utility, discounted by $\beta$. We focus on the case where private transfers are operative, and thus assume $y_B$ is sufficiently large that $b > 0$ in equilibrium. The timing of transfers is such that $b$ is given before the state of nature is revealed. Note that the benefactor neither knows nor directly cares about the

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1 Even in the absence of such transfers, the moral hazard between the worker and the firm implies that, in equilibrium, wages are not constant across states of nature, leading to a second-best result.

2 Note, however, that although the benefactor is altruistic, but with $\beta < 1$, the benefactor and his beneficiary do not necessarily agree on the level of effort that the beneficiary should expend.

3 Alternatively, we could allow for state-contingent transfers, however, they do not affect the present analysis. Chami (1998) shows that an altruistic-benefactor would set the state-contingent transfers such that, at the margin, they are compensatory.

4 Relaxing this assumption would only strengthen our results, since allowing an altruistic benefactor to observe output and hence wages before committing to a transfer would yield a bequest that provides the beneficiary the same consumption across both states of nature, i.e., full insurance (see Chami, 1996).
beneficiary’s effort level; hence transfers, at the margin, are purely compensatory in nature. In contrast, in the absence of an outside market, Kotlikoff and Razin (1988) and Cremer and Pestieau (1996) consider an adverse selection model with high- and low-ability beneficiaries, where altruistic benefactors do not act altruistically at the margin. Expected utility to the beneficiary/worker is given by

\[ E U_w = p(e)u_w(w_L + b) + (1 - p(e))u_w(w_H + b) - v(e). \]

Let \( u_{wL} = u_w(w_L + b) \) and \( u_{wH} = u_w(w_H + b) \). We assume \( u_w \) is strictly increasing, concave, and twice continuously differentiable. The disutility of effort \( v \) is an increasing, strictly differentiable convex function.

The worker first contracts with a firm, receives a transfer, then decides on a level of effort. Output is realized, and, finally, wages are paid according to the labor contract. Using backward induction, we first examine the worker’s choice of effort.

2.1. Effort

The optimal level of effort is given by the first-order condition:

\[ (u_{wL} - u_{wH})p' - v' = 0. \] (2)

Thus \( e^* = e^*(b, w_L, w_H) \). Using the fact that \( u_{wH} > u_{wL} \), so \( u_{wH}' < u_{wL}' \), we have \( e_{wH}^* < 0, e_{wL}^* < 0, \) and \( e_{wL}' > 0 \). Transfers, through an income effect, reduce effort, while raising the benefits of high output and reducing the benefits of low output increases effort.

2.2. Transfers

Next, the first-order condition for the benefactor is

\[ \frac{\partial E U_B}{\partial b} = -u_B' + \beta [p(e)u_{wH}' + (1 - p(e))u_{wH}'] + \beta [(u_{wL} - u_{wH})p' - v'(e)] \frac{\partial e^*}{\partial b} \] (3)

This expression is composed of three parts: \( -u_B' \), the decrease in the utility of consumption because of additional transfers; \( \beta [pu_{wL}' + (1 - p)u_{wH}'] \), which is the direct effect of the beneficiary’s utility on

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9In contrast, Bernheim et al. (1985) and Becker (1991, Ch. 1) consider the case of parents who, while altruistic, also care about some behavioral characteristic of their children, such as affection or career advancement; these are what Becker (1991) and Chami (1998) term ‘merit goods.’ In such models parents use transfers both to increase the welfare of their children and to purchase affection (or other merit goods) from their children. Equilibrium transfers are, on the margin, exchange-motivated rather than altruistic. By excluding merit goods from the analysis, we focus on the altruistic motivation for bequests and other transfers. Note, however, that adding exchange-motivated transfers to our model would not affect the results because the key point – that benefactors fail to internalize the collective effect of their actions on the labor market – remains.

10The derivation is provided in Appendix A.

11Notice that the change in the beneficiary/worker’s equilibrium effort for a small change in income is the same whether income is in the form of wages or transfers: in taking derivatives with respect to \( e^* \), one can show that \( \partial e^*/\partial b = \partial e^*/w_L + \partial e^*/w_H \), so that an increase in the transfer is equivalent to an increase in wages in both states of nature.
his benefactor’s utility, and is positive; and \( \beta \left( (u_{w_L} - u_{w_H})p' - u'(e) \right) \partial e^*/\partial b. \) In this last term, higher transfers yield lower effort (recall that \( e^* < 0 \)), which in turn increases the probability of the low-output state. However, the term in brackets is nothing more than the first-order condition for the beneficiary (Eq. (2)), and hence is zero in equilibrium; holding wages constant, the benefactor completely internalizes the effect that the transfer has on the beneficiary’s labor supply. Note that if the benefactor cared about effort directly, as in the discussion of merit goods in Becker (1991, Ch. 1), this term would have an additional, nonzero component, reflecting the moral hazard between the benefactor and the transfer recipient. Eq. (3) reflects the fact that, at the margin, the benefactor is an altruist, and transfers are compensatory in nature. Solving (3) implicitly for \( b^* \), we find that \( b^* = b^*(w_L, w_H, e^*; \beta) \), where \( \partial b^*/\partial w_H < 0 \) and \( \partial b^*/\partial \beta > 0 \). The derivation of these expressions is shown in Appendix A.

The benefactor’s reaction to changes in the beneficiary’s wage income illustrates that transfers are substitutes for wages with respect to protecting the beneficiary/worker against negative income shocks. This is a function of the compensatory nature of altruistically-motivated transfers.

2.3. Wages

Firms, anticipating the reaction that wages have on transfers and worker effort, offer wages in each state to maximize profits, subject to a zero-expected-profit condition. Rearranging (1), the zero-profit condition yields the following relationship between wages in good and bad states of nature:

\[
w^*_L = x_L + (x_H - w_H) \frac{1 - p(e)}{p(e)}
\] (4)

Note that this expression indicates an inverse relationship between \( w^*_L \) and \( w_H \). Firms then choose \( w_H \) to maximize profits (Eq. (1)), while their equilibrium choice of wages is subject to the constraint in Eq. (4).

3. Welfare implications of private income transfers

Differentiating the zero-profit condition (4), we have

\[
\left[ \frac{d}{d\beta} \left( \frac{w_L - x_L}{x_H - w_H} \right) \right] = \frac{p'}{p^2} \frac{\partial e^*(b^*(\beta))}{\partial \beta} < 0,
\]

where, as we have shown previously, \( \partial e^*/\partial b < 0 \) whereas \( \partial e^*/\partial \beta > 0 \). Since risk-aversion on the part of workers implies that \( w_L < x_L \) and \( w_H < x_H \), an increase in \( \beta \) moves \( w_L \) and \( w_H \) further apart from one another, and closer to the value of marginal output in their respective states of nature. This reduces the insurance aspect of wages, placing more risk with risk-averse workers and less with risk-neutral firms.

Intuitively, benefactors take as given the wage rate when making transfer decisions. The aggregate effect of transfers, however, causes firms to react to the effort-reducing incentives of such nonmarket transfers by reinforcing the incentives that different wages across states of nature provide. Thus
transfers in effect crowd out wages from the standpoint of the distribution of risk across economic agents. Benefactors, who are also risk-averse, wind up bearing more risk than before. These effects suggest that altruistically-motivated transfers, through their effect on the equilibrium wage rates, reduce welfare.

The following Proposition makes this argument explicit:

**Proposition.** The equilibrium level of transfers exceeds the socially optimum level of transfers for all positive values of $\beta$.

**Proof.** The planner’s problem is to maximize the expected utility of the benefactor, $U_B$, subject to the utility-maximizing choice of effort for the beneficiary – that is, subject to

$$e^* = \arg \max_{EU_w} -u_p + \beta \left[ p(e^*)u_{wL} \left( \frac{\partial w^*}{\partial e^*} \frac{\partial e^*}{\partial b} + 1 \right) \right] = 0$$

Compare (5) with (3), recalling that $(u_{wL} - u_{wH})p' = v'$. The difference between the two equations is the term

$$p u_{wL} \frac{\partial w^*}{\partial e^*} \frac{\partial e^*}{\partial b}$$

Appendix A shows that $\partial e^*/\partial b < 0$ while $\partial w^*_L/\partial e^* > 0$, so (6) is negative for all $b > 0$. Hence $b^{op} < b^*$.

Both the planner and the benefactor recognize the effect of transfers on the beneficiary/worker’s effort, and internalize this effect. However, the planner, unlike the benefactor, also recognizes the effect that transfers have on the equilibrium wage in bad states of nature, and internalizes that effect as well. This is reflected in Eq. (6). Private income transfers, by lowering effort, also increase the gap between $w_L$ and $w_H$. This effect reduces welfare by shifting risk from the firm to the benefactor. Since all other terms are the same in both the planner’s problem and the benefactor’s problem, the planner prefers a lower level of transfers than does the benefactor.

### 4. Conclusion

While individual benefactors correctly view their transfers as having no effect on wages rates, the aggregate effect of many similar decisions does affect wages. This view is incorrect on a family-by-family basis. Each benefactor takes wages as fixed and chooses the appropriate level of transfer. However, evidence that private transfers (including transfers-in-kind, such as investments in education) are prevalent (Cox, 1987; Kotlikoff and Summers, 1981) suggests that examining
labor-market responses may be appropriate. That the conclusions of this model also apply to altruistically-motivated transfers between partners and spouses only strengthens our conclusions.

Moral hazard in the labor market causes firms to raise wages above the full-information level in good states of nature, but to lower wages below the full-information level in bad states. Nevertheless, firms still provide partial insurance to workers against negative productivity shocks. Altruistic benefactors give transfers in order to reduce labor market risk further, but transfers crowd out wages to perform this function. Because benefactors, like their beneficiaries, are risk-averse, however, this crowding-out effect makes transfers undesirable from a social point of view, by shifting risk from risk-neutral employers to benefactors. This shift of risk is inefficient, and leads to a third-best solution.

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Appendix A

A.1

Taking the differential of the first-order condition for the worker (Eq. (2)), we obtain

\[
\begin{align*}
 e^*_1 &= \frac{\partial e^*}{\partial b} = -\frac{(u'_{wL} - u'_{wH})p'}{(u'_{wL} - u'_{wH})p'' - v''} < 0 \\
 e^*_2 &= \frac{\partial e^*}{\partial w_L} = -\frac{u'_{wL}p'}{(u'_{wL} - u'_{wH})p'' - v''} < 0 \\
 e^*_3 &= \frac{\partial e^*}{\partial w_H} = -\frac{-u'_{wH}p'}{(u'_{wL} - u'_{wH})p'' - v''} > 0.
\end{align*}
\]

A.2

Writing out the second order condition for transfers, and rearranging terms, gives,

\[
\Delta = \frac{\partial^2 EU_B}{(\partial b)^2} = \beta p' u'_{wL} \left[ \frac{p' e^{*1}}{p} + \frac{u''_{wL}}{u'_{wL}} \right] - p' e^{*1} u'_{wH} + u''_{wH} + \beta (1 - p) u''_{wH}.
\]

Note that all the terms save the one in brackets are negative, thus a sufficient condition for the concavity of the benefactor’s surplus function is

\[
\frac{-u''_{wL}}{u'_{wL}} > \frac{p' e^{*i}}{p}, \text{ where } i = 1, 2. \quad (A.1)
\]

The above assumption implies that a sufficient condition for an interior solution to the benefactor’s
problem is that the beneficiary is sufficiently risk averse, such that the direct impact of a change in his wealth on his marginal utility of wealth, in the bad state, exceeds the indirect impact of wealth on the probability of a low output occurring through its effect on the beneficiary’s effort.

To sign the derivative of $b^*$ with respect to $\beta$, differentiate the first-order condition for the benefactor (3):

$$\frac{db^*}{d\beta} = -\frac{[pu'_{wL} + (1-p)u'_{wH}]}{\Delta} > 0.$$  
$$\frac{db^*}{dw^*_H} = -\beta\frac{[1-p]u''_{wH} + (u'_{wL} - u'_{wH})p'e^*]}{\Delta} < 0.$$  

A.3

From the zero-profit condition,

$$\frac{dw^*_{-L}}{de^*} = -\frac{(x_H - w_H)}{p} - \frac{(x_H - w_H)(1-p)}{p^2}p'$$  
$$= -\frac{(x_H - w_H)}{p^2}p' > 0.$$  

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