



HOKKAIDO UNIVERSITY

Title	Transfer Arrangement, Labor Migration and Community Welfare
Author(s)	Yamada, Daichi
Citation	Discussion Paper, Series A, 272, 1-11
Issue Date	2014-05
Doc URL	https://hdl.handle.net/2115/55296
Type	departmental bulletin paper
File Information	DPA272.pdf



Discussion Paper, Series A, No.2014-272

Transfer Arrangement, Labor Migration
and Community Welfare

Daichi Yamada

5.2014

Graduate School of Economics &
Business Administration
Hokkaido University
Kita 9 Nishi 7, Kita-Ku, Sapporo 060-0809, JAPAN

Transfer Arrangement, Labor Migration and Community Welfare

Daichi Yamada [†] [‡]

Graduate School of Economics and Business Administration, Hokkaido University.

Abstract

An informal transfer arrangement within a community redistributes incomes. While this may improve the welfare by mitigating the income inequality, it will also affect households' decisions on labor migration, a way to expand incomes. This paper theoretically examines the transfer arrangement that maximize the community welfare, taking into account its effect on endogenous labor migration decisions. The result shows that the welfare is maximized when the redistribution through transfer is limited. It also presents an alternative explanation for empirical findings of limited transfer arrangement.

Keywords: Informal transfer, Labor migration.

JEL classification: O15, O17.

1 Introduction

An informal transfer arrangement between households and labor migration play important roles on the welfare, especially in developing countries. Transfers mitigate the income inequality and risks

[†]Address for correspondence: dyamada@econ.hokudai.ac.jp.

[‡]The author is grateful to M. Hiwatari and A. Ohyama for their helpful comments.

instead of formal redistribution or insurance, which are often imperfect in developing countries (Ravallion & Dearden 1988, Townsend 1994). Households in developing countries send some of their members out by labor migration, share migrants' incomes through remittances, and realize higher household incomes (Lucas & Stark 1985).

Although each of these improves the community welfare, if one considers these activities simultaneously, their roles on the community welfare get ambiguous. A transfer arrangement will affect households' migration decisions. On one hand, a transfer arrangement can encourage migration. Households can receive transfers if their household members get unemployed in the migration destination. This mitigates the risk of migration and encourages risk-averse households to send migrants (Lucas & Stark 1985). On the other hand, a transfer arrangement can discourage migration. Households may be unwilling to send migrants if they know that migrants' incomes flow to other households through transfers. Then the arrangement can even deteriorate the community welfare since the high incomes that could be obtained by labor migration are gone. These illustrate the trade-off between encouraging migration and redistribution, and therefore the role of the arrangement on the community welfare is ambiguous intuitively.

This paper theoretically examines the transfer arrangement that maximizes the welfare of the community whose members make labor migration decisions endogenously. Ignoring the effect of the arrangement on the labor migration decisions, the egalitarian redistribution through transfers maximizes the Benthamian community welfare. However, the above argument suggests that it is not necessarily true if endogenous labor migration decisions are considered.

The contribution of this paper is that it presents a simple model to discuss the relationships between a transfer arrangement, labor migration decisions, and the community welfare. Previous studies on transfer arrangements have regarded incomes as exogenous and labor migration decisions have been out of scope (Coate & Ravallion 1993, Ligon et al. 2002). However the importance of labor migration and remittances for developing countries is growing nowadays. For example, migrants' remittances surpass the ODA and amount to non-negligible percentage of GDP in some countries (Yang 2011). This suggests that the exogeneity of incomes may not be adequate in some

cases and that, to discuss the role of the arrangement on the community welfare, incorporating its effect on labor migration decisions is necessary.

The results show that neither maximization of the migration rate nor egalitarian redistribution maximizes the community welfare. When the migration rate is maximized, the community's aggregate income also reaches its maximum. Although this seems to be beneficial to the community welfare, there remains substantial income inequality between households. Additional transfers can mitigate the inequality and improve the community welfare without discouraging labor migration much. However, too much redistribution is not beneficial, either. Migration is discouraged so much as the welfare loss from decreased aggregate income surpasses the gain from redistribution. Therefore at intermediate level of redistribution, the community welfare will be maximized.

This also presents an alternative interpretation of empirical findings of limited transfer arrangements. Empirics often find that the actual arrangements are limited and inefficient (Foster & Rosenzweig 2001, Townsend 1994). Previous studies have explained these findings by lack of enforceability of transfers and suggest that the communities compromise with limited arrangements although more transfers can improve the welfare (Coate & Ravallion 1993, Ligon et al. 2002). However, the result suggests the possibility that the community *do not* employ the egalitarian transfer arrangement so as to encourage labor migration, expand the community's aggregate income, and improve the welfare.

2 Model setting

Consider a community consisting of a continuum of households all of which have one worker and one non-worker. Each household decides whether to send the worker out by labor migration while it participates in a transfer arrangement.

Income in the community is y_o . Labor migration expands the income although it has the unemployment risk; a migrant earns y_e with probability of $p \in [0, 1]$ and $y_u = 0$ otherwise, where $py_e > y_o$. These incomes and probabilities are identical. Also the community can observe mi-

grants' incomes by observing remittances within migrants' households. Let $\beta \in [0, 1]$ be the migration rate, which will be solved in the next section. The community's average income will be

$$\bar{y} = \beta p y_e + (1 - \beta) y_o.$$

The transfer arrangement is treated as follows. The social planner subscribes each household making a transfer of $\alpha(y_s - \bar{y})$ for $s = o, e, u$. $\alpha \in [0, 1]$ captures the degree of redistribution; $\alpha = 1$ corresponds to the egalitarian and $\alpha = 0$ corresponds to autarchy. Since $y_e \geq \bar{y} \geq y_o$, those with y_e are donors while those with y_o and y_u make negative transfers, i.e. they are recipients. Assume that the transfers are perfectly enforceable.¹ Then ignoring savings and loans, each household consumes

$$c_s = y_s - \alpha(y_s - \bar{y}) = \alpha\bar{y} + (1 - \alpha)y_s \text{ for } s = o, e, u.$$

This is basically the same equation Townsend (1994) estimates.

The utility of household i is $u(c_s) - z_i$. Assume $u'(c) > 0$, $u''(c) < 0$, $u(0) = 0$ and $u'(\infty) = +\infty$. z_i is the utility cost of migration, which is uniformly distributed in $[0, \bar{z}]$ across households and subtracted if i chooses migration. It captures the effort migrants make such as making a lot of official or counterfeit documents or getting accustomed to the migration destination (Chiquiar & Hanson 2005, Sjaastad 1962).

The decisions are made in a two-stage game. In the first stage, the social planner decides α to maximize the community welfare. In the second stage, given α , each household makes its migration decision to maximize its own expected utility. A migration decision does not depend only on α , but also on other's decisions since they change $\bar{y}$ and c_s . Therefore the equilibrium concept for the whole game is the subgame perfection while that for each subgame is Nash equilibrium.

¹While households on the donor side may deviate from the arrangement by not making transfers, Ligon et al. (2002) shows that any transfer is enforceable if the punishment for the deviators is sufficiently strong. Communities often possess (sometimes irrationally) severe punishments such as excommunication, violence, shame, or deprivation of rights to trade, inherit or marry, which deter households from deviation (Fafchamps 2011).

3 Equilibrium and community welfare

3.1 Equilibrium migration rate in each subgame

Each household makes migration decision to maximize the expected utility, given α . Suppose that households expect the migration rate to be β . Then the gain from migration except utility cost is

$$pu(c_e) + (1 - p)u(c_u) - u(c_o) \equiv f(\alpha, \beta)$$

To see how α and β affect the gain, consider partial derivatives of f with respect to α and β ;

$$f_\alpha(\alpha, \beta) = p(\bar{y} - y_e)u'(c_e) + (1 - p)\bar{y}u'(c_u) - (\bar{y} - y_o)u'(c_o)$$

$$f_\beta(\alpha, \beta) = \alpha(py_e - y_o)[pu'(c_e) + (1 - p)u'(c_u) - u'(c_o)]$$

The signs of these derivatives are ambiguous. While an increase in α may raise the gain from migration by mitigating the unemployment risk, $u'(c_u)$, it can also reduce the gain by reducing c_e and raising c_o . Indeed, $f_\alpha(0, \beta) = +\infty$ while $f_\alpha(1, \beta) = (-py_e + y_o)u'(\bar{y}) < 0$. Similarly, an increase in β can both raise and reduce the gain.

Although these signs are ambiguous, assume

$$\begin{aligned} f_{\alpha\alpha}(\alpha, \beta) &< 0, \quad f_{\beta\beta}(\alpha, \beta) < 0, \quad \text{and} \\ f_{\alpha\beta}(\alpha, \beta) &> 0 \quad \text{for any } \alpha \in (0, 1), \beta \in [0, 1]. \end{aligned} \tag{1}$$

The first two assumptions tell that increases in α and β likely reduce the gain if the respective variables are already large. The last assumption tells that an increase in α likely raises the gain if β is large. Indeed, the larger is β , the more an increase in α raises c_u and the less it reduces c_e .

Now consider households' decisions. Migration is the best response for any i with $z_i \leq f(\alpha, \beta)$. To focus on the community where migration likely occurs but migration of all workers does not

occur, assume

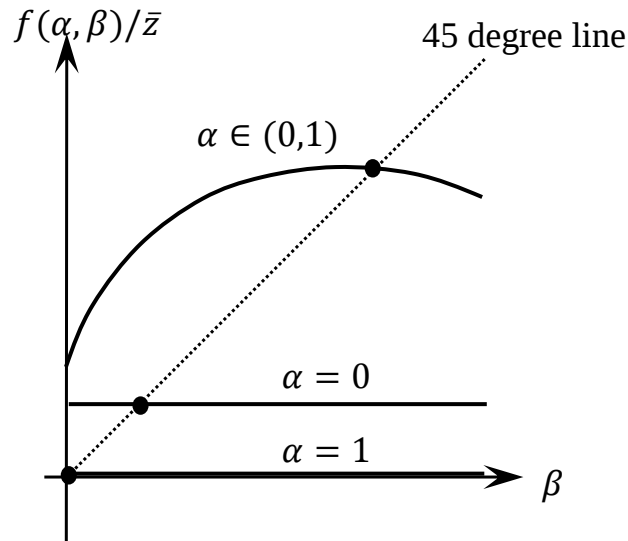
$$f(\alpha, \beta) \geq 0 \text{ and } f(\alpha, \beta) < \bar{z} \text{ for any } \alpha, \beta. \quad (2)$$

Since z_i is uniformly distributed, the best-response migration rate will be $f(\alpha, \beta)/\bar{z}$. Then a Nash equilibrium for each subgame can be defined as $f(\alpha, \beta)/\bar{z} = \beta$.

Lemma 1 *Each subgame with given α has the unique Nash equilibrium.*²

Figure 1 describes the equilibrium in each subgame. f is flat for $\alpha = 0, 1$. $f(1, \beta)$ always corresponds to the horizontal axis while $f(0, \beta)$ may or may not. For $\alpha \in (0, 1)$, f crosses the 45 degree line from above. Although the sign of the slope is undetermined, it must be decreasing in β . In any case, the equilibrium for each subgame is unique.

Figure 1



3.2 Equilibrium transfer arrangement and community welfare

The social planner chooses α , taking into account the best responses to be made in each subgame. However, before moving to the social planner's problem, discuss the properties of equilibrium in

²Proofs of all lemmas and the proposition are given in Appendix.

the subgame.

Lemma 2 *Let $\beta(\alpha)$ be the subgame-equilibrium migration rate, i.e. $f(\alpha, \beta(\alpha))/\bar{z} = \beta(\alpha)$. Then*

- (i) $\beta(\alpha)$ is a continuous function of α .
- (ii) There is the unique migration-rate maximizer $\alpha_m \in (0, 1)$.
- (iii) $\beta(1) = 0$.
- (iv) $\beta'(\alpha) < 0$ and $\beta''(\alpha) < 0$ for any $\alpha > \alpha_m$.

Now suppose that the social planner maximizes the Benthamian welfare function, $W(\alpha)$. Since only households with $z_i \leq f(\alpha, \beta(\alpha)) = \bar{z}\beta(\alpha)$ choose migration and pay the utility costs,

$$\begin{aligned} W(\alpha) &= \beta(\alpha)[pu(c_e) + (1 - p)u(c_u)] - \frac{1}{\bar{z}} \int_0^{\bar{z}\beta(\alpha)} z_i dz_i + (1 - \beta(\alpha))u(c_o) \\ &= (\beta(\alpha))^2/2 + u(c_o). \end{aligned}$$

If incomes are exogenous, $\alpha = 1$ maximizes the welfare.³ However, if endogenous migration decisions are considered, it is not.

Proposition. *The unique welfare maximizer α_w lies in $(\alpha_m, 1)$.*

Consider the maximization of the migration rate, which also maximizes the community's aggregate income. While it seems beneficial to the community welfare, there remains a consumption inequality between households. Proposition tells that, at α_m , although an increase in α reduces the migration rate and the aggregate income, these losses can be compensated by benefit of increased redistribution. Hence raising α from α_m improves the community welfare.

However, too large α is not beneficial to the community. The gain from migration is so small that few households choose migration and that the community's aggregate income is also low.

³For example, consider the maximization of

$$W(\alpha) = \beta[pu(c_e) + (1 - p)u(c_u)] + (1 - \beta)u(c_o) - \bar{z}\beta^2/2.$$

$\alpha = 1$ maximizes this welfare function.

$\alpha = 1$ is the extreme case where no migration occurs, i.e. $\beta(1) = 0$. Indeed, it minimizes the community welfare since $W(1) = u(y_0)$ and for any α , $c_o \geq y_o$ and $\beta(\alpha) \geq 0$.

Figure 2 and 3 describe the equilibria for three cases. In case 1, migration is riskier but more profitable than in case 2. Case 3 corresponds to cases where households are less risk averse than other two cases.⁴ In each cases, α_m is low while α_w is intermediate. At $\alpha = 1$, no migration occurs and the welfare is minimized.

Figure 2

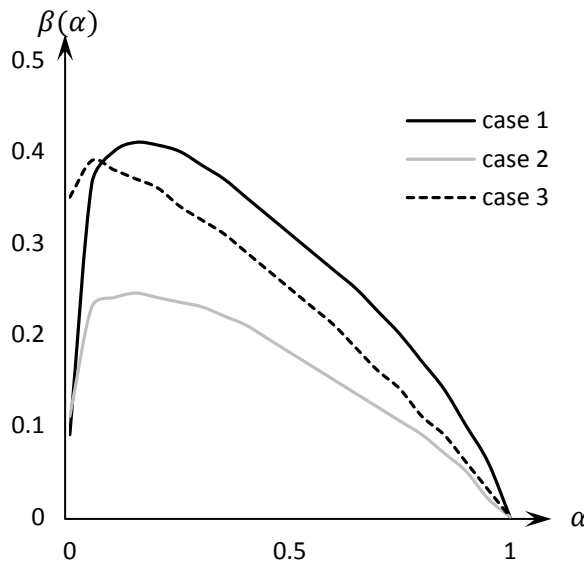
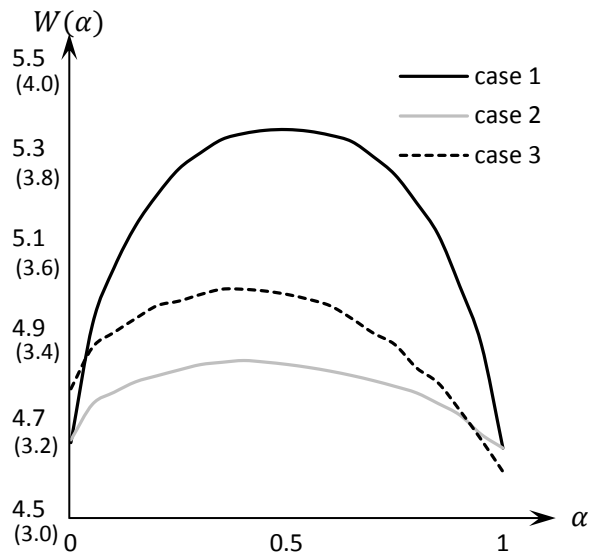


Figure 3



4 Discussion and Conclusion

The result is contrasting to the efficient transfer arrangement with exogenous income assumption, which tells that the egalitarian transfer arrangement maximizes the welfare. However, if endogenous labor migration decisions are considered, limiting the transfer arrangement ($\alpha < 1$) is

⁴The results in Figure 2 and 3 are derived as follows. The utility function is assumed to have the CRRA form, i.e. $u(c) = c^{1-\sigma}/(1-\sigma)$. Parameters are $(y_o, y_e, p, \bar{z}, \sigma) = (3, 20, 0.6, 3, 0.7)$, $(3, 8, 0.8, 3, 0.7)$ and $(3, 8, 0.8, 3, 0.3)$ for each case. Welfare for case 3 has quite different values from other 2 cases. The values of $W(\alpha)$ for case 3 are written in parentheses.

beneficial to the community.

The result also presents an alternative explanation for why empirics often find that the transfer arrangement is limited and inefficient (Foster & Rosenzweig 2001, Townsend 1994). Previous studies have explained these findings by lack of enforceability of transfers. Households in the donor side of the arrangement have incentives to deviate from the transfer arrangement by not making transfers if they are asked to make large transfers. Although the community punishes these deviators, if the punishment is not sufficiently strong, the community cannot prevent deviation. Therefore the community compromises with asking donor households to make only limited amount of transfers although more redistribution can improve the welfare (Coate & Ravallion 1993, Ligon et al. 2002). Different from this logic, the result of this paper suggests the possibility that the community do not ask donor households to make too large amount of transfers. In that case, limited transfer arrangement is not necessarily inefficient, but can be regarded as the community's intention to encourage labor migration, expand the aggregate income, and improve the welfare.

Appendix

PROOF OF LEMMA 1. If $\alpha = 0$, then $\forall s, c_s = y_s$. If $\alpha = 1$, then $\forall s, c_s = \bar{y}$. I.e. for $\alpha = 0, 1$, f is constant and has the unique fixed point. For $\alpha \in (0, 1)$, let $g(\alpha, \beta) \equiv f(\alpha, \beta)/\bar{z} - \beta$. By (2) and (1), $g(\alpha, 0) > 0$ and $g(\alpha, 1) < 0$. By the intermediate value theorem, $\exists \beta \in (0, 1)$ s.t. $g(\alpha, \beta) = 0$, which is a fixed point of f . Let β^* be the smallest of such β . Then $\exists \beta^{**} < \beta^*$ s.t. $g_\beta(\alpha, \beta^{**}) < 0$. This and $g_{\beta\beta} < 0$ imply $\forall \beta \geq \beta^{**}$, $g_\beta(\alpha, \beta) < 0$. Therefore, $f(\alpha, \beta) = 0$ holds only at β^* . ■

PROOF OF LEMMA 2. Simple application of $\varepsilon - \delta$ method suffices to prove (i). (iii) is clear since $\forall \beta, f(1, \beta) = 0$.

(ii) Since $\beta(\alpha)$ is continuous and $\alpha \in [0, 1]$, there is the maximum. The derivatives of $\beta(\alpha)$ are

$$\beta' = f_\alpha / (\bar{z} - f_\beta) \quad \text{and}$$

$$\beta'' = [(\bar{z} - f_\beta)(f_{\alpha\alpha} + f_{\alpha\beta}\beta') + f_\alpha(f_{\beta\alpha} + f_{\beta\beta}\beta')] / (\bar{z} - f_\beta)^2.$$

Since $f_\beta/\bar{z} < 1$ at the fixed point, the sign of β' and f_α are the same. Note $\alpha_m \neq 0, 1$ since $f_\alpha(0, \beta(0)) > 0$ and $f_\alpha(1, \beta(1)) < 0$. Hence a migration-rate maximizer satisfies $\beta' = f_\alpha = 0$. Note also that, if $\beta' \leq 0$, then $\beta'' < 0$. This proves the uniqueness of α_m and (iv). ■

PROOF OF PROPOSITION. Since $W(\alpha)$ is continuous and $\alpha \in [0, 1]$, there is a welfare maximizer. Consider $W'(\alpha) = \beta\beta' + u'(c_o)(py_e - y_o)(\beta + \alpha\beta')$. $W'(\alpha_m) = u'(c_o)(py_e - y_o)\beta > 0$. $W'(1) = u'(y_o)(py_e - y_o)\beta' < 0$. Moreover $\forall \alpha < \alpha_m$, $W(\alpha) < W(\alpha_m)$ since $\beta(\alpha) \leq \beta(\alpha_m)$ and c_0 is increasing in both α and β . Hence $\alpha_w \in (\alpha_m, 1)$. Then the first-order condition implies $\beta' < 0$ and $\beta + \alpha\beta' > 0$. Consider the second-order condition, $W''(\alpha) = \beta'^2 + \beta\beta'' + u''(c_o)(py_e - y_o)^2(\beta + \alpha\beta')^2 + u'(c_o)(py_e - y_o)(2\beta' + \alpha\beta'')$. Substituting the first-order condition, one obtains $W''(\alpha) < 0$. This tells that the smallest α that satisfies the first-order condition is the unique welfare maximizer α_w . ■

References

- [1] Chiquiar, D. and G. H. Hanson (2005): “International Migration, SelfSelection, and the Distribution of Wages: Evidence from Mexico and the United States”. *J. Polit. Econ.* 113 (2), 239-281.
- [2] Coate, S. and M. Ravallion (1993): “Reciprocity without commitment: Characterization and performance of informal insurance arrangements”. *J. Dev. Econ.* 40 (1), 11-24.
- [3] Fafchamps, M (2011): “Risk Sharing Between Households”. In Benhabib, J., Bisin, A. and M. O. Jackson (eds.) *Handbook of Social Economics* 1, 1255-1279. Elsevier, Amsterdam.

- [4] Foster, A. and M. Rosenzweig (2001): "Imperfect Commitment, Altruism, and the Family: Evidence from Transfer Behavior in Low- Income Rural Areas". *Rev. Econ. Stat.* 83 (3), 389-407.
- [5] Ligon, E., Thomas, J. P., and T. Worrall (2002): "Informal Insurance Arrangements with Limited Commitment: Theory and Evidence from Village Economies". *Rev. Econ. Stud.* 69 (1), 209-244.
- [6] Lucas, R. E. B. and O. Stark (1985): "Motivations to Remit: Evidence from Botswana". *J. Polit. Econ.* 93 (5), 901-918.
- [7] Ravallion, M. and L. Dearden (1988): "Social Security in a "Moral Economy": An Empirical Analysis for Java". *Rev. Econ. Stat.* 70 (1), 36-44.
- [8] Sjaastad, L. (1962): "The Costs and Returns of Human Migration". *J. Polit. Econ.* 70 (5), 80-93.
- [9] Townsend, R. (1994): "Risk and Insurance in Village India". *Econometrica* 62 (3), 539-591.
- [10] Yang, D. (2011): Migrant Remittances. *J. Econ. Perspect.* 25 (3), 129-152.