Preliminary

Private Transfers and the Crowding Out Hypothesis:

Semiparametric and Threshold Regression

Evidence from Four Developing Countries

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Abstract

This paper investigates whether there is a non-linear relationship between income and the private transfers received by households in developing countries. If private transfers are unresponsive to household income, expansion of public social security is unlikely to crowd out private transfers, contrary to concerns first raised by Barro and Becker. There is little existing evidence for crowding out effects, but this may be because they have been obscured by methods that ignore non-linearities. If donors switch from altruistic motivations to exchange motivations as recipient income increases, a sharp non-linear relationship between private transfers and income may result. In fact, threshold regression techniques find such non-linearity in the Philippines, where 30-80% of private transfers might be crowded out for low-income households [Cox, D., Hansen, B., and Jimenez, E., 2004, How responsive are private transfers to income? Evidence from a laissez-faire economy, *Journal of Public Economics*.]. To see if these non-linear effects occur more widely, semiparametric and threshold regression methods are used to model private transfers in four developing countries – Indonesia, Vietnam, Cambodia and Papua New Guinea. The results suggest that non-linear crowding-out effects are not important features of transfer behaviour in most of these countries, so expansions of public social security to cover the poorest households need not be stymied by offsetting private responses.

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I. Introduction

According to the influential hypothesis of Barro (1974) and Becker (1974), public social security interventions may be neutralized by the offsetting response of private transfers. This "crowding out" could occur if altruistic donors reduce their transfers as public interventions increase the incomes of recipient groups. For example, rather than benefiting the elderly a public pension program might reduce the burden on working families who had previously contributed to their aged parents (Lampman and Smeeding, 1983). Concerns about crowding out are particularly relevant to the developing countries beginning to construct formal pension and social security systems. Indeed, according to the World Bank, anywhere between 20-91 percent of private transfers might be displaced by expansions of formal safety nets in developing and transition economies (World Bank, 2001, p.149) although this wide range comes from a limited set of one-off studies rather than a comprehensive evaluation.

A key parameter for evaluating the crowding out hypothesis is the "transfer derivative", which shows by how much in-coming transfers change as the resources of the recipient household increase. Most existing evidence suggests that transfer derivatives are small, making crowding out unlikely. For example, Cox and Jakubson (1995) estimate that a one dollar increase in public welfare spending in the United States would result in no more than a 12 cent reduction in private transfers. Altonji, Hayashi, and Kotlikoff (1997) find that an increase by one dollar in the income of parents actively making transfers to a child, coupled with a one-dollar reduction in that child's income, results in only a 13 cent increase in the parents' transfer to the child.

Recently, Cox, Hansen and Jimenez (2004) have suggested that the failure to find economically significant transfer derivatives is because economists have looked in the wrong places and used the wrong methods. Developed countries may be the wrong place to look

because they have experienced a century of large public transfers so most private transfers have probably long since been crowded out.[1] For example, Roberts (1984) suggests that charity, which is one form of private transfers, was crowded out by public relief programs in the United States in the 1930s. But in developing countries private transfers are still very widespread, reaching up to one-half of the population in some cases (World Bank, 2001). Perhaps as a result, crowding out effects seem larger in developing countries. For example, Jensen (2003) finds that in South Africa each rand increase in public pension income for the elderly leads to a 0.25-0.30 rand reduction in inter-household transfers made by children.

But even in developing countries, significant transfer derivatives may be disguised if economists use inappropriate empirical methods. Donor households may have several different motives for the private transfers they make, so econometric models of transfers that assume a single (linear) regime may be mis-specified. Instead, if donors switch from altruistic motivations to self-interested exchange motivations as recipient income increases, a sharp non-linear relationship between private transfers and income may result. Cox et al. (2004) use threshold regression techniques to find such non-linearity in the Philippines, where transfer derivatives are approximately -0.4 for the poorest households but almost zero for richer households. For a subset of large families, transfer derivatives are in the range -0.66 to -1.06 for the poorest households. Based on these results, Cox et al. suggest that the crowding out problem for public redistribution policy first posed by Barro and Becker is likely to be important. Thus, expansions of public transfers in developing countries may not improve welfare for the poor.

[1] Public pensions were introduced in New Zealand in 1898 and in the United Kingdom in 1908. In the United States, the 1935 Social Security Act marked the start of a significant expansion in public transfers although pensions for state and local government employees dated from the 1890s.

The purpose of this article is to see whether the non-linearities found by Cox et al. in the Philippines occur more widely in developing countries. Such an evaluation is needed because there appears to be only two related studies of non-linear transfer derivatives in developing countries. Kaufmann and Lindauer (1986) find a transfer derivative of -0.55 below a threshold level of income needed to satisfy basic needs, and a derivative of zero above that threshold. However, this evidence comes from a sample of just 500 households in a single city (Santa Ana) in El Salvador, with a threshold that was found by searching over transfer values. Maitra and Ray (2003) find that for South African households below the poverty line, a rand of public pension income reduces private transfer receipts by -0.09 rand, while for those above the poverty line there is no crowding out.[2]

The approach used here is to econometrically model the determinants of private transfers using household surveys from several different developing countries. By using a consistent set of estimation methods on similar sets of data, one source of variability in estimated transfer derivatives is removed. The selected countries (Indonesia, Vietnam, Cambodia, and Papua New Guinea) all have household surveys with comprehensive information on private transfers, public social security and incomes from private sources. These are all countries where private transfers are important, as they are throughout Asia where there are strong norms about family support for the elderly (Kwon, 1999; Benjamin, Brandt and Rozelle, 2000) and about community support for the poor (Scott, 1976).

[2] Their main specification also suggests that the transfer derivative with respect to other (private) income is positive and statistically significantly higher for poor households than for those above the poverty line. Unlike the result for

II. A Framework for Observing Non-Linear Transfer Derivatives

Cox et al. (2004) show that a prediction of non-linear transfer derivatives can be derived from either a risk sharing model or an augmented altruistic model that allows exchange motivated transfers. Only the second approach is summarised here.

Consider the relationship between a person providing transfers – a 'donor' for short – and the recipient of these transfers. The donor obtains utility from his own consumption, from any "services" the recipient provides in exchange for transfers, *s* and from the well being of the recipient, *V*. Recipient well being depends on her consumption, C_r and the services she provides to the donor, $V(C_r, s)$, where $\partial V/\partial s < 0$. The recipient's budget constraint is $C_r = I_r + T$ where I_r is her pre-transfer income and *T* is the transfer she receives. For altruistically motivated transfers, $\partial T/\partial I_r < 0$. As recipient pre-transfer income rises, a smaller transfer is needed to get her consumption to the level that is optimal from the donor's point of view.

At some threshold level of the recipient's pre-transfer income, *K* transfers switch from altruistic to exchange-related motivations. Otherwise declining altruistic transfers would violate a participation constraint. Specifically, for there to be a relationship, the transfers the donor provides and the services he demands have to allow the recipient's welfare to be no lower than it would be if the recipient were to end the relationship, $V(I_r, 0)$. Beyond the threshold $(I_r > K)$ transfers can increase with recipient income because one way for the donor to keep the recipient in the relationship is by increasing exchange-related transfers. But eventually this positive transfer derivative becomes negative again when income level I_r' is reached, due to opposing effects of higher I_r on the supply and implicit price of services (Cox, 1987).

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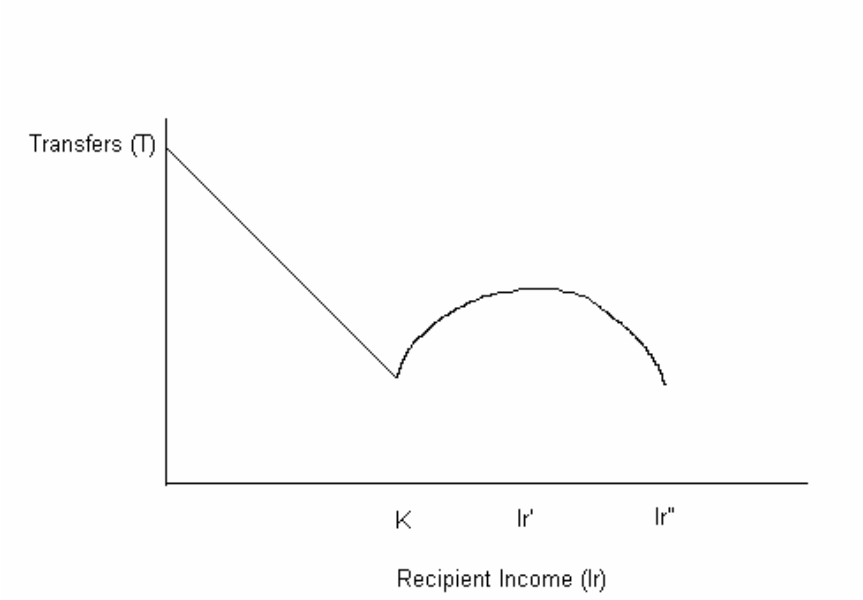
public pension income, this pattern is not consistent with the findings of Cox et al. (2004).

The result of these switching motivations is a non-linear and non-monotonic relationship, made up of a linear segment followed by an inverted-U-shape (Cox et al., 2004, p. 2199):



To estimate the relationship between recipient income and transfers that is implied by the figure, Cox et al. (2004) use a linear spline-model.[3] This involves defining a dummy variable, d_1 which takes the value 1 if $I_r \leq K$ and another dummy variable d_2 which takes the value 1 if $I_r > K$. For a fixed K the continuous linear spline is a linear function of the variables $(I_r - K)^* d_1(K)$ and $(I_r - K)^* d_2(K)$, plus any other determinants of transfers (e.g., education). But because the threshold K is not known, non-linear least squares is needed. Specifically, for a range of possible values of K the model is estimated by OLS, yielding the sum of squared errors as a function of K. The conditional least squares estimate of K is then found by searching over K and selecting the value which gave the lowest sum of squared errors.

This spline function approach is also used here to search for non-linear transfer derivatives. Non-parametric and semi-parametric nearest neighbour estimators are also used

because these may be more flexible than the spline function. Our nonparametric LOWESS regression estimates the function, $m(I_r)=E(T|I_r)$, by computing an estimate of the location of transfers, T within a specific band of recipient pre-transfer income I_r. For each point (I_r^i, T^i) on a scatterplot, the smoothed point $(I_r^i, \hat{T}^i)$ is formed from a locally weighted regression of a first order polynomial. The weights come from a "tricube" function (Cleveland, 1979) which decreases for points further away from (I_r^i, T^i), becoming zero at the boundary. This procedure is then repeated but with a new set of weights defined for each (I_r^i, T^i) based on the size of the residual $(T^i, \hat{T}^i)$, where larger residuals have smaller weights to guard against outliers distorting the smoothed plots. The smoothness of the plots is also affected by the bandwidth, which is the proportion of the sample used for calculating the smoothed values for each point.

To see the effect of income on transfers after controlling for relevant covariates, a partially linear (or semiparametric) model is used:

$$T = m(I_r) + bX + u. \quad (1)$$

The function $m(\ )$ is estimated by the LOWESS estimator described above, after the effect of other observed characteristics of the household, such as age, education and demographic composition, which are contained in the matrix of control variables, X, are controlled for. This involves an initial linear regression where the non-parametric part is removed by differencing (after an initial sorting by I_r) and the parameters from this first-differenced regression are then used to remove the effects of X. More details on the approach are available in Yatchew (2003).

[3] A quadratic specification for the region $I_r > K$ was rejected in favour of a single linear term.

III. Data

We use data from a number of household surveys to search for non-linearities in the relationship between private transfers and the pre-transfer income of recipient households. The surveys are from the rural and urban sectors of Indonesia, Vietnam and Cambodia, and the urban sector of Papua New Guinea. Most of our surveys are from the late 1990s, specifically 1997 (Indonesia), 1998 (Vietnam) and 1999 (Cambodia). The PNG survey is from 1988, which is the same year as the Philippines survey used by Cox et al. (2004). A single cross-section is used for each survey, even though those for Indonesia and Vietnam are part of longer term panels. The variables are defined to be as close as possible to the variables used by Cox et al for the Philippines seeing as our main purpose is to see if the non-linear relationship they find holds more widely. Full details on the surveys and the variables are in a Data Appendix.

All of the countries in the sample are poorer than the Philippines, both currently and for 1988, which is when Cox et al.'s data were collected. With the exception of Vietnam, the selected countries all spend less than one percent of their GDP on public social security and welfare. This is a smaller proportion than is currently spent in the Philippines (Table 1). Thus these countries should be at least as good, as candidates for studying the potential for crowding out, as the Philippines was, because their public transfer systems are so small. The comparison of their public welfare spending with that in rich countries also indicates why it may have proved so difficult to find evidence of crowding out in the developed countries – when about 14 percent of GDP is allocated to public transfers, as it is in Australia and the United Kingdom, there may be few private transfers left to crowd out.

The case of Vietnam deserves comment because of the significant share of government expenditures and GDP allocated to public transfers in this low-income country. Part of this

expenditure is for the Social Guarantee Fund, which provides income transfers to ex-soldiers and others who contributed to the re-unification of Vietnam. These transfers aren't necessarily a needs-based redistribution, although many of the recipients are poor. Additionally, since 1995 the Vietnam Social Insurance and Vietnam Health Insurance schemes have been operating and the social insurance scheme now covers about 14 percent of the labour force (World Bank, 2000). Nevertheless, despite these non-trivial public transfers, they are still less than one-half the value of private, inter-household, transfers (Cox, 2002). Thus, Vietnam should still be a relevant case for studying the potential for crowding out effects.

The data show that about two-thirds of households in the selected countries receive private transfers (Table 2). Fewer households are observed to be making transfers, although this may reflect the structure of questionnaires, with sometimes more attention paid to the receipt of remittances than to the expenditure on gifts for other households. A case in point is Cambodia, where it is only possible to calculate gross transfers received, rather than the net transfers used by Cox et al. as their dependent variable. This lack of data will not necessarily affect the results because Cox et al. note that they also find non-linear transfer derivatives in the Philippines when using gross transfer receipts.

For households who are net recipients of private transfers, the median income share for the transfers is between 5-10 percent of total, post-transfer income. This estimate is somewhat lower than other studies which typically estimate the mean of the ratio of transfers to post transfer income. For example, in urban Vietnam, the mean of the ratio of transfers to post transfer income for net recipients is 19.9 percent, compared with a median ratio of only 10.2 percent. Nevertheless, private transfers are still a somewhat important source of income for these receiving households.

IV. Specification and Estimation Results

The specification is designed to replicate the model used by Cox et al. (2004) in the Philippines. Thus, we followed them in omitting the top two percent of household incomes from each sample, in case there was undue influence of the extremely wealthy on the results. In addition to pre-transfer income, the models include a dummy variable for households with zero pre-transfer income to see if there is additional targeting of transfers to the very poor. The level of retirement income and a dummy for the presence of retirement income are used to account for any differential behavior of retirees. The non-income characteristics in the transfer equation include the age, education, gender and marital status of the household head. Further dummy variables control for whether the household head is employed and whether husband and wife are both employed. In addition, household size and composition, and a varying number of regional fixed effects are controlled for.

When the transfer function (equation (1)) is constrained to be linear in pre-transfer incomes, the estimated transfer derivatives are universally small (Table 3). In fact, the transfer derivatives are not statistically significantly different from zero for both sectors in Vietnam and for the urban sector in Cambodia. For the other four samples, the estimated transfer derivative ranges from -0.04 to -0.07. In other words, to the extent that the linear model is appropriate, even in these low-income settings with large private transfers and limited public transfers, there does not seem to be much potential for crowding out effects.

The results for the other income variables in the model also do not seem to indicate potentially important crowding out effects. With the exception of rural Vietnam, there is no significant targeting of private transfers to those households with zero pre-transfer income.

Amongst retirees, the only evidence for substitution between pension income and private transfers comes from rural Vietnam, and the size of the substitutions effect is small – losing 12 dong of private transfers for every 100 dong of pension income.

The possibility of measurement error attenuating the linear transfer derivatives towards zero can be discounted. When dwelling characteristics are used as instrumental variables for potentially mis-measured pre-transfer income, the estimated transfer derivatives become even less negative (Table 4). This pattern could also be consistent with transfers having a negative effect on pre-transfer incomes, due perhaps to work disincentives. However, neither an endogeneity nor measurement error story are supported because the Hausman tests are insignificant in all cases.

When the transfer derivative is allowed to vary, using the non-parametric and semi-parametric estimators, there is some evidence of non-linearity (Figures 1-4). Specifically, there is evidence of negative transfer derivatives that then flatten out, with this (smoothed) kink usually occuring amongst the poorest quartile of households. However, once the other covariates are accounted for, using the semiparametric estimator, this pattern persists only for Cambodia and rural Indonesia. In the other samples, the transfer derivatives appear to be approximately linear.

When the same linear spline model that Cox et al. used is estimated, a significant threshold effect in the transfer derivatives is found only in the samples from rural Indonesia and urban Cambodia. For rural Indonesia the transfer derivative for the poorest 20 percent of households is -0.24, and it then flattens out to being -0.05 at higher incomes.. In urban Cambodia, the derivative is -0.68 for the poorest five percent of households, and then -0.02 for the rest of the sample. In the other five samples there is a much less pronounced kink, which is sometimes in an unexpected direction (becoming *more* negative above the threshold), and which

usually occurs at a very high threshold (e.g., the 96th percentile of the household income rank in urban Indonesia).

V. Conclusions

The research reported in this article has followed the recommendation of Cox et al. (2004, p. 2217) that "future work on private transfers should focus on sharp non-linear relationships, preferably in settings where public transfers are small." Specifically, we examined how responsive private transfers are to the pre-transfer income of recipient households in seven different samples from four developing countries. When a linear model is used, these transfer derivatives are uniformly small. Even when more flexible methods are used to detect sharp non-linearities, such effects are found in only two settings – rural Indonesia and urban Cambodia. In rural Indonesia, the transfer derivative for the poorest 20 percent of households is -0.24. In urban Cambodia, the derivative is -0.68 for the poorest five percent of households, although this evidence is less compelling because it only applies to gross transfers because of data limitations.

While this evidence of limited non-linearities may indicate a need for caution when expanding public transfers in these two particular settings, it hardly seems compelling as general evidence for the potential of crowding out effects. Thus, the crowding out problem for public redistribution policy first posed by Barro and Becker may not so important.

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Table 1: Importance of Public Social Security in Selected Countries

Country	Year	Social Security and Welfare Payments as % of: Government Expenditure	GDP	Per Capita GDP ($PPP)[a]
United States	1998	28.7	9.8	30,600
United Kingdom	1998	36.4	14.5	21,140
Australia	1998	35.5	13.2	22,360
Philippines	1988	0.8	0.1	3,070
Philippines	1998	4.4	0.9	3,500
Cambodia	1998	3.1	0.4	1,510
Indonesia	1998	5.0	0.9	2,680
Papua New Guinea	1988	0.5	0.1	1,990
Vietnam	1998	12.1	2.3	1,720

Source: Asian Development Bank *Key Indicators* and International Monetary Fund *Government Finance Statistics Yearbook*.

[a] In international prices, from the World Bank *World Development Indicators*.

Table 2: Characteristics of Private Transfers

	Urban Indonesia	Rural Indonesia	Urban Vietnam	Rural Vietnam	Urban Cambodia	Rural Cambodia	Urban PNG
Prevalence[a]							
% receiving gross transfers	57.9%	64.5%	37.7%	22.3%	22.3%	21.9%	65.2%
% giving gross transfers	36.7%	33.7%	22.4%	18.0%	n.a.	n.a.	65.6%
% who are net recipients	36.2%	37.3%	36.3%	20.6%	n.a.	n.a.	39.9%
% who are net donors	35.2%	32.1%	16.7%	14.9%	n.a.	n.a.	38.9%
Intensity (income shares)[b]							
Net receipts for recipients	9.1%	3.3%	10.2%	10.1%	4.7%[c]	4.3	9.4%
Net outlays for net donors	1.4%	1.3%	2.2%	2.6%	n.a.	n.a.	6.4%

Notes:

[a] As a percentage of all households in the sample.

[b] Median of the ratio of net receipts (outlays) to post-transfer income for households who were net recipients (net donors).

[c] For Cambodia it is the median of the household-level ratio of gross transfer receipts (outlays) to post-transfer income.

Table 3: Linear Estimates of Net Transfer Functions[a]

	Urban Indonesia	Rural Indonesia	Urban Vietnam	Rural Vietnam	Urban Cambodia	Rural Cambodia	Urban PNG
Income							
Pre-transfer income	-0.069	-0.047	0.003	0.003	-0.014	-0.040	-0.043
	(0.014)*	(0.007)*	(0.004)	(0.006)	(0.009)	(0.016)*	(0.013)**
Has no income	106.632	22.372	15.354	7.781	-113.230	-132.396	438.473
	(67.483)	(30.550)	(10.614)	(4.221)+	(85.854)	(77.779)+	(405.634)
Retirement income	-0.026	-0.080	-0.180	-0.115	-2.040	0.057	-0.755
	(0.045)	(0.045)	(0.159)	(0.061)+	(1.517)	(0.442)	(1.053)
Has retirement income	-46.819	-9.647	-4.595	-2.224	1,749.077	-337.540	-75.111
	(97.809)	(83.511)	(9.113)	(2.698)	(1,238.634)	(400.350)	(380.045)
Education							
Primary graduate	-45.583	26.487	13.520	0.408	100.741	-7.998	98.657
	(52.609)	(23.054)	(9.517)	(1.292)	(94.516)	(39.244)	(126.522)
Some secondary	40.265	-9.928	18.214	4.137	189.388	117.626	79.790
	(44.925)	(49.738)	(6.672)**	(1.512)**	(70.538)**	(104.660)	(118.669)
Secondary graduate	84.680	-39.443	29.323	6.306	140.436	52.802	147.581
	(48.208)	(30.237)	(10.878)**	(3.360)+	(73.216)+	(66.466)	(150.199)
Some tertiary	120.596	-30.297	19.043	-6.531	1,457.160	147.266	18.253
	(136.707)	(110.012)	(15.278)	(18.924)	(1,061.559)	(149.837)	(177.553)
University graduate	70.964	-182.755	34.913	5.726	709.302	452.968	410.827
	(119.755)	(185.154)	(17.409)*	(4.352)	(334.754)*	(496.416)	(204.670)*
Other characteristics							
Age of household head	-3.744	-0.742	0.350	0.191	9.666	1.789	7.189
	(1.442)*	(0.470)	(0.316)	(0.066)**	(3.418)**	(2.246)	(4.529)
Female household head	-29.596	1.045	15.237	3.371	153.419	252.788	449.709
	(70.876)	(37.879)	(9.256)+	(2.128)	(145.428)	(136.261)+	(478.769)
Married	-120.655	-47.037	18.919	8.159	209.010	276.600	166.780
	(47.705)*	(32.232)	(10.061)+	(3.312)*	(127.830)	(154.825)+	(227.331)
Married & female-headed	53.446	-95.187	-3.915	5.710	-24.954	-317.625	-530.167
	(55.587)	(61.600)	(11.763)	(4.296)	(168.659)	(176.370)+	(511.818)
No. of children < 1 yr	50.524*	15.445	-3.780	-2.800	11.098	-19.207	-132.270
	(17.472)	(15.146)	(7.813)	(1.465)+	(69.769)	(43.510)	(114.534)
No. of children 1-6 yrs	-38.447	-10.132	2.635	2.982	16.011	-4.608	-44.286
	(20.244)	(8.077)	(5.706)	(1.322)*	(30.159)	(23.434)	(38.470)
No. of children 7-14 yrs	44.960	5.098	-3.910	1.688	23.303	10.388	-34.749
	(14.256)*	(4.651)	(3.315)	(0.671)*	(20.491)	(10.497)	(32.745)
Number of adults	51.074	-11.896	-0.347	-0.564	-10.000	0.067	139.681
	(44.432)	(22.763)	(1.964)	(0.486)	(22.185)	(13.675)	(39.823)**
Husband & wife both work	-4.412	72.745	-17.495	-9.479	-171.813	-51.343	118.117
	(78.033)	(35.110)*	(8.376)*	(3.376)**	(82.249)*	(149.238)	(94.875)
Head not employed	212.441	391.711	17.519	8.970	133.525	613.993	487.338
	(112.772)	(137.838)*	(7.962)*	(4.123)*	(131.345)	(368.152)+	(186.06)**
Constant	151.266	-56.433	-22.408	-12.421	-170.321	291.802	-666.417
	(149.284)	(47.525)	(21.534)	(4.855)*	(202.724)	(330.192)	(246.15)**

Regional effects	11	11	6	7	4	4	5
R^2	0.109	0.087	0.038	0.038	0.057	0.023	0.085
No. of observations	3399	4018	1656	4072	2307	3523	1060

Notes: Heteroscedasticity-robust standard errors in ( ), **=significant at 1% level, *=significant at 5% level, +=significant at 10% level. The sample excludes the top two percent of household incomes.

[a] Dependent variable is gross transfers received minus gross transfers given.

Table 4: Linear Instrumental Variables Estimates of Net Transfer Functions

	Urban Indonesia	Rural Indonesia	Urban Vietnam	Rural Vietnam	Urban Cambodia	Rural Cambodia	Urban PNG
Pre-transfer income	0.117	0.055	0.117	0.055	0.018	0.157	-0.043
	(0.032)**	(0.027)*	(0.032)**	(0.027)*	(0.019)	(0.112)	(0.036)
Has no income	60.355	11.032	60.355	11.032	-93.900	-32.050	439.969
	(17.668)**	(4.287)*	(17.668)**	(4.287)*	(74.893)	(140.91)	(379.748)
Retirement income	-0.002	-0.102	-0.002	-0.102	-1.978	0.230	-0.758
	(0.240)	(0.062)**	(0.240)	(0.062)**	(1.519)	(0.578)	(1.073)
Has retirement income	2.357	-1.578	2.357	-1.578	1716.24	-321.713	-74.807
	(13.685)	(2.781)	(13.685)	(2.781)	(1248.68)	(520.871)	(375.616)
F-test 1st stage instruments[a]	10.05**	88.94**	10.05**	88.94**	91.03**	29.53**	21.54**
Over-identification test[b]	5.74	0.10	5.74	0.10	0.94	0.23	8.95
Hausman test (OLS vs IV)[c]	20.17	4.02	20.17	4.02	4.43	2.95	0.03

Notes: Each equation also includes the other variables listed in Table 3. For other notes see Table 3.

[a] Instruments for pre-transfer income are variables measuring the size and quality of the dwelling. The F-test is for excluding these instruments in the first stage model.

[b] Sargan test from a regression of the IV residuals on the full set of instruments, distributed as chi-squared in the number of over-identifying restrictions.

[c] Hausman test for significant differences between the vector of efficient (OLS) and consistent (IV) estimates, distributed as $?^2_{(k)}$.

Table 5: Single-Knot Spline Function Estimates of Net Transfer Functions

	Urban Indonesia	Rural Indonesia	Urban Vietnam	Rural Vietnam	Urban Cambodia	Rural Cambodia	Urban PNG
Income threshold (K)	15600	422	841	64.1	1365	2495	12376
	(4386)**	(131)**	(313)**	(31)*	(891)	(1131)*	(2524)**
Income below K	-0.056	-0.243	0.025	0.063	-0.682	0.063	-0.083
	(0.008)**	(0.106)**	(0.014)+	(0.037)+	(0.293)*	(0.102)	(0.016)**
Income above K	-0.131	-0.045	-0.003	0.002	-0.013	-0.051+	0.040
	(0.095)	(0.007)**	(0.005)	(0.006)	(0.009)	(0.027)	(0.044)
Has no income	140.009	-33.147	18.719	9.387	-108.016	-129.342	736.144
	(67.785)*	(37.176)	(10.859)+	(4.168)*	(88.029)	(80.243)	(580.830)
Retirement income	-0.023	-0.079	-0.174	-0.117	-2.042	0.042	-0.649
	(0.044)	(0.045)+	(0.160)	(0.061)+	(1.517)	(0.444)	(1.208)
Has retirement income	-55.490	-15.005	-5.396	-2.100	1759.23	-318.751	-187.972
	(96.947)	(83.612)	(9.145)	(2.684)	(2534.21)	(400.562)	(423.560)
Threshold quantile [a]	0.955	0.203	0.740	0.290	0.050	0.280	0.867
R^2	0.114	0.088	0.035	0.035	0.058	0.021	0.106

Notes: Each equation also includes the other variables listed in Table 3. For other notes see Table 3.

[a] The proportion of the sample with incomes below the income threshold (K) where the spline function kinks.

Figure 2a: Transfer Functions For Urban Vietnam

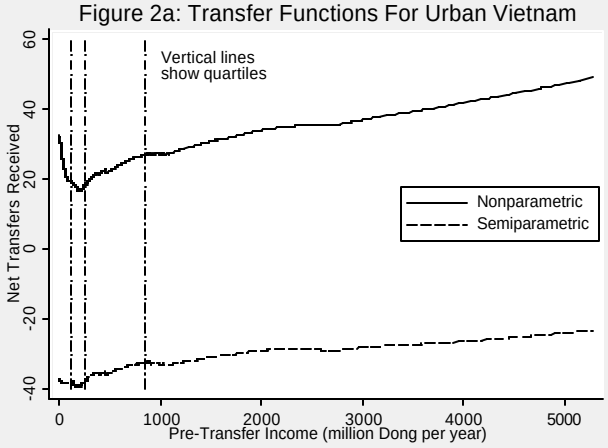

Figure 2b: Transfer Functions For Rural Vietnam

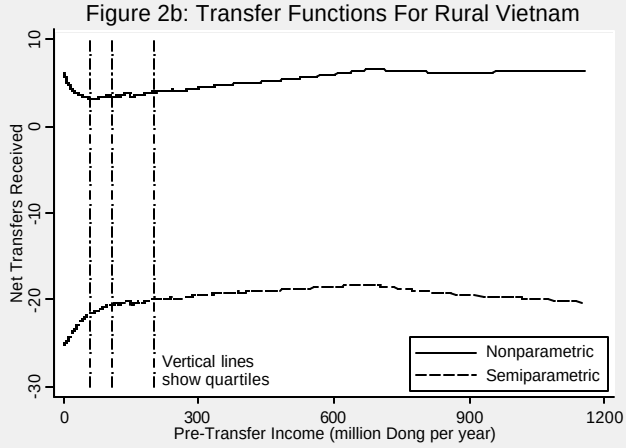

Figure 3a: Transfer Functions For Urban Cambodia

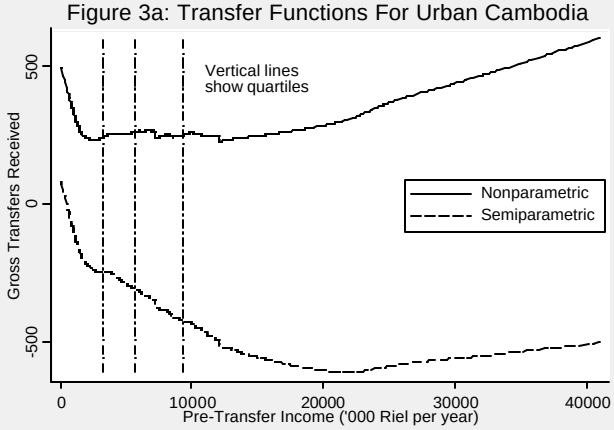

Figure 3b: Transfer Functions For Rural Cambodia

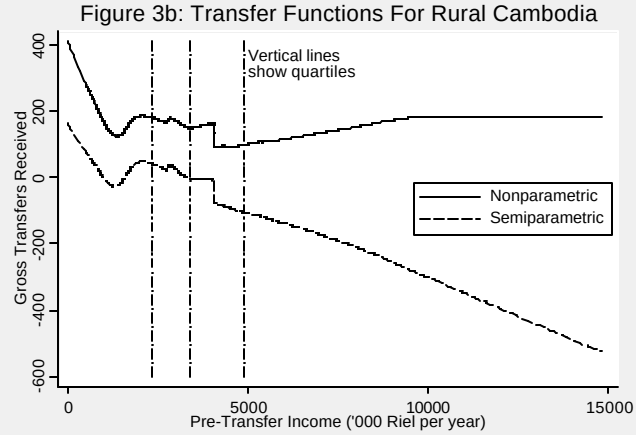

Figure 4: Transfer Functions For Urban PNG