The Determinants of Private Transfers in Rural Vietnam

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Abstract

We use the Vietnam Living Standard Survey conducted in 1993 and in 1998 to analyze the determinants of private transfers among rural farmers. Private transfers are widespread and important relative to pre-transfer income levels of recipients in both years. Conducting parametric and semiparametric analysis of single-index models for transfer status, we find that private transfers help smoothing income across the life cycle and across states of nature. Pre-transfer income is positively related to the net donor status and negatively associated with the net recipients status, especially for low levels of income. These results suggest that crowding-out of public redistributive policies targeted to the rural poor might be an issue to take into account in Vietnam.

JEL Classification: D63, D64, I15, I30

Keywords: Private Transfers; Single-Index Model; Probit; Semiparametric Estimation; Vietnam.

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1 Introduction

Analyzing inter-household private transfers in developing countries matters because these transfers can act as partial substitutes for weak public transfers or for the absence of adequate market institutions designed to pool idiosyncratic risk. More specifically, the transfer response to changes in income is of primary interest since it has important consequences for the design of public redistribution policies. If inter-household private transfers are very responsive to income, the redistributive effect of government policies could be weakened due to "crowding-out" effects.

The possibility that public transfers could crowd-out existing private transfers was first suggested by Barro (1974) and Becker (1974). In subsequent theoretical work, the inflow of private transfers was modeled as being either negatively or positively determined by the recipient's income, depending on the nature of these private transfers. Cox (1987) shows that if private transfers are altruistic in nature, or if they follow self-interested risk-sharing arrangements, then the inflow of private transfers should be negatively related with recipients income. If private transfers are driven by exchange motives though, it is possible that the response of private transfers inflow to recipients income becomes positive.

So far, the existing empirical evidence on developed countries found a very weak, if any, relationship between transfer inflow and income. Based on US data, Cox and Jakubson (1995) and Altonji et al. (1997) estimate transfer derivatives on the order of magnitude of 10 cents for a 1 dollar change in income. One explanation accounting for this low magnitude could be that public transfers are already sufficiently developed in the US, so that private transfers do not respond one to one to income changes. This is the reason why the empirical literature on private transfers has recently shifted its attention do developing countries where the public sector is less in the capacity of managing generalized redistribution transfers.

Cox et al. (2004) analyze inter-household private transfers in the Philippines and they find evidence of non-linear effects in the way transfers respond to income. This possible non-linearity in the transfer response to income can also explain to some extend why previous empirical studies based on linear specifications didn't find a strong elasticity of transfers to income. While previous studies have focused on either one of the three motives underlying private transfers (altruism, exchange or risk-sharing), Cox et al. (2004) argue that taking into account all three motives together could explain

the presence of non-linear effects in the transfer function. They found evidence of strong transfer derivatives, but only among low income households. Their result is consistent with transfers being determined either by altruism or by risk-sharing considerations. Yang and Choi (2007) also look at Philippine households but they focus on transfers received from abroad (remittances). Contrarily to Cox et al. (2004) they adopt a linear specification of the transfer function, and they find some evidence in support of transfers being driven by risk-sharing arrangements. Finally, Kazianga (2006) analyzes the transfer behavior of rural households from Burkina Faso, allowing for non-linear effects in the transfer response to income. His findings contrast with those of Cox et al. (2004) in that the transfer response to income is found to be small, and it is smaller for the low income households. This result implies in turn that as far as Burkina Faso is concerned, crowding out effects from public transfers may not arise for very low income groups.

In our paper, we use a household survey from Vietnam conducted in 1993 and 1998 to study the determinants of inter-household private transfers among rural farmers. Cox (2002) gives a descriptive overview of transfer patterns based on the same data-set, highlighting the fact that these transfers are large and widespread in both years of the survey. Our contribution is to build up on this descriptive work using regression analysis to examine the scope for potential crowding-out effects in Vietnam. We use both parametric and semiparametric methods to conduct binary dependent variable analysis focusing on the probability that a rural farmer is either net receiver or net sender of private transfers. We find that the probability of being a net receiver depends negatively on recipients pre-transfer income in a non-linear way. The low income group is more likely to receive transfers than higher income groups. This finding alone suggest that crowding-out effects from public redistribution policies might be an issue for the low income group. Furthermore, The probability of being a net sender of transfers depends positively on pre-transfer income of the sender. Finally the age of the household's head is another strong determinants of transfer inflows.

The paper is organized as follows. Section 2 presents a conceptual framework for private transfers following Cox (1987) and Cox et al. (2004). The third section describes the data and gives a first account of transfer patterns in rural Vietnam. Empirical methods and results are described in section 4 and section 5 concludes.

2 Conceptual Framework

The theoretical literature on private transfers is driven mainly by two lines of work: the altruism vs exchange dichotomy, and the risk-sharing motive.

2.1 Altruism vs Exchange

The standard analytical framework in the transfer literature is one in which there is a dichotomy between pure altruism and exchange motives ((Cox, 1987)).

Consider two individuals, a donor d and a recipient r. One-sided altruism from the donor perspective is assumed, and the recipient's utility V enters directly in the donor's utility function U.

$$U_d = U\left(C_d, S, V\left(C_r, S\right)\right) \tag{1}$$

$$C_d = Y_d - T \tag{2}$$

$$C_r = Y_r + T \tag{3}$$

$$V\left(Y_r + T, S\right) \geq V_0\left(Y_r, 0\right) \tag{4}$$

S denotes "services" (in a large sense) that the recipient might deliver to the donor. C_d and C_r are consumption levels of, respectively, the donor and the recipient, and Y_d and Y_r are their pre-transfer income levels. Expressions (2) and (3) are the budget constraints faced by the donor and the recipient, with T being the amount of transfer taking place from the donor to the recipient. Altruism is implied by assuming that $\frac{\partial U}{\partial V} > 0$, and the exchange motive is also embedded by assuming that $\frac{\partial V}{\partial S} < 0$ and $\frac{\partial U}{\partial S} > 0$. Finally, (4) is a participation constraint specifying that the recipient accepts receiving the donor's transfer only if his utility improves over the status quo. Additional necessary assumptions involve the absence of market substitutes for the services S provided by the recipient, and the dominating position of the donor in the bargaining arrangement in order to ensure that the transfer amount T exactly compensates the offered services S.

When the participation constraint is not binding ($V > V_0$), altruism is the main driving force behind private transfers. In this is the case Cox (1987) shows that $\frac{\partial T}{\partial Y_r} < 0$. When the participation constraint binds however, transfers are driven by exchange motives. In this case, transfers will first rise with Y_r for low income levels and then fall with Y_r, generating and inverted-U-shaped relationship.

The work of Cox et al. (2004) with Philippine data, and of Kazianga (2006) with rural households from Burkina Faso, suggest that the coexistence of altruism and exchange-based motivations behind transfers can generate non-linearities in the empirical relationship between transfers and income.

In addition to altruism and exchange risk-sharing arrangements can also drive transfers.

2.2 Risk Sharing and Transfers

Becker (1974) already noted that altruistic transfers could imply that effective risk-sharing is taking place. However, subsequent work on risk sharing showed that altruism is not needed for mutual insurance to occur through private transfers. The studies of Cochrane (1991) and Townsend (1994) for example suggest that selfish individuals could enter into efficient risk-pooling arrangements taking place through private transfers or through other means.

In this setup, if risk-sharing takes place through private transfers, it means that transfers inflow will be negatively related to the recipient's transitory income and similarly, transfer outflows will be positively related to the donor's transitory income. Moreover, the consequences of a given negative income shock are often likely to be higher for low income groups, meaning that a higher amount of transfer is needed to insure households in low income categories.

Hence, whether transfers are motivated by altruism or exchange considerations, or whether they are the manifestation of informal risk-sharing arrangements taking place between selfish individuals, the relationship between transfers and income is likely to be non-linear. In the following analysis, this potential non-linearity will be explicitly taken into account.

3 Data and Transfer Patterns

This section presents the Vietnam Living Standard Survey (VLSS) and focuses particularly on transfers and income. Patterns of inter-household private transfers are given at the end of the section.

3.1 The Vietnam Living Standard Survey

The first round of the Vietnam Living Standard Survey (VLSS93) was conducted between October 1992 and October 1993. A total of 4,800 households were first randomly selected according to a multistage cluster sampling procedure in order to give a representative picture of the whole country, based on the 1989 census data. The second round of the survey was conducted between December 1997 and November 1998 (VLSS98). The VLSS98 bears many similarities in design with the VLSS93, and 4,305 households interviewed during the first round of the survey were re-interviewed in 1998. In addition to these households, the sample size was increased to a total of 5,999 households. Both surveys were undertaken by the General Statistical Office of Vietnam, with the technical assistance of the World Bank.

Overall, both survey were well designed and conducted. They offer an important source of reliable information related to the country's living standards during a period of transition. The surveys were conducted in the aftermath of the "Doi Moi", a generic term describing a set of important reforms taken in 1986 and designed to gear a centrally planned country towards a decentralized market economy. Between 1993 and 1998, Vietnam's GDP rose by 8.9% per year, and the headcount poverty declined from 58% to 37%.

The questionnaires were based on a standard format used by the World Bank in other Living Standard Measurement Surveys. Typically, these questionnaires are divided into many components including household demographics, education, health, employment, agricultural activity, migrations, consumption, and private transfers.

In this paper we focus on a sub-sample of rural farmer households who participated in both rounds of the survey. This subsample is composed with 2871 households interviewed in 1993 and in 1998.

3.2 Transfers

Sections 12 and 13 in the questionnaires were dedicated to ”assistance send” and ”assistance received”. The head of the household was asked: *”during the past 12 months has any member of your household provided (received) money or goods to (from) persons who are not member of your household?”*. If this question was answered positively, then details were asked at the individual level concerning the relationship of the donor to the recipient, the monetary value of the transfer and the geographical origin and destination of the transfer.

Ideally, to analyze transfer relationships, one would need very detailed information from *both* the donor *and* the recipient for every transfers. This is simply not feasible in a survey as large as the VLSS. What we have here instead is detailed information on *either* the recipient *or* the donor.

In this paper, we focus our attention on pure domestic transfers. We do not take into account borrowing and lending transfers which can occur between an individual and a formal financial institution or (and this is indeed often the case) between an individual and a a private moneylender. Moreover, we focus on domestic transfers and discard remittances from abroad. We do so because remittances from abroad involve a minority of farmers in our sample and because the magnitude of these transfers is much higher than the magnitude of domestic transfers, suggesting that these flows should be considered separately. Patterns of transfers ares described at the end of this section, but before we now turn our attention to households income.

3.3 Income

The VLSS does not provide direct calculations of household income, but detailed information on the sources of income is available and allows us to estimate household real income for the whole sample in both years. Nominal income is corrected in both years for monthly and regional variations. Moreover we express income from VLSS93 in 1998 real terms. From the survey information, total income can be disaggregated into 6 components: (1) income from land payments, (2) income from agricultural activities, (3) non-farm self-employment income, (4) wage income, and (5) other income (including public and private transfers). The details concerning these broad income components are given in Appendix 1.

Income estimates obtained by aggregating these various components are in line with the estimated total consumption expenditures given by the survey (figure 1). We focus more specifically on pre-transfer income, that is total income plus transfers send to other households minus transfers received from other households. Annual pre-transfer income and total consumption per capita are both close to 1500 thousand VND. Between 1993 and 1998 in our sample of farmers, pre-transfer income grew at an annual rhythm of 9.6% while total consumption per capita grew at an annual rate of 5.3%.

The structure of income for our sample of farmers is represented in figure 4 and 5. Not surprisingly, the main component of farmers income is derived from agricultural activities. Figure 2 and table 1 show the regional repartition of income in 1993 and 1998[1]. Southern regions grew more rapidly than northern regions[2]. The highest growth is experienced in the Central Highlands, and this region deserves some special attention.

The Central Highlands is a region specialized in the production of tea and coffee. These coffee plantations were the result of a resettlement policy in New Economic Zones promoted by the government after the war. Vietnam became the 4th largest world exporter of coffee in 1998 with 6.5% of total production, most of which consists in Robusta variety. Coffee currently represents 12% of Vietnam total exports which is the second highest share behind rice[3]. Table 2 shows the repartition and the concentration of coffee producers in our sample. Central Highlands account for 48% of total coffee production in 1993 and for 60% in 1998. Moreover, 61% of Central Highlands farmers are coffee producers in 1993, and this proportion rises to 84% in 1998. These coffee producers experienced an important positive price shock between 1993 and 1998. World prices trends for coffee are pictured in figure 3. Coffee prices grew more than 150% between 1993 and 1998.

We will see below that most of these coffee producers involved in transfers are in fact net senders of transfers.

[1] Income calculations revealed outliers which were excluded from our subsample of farmers (64 households in 1993 and 69 in 1998). In most cases, these are households for which it was not possible to distinguish recurrent production costs from investment. The resulting sample size is thus 2807 in 1993 and 2802 in 1998

[2] In the figures, regions from left to right correspond to regions from north to south.

[3] See de Fontenay and Leung (2002).

3.4 Patterns of domestic transfers

Relatively many households in our sample participate in transfers, and the percentage of households involved in transfers rises between 1993 and 1998 from 23% to 32%. In other words, six years of sustained economic growth in Vietnam has not diminished the importance of transfers among Vietnamese farmers, to the contrary. If we look at the regional repartition of these participation rates (table 4a and 4b), it appears that households from the northern regions, relatively poorer than those in the south, are more likely to participate in transfers. These two tables also show us that Central highland farmers are net senders for the most part.

Private transfers are not only widespread, they are also important in magnitude (table 5). The average transfer amount received represent 7% in 1993 and 10% in 1998 of the average (pre-transfer) income of *all* farmers. If we consider now only recipient households, private transfers represent 60% of income in 1993 and 70% in 1998. Focusing on the whole sample and just on rural farmers, Cox (2002) reports lower magnitude, even though still important for the receiving households. For the whole sample, received transfers represent 32% of recipients income in 1993 and 39% in 1998. Private transfers are also relatively important relatively to the senders income level, amounting to 25% of senders income in 1993 and to 35% in 1998.

If we look now at the direction of transfers, we can say that these take place essentially within family members from other households. This relative vicinity of transfer partners is however less important in 1998 compared to 1993. Moreover, contrarily to the evidence reported from developed economies, transfers in rural Vietnam are more likely to flow from young to old individuals rather than from old to young.

Finally, table 3 gives us some insights about the characteristics of the net receivers of transfers compared to the net senders. Consistently with the previous findings, recipient households heads are older than donor households heads, and they include relatively more dependent members. Besides, net givers are relatively richer than net recipients, in terms of pre-transfer income, but also in terms of wealth.

4 Empirical Analysis

From the previous section, we saw that private transfers in Vietnam seem to function as family support means to elderly members, contributing to consumption smoothing across the live cycle. These transfers also seem to provide support from rich to poor members suggesting also the possible existence of an insurance motive. Building on the previous descriptive section we now turn our attention to regression analysis.

The approach adopted here is to use binary dependent variable regression methods to investigate what are the determinants of transfers status.

4.1 Econometric model

We choose an index function formulation to model the underlying latent variable determining the observed transfer status for net receivers and for net senders. Let y^*_{send} be this latent unobserved variable for net senders and y^*_{rec} for net receivers[4]. The index function model is given by:

$$y^*_{rec} = X\beta + u \tag{5}$$

X is an $N \times K$ matrix of exogenous explanatory variables for the transfer status binary indicator and β is a $K \times 1$ vector of parameters, with N observations and K explanatory variables, including a constant. This equation however cannot be directly estimated as y^*_{rec} is not observed. Instead we observe the binary variable y such that

$$y = \begin{cases} 1 \text{ if } y^*_{rec} > 0 \\ 0 \text{ if } y^*_{rec} \leq 0 \end{cases} \tag{6}$$

[4]We will present only the model for net receivers as both have similar formulations.

Moreover, we have that

$$\begin{aligned} \Pr\left[y=1\,|X\,\right] &= \Pr\left[y^{*}_{rec}>0\right] \\ &= \Pr\left[X\beta+u>0\right] \\ &= \Pr\left[-u<X\beta\right] \\ &= F\left(X\beta\right) \end{aligned} \tag{7}$$

where F is the cumulative distribution of $-u$ with $F\left(-u\right)=F\left(u\right)$ if the density is symmetric around 0.

We can choose to impose a parametric assumption concerning the distribution of u to this model. If we assume that $u\sim N\left(0,1\right)$, then (7) becomes a Probit model with $\Pr\left[-u<X\beta\right]=\Phi(\,X\beta)$, and $\Phi\left(.\right)$ is the cumulative distribution of the standard normal. The matrix X of explanatory variables includes household characteristics, permanent income controls (education of head, owned land surface, value of capital equipment and value of livestock), regional dummies and pre-transfer income. Quadratic terms for the age of the household head and for pre-transfer income are also included to allow for non-linear effects.

With this specification, some concern may arise regarding the identification of β if one explanatory variable is correlated with the error term.

4.2 Endogeneity

One could reasonably expect pre-transfer income to be endogenously determined with respect to transfer status, especially for net receivers. If effort is not perfectly observable and if recipient households anticipate some transfer for assistance when they report a low annual income, they have incentives to reduce their effort. As a result annual income would be lower for recipient households and identification of β would be biased.

Correlation between pre-transfer income and the error term u could also arise because of omitted variables or if income is measured with errors and if the measurement error is related to the dependent variable.

Our strategy to account for the potential endogeneity of income is to conduct an endogeneity test. Wooldridge (2001) presents a two-step procedure following Rivers and Vuong (1988) to test the endogeneity of regressors in a simultaneous probit model. We can rewrite (5) as

$$y^*_{rec} = Z_1\delta_1 + \alpha_1 y_2 + u_1 \tag{8}$$

$$y_2 = Z_1\delta_{21} + Z_2\delta_{22} + v_2 = Z\delta_2 + v_2 \tag{9}$$

$$y = \mathbf{1}\left[y^*_{rec} > 0\right] \tag{10}$$

where (u_1, v_2) has a bivariate normal distribution with mean zero and is independent of Z. If u_1 and v_2 are correlated, y_2 is endogenous.

In our case, y_2 is our measure of pre-transfer income, Z_1 are the other explanatory variables, and Z_2 is an instrument for income. We use estimated shocks to the farmers production function as an instrument for pre-transfer income. The underlying identifying assumption that we are making here is that these estimated shocks matter for the transfer status only insofar as they matter for income.

4.2.1 Shocks to farmers production function

For the farmers production function, we assume a Cobb-Douglas form given by

$$\log Y_{it} = \alpha + \sum_{k=1}^{K} \beta_k \log X_{kit} + \gamma\varphi_{it} + \sum_{t=1}^{T}\sum_{c=1}^{C} \lambda_{ct}\delta_{ct} + \phi_i + \epsilon_{it} \tag{11}$$

where Y_{it} is the real value of household agricultural revenue, X_{kit} are k inputs to the production function, and ϕ_i is a fixed-effect capturing heterogeneity across households such as unobserved ability but also time invariant commune characteristics such as soil conditions and other geographic characteristics influencing production. δ_{ct} are commune-year characteristics which are meant to capture time-varying common conditions or shocks to households production function. ϵ_{it} is a mean zero error term which is identically and independently distributed across households. We use ν_{it} as a measure of idiosyncratic shock to the household production function. Input variables X_{kit} include cultivated land surface, hired labor expenses, hours worked on farm by the household members, the value of capital equipment used for production and the value of various input expenditures such as seeds, fertilizers, insecticides, transport and storage. We also include a measure of technical

efficiency φ_{it} in the regression, where technical efficiency is obtained after estimating a stochastic frontier production function following Battese and Coelli (1995). In this specification, technical efficiency effects are an explicit function of household-specific variables and are allowed to vary in time. The stochastic frontier model can be written as

$$\log Y_{it} = \alpha + \sum_{k=1}^{K} \beta_k \log X_{kit} + (\nu_{it} - u_{it}) \tag{12}$$

where Y_{it}, X_{kit} are as defined earlier, $\nu_{it} \sim iid\left(0, \sigma_v^2\right)$ and are independent of the u_{it} which are non-negative random variables accounting for technical efficiency in farm production. u_{it} measures the distance to the efficient stochastic production frontier given by $\alpha + \sum_{k=1}^{K} \beta_k \log X_{kit} + \nu_{it}$. We assume that u_{it} are independently distributed as truncation at zero of the $N\left(m_{it}, \sigma_u^2\right)$ distribution, where

$$m_{it} = z_{it}\delta \tag{13}$$

where z_{it} are p household-specific variables influencing farm efficiency. In our case, z_{it} contains information on the number of crops owned by the household, the age and education of the household head, and the size and composition of the household. Our estimated measure of technical efficiency to be included in (11) is thus given by

$$\hat{\varphi}_{it} = \exp\left(-u_{it}\right) \tag{14}$$

We use the estimated residuals from (11) to construct shock variables for agricultural revenues a

$$exp(\hat{\epsilon}_{it})/\hat{Y}_{it} \tag{15}$$

Figure 6 represents the distribution of these shocks in 1993 and in 1998. The distribution is bell shaped and centered around zero with most observation belonging to the $[-20\%; +20\%]$ interval, with extreme values ranging in $[-40\%; +40\%]$.

4.2.2 Two-step endogeneity test

Rivers and Vuong (1988) show that if

$$(u_1, v_2) \sim N\left(\mathbf{0}, \begin{bmatrix} 1 & \eta_1 \\ \eta_1 & \tau_2^2 \end{bmatrix}\right)$$

then we can write $u_1 = \theta_1 v_2 + e_1$ with $\theta_1 = \eta_1/\tau_2^2$ and $e_1 \perp Z$ and v_2.

In this case, we have that

$$\Pr[y = 1 \,|Z, y_2, v_2] = \Phi\left[(Z_1\delta_1 + \alpha_1 y_2 + \theta_1 v_2) / \left(1 - \rho_1^2\right)^{1/2}\right]$$

So observing v_2 would allow us to run a probit regression of y^*_{rec} on Z_1, y_2 and v_2 in order to estimate consistently the scales coefficients $\delta_{\rho 1} \equiv \delta_1/\left(1 - \rho_1^2\right)^{1/2}$, $\alpha_{\rho 1} \equiv \alpha_1/\left(1 - \rho_1^2\right)^{1/2}$, and $\theta_{\rho 1} \equiv \theta_1/\left(1 - \rho_1^2\right)^{1/2}$

However, v_2 is not observed, but it can be estimated in a first step by running an OLS regression of y_2 on Z_1 and Z_2. Then we can run a probit regression of y^*_{rec} on Z_1, y_2 and $\hat{v}_2$ to estimate consistently the scaled coefficients $\delta_{\rho 1}$, $\alpha_{\rho 1}$ and $\theta_{\rho 1}$. In this second step, the t statistics on the estimated residual $\hat{v}_2$ is a valid test of endogeneity with $H_0 : \theta_1 = 0$[5].

The results for this two-step procedure are reported in table 6. For both transfer status (net receiver or net sender), endogeneity is rejected at conventional significance level. Therefore, we continue our analysis assuming that pre-transfer income is not endogenous to transfers status.

4.3 Parametric Analysis

We begin the regression analysis by postulating a specific functional form for the distribution of the error term u in (5). More specifically, we consider two alternative parametric models, a *Linear Probability Model* and a *Probit* model.

[5] See Rivers and Vuong (1988) and Wooldridge (2001) for more details

4.3.1 Linear Probability Model

The distributional assumption for the linear probability model imposes that

$$F(X\beta) \equiv X\beta \tag{16}$$

The only issue with the linear probability model is that it cannot be an accurate description of the population response probability $E(y = 1 \,|X\,)$ because it does not restrict the estimated probability to belong to the $[0, 1]$ interval. However, in most cases, the linear probability models is a useful approximation. The model is estimated by OLS and the results are reported in table 7a and 8a.

Focusing on the probability of being a net receiver of transfers, the first result to note is that the gender of the household's head appears as an important determinant of transfer inflows. In 1993, female household heads had 9% more chances to be net receivers of transfers than men, and 5% more chances in 1998. Most of these household heads are widowed women who receive family assistance to compensate for the death of the breadwinner.

Beside gender, the age of the household head also matters for net receivers. The probability of receiving transfers decreases with age as the household's head lives his productive life. However, this relation is non-linear, and after a certain age, this probability increases with age. The number of dependent members in the household, in proportion to working age members, also drives the probability of receiving transfers up.

Surprisingly, whether households received some form of public assistance or whether they subscribed to a private insurance does not matter for the transfer status of recipients. These are however a minority of households.

Finally, apart from education, variables related to permanent income such as the surface of owned land or the value of capital (equipment and livestock) do not affect the probability of receiving transfers. Once we control for these factors however, the remaining part of our income measure is and important determinant of transfer inflows. Moreover, the probability of being a net receiver decreases non-monotonically with the level of income, and past a given level it increases with income.

If we turn now to the transfer outflows, we observe opposite effects for income and age. The probability of being a net donor increases with age up to a threshold level, and it increases similarly

with transitory income in a non-linear way. Contrarily to the previous case however, some permanent income characteristics now matter with respect to the transfer status for donors. Wealthier households are more likely to send transfers.

4.3.2 Probit Model

We consider now an alternative distribution function by assuming that the error term u is normally distributed:

$$F(X\beta) \equiv \Phi(X\beta) \equiv \int_{-\infty}^{X\beta} \phi(x)\, dx$$

with $\phi(x) = (2\pi)^{-1/2} \exp\left(-x^2/2\right)$ which is the standard normal density function. This model is estimated by maximum likelihood and the results are given in table 7a and 8b.

Probit estimates are qualitatively very similar to those obtained with the linear probability model. The coefficient for the age of the head in 1998 is only short of being significant at conventional confidence level ($p = 0.12$).

Figure 7 plots the predicted probabilities of being a net receiver against pre-transfer income and age. The red lines represent the probit predictions holding all variables at their mean value, except for income and for age. In both years, the predicted probability of being a recipient is much higher at low levels of income, and it falls relatively quickly as income increases. This predicted probability then rises again for the few very rich observations in our sample. This picture is consistent with transfers being driven by altruism or risk-sharing motives at low level of income.

The predicted probabilities plotted against the age of the household head are also relatively higher for older heads.

Looking now at net donors, the estimates obtained from the probit model are also very similar to the linear model estimates. The probability of sending transfers increases non-linearly with pre-transfer income and with age. The fact that households are more likely to be net donors as the transitory component of income increases is also consistent with transfers being driven in part by risk-sharing considerations.

4.4 Semiparametric Analysis

Consistency of estimates for binary dependent variable models depends crucially on the validity of the distributional assumption. If errors are normally distributed, then the probit model is the most efficient estimator. On the contrary, if this normality assumption is not true, then the probit estimates are not consistent. In reality, we don't know whether errors are normally distributed or not. To check the robustness of our previous findings, we choose to conduct semiparametric analysis of the transfer response to income.

Semiparametric methods to estimate single-index models are relatively less efficient than parametric methods, but the results are robust to failures of the distributional assumptions in fully parametric models.

Many semiparametric estimators of the single-index model have been proposed[6]. Klein and Spady (1993) propose a semiparametric MLE similar in spirit to the WSLS estimator of Ichimura (1993). Their estimator is however fully efficient in the sense that it attains the semiparametric efficiency bound. The Klein and Spady (1993) estimator maximizes the following likelihood function

$$L\left(\beta\left|y,X\right.\right)=\sum_{i=1}^{N}\left\{y_i\ln\hat{F}\left(X_i\beta\right)+\left(1-y_i\right)\ln\left(1-\hat{F}\left(X_i\beta\right)\right)\right\} \tag{17}$$

where $\hat{F}\left(X_i\beta\right)$ is a nonparametric estimator of $F\left(X_i\beta\right)$. More specifically, $F\left(X_i\beta\right)$ is estimated with a local constant kernel estimator using cross-validated bandwidth[7]. The estimation is conducted using the np package of R.

The predicted probabilities of being net recipient or net donor are plotted against income and against age in figure 9. We can see that for both transfers status, semiparametric predicted probabilities are in line with the parametric results obtained with the probit model. To further assess whether our results are sensitive to the estimation method we plot the semiparametric predicted probabilities against the parametric predictions in figure 10. Except for some outliers, both approaches deliver predictions in the same ball park. However, the scatter around the 45 degree line increases slightly when predicted probabilities are high.

To summarize, we found that inter-household private transfers in rural Vietnam serve partly as a vehicle of life-cycle insurance. This intergenerational insurance is most likely to take place within family members who do not live in the same household. Active members are most likely to be net

[6] See for example Manski (1975), Horowitz (1992), Ichimura (1993) or Lewbel (1997).
[7] See Li and Racine (2006) and Hayfield and Racine (2008) for details.

donors, and older retired members are more likely to be net recipients.

These transfers can also protect against major life events such as the death of the household's head. Being a female head of household increases the likelihood of being a net recipient of transfers

Finally, transfers also seem to provide some insurance against low income. Controlling for the permanent determinants of income, the probability of becoming a net donor increases with the level of pre-transfer income. Moreover, the probability of becoming a net recipient is relatively high for low levels of income, and it decreases dramatically as the level of income increases.

The shape of the relationship between the transfer status and pre-transfer income for net recipients is consistent with models in which either altruism or risk-sharing are the determinants of transfers ((Cox, 1987)). Moreover, the positive association between pre-transfer income and the net donor status would be more easily related to situations where risk-sharing arrangements are executed through transfers.

As Cox et al. (2004) already suggested it, it is not unlikely that these motives coexist in driving observed transfers in our rural environment. This juxtaposition of motives also helps to explain why the relationship between the transfer status and income is non-linear. In the end, what matters for the design of public policy is less the exact underlying motive behind transfers than the sign and the magnitude of the transfer response to income. In our case, transfers seem very responsive to income at low level of pre-transfer income. This elasticity of private transfers to income should be accounted for if the government seeks to conduct effective redistribution plans targeted towards the rural poor.

5 Conclusion

We have examined the determinants of inter-household private transfers based on a sample of rural farmers from Vietnam in 1993 and 1998.

Using both fully parametric and semiparametric estimation methods for single index models, we found that among other factors, the age of the head, the gender of the head and the transitory component of income are major determinants of transfer inflows and outflows.

Transfers seem to help smoothing income through the life cycle and across states of nature. Controlling for permanent income factors, the transitory part of pre-transfer income is positively related to the donor status and negatively to the recipient status.

These results suggest that potential redistributive public transfers targeted towards the rural poor may just crowd-out existing private transfers taking place mostly at the family level.

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Tables

Table 1: Sample size and pre-transfer income

	1993		1998	
	Size	**Income**	**Size**	**Income**
Whole sample	*2807*	*1509.5*	*2802*	*2617.3*
North	1757	1405.7	1758	2258.9
South	1050	1683.1	1044	3220.7
North Mountains	540	1288.3	593	2146.6
Red River	744	1611.5	692	2498.0
North Central	473	1216.1	473	2050.0
South Central	295	1095.5	294	2233.9
Central Highland	96	1401.1	94	4384.8
Southeast	161	1752.6	159	3640.4
Mekong River	498	2063.2	497	3450.1

Table 2: Coffee producers

Whole sample farmers				
	1993 *(N = 3770)*		**1998** *(N = 4259)*	
	Repartition	**Concentration**	**Repartition**	**Concentration**
North Mountains	15.1	3.3	3.7	1.7
Red River	11.6	1.7	0.0	0.0
North Central	4.8	1.1	7.1	4.0
South Central	4.1	1.6	0.8	0.6
Central Highlands	*43.8*	*51.6*	*72.7*	*71.1*
Southeast	17.1	9.5	15.1	13.1
Mekong Delta	3.4	0.7	0.6	0.3

"Repartition" is the % of all coffee producers in each region

"Concentration" is the % of coffee producers among all farmers in each region

Subsample farmers				
	1993 *(N = 2807)*		**1998** *(N = 2802)*	
	Repartition	**Concentration**	**Repartition**	**Concentration**
North Mountains	12.9	3.0	9.7	2.2
Red River	12.9	2.1	0.0	0.0
North Central	4.8	1.3	16.4	4.6
South Central	4.8	2.0	2.2	1.0
Central Highlands	*47.6*	*61.4*	*59.0*	*84.0*
Southeast	13.7	10.6	11.9	10.1
Mekong Delta	3.2	0.8	0.7	0.2

"Repartition" is the % of all coffee producers in each region

"Concentration" is the % of coffee producers among all farmers in each region

Table 3: Household characteristics

	1993			1998		
	All	**Net receivers**	**Net givers**	**All**	**Net receivers**	**Net givers**
N	*2807*	343	307	*2802*	460	418
Age	*44.6*	47.4	45.6	*47.4*	52.9	46.5
Male %	*80.0*	66.2	81.1	*78.9*	68.5	82.5
Education (% primary)	*76.5*	74.6	73.9	*75.8*	74.3	71.2
Size	*5.1*	4.4	5.1	*4.9*	4.1	4.8
Pre-transfer income	*1509.5*	1220.6	2081.6	*2617.3*	1867.2	3669.1
Consumption per cap.	*1518.9*	1544.3	1840.7	*2067.8*	2167.2	2543.1
Age dependency ratio	*0.42*	0.45	0.38	*0.39*	0.47	0.35
Public assistance	*20.2*	26.8	25.1	*20.7*	24.6	27.3
Private insurance	*6.4*	6.7	11.4	*3.3*	2.4	3.1
Surface owned	*5662.1*	4235.3	7055.3	*8160.6*	4877.9	9117.5
Capital value	*210.7*	130.7	314.8	*448.3*	261.7	868.3
Livestock value	*1347.2*	995.0	1624.4	*2224.1*	1547.9	2899.2
Shock	*0.1*	-1.1	0.0	*0.1*	-0.2	0.1

Table 4a: Transfer frequencies, 1993

	% involved	% receiving	% giving	% net receivers	% net givers
Whole sample	*23.0*	*12.8*	*12.3*	*12.0*	*10.9*
North	27.0	15.7	14.2	14.6	12.2
South	17.0	8.7	9.4	8.3	8.8
North Mountains	22.8	10.9	15.0	9.4	13.1
Red River	29.3	17.2	15.2	16.3	12.9
North Central	28.3	18.8	11.8	17.7	10.1
South Central	18.3	11.5	7.5	11.5	6.8
Central Highland	12.5	1.0	12.5	0.0	12.5
Southeast	16.1	8.1	9.3	8.1	9.2
Mekong River	17.5	8.6	10.0	8.0	9.4

Table 4b: Transfer frequencies, 1998

	% involved	% receiving	% giving	% net receivers	% net givers
Whole sample	*31.6*	*18.2*	*17.4*	*16.4*	*14.9*
North	34.7	19.5	19.6	17.4	16.9
South	26.3	16.0	13.8	14.7	11.5
North Mountains	27.5	12.6	16.3	12.0	15.5
Red River	30.6	19.4	15.5	17.3	13.0
North Central	49.7	28.3	29.6	24.3	24.5
South Central	28.9	20.4	11.2	20.1	8.5
Central Highland	13.8	5.3	8.5	5.3	8.5
Southeast	34.0	15.7	22.6	15.1	18.9
Mekong River	24.7	15.5	13.5	13.3	11.5

Table 5: Transfer Patterns

	1993	**1998**
Received Transfers		
Received: from family (%)	83.6	67.0
Received: young to old (%)	42.5	76.9
Received: old to young (%)	20.4	21.2
% of pre-transfer income (all households)	6.8	9.8
% of pre-transfer income (receivers)	61.2	70.2
Send transfers		
Send: to family (%)	84.2	69.5
Send: young to old (%)	44.1	45.7
Send: old to young (%)	23.8	28.5
% of pre-transfer income (all households)	4.1	8.2
% of pre-transfer income (senders)	24.8	35.3

Table 6: Test for endogeneity of pre-transfer income (Rivers and Vuong, 1988)

Step 1: OLS (Dependent = Pre-transfer income)

	1993			**1998**		
	Estimate	**Std. Error**		**Estimate**	**Std. Error**	
Intercept	1.36e+03	2.35e+02	*(***)*	1.76e+03	5.82e+02	*(***)*
Education	2.63e+02	4.50e+01	*(***)*	5.53e+02	7.87e+01	*(***)*
Gender	5.30e+01	5.23e+01		3.61e+02	9.28e+01	(***)
Age	9.22e+00	9.90e+00		3.70e+01	2.31e+01	
Age^2	-9.23e-02	1.00e-01		-3.76e-01	2.26e-01	
Minority	-3.10e+02	5.86e+01	*(***)*	-6.75e+02	1.09e+02	*(***)*
Size	-9.31e+01	1.13e+01	*(***)*	-1.87e+02	2.22e+01	*(***)*
Age Dependency	-6.42e+02	9.52e+01	*(***)*	-1.17e+03	1.73e+02	*(***)*
Surface Owned	2.97e-02	3.62e-03	*(***)*	1.66e-03	6.00e-04	*(***)*
Capital Value	3.31e-01	2.54e-02	*(***)*	1.25e-01	1.35e-02	*(***)*
Livestock Value	8.72e-02	1.22e-02	*(***)*	2.77e-01	1.62e-02	*(***)*
Public Assistance	-5.12e+01	5.10e+01		-3.25e+02	9.09e+01	*(***)*
Private Insurance	1.47e+01	8.23e+01		6.87e+02	1.95e+02	*(***)*
Shock	1.18e+01	2.31e+00	*(***)*	3.20e+00	1.61e+00	*(***)*
Regional Dummies		Yes			Yes	
$\mathbf{R}^2$		0.26			0.28	

Step 2: Probit (Dependent = Net transfer receiver / Net transfer sender)

	Estimate	**Std. Error**	**Estimate**	**Std. Error**
residual $\hat{v}_2$ **(Receiver)**	3.27e-04	3.43e-04	3.57e-04	3.36e-04
residual $\hat{v}_2$ **(Giver)**	-1.51e-03	1.14e-03	9.50e-04	1.18e-03

Table 7a: Parametric results: Linear model for net receivers

Linear Model (OLS)						
Dependent: Net receiver of transfers						
	1993			**1998**		
	Estimate	**Std. Error**		**Estimate**	**Std. Error**	
Intercept	4.10e-01	7.31e-02	*(***)*	4.07e-01	1.10e-01	*(***)*
Gender	-8.96e-02	1.61e-02	*(***)*	-4.71e-02	1.74e-02	*(***)*
Size	-1.36e-02	3.51e-03	*(***)*	-2.62e-02	4.22e-03	*(***)*
Income	-5.44e-05	1.19e-05	*(***)*	-6.38e-05	7.76e-06	*(***)*
Income^2	4.60e-09	1.66e-09	*(***)*	3.93e-09	6.60e-10	*(***)*
Education	5.12e-02	1.40e-02	*(***)*	3.99e-02	1.49e-02	*(***)*
Surface owned	7.48e-07	1.12e-06		3.33e-08	1.12e-07	
Capital value	4.26e-06	8.14e-06		-3.92e-06	3.43e-06	
Livestock value	-4.36e-06	3.82e-06		-2.68e-06	2.59e-06	
Minority	-3.09e-02	1.82e-02	*(**)*	-5.07e-02	2.07e-02	*(**)*
Age	-1.09e-02	3.04e-03	*(***)*	-7.50e-03	4.35e-03	*(*)*
Age^2	1.38e-04	3.09e-05	*(***)*	1.22e-04	4.26e-05	*(***)*
Age dependency	9.24e-02	2.96e-02	*(***)*	1.67e-01	3.29e-02	*(***)*
Public assistance	2.24e-02	1.57e-02		-1.15e-02	1.71e-02	
Private insurance	1.39e-02	2.53e-02		-2.32e-02	3.68e-02	
Regional dummies		Yes			Yes	
$\mathbf{R}^2$		.078			.125	

Table 7b: Parametric results: Non-linear model for net receivers

Non-linear Model (Probit)						
Dependent: Net receiver of transfers						
	1993			**1998**		
	Estimate	**Std. Error**		**Estimate**	**Std. Error**	
Intercept	2.13e-01	3.78e-01		9.53e-02	4.90e-01	
Gender	-4.08e-01	7.99e-02	*(***)*	-1.99e-01	7.55e-02	*(***)*
Size	-7.02e-02	2.04e-02	*(***)*	-9.75e-02	1.97e-02	*(***)*
Income	-2.68e-04	6.38e-05	*(***)*	-2.83e-04	3.77e-05	*(***)*
Income^2	2.13e-08	8.49e-09	*(**)*	1.69e-08	3.17e-09	*(***)*
Education	2.66e-01	7.42e-02	*(***)*	1.79e-01	6.83e-02	*(***)*
Surface owned	2.31e-06	6.95e-06		-7.80e-08	1.06e-06	
Capital value	1.65e-05	5.49e-05		-1.98e-05	1.88e-05	
Livestock value	-2.90e-05	2.57e-05		-2.33e-05	1.50e-05	
Minority	-1.79e-01	1.09e-01		-2.32e-01	1.02e-01	*(**)*
Age	-5.14e-02	1.56e-02	*(***)*	-2.99e-02	1.91e-02	
Age^2	6.27e-04	1.57e-04	*(***)*	4.53e-04	1.85e-04	*(**)*
Age dependency	3.23e-01	1.50e-01	*(**)*	4.85e-01	1.43e-01	*(***)*
Public assistance	1.16e-01	8.07e-02		-3.89e-02	7.75e-02	
Private insurance	8.02e-02	1.33e-01		-1.47e-01	-1.47e-01	
Regional dummies		Yes			Yes	
$\%$ **Correct Pred.**		88.1			84.8	

Table 8a: Parametric results: Linear model for net givers

Linear Model (OLS)						
Dependent: Net giver of transfers						
	1993			**1998**		
	Estimate	**Std. Error**		**Estimate**	**Std. Error**	
Intercept	-1.13e-01	7.06e-02		-2.83e-01	1.08e-01	*(***)*
Gender	5.95e-04	1.55e-02		8.13e-03	1.71e-02	
Size	-2.69e-03	3.39e-03		-4.51e-03	4.14e-03	
Income	5.72e-05	1.15e-05	*(***)*	5.45e-05	7.62e-06	*(***)*
Income^2	-2.82e-09	1.60e-09	*(*)*	7.62e-06	6.48e-10	*(***)*
Education	3.31e-02	1.35e-02	*(**)*	4.26e-02	1.46e-02	*(***)*
Surface owned	2.93e-06	1.08e-06	*(***)*	-6.92e-08	1.10e-07	
Capital value	-4.97e-06	7.86e-06		6.36e-06	3.37e-06	*(*)*
Livestock value	2.10e-06	3.69e-06		5.69e-06	2.54e-06	*(**)*
Minority	-2.83e-02	1.75e-02		-9.87e-03	2.04e-02	
Age	6.54e-03	2.93e-03	*(**)*	1.23e-02	4.27e-03	*(***)*
Age^2	-6.13e-05	-6.13e-05	*(**)*	-1.26e-04	4.18e-05	*(***)*
Age dependency	-3.11e-02	2.86e-02		1.43e-02	3.23e-02	
Public assistance	1.08e-02	1.51e-02		5.72e-02	1.68e-02	*(***)*
Private insurance	6.25e-02	2.44e-02	*(**)*	-7.17e-02	3.61e-02	*(**)*
Regional dummies		Yes			Yes	
$\mathbf{R}^2$		.053			.087	

Table 8b: Parametric results: Non-linear model for net givers

Non-linear Model (Probit)						
Dependent: Net giver of transfers						
	1993			**1998**		
	Estimate	**Std. Error**		**Estimate**	**Std. Error**	
Intercept	-2.63e+00	4.38e-01	*(***)*	-3.47e+00	5.85e-01	*(***)*
Gender	-2.18e-05	8.97e-02		4.23e-02	8.46e-02	
Size	-1.66e-02	2.07e-02		-1.89e-02	2.13e-02	
Income	2.07e-02	6.31e-05	*(***)*	2.60e-04	3.73e-05	*(***)*
Income^2	-2.17e-08	8.25e-09	*(***)*	-1.09e-08	2.92e-09	*(***)*
Education	1.92e-01	7.62e-02	*(**)*	2.05e-01	6.93e-02	*(***)*
Surface owned	1.29e-05	5.35e-06	*(**)*	-3.33e-07	6.60e-07	
Capital value	-1.80e-05	3.79e-05		3.33e-05	2.35e-05	
Livestock value	1.66e-05	1.92e-05		2.09e-05	1.10e-05	
Minority	-1.86e-01	1.03e-01	*(*)*	-7.23e-02	1.02e-01	
Age	4.29e-02	1.86e-02	*(**)*	7.36e-02	2.34e-02	*(***)*
Age^2	-4.20e-04	1.91e-04	*(**)*	-7.69e-04	2.32e-04	*(***)*
Age dependency	-1.80e-01	1.68e-01		8.65e-02	1.63e-01	
Public assistance	3.51e-02	8.38e-02		2.34e-01	7.79e-02	*(***)*
Private insurance	2.69e-01	1.20e-01	*(**)*	-3.21e-01	1.77e-01	*(*)*
Regional dummies		Yes			Yes	
% **Correct Pred.**		88.1			81.5	

Figures

Figure 1: Income vs Consumption

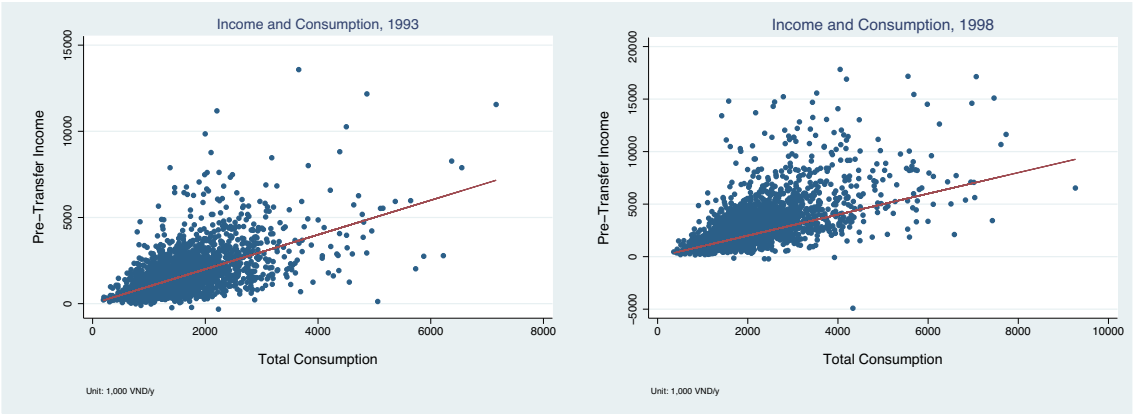


Figure 2: Pre-Transfer Income and Participation in Transfers

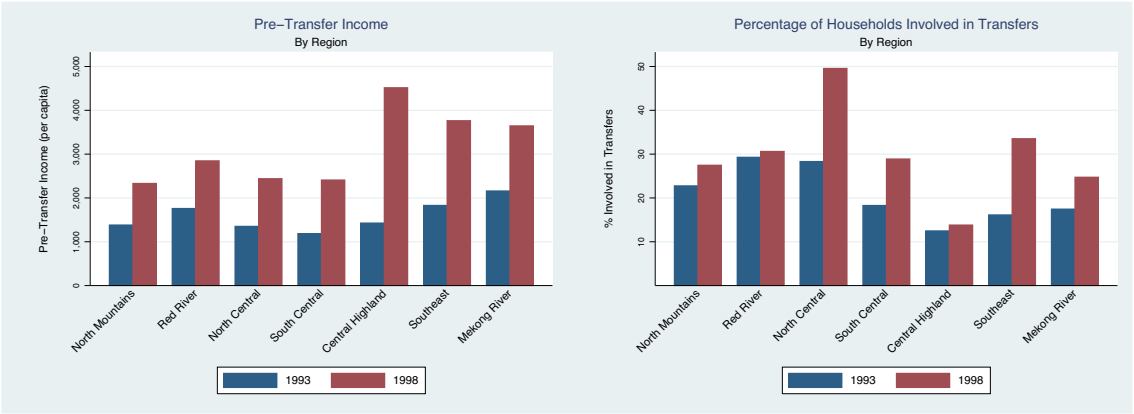


Figure 3a: Coffee prices (New York market)

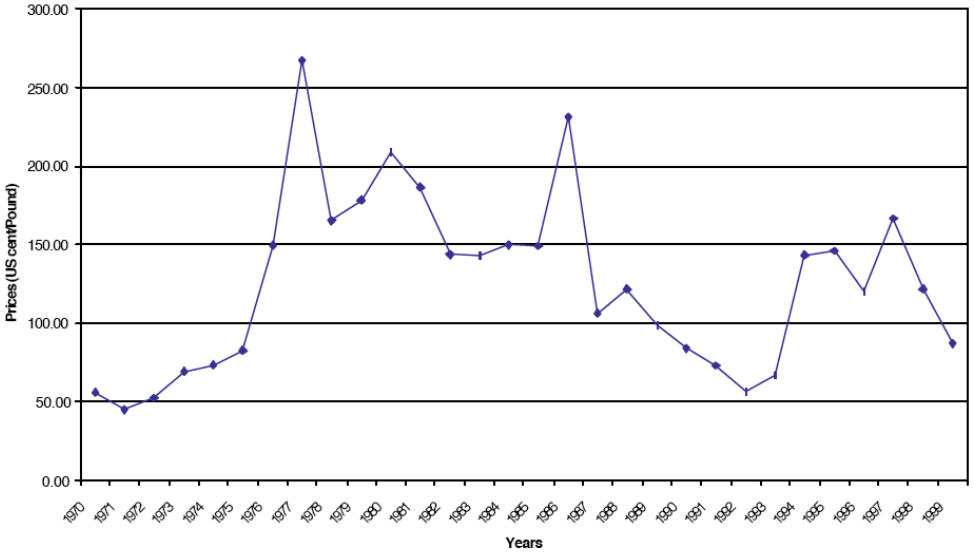


Figure 3b: Robusta prices (London market)

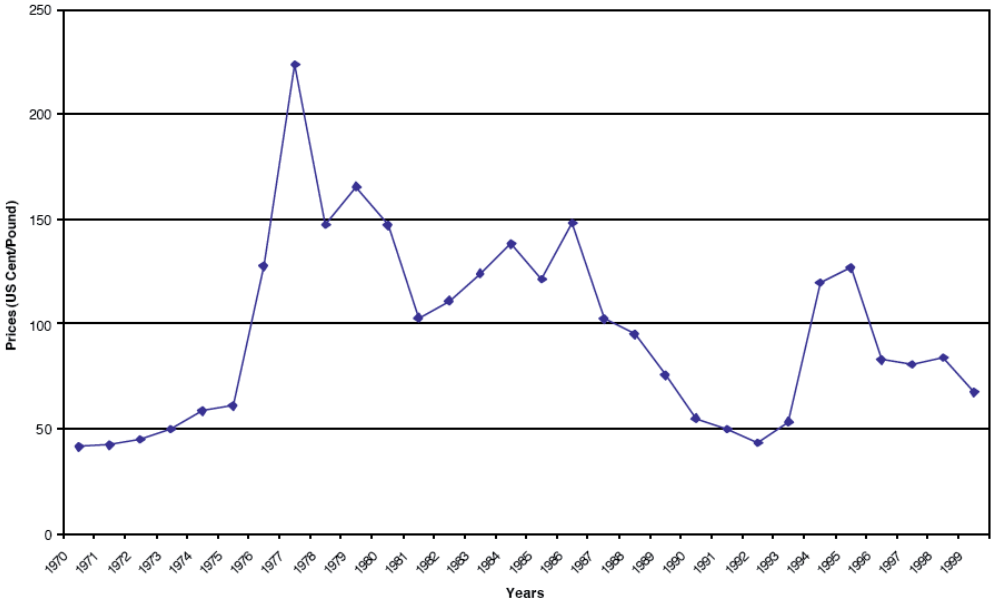


Figure 4: Income Structure, 1993

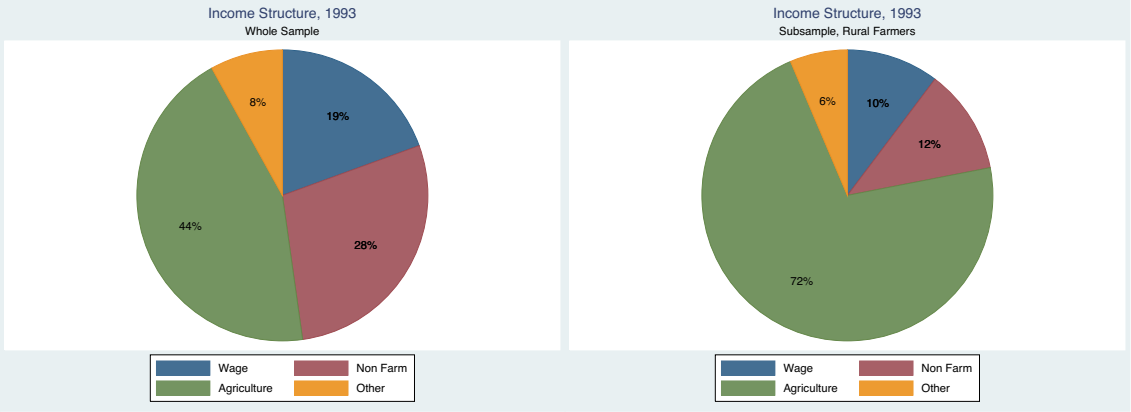


Figure 5: Income Structure, 1998

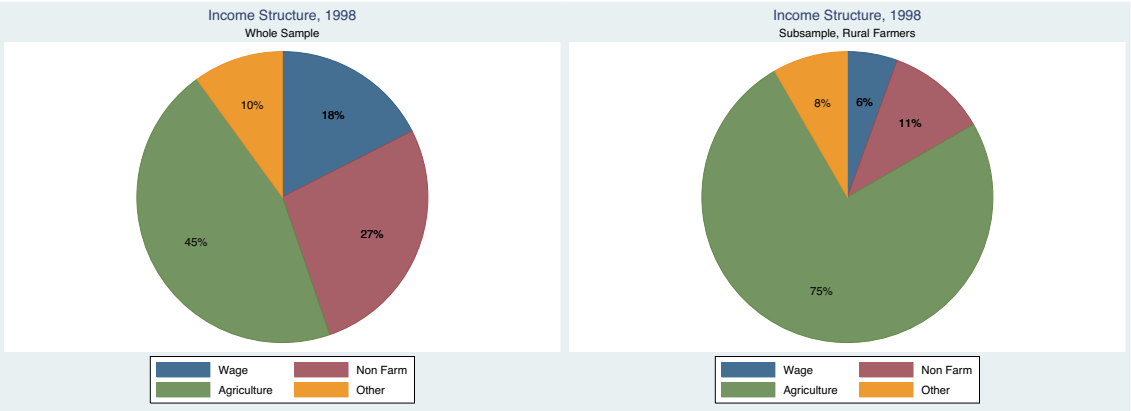


Figure 6: Distribution of shocks to the production function

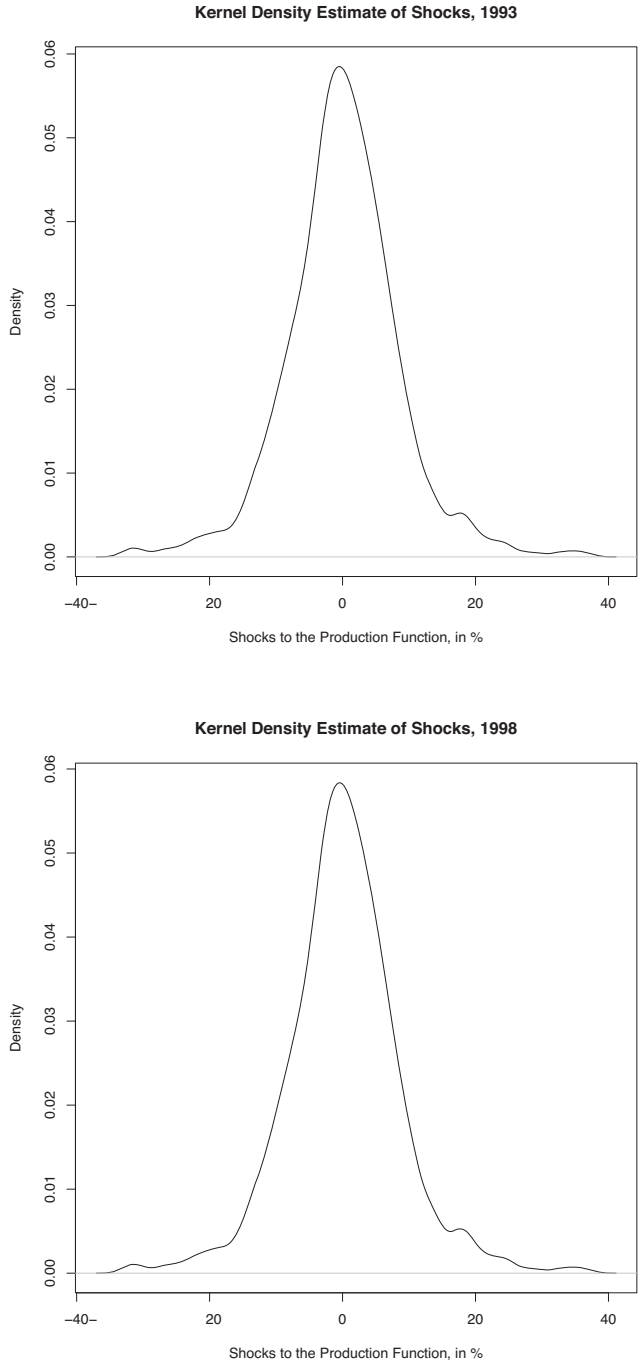


Figure 7: Predicted probabilities of receiving transfers (probit model)

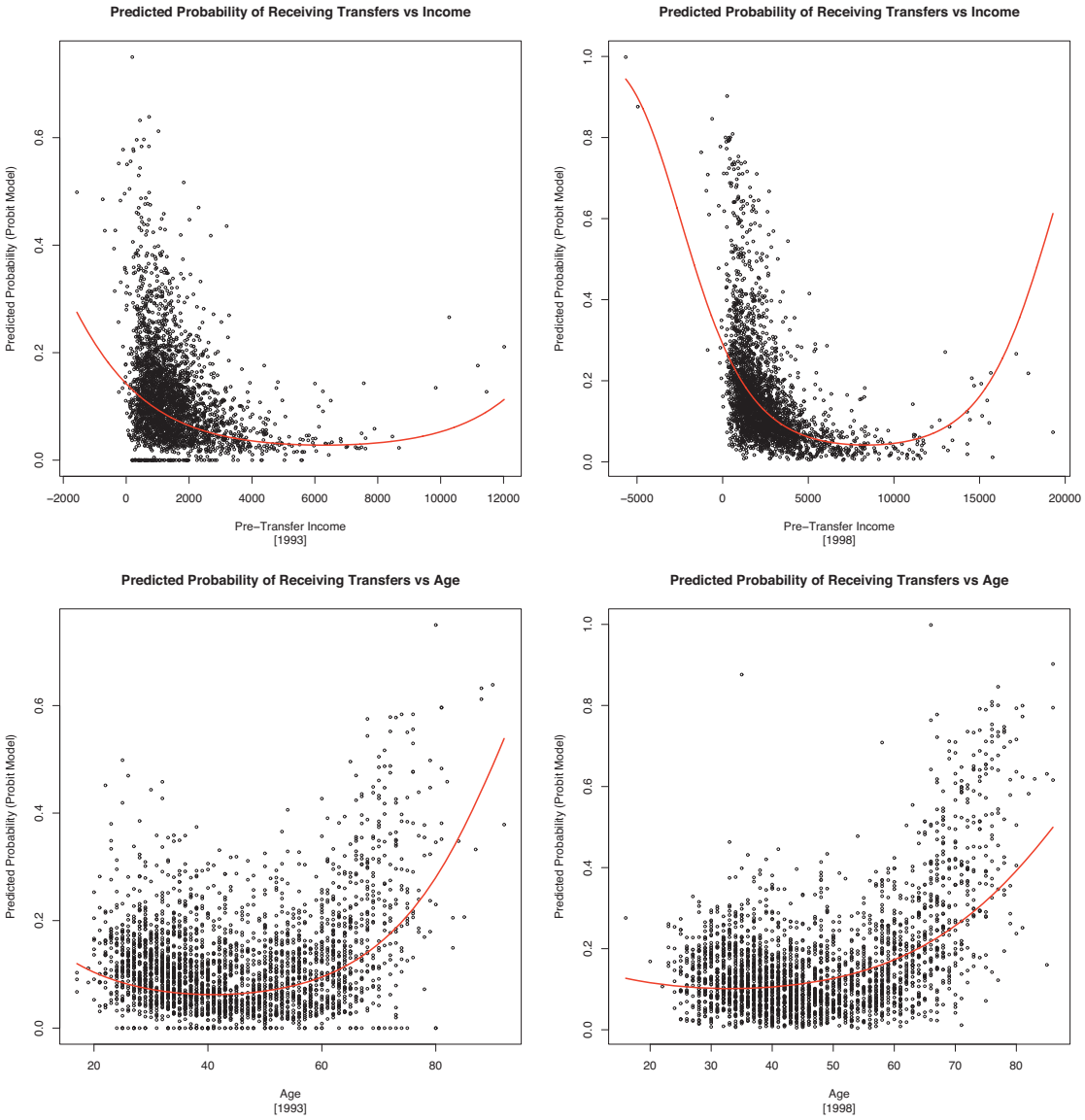


Figure 8: Predicted probabilities of sending transfers (probit model)

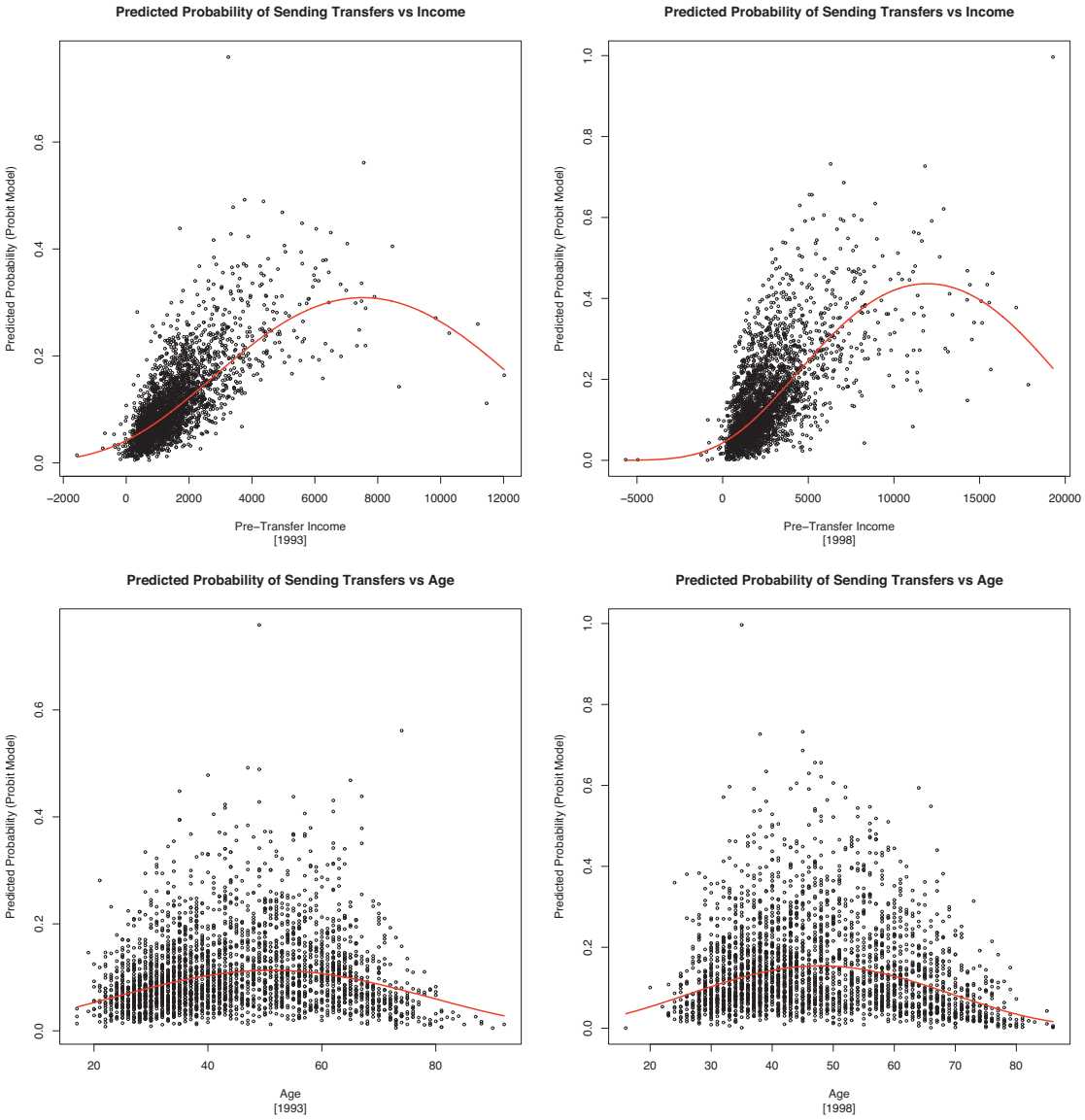


Figure 9: Predicted probabilities of receiving transfers (Klein-Spady model)

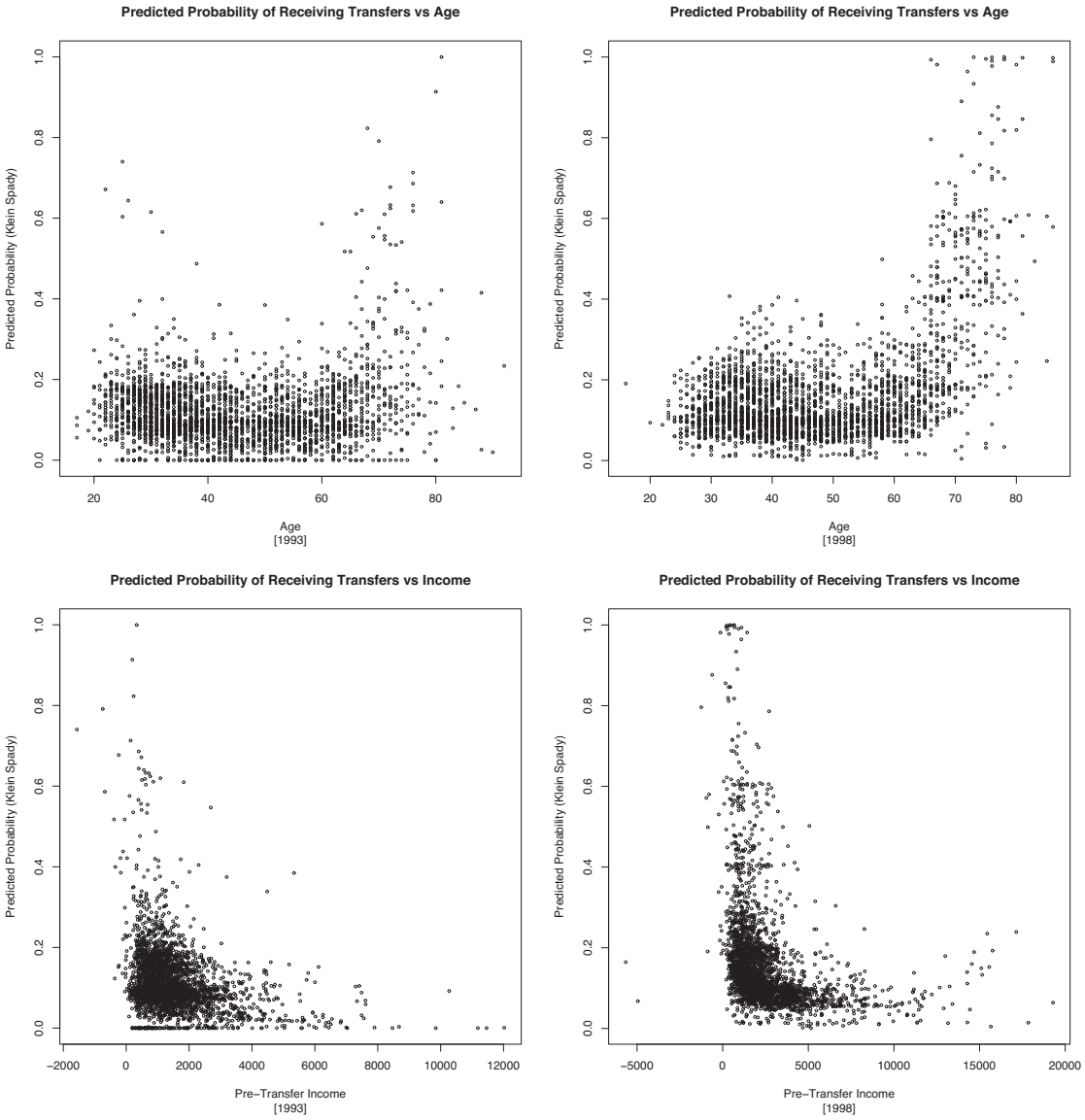


Figure 10: Predicted probabilities of sending transfers (Klein-Spady model)

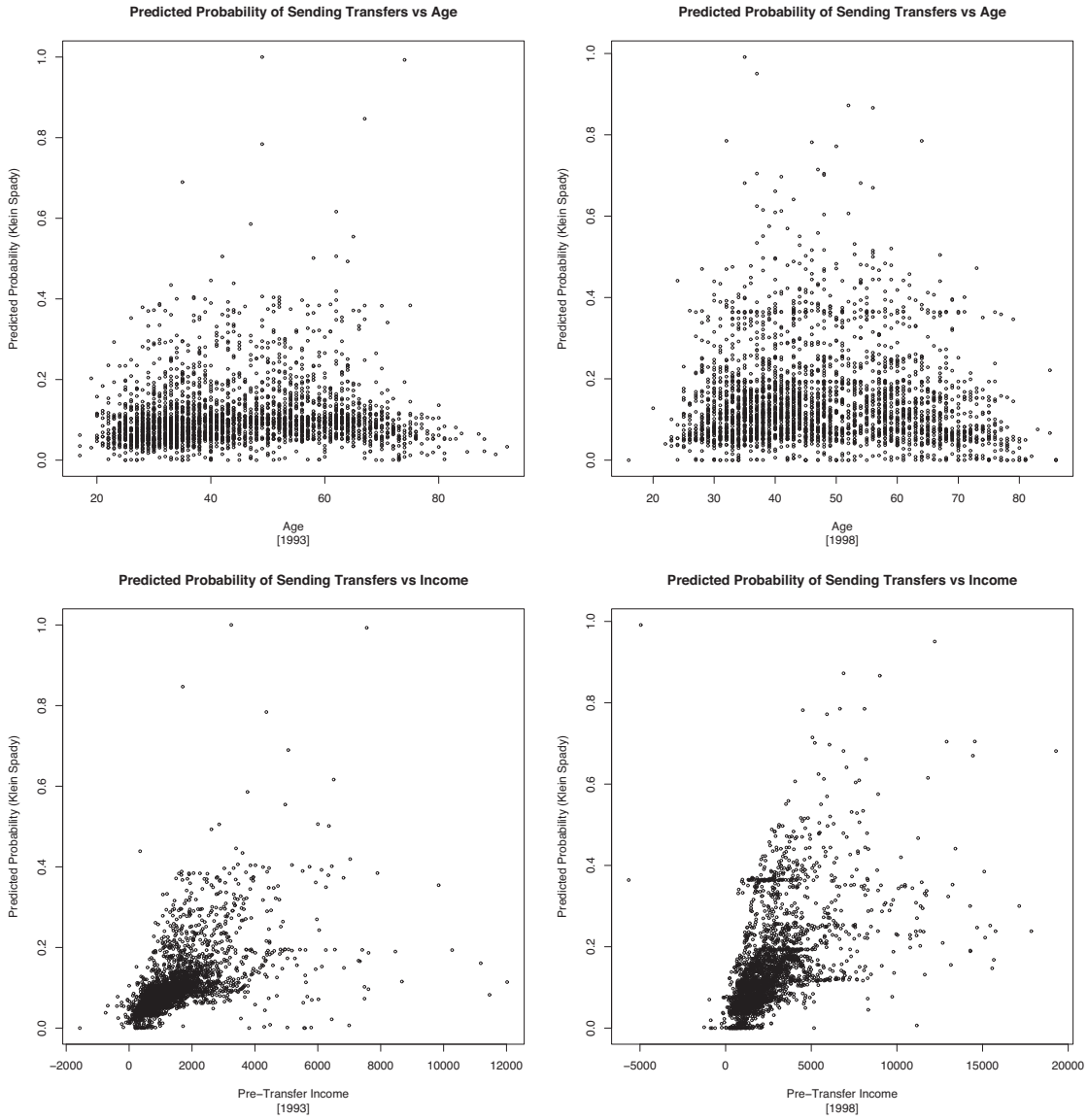
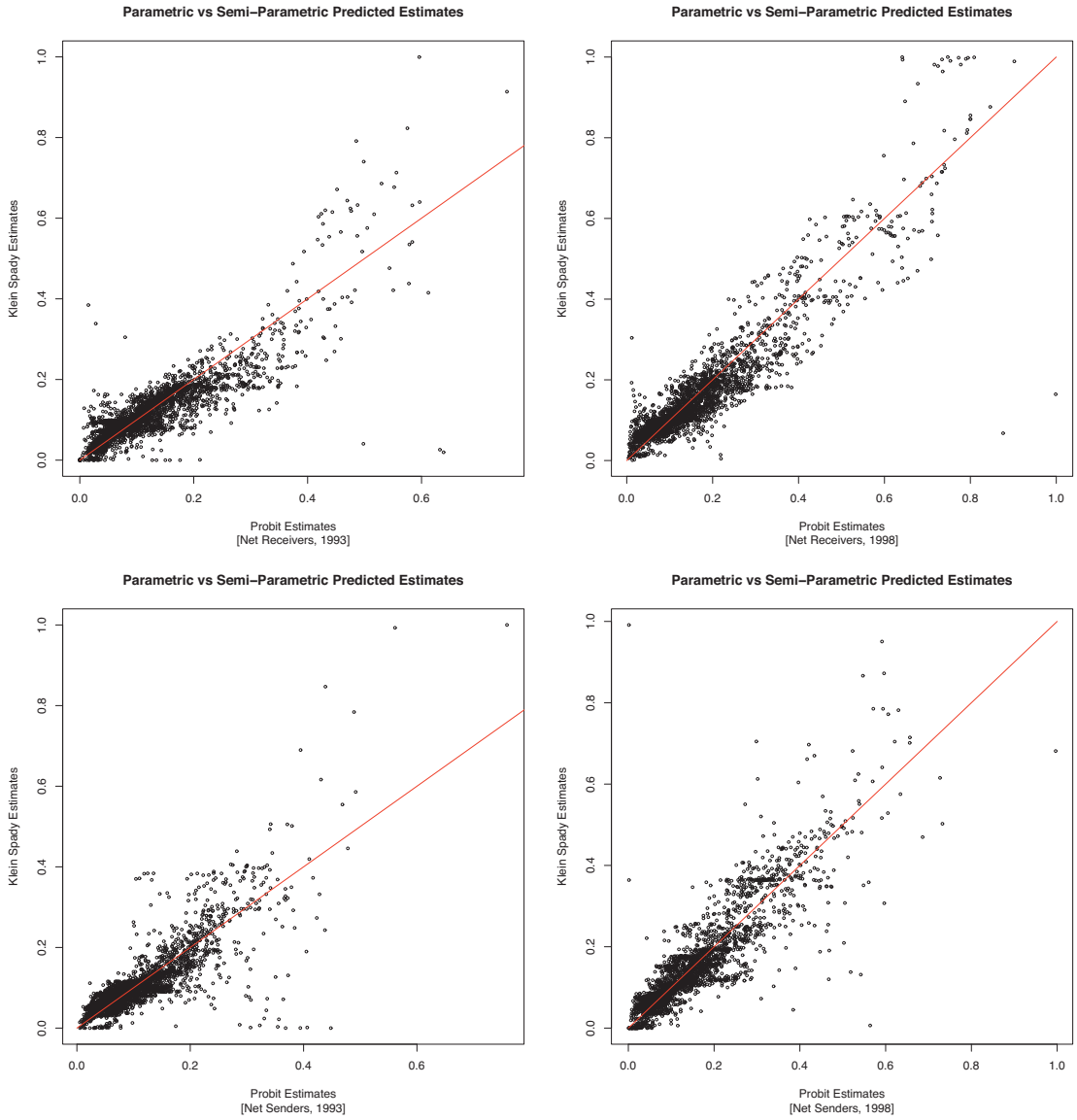


Figure 11: Parametric vs Semiparametric predicted probabilities



Annex 1: Income calculation details

- **Land payments:**
  - payments received from rent (+)
  - payments made to use owned land (-)
  - payments made to use rented land (-)
- **Agricultural income:**
  - Crop
  - By-products
  - Home-production
  - Livestock
  - Water product
  - Lease of farming equipment
- **Non-farm self-employment (income from family)**
- **Wage income**
- **Other income**
  - Private transfers
  - Scolarship
  - Pensions
  - Subsidies
  - Interest on savings, loans
  - Private insurance
  - Gifts
  - Inheritance
  - Lottery gains
  - Lease of building
  - Lease of machines