

Are Voluntary Transfers An Effective Safety Net in Urban Papua New Guinea?

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Abstract

Although voluntary, inter-household, transfers of cash and goods are considered an effective safety net in many developing countries, previous research in Papua New Guinea suggests that this safety net fails. This article reports on a survey carried out in an urban area of Papua New Guinea that was designed to answer three questions about voluntary transfers: (i) are they targeted towards the poor? (ii) do they insure against reductions in earnings related to illness and unemployment? (iii) do households with access to more formal credit and insurance mechanisms still make transfers? The results suggest that voluntary transfers are targeted towards the poor, do respond to unemployment shocks, and continue to be made by households with access to other credit and insurance mechanisms.

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Private transfers of cash and goods between households are an important institution in many developing countries (Cox and Jimenez, 1990). These transfers may provide safety nets for people who find themselves in temporary distress (e.g., illness or unemployment), and may reduce disparities in income and consumption levels (e.g., by being directed mainly from rich households towards poor households). If private transfers act as an effective safety net and also effectively redistribute income, there may be less need for developing countries to try to set up formal social security systems.

There is a presumption within Papua New Guinea that the sharing of goods and income between households under the "wantok system" gives a built-in social safety net. Despite this presumption, existing research in Papua New Guinea suggests that the system of voluntary transfers is not an effective safety net (Morauta, 1984). It is particularly for urban residents that the safety net is believed to fail (Mounsell-Davis, 1993).

The operation of social safety nets is particularly important in Papua New Guinea at the moment because of concern about the living standards of vulnerable groups during the structural adjustment. If voluntary transfers are not an effective safety net and do not redistribute income towards the needy, government and donors may need to revise elements of the structural adjustment that impact most heavily on vulnerable groups.

In view of the negative findings of the earlier literature, and in order to see how the social safety net might cope with the stresses caused by structural adjustment, we re-examine the operation of private transfers in urban areas in Papua New Guinea. There are three specific research questions: (i) are voluntary transfers targeted towards the poor, so that they

systematically reduce inequality? (ii) Do transfers insure against reductions in earnings related to illness and unemployment? (iii) Do households with access to more formal credit and insurance mechanisms still participate in the system of voluntary transfers?

To answer these questions a household survey was carried out between April and June 1996, in Hanuabada village, Port Moresby. This village is in an urban area, and with a population of approximately 9000 it is the largest village in Papua New Guinea. Hanuabada has also been the site of a previous study of voluntary transfers (Belshaw, 1957).

This paper reports on an analysis of this household survey. We use graphical and regression analysis to see whether transfers of cash and goods are targeted towards the poor. The basic model of transfers is then augmented with variables that measure various forms of temporary distress to see how effective voluntary transfers are at acting as a safety net. To answer our third research question, of whether well-to-do households ‘drop out’ of the system of voluntary transfers, the basic model is augmented with variables that measure access to formal credit and insurance markets. Overall, and in contrast to the doubts raised by previous authors, we find that voluntary transfers can act as a safety net, at least for households in urban villages.

Previous Evidence on Voluntary Transfers in Papua New Guinea

From a previous survey in the village being studied, Belshaw (1957) found that 13 percent of total income was received as cash gifts from relatives, including ceremonial payments, and 13.5 percent as gifts in kind for a sample of 20 households in Hanuabada village. Thus around one quarter of income was from voluntary redistribution (although not necessarily from within this one village).

Morauta (1984) studied inter-household transfers in four low income areas and one high income area in two towns (Port Moresby and Madang). The 48 households in the study gave away goods and services (including meals and accommodation) that were equivalent to 45 percent of their earnings and received transfers equivalent to 39 percent of their earnings, for a net outlay equivalent to six percent of earnings. Despite the aggregate importance of these transfers, Mourata (1983) noted, on the basis of her fieldwork in Madang, that:

‘not everyone who needs transfers receives them or receives enough. This is because transfers in the wantok system are not transfers of charity or in a state welfare programme. They are part of a system of personal obligation, and some people who badly need transfers have nobody to help them’ (p.8).

Morauta (1984a) reports the value of voluntary transfers in a rural coastal village with 400 resident members and 600 others who resided in other parts of the country. The 16 households involved in the two-week survey received gifts that contributed about 33 percent of their total consumption. Approximately one-third of these gifts came from within the village and the rest were in-kind gifts and cash remittances from relatives living outside the village (mainly in Port Moresby). However, Morauta observed that this sharing and gift-giving did not seem to reduce disparities in consumption levels between households, and may even have made them worse.

The size and frequency of transfers reported by this previous research in Papua New Guinea is consistent with findings from other countries. Amongst a group of poor urban households in El Salvador, Kaufman and Lindauer (1986) found that receipts of voluntary cash transfers were equivalent to 11 percent of total household income. In a similar study from an urban area in Java, transfer receipts represented 20 percent of income (Ravallion and Dearden, 1988).

Types of Voluntary Transfers in Hanuabada Village

Transfers of goods or money are commonly made between households of families, friends or neighbours in Hanuabada. For example, if a household lacks food for a meal, they may ask another household for some rice or leftover cooked food. If the household who is asked either has enough of the requested foodstuff or has cash on hand or is more able to obtain the food on credit, they will normally meet the request of the needy household. Whether this transfer is reciprocated may depend on the relative level of earnings of the two households. If both have similar earnings, the household who gave the food will normally not hesitate in asking for help from the other household at some future time when it has a need. But if the household receiving the food has much lower earnings, the household who gave the food usually will not expect any return or will accept a return in terms of things the recipients can afford to give, such as labour, or something that can be obtained without much cash expense, like fish from the nearby sea.

Another common form of transfer in the village is when individuals or families repeatedly eat meals at another house. Also, surplus catch from a fishing trip or food gifts from another village may be shared out to the network of family, neighbours and friends of the giver. Adopting or fostering of children, whether short term or long term, is another form of transfer in the village where children from unemployed parents live with better-off relatives so their schooling and other basic needs can be met. A less frequent form of transfer is the migration of an employed relative into a needy household, usually temporarily, to provide some form of income.

Many transfers in the village take place in ceremonial events such as bride price payments, deaths, funerals and death feasts, church membership obligations, births and first born child

recognition gifts, church weddings and birthday parties. In such events, peoples' transfers can be less voluntary because these events are considered culturally important. In all events, if a family or household member is connected to the event in some way, then all his or her relatives and friends become automatically involved too as they will be obliged to help out their friend and relative. The outcome is a strengthening of ties and also the maintenance of personal and family prestige in the eyes of the villagers. Economically, as long as ties are strong, reciprocity of transfers in times of need is almost guaranteed.

Economic Explanations for Voluntary Transfers

Although the study of gift giving and informal support networks was originally an area of study mainly for anthropologists, economists have started to look at these processes as well. These voluntary transfers have been viewed by economists as a form of 'mutual insurance network' (Fafchamps, 1992). The idea is that people who are above the minimum standard of living may help others who have fallen, or are in danger of falling, below the minimum, so that they in turn may be helped if they should come upon future misfortune.

Although a mutual insurance network may face incentive problems, with people tempted to work less and rely on the help of others for their survival, an insurance network can be stable. The reason is that the self-interested members of the network have a long-lasting relationship. Therefore, opportunistic behaviour can be prevented as long as short-run benefits from deviation are smaller than long-run punishments (Fafchamps, 1992). Examples of long-run punishments are being excluded from the network, so that free riders will not get assistance in the future when they need it. Another method by which the 'moral hazard' or incentive problem of mutual insurance is overcome is by limiting the network where reciprocal sharing takes place to a small group

whose members know and continually interact with one another and who are broadly similar (Posner, 1980).

The insurance motivation in societies where gift exchange is prominent is also stressed by anthropologists (Belshaw, 1965). Examples from East Africa, North America and Melanesia where people distribute their material wealth by giving gifts are described as the building up of a form of credit which can be called upon in a time of major need. Belshaw goes so far as to describe the distribution of material wealth in this way as a 'capital investment' which will allow the gift-giver continuing control over future services (1965, p.49).

The explanations given by economists and anthropologists for transfers between households suggest that people will tend to make transfers to others who are worse off than they currently are. Although transfers may not go all the way towards equalizing incomes they may even out some existing inequalities. Transfers may also help maintain incomes in the face of temporary shocks like illness and unemployment. These characteristics of recipients are included in our empirical model of transfers.

The Household Survey

A household survey was carried out in Hanuabada between April and June 1996 so that empirical evidence could be gathered on voluntary transfers and the social safety net. Prior to the survey, all households in the eight Census Units (CUs) that make up the village were listed so that a random sample could be drawn. In total, 804 households were listed, implying an annual growth rate in household numbers of 3.3 percent since the 1990 Census.

The list of households was used to select a random sample of 67 households (an 8.33 percent sampling rate), by selecting every 12th household in a CU after a random start. In addition, a list of reserve households was made using the same method. These reserves were used if one of the originally selected households was unable to participate in the survey.

All households were interviewed twice, so that the start of the recall period was signalled by the first interview and the end was signalled by the second interview. This bounding can help overcome the problem of "telescoping error" where households report events or expenditures that happened earlier, as if they were in the recall period (Scott and Amenuvegbe, 1991).

The first interview asked about household composition and economic activity, and the household's access to formal and informal credit and insurance networks. Household stocks of important foods were also measured. The second interview asked about all food purchases, food gifts in and out, and food production and sales made since the first interview. Food stocks were also re-measured, so that the value of food consumption could be estimated from purchases, own-production and sales, net gifts, and stock changes. As well as questions on food consumption, the second interview also asked about money gifts given and received during the recall period.

The period between the two interviews was designed to be seven days but in some cases it was longer because appointments were not always able to be made with households. Overall, the average length of time between interviews was 7.8 days. To help guard against recall errors, each household was given a notebook and pencil on the first interview, with instructions to record their food purchases, gifts and other transfers over the recall period. These notes were then used as an aid during the second interview when transactions were recalled. After the interviews were finished the questionnaires were checked and anomalous answers were queried by going back to the

household. This was usually done when delivering a sack of rice, which was given to the household as a thank you for participating in the survey.

How Important are Private Transfers in Hanuadaba?

Almost two-thirds of the households in the sample received cash gifts during the period, which was usually one week, that they were surveyed. A smaller proportion (40 percent) of households made cash transfers to persons outside their household during the survey. In total, over four-fifths of households either gave or received cash transfers during the survey (Table 1). A further 12 percent of households had given or received cash transfers in the preceding four months, even though they did not in the week of the survey.

Table 1 Survey findings on the importance of private transfers of cash in Hanuabada

	Receiving cash gifts	Giving cash gifts	Either giving or receiving
Percentage participating (%)	62.7	40.3	80.6
Average for participants (toea/person/day)	49.5	50.4	n.a.
Average over all households (toea/person/day)	31.0	20.3	10.7

Source: Author's survey

What was the average value of these cash transfers? Table 1 contains estimates of the value of transfers per equivalent person per day, where we use person-days to control for the different size and composition of each household, and for the differing length of the recall periods. (The equivalence scale used gives children aged 0-6 years a weight of 0.5 and everyone else a weight of 1.0, based on evidence reported by Gibson, 1996.) The average size of incoming cash transfers for recipient households was almost 50 toea per person per day, which is equivalent to about 30 percent of daily per capita food expenditures by these households. The sample as a whole was a

net recipient of cash transfers, with the average for incoming cash transfers being 11 toea per person per day higher than for outgoing transfers.

Table 2 contains information on the pattern of food transfers between households. In contrast to transfers of cash, a greater proportion of households both gave and received gifts of food, and almost everyone who gave food gifts also received them. Another contrast with cash transfers was that the sample as a whole was a larger net recipient of food gifts, with incoming food transfers being 21 toea per person per day higher than outgoing food transfers (transfers of food were valued according to the market prices used to estimate the value of food consumption).

Table 2 Survey findings on the importance of private transfers of food in Hanuabada

	Receiving food gifts	Giving food gifts	Either giving or receiving
Percentage participating (%)	83.6	49.3	86.6
Average for participants (toea/person/day)	38.5	23.1	n.a.
Average over all households (toea/person/day)	32.2	11.4	20.8

Source: Author's survey

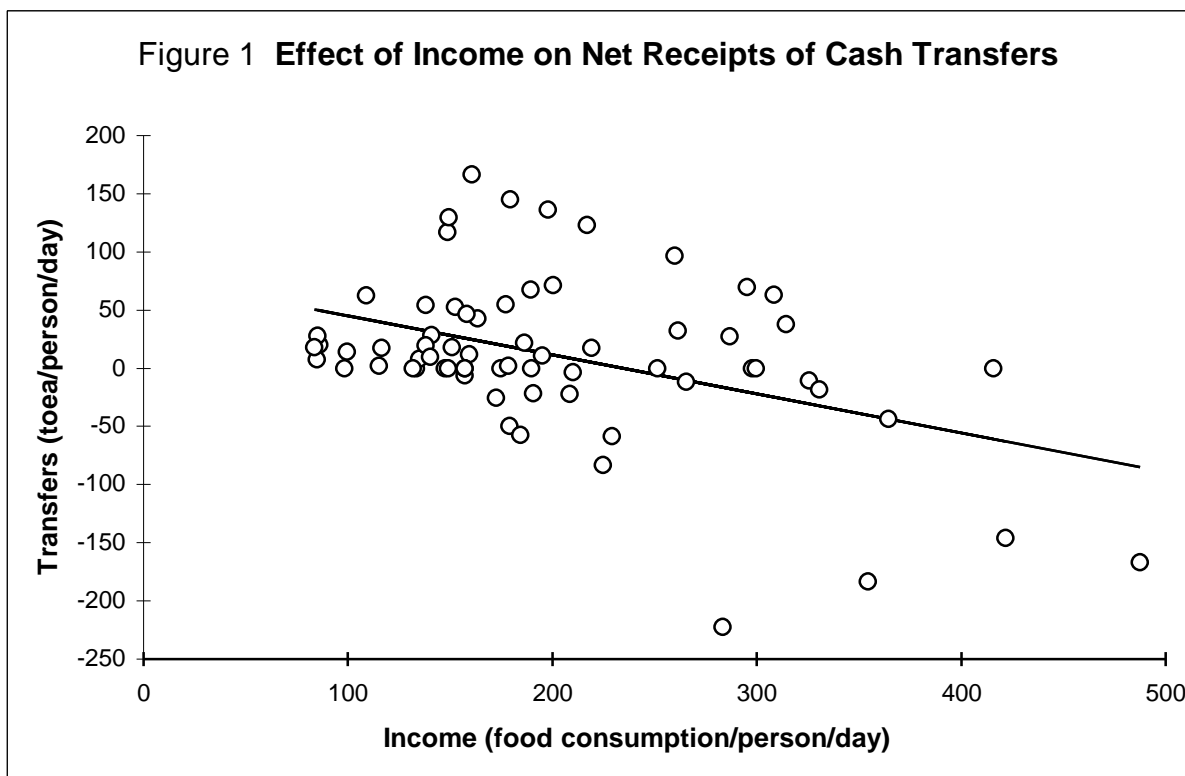
Closer examination of the data showed that the main factor determining the receipt (and subsequent re-giving) of food gifts was whether a household had visitors from rural areas during the week of the survey. These visitors typically bring large amounts of garden produce for their hosts. Because there was no overall pattern to these visits from rural relatives, our remaining analyses concentrate on the patterns of cash transfers, which more closely reflect redistribution within Hanuabada.

How Well Are Transfers Targeted Towards the Poor?

In this section we consider the relationship between transfers of cash and household income. We measure the income level of households by the value of food consumption per equivalent-person

per day. Previous research has shown that food consumption is a very good indicator of households' long-run (or "permanent") income, because it fluctuates less than either current income or total expenditure and it can be more reliably measured (Anand and Harris, 1994).

Figure 1 gives the scatter plot for the relationship between income and net transfers of cash during the interview recall period. Both income and transfers have been expressed on a equivalent-person per day basis, so that differences in household size and the length of the recall period do not distort the comparisons between households. The regression trend line is also displayed on the scatter plot, to show the average relationship between income and gifts.



There is a clear tendency for poorer households in Hanuabada to be net recipients of cash transfers, while richer households tend to be net donors. In other words, cash transfers go

from the rich to the poor and act to reduce inequality. The equation for the regression trend line is:

$$\text{Net transfers} = 78.57 - 0.34 \times \text{Income} \quad R^2=0.18$$

(0.09) standard error in ().

The coefficient on income is statistically significant ($t=3.80$) so there is strong evidence that the pattern of cash transfers going from rich households to poor households occurs in all of Hanuabada village, and not just in the sample.

The statistical problem of simultaneous equation bias (endogeneity) may be affecting the trend line in Figure 1. Although the graph is drawn as if income is the independent variable ‘causing’ net cash transfers, the relationship may go the other way. A household that received a large gift of cash during the survey recall period may have a high value of measured food consumption, because incoming gifts can be spent on consumption.

To see how important this bias may be, the instrumental variables (IV) technique was used to re-estimate the trend line. The first step was to form the predicted value of income, and the first-stage equation used to do this is reported in Appendix Table 1. This equation explains over one-half of the variation in household income levels, and the correlation between the actual and the predicted value is 0.74, so the predicted values should be quite accurate for using as an instrumental variable. Appendix Table 1 also contains the results of a regression equation predicting the logarithm of the total value of food consumption per household, which will be used in some later models.

The results of using instrumental variables to re-estimate the trend line are:

$$\text{Net transfers} = 121.86 - 0.55 \times \text{Predicted Income} \quad R^2=0.27$$

(0.11) standard error in ().

The results for net cash receipts, using instrumental variables, are in the same direction and even stronger than the trend line in Figure 1. Therefore the conclusion that cash transfers tend to go from the rich to the poor, and hence reduce inequality, remains unchanged.

To give a more practical sense of what these results imply about the effect of inter-household transfers, it is helpful to consider the position of a ‘poor’ and a ‘rich’ household. The predicted income level of the poor household, in the absence of transfers, allows food consumption of 140 toea per person per day (this is one standard deviation below the mean), while food consumption in the rich household is twice as high, at 280 toea per person per day. The IV estimate of the trend line suggests that the poor household will be a net recipient of cash transfers valued at 45 toea per person per day, while the rich household will be a net donor, at a rate of 32 toea per person per day. If net transfers were applied entirely to food consumption, the post-transfer consumption levels in the poor and rich households would be 185 and 248 toea per person per day. Thus, the effect of the transfers would be to raise the consumption level of the poor household to three-quarters of that of the rich household, compared with the pre-transfer case where it was only one-half as high.

Do Transfers Insure Against Shocks?

In this section we report the results of multiple regression models that test whether cash transfers insure against reductions in earnings due to illness and unemployment. The unemployment variable records whether anyone in the household became unemployed in the months prior to the survey (specifically, since the start of 1996). This definition means that the variable should locate households whose income had fallen, rather than those whose income has always been low because of permanent unemployment. The illness variable records

whether anyone in the household was too sick (or handicapped) to work in the week of the survey. We also include variables for two other types of shocks that may affect cash transfers; whether there had been a birth or a death in the household in the last 12 months. The models also include the household's predicted income (using the results from Appendix Table 1) and the size of the household.

Table 3 The effect of household income, household size, and various shocks on the receipt of cash transfers in Hanuabada

Independent variables	Change in probability of receiving transfers	Tobit coefficients	Effect of a unit change on expected value of transfers
Predicted income (log)	-0.52 (2.4)	-5.42 (2.4)	-3.6
Household size (log)	0.38 (2.0)	3.90 (1.9)	2.6
Ill-health dummy	0.17 (0.7)	0.78 (0.3)	1.7
Birth dummy	0.15 (1.0)	2.48 (1.4)	5.1
Death dummy	-0.24 (1.2)	-2.23 (1.0)	-0.8
Unemployment dummy	0.29 (1.6)	2.91 (1.5)	6.8
Constant	n.a.	44.81	
R^2	0.15	0.16	
S	n.a.	5.19	
Predicted probability of receiving transfers	0.66	n.a.	

Notes: 1. t -statistics for hypothesis that coefficient equals zero reported in ().

2. The change in the probability of receiving transfers is calculated from a probit model, and is for a discrete change from 0 to 1 for dummy variables, otherwise for infinitesimal changes (see the Appendix for derivation).

3. The effect of a unit change on the expected value of transfers is the product of the tobit coefficient and the probability of receiving transfers, or the exponential of this product if the independent variable is a dummy variable (see the Appendix for derivation).

4. The dependent variable for the probit model (column 1) is a dummy variable (=1 if the household received cash transfers, =0 otherwise) and the dependent variable for the tobit model is the log of cash transfers received during the survey period.

Source: Author's survey.

The first question answered by the models is whether the probability of receiving cash transfers rises if a household suffers an earning shock. Results in the first column of Table 3 show that the probability of receiving cash transfers is almost 30 percentage points higher for a household where someone lost a job, compared with a household of the same income and size but with no unemployment shock, although this effect falls just outside the usual level of statistical significance ($p=0.11$). This result is derived from the Probit coefficients reported in Appendix Table 2, which show that a household with average characteristics but no job loss has a 61 percent chance of receiving cash transfers, while the same household with job loss has a 90 percent chance of receiving transfers. The other variables measuring shocks (illness, births and deaths) fall well outside usual statistical significance levels, so private cash transfers apparently react to only some shocks. The results in the first column of Table 3 also show that the probability of receiving transfers is lower for richer households – confirming what was apparent in Figure 1 – and is higher for larger households.

The Tobit coefficients reported in the second column of Table 3 show the effect of the independent variables on the value of transfers received. These coefficients correct for the fact that households receiving transfers are not a random sample of all households in Hanuabada (the problem of a censored sample). It appears that incoming transfers are higher for poorer and larger households, and for households where someone lost their income source (although the impact of unemployment is not precisely estimated). Ill-health, births and deaths have no statistically significant effect on incoming cash transfers for the households in the sample. The unconditional expected value of transfers, which takes into account the probability of receiving transfers and the value of transfers for those who do receive them, can be calculated from these Tobit coefficients using the approach outlined in the Appendix.

For a household with average characteristics and having no earnings shock due to job loss in the months before the survey, the expected value of cash transfers received during the survey period was approximately K30. For that same household, suffering a job loss, the expected value of transfers received is K180. The increase in transfers received of approximately K150 (an increase by a factor of six) is equivalent to about three-quarters of the average fall in household income caused by the job loss.

The results in the third column of Table 3 report the proportionate increase in transfers received following a unit change in each of the explanatory variables. Hence, these ‘quasi-elasticities’ summarize responses of the type illustrated above for the case of an unemployment shock. The expected value of transfers is four times higher for households which had a birth in the last year, while ill-health and deaths have only small effects on the expected value of transfers. For the continuous variables, a one percent increase in household size increases the expected value of transfers received by 2.6 percent, while the expected value falls by 3.6 percent for a one percent increase in household income.

In summary, the models reported in Table 3 show that transfers do insure against reductions in earnings caused by unemployment, although the results are less clear for other shocks. The results also reaffirm that voluntary transfers of cash are targeted towards the poor.

Are Households With Formal Credit and Insurance Part of the Transfers Network?

One of the main reasons for voluntary transfers of cash between households, according to economists, is that these households are in a mutual insurance network (Fafchamps, 1992). Traditionally, mutual insurance was needed because households lacked technologies for storing surplus wealth from one period for use in the future (Posner, 1980). But now many

households in Hanuabada have bank accounts and insurance policies, which give them alternative ways of storing surplus wealth for future use. It is therefore interesting to see whether people who use formal insurance and credit mechanisms continue to participate in the mutual insurance network of voluntary transfers between households.

A practical reason for studying the effect of formal credit and insurance is that our previous conclusions – that cash transfers in Hanuabada target the poor and help insure against unemployment – may just be due to households without formal credit and insurance mechanisms. It might be that households with access to formal credit and insurance “drop out” of the system of voluntary transfers. If this is the case, relying on voluntary transfers as a safety net may be unwise because use of formal credit and insurance is likely to continue rising with economic development, possibly crowding out the informal safety net.

Just over one-half of the households in the sample had either life or medical insurance, while access to formal credit markets was even higher with four-fifths of households having bank or savings and loan accounts (Table 4). Households with access to formal insurance were less likely to receive cash transfers than were other households, but were more likely to give cash transfers. Because these households had above-average incomes (food consumption was almost 50 toea per person per day higher than for other households), they are more likely to be donors rather than recipients of transfers, so it is their slightly above-average participation rate as donors which is relevant.

Table 4 **Participation rates in cash transfer networks by households in Hanuabada**

	Percentage of all households	Percentage participating (%)		
		Receiving cash gifts	Giving cash gifts	Either giving or receiving
All Households	100.0	62.7	40.3	80.6
Households with:				
Life and medical insurance	53.7	50.0	41.7	75.0
Bank and savings and loan accounts	80.6	59.3	37.0	77.8

Source: Author's survey

Households with either bank or savings and loan accounts had a slightly lower likelihood – by approximately three percentage points – of either receiving or giving cash transfers. (Because these households are of average income, it is both the receiving and giving participation rates that are relevant.) Overall, the results in Table 4 do not give a strong suggestion that households who have alternative ways of insuring themselves drop out of the mutual insurance network of voluntary transfers between households.

Conclusions

A survey of eight percent of the households in Hanuabada village was conducted to answer three questions: (i) are voluntary transfers targeted towards the poor, so that they systematically reduce inequality? (ii) Do transfers insure against reductions in earning potential related to illness and unemployment? (iii) Do households with access to more formal financial and insurance institutions still participate in the system of voluntary transfers? The results suggest that voluntary transfers of cash made on a day-to-day basis are targeted towards the poor, and households receive more of these transfers if they suffer sudden misfortune in the form of lost employment. Households with access to formal credit and insurance facilities do appear to stay in the network of households giving and receiving transfers.

These results can be contrasted with earlier findings that the system of voluntary transfers is not an effective safety net (Morauta, 1984; Mounsell-Davis, 1993). However, two important features of Hanuabada may distinguish it from other urban areas in Papua New Guinea. First, it is a traditional village, where social and economic ties are long-standing. Second, and perhaps more importantly, poverty levels are higher in Hanuabada than in most urban areas. A common benchmark for defining poverty is a food energy intake of less than 2000 calories per person per day. By this standard, 42 percent of the households in the sample would be classified as being in poverty. In contrast, in the poverty assessment survey carried out in PNG in 1996 (Gibson and Rozelle, 1998) only 25 percent of households in urban areas, and 27 percent of households in Port Moresby, had energy intakes below the poverty line of 2000 calories per person per day.

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Appendix Table 1 Results of the First Stage Equation Predicting Food Expenditure per Equivalent Person per Day and Log of Food Expenditure per Household

Dependent variable:	Food expenditure per equivalent person per day		Log (food expenditure per household)	
Independent variables:	b	<i>t</i> -statistic	b	<i>t</i> -statistic
Log (person days of recall period)			0.961	5.82
Household head's years of schooling	4.867	2.11	0.023	2.06
Dummy variable for landward census units	36.497	1.92	0.154	1.66
Total number of household dwellers	-7.758	4.12	-0.038	2.24
Dummy variable for households that had a job lost since the New Year	-101.31	2.54	-0.481	2.46
Income lost from job loss	0.313	2.09	0.002	2.29
Number of dwelling or vehicle insurance policies per household	49.723	3.24	0.170	2.27
Total number of bank accounts per household	13.244	1.89	0.082	2.49
Dummy variable for households in rotating credit scheme	77.813	1.68	0.316	1.41
Intercept	204.05		5.392	
R ²		0.55		0.66
N		67		67

Appendix Table 2 Results for Probit model of the receipt of cash transfers in Hanuabada

Independent variables	Probit coefficients
Predicted income (log)	-1.41 (2.4)
Household size (log)	1.04 (2.0)
Ill-health dummy	0.51 (0.7)
Birth dummy	0.44 (1.0)
Death dummy	-0.62 (1.2)
Unemployment dummy	1.01 (1.6)
Constant	11.10 (2.3)
R^2	0.15

Notes: 1. t -statistics for hypothesis that coefficient equals zero reported in ().
2. The dependent variable is a dummy variable (=1 if the household received cash transfers, =0 otherwise).

Source: Author's survey.

Appendix A

Marginal Effects in Probit and Tobit Models

For continuous variables, marginal effects in the Probit model are calculated at the mean as:

$$\left. \frac{\partial \Phi(\mathbf{x}\mathbf{b})}{\partial x_i} \right|_{\mathbf{x} = \bar{\mathbf{x}}} = f(\bar{\mathbf{x}}\mathbf{b})b_i \quad (1)$$

where Φ is the cumulative normal distribution function, \mathbf{x} is the matrix of explanatory variables, \mathbf{b} is the vector of estimated coefficients and $f(\cdot)$ is the normal density. For dummy variables, the discrete change in probability when the dummy variable switches from zero to one is calculated as $\Phi(\bar{\mathbf{x}}_1\mathbf{b}) - \Phi(\bar{\mathbf{x}}_0\mathbf{b})$ where $\bar{\mathbf{x}}_1 = \bar{\mathbf{x}}_0 = \bar{\mathbf{x}}$ except that the i th elements of $\bar{\mathbf{x}}_1$ and $\bar{\mathbf{x}}_0$ are set to one and zero, respectively (StataCorp, 1997).

The stochastic process underlying the Tobit model is:

$$\begin{aligned} y_t &= X_t\mathbf{b} + u_t && \text{if } X_t\mathbf{b} + u_t > 0 \\ &= 0 && \text{if } X_t\mathbf{b} + u_t \leq 0 \end{aligned} \quad t = 1, 2, \dots, N, \quad (2)$$

where N is the number of observations, y_t is the dependent variable, X_t is a vector of independent variables, \mathbf{b} is a vector of unknown coefficients, and u_t is an independently distributed error term assumed to be normal with zero mean and constant variance \mathbf{s}^2 . The expected value of y in the model is:

$$E y = X\mathbf{b}F(z) + \mathbf{s}f(z), \quad (3)$$

where $z = X\mathbf{b}/\mathbf{s}$, $f(z)$ is the unit normal density, and $F(z)$ is the cumulative normal distribution function (giving the probability of observations being above the limit). Note that equation (3) is not the same as the expected value conditional upon being above the limit.

McDonald and Moffit (1980) show that the effect of a change in the i th variable on the unconditional expected value is:

$$\partial E y / \partial X_i = F(z) \mathbf{b}_i \quad (4)$$

and it is this effect of a unit change on the expected value of transfers that is reported in the third column of Table 3.