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## **Are There Holes in the Safety Net?**

### **Remittances and Inter-household Transfers in Pacific Island Economies**

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#### **Abstract**

A key feature of Pacific Island economies is the emphasis on redistributive activities, especially domestic inter-household transfers and international remittances. However there is no consensus in the literature on the impact of these transfers on the distribution of income. In this study data from two samples of households in Papua New Guinea and one in Tonga are used to estimate the determinants of remittance and transfer receipts. These estimates can be used to infer the attitude of remitters with regards to inequality amongst the recipients. The results suggest that it is not possible to generalise across the Pacific about the impact of these transfers on the distribution of income, nor on the responsiveness of transfers to short term shocks. However, in the largest population studied (the rural sector of PNG), informal transfers either leave the distribution of income unchanged or make it even more unequal despite high participation rates in transfer networks in this population. Thus policymakers would be wrong to assume that high rates of participation transfer or remittance networks throughout the Pacific imply equally good informal safety nets in all areas.

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## I. Introduction

A key feature of Pacific Island economies is the emphasis on redistributive activities. Most households are involved in networks that share cash, food, housing and other resources. Social competition often takes the form of ceremonial gift-giving, where families, clans and villages endeavour to raise the most money for either church activities or bride price and other customary payments. The Pacific Island diaspora are included in these redistributive activities through their remittances and the support they provide to newly arrived immigrants from their home communities.

These redistributive activities go by many names in the Pacific. In Melanesia they tend to be known as the ‘*wantok* system’ (except in Fiji where it is called *kerekere*). A recent description of the ‘*wantok* system’ is provided by Forster in the context of Vanuatu (2005, p. 288):

“*Wankok* literally means ‘one talk.’ Wantoks are people who speak the same language as you – your family and your clan.<sup>2</sup> The wantok system involves both responsibilities and privileges. Within a village, everyone is entitled to land, food and a share in community assets. If ni-Vanuatu travel anywhere, other wantoks are expected to feed and shelter them until they can make longer-term arrangements. In a country without a social security system, the wantok system provides for material care, a sense of identity and support during difficult times...”

Similar traditions of reciprocal obligations are found throughout the Pacific. Although the study of gift exchange networks was originally dominated by anthropologists, such as Belshaw (1965), economists have started to look at these processes as well. There are at least three reasons for this interest by economists: First, these networks may function as an informal social safety net. The features of a safety net are that it provides assistance for those people who find themselves in temporary distress and it may help to reduce longer term disparities in living standards (Cox and Jimenez, 1990). This potential reduction in inequality is of interest because most evaluations of social welfare consider both the level or growth in income (or consumption) and the distribution of that income or consumption across the population.<sup>3</sup> Moreover, to the extent that there is an existing informal safety net, the introduction of any public transfers program (which may be partly funded by aid, so it should be of interest to the donor community) may be less effective than expected because public transfers could crowd out the existing informal safety net (Dercon, 2002).

Second, remittances and other transfers may act like insurance. In other island regions remittances have been shown to respond to the damage caused by natural disasters.<sup>4</sup> Similarly, Connell and Brown (2005) suggest that remittances in the Pacific may play a key role in reducing national and household vulnerability. For example, in the two months after Cyclone Ofa, which struck Samoa in 1989, remittances were 70 percent higher than in the same months of the previous year as immigrants who had not remitted for some time sent money to friends and relatives (Macpherson, 1994). The insurance role of transfers is also

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<sup>2</sup> There appears to be a growing flexibility in the identification of Wantoks, who may also be non-kin with shared school, work or church experiences.

<sup>3</sup> Formally, it is possible to express the average level of social welfare in a society, as judged by some observer,  $W/N$  as depending on the average income level,  $\bar{y}$  and some penalty for the degree of income inequality:

$W/N = \bar{y} - \bar{y}A$  where  $A$  is the Atkinson measure of inequality. Details are in Creedy (1996).

<sup>4</sup> However, this insurance is only partial – remittances to Jamaica appear to increase by only 25 cents for every one dollar of hurricane damage (Clarke and Wallsten, 2003).

illustrated during the 1997 food shortages in Papua New Guinea that were caused by frost and drought during the *El Nino* conditions. Consumption of imported rice soared by 58,000 tonnes (40 percent above the previous level) during this event, and much of this reflected private transfers rather than supply by aid donors, who started food distribution after the peak of the crisis (Whitecross and Franklin, 2001). Rural people with relatives in urban areas received money which was used to help pay for imported food during the crisis but people in poor and isolated places who had no urban wantoks were unable to compensate for the loss of their traditional foods (Allen, Bourke and Gibson, 2005).

Third, remittances and other transfers may have broader effects. For example, in terms of benefits, there are claims that remittance income may help prevent conflict (Ware, 2005). According to this view, it is perhaps not surprising that Melanesia has been conflict-prone while Polynesia has not, given the much greater importance of remittances to the Polynesian countries. It is also argued that remittance flows (and their attendant emigration flows) have greater benefits than aid inflows of similar magnitude, because the possibility of emigration may impose discipline on Pacific Island policy makers given that people can 'vote with their feet' (Chand, 2004, p.16).

Of course there is also a very large literature that argues that remittances to Pacific Island countries have undesirable economic effects. In particular, they are believed to contribute to over-valued real exchange rates by pushing up domestic wages and production costs, which reduces international competitiveness (Ahlburg, 1991). In this sense, remittances may have effects like that of other booming sectors, such as mineral exports in Papua New Guinea, leading to the so-called 'Dutch disease' where resources flow out of other sectors that in the longer-run may have greater comparative advantage (Sturton, 1992). For example, Faeamani (1995) suggests that remittances are associated with a reduction in garden size and food production in Tonga. In addition, Borovnik (2006) gives an example where the difficulty of transferring remittances to the outer islands in Kiribati has contributed to the urbanization of South Tarawa, with consequent environmental problems. On the other hand, a more positive view of the developmental impact of remittances in the Pacific is reported by World Bank (2006).

Despite this considerable literature on remittances and inter-household transfers in the Pacific there is no consensus on the impact of these transfers on the distribution of income, nor on the responsiveness of transfers to short term shocks. A brief review in Section II shows some of the diversity of the claims made in this regard. Consequently it is not possible to make general statements about the extent to which these informal transfers do constitute a safety net. Therefore the goal of the current paper is to report on empirical analyses of the pattern of remittances and inter-household transfers in several locations in the Pacific.

The empirical framework is based on a seminal study of transfers in Indonesia (Ravallion and Dearden, 1988) which shows how an econometric model can be used to infer the attitude of remitters with regards to inequality amongst the recipients. The data come from Tonga and Papua New Guinea and are designed to illustrate several contrasts, including between international remittances and domestic transfers, between urban and rural areas, and between urban squatter settlements and more formalised urban residential areas.<sup>5</sup>

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<sup>5</sup> These squatter areas are likely to be viewed by many outsiders as some of the most deprived places in the Pacific, although this view is not always supported by statistical analyses of poverty which find that living conditions are significantly worse in the rural sector (Gibson and Rozelle, 1998).

These contrasts are designed to capture several themes in the literature. International remittances may be better at insuring against shocks because there is less likelihood of the donor and recipient households suffering from the same shock (Dercon, 2002). Informal insurance may be more feasible in urban areas where the diversity of occupations favours the survival of risk-sharing networks since member incomes are less correlated than in rural villages (Cox and Jimenez, 1998).<sup>6</sup> But occupational diversity also increases the risk of moral hazard because members can no longer use their own work experience to decide whether the income shock of another member reflects bad luck rather than laziness or negligence. These pressures toward distrust and failure of the network may be especially a feature of urban squatter settlements that are marked by a high degree of ethnic diversity, and occasional outright conflict.<sup>7</sup> However, at least in Port Moresby, which is the largest city in the Pacific Islands, squatter settlements tend to be formed from clusters of kinsfolk, in contrast with squatter areas in other countries where there is more inter-mixing of clan groups (Norwood, 1984). This clustering may favour the continuation of *wantok*-based support networks.

The next section of the paper briefly reviews previous claims about informal safety nets in the Pacific Islands. Following that, the theoretical framework and model specification are outlined. The data are described in Section IV and the empirical results are in Section V. The concluding section discusses the implications of the results.

## II. Previous Literature

Existing studies from the Pacific do not provide any consensus about whether the widespread presence of redistribution is sufficient for there to be a safety net. Despite this, there may be a presumption from some researchers and probably more policy makers that because transfer networks are so prevalent, this will automatically give a built-in social safety net. That this is not necessarily so was cogently argued by Louise Morauta, over 20 years ago.

“..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, either because they have no relatives living near or because the relatives they do have are too poor or otherwise unwilling to help.” Morauta, 1983, p.8

Although Morauta was describing urban squatter settlements,<sup>8</sup> her other fieldwork in rural areas also reached similarly pessimistic conclusions. In Morauta (1984) the situation in a rural village in Gulf province of PNG with a high rate of emigration is described.<sup>9</sup> Transfers were very important, contributing about 33 percent of the total consumption of surveyed households, with most of this coming from relatives living outside the village (mainly in Port Moresby). However, this sharing and gift-giving did not seem to reduce disparities in consumption levels between households, and may even have made them worse.

Rather different conclusions were reached by Ward (1977) and Norwood (1984) in the context of urban areas in PNG. According to Ward (1977, p. 43) reciprocity still operates in urban areas of PNG, kinship groups support those in need and “income is spread through

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<sup>6</sup> This correlation matters because if all members experience a negative shock at the same time there is no one in a favourable position to help those who are badly off, and the network will fail to provide insurance.

<sup>7</sup> For example, in Côte d’Ivoire it is the spatially dispersed members of the same ethnic group rather than the ethnically diverse neighbours who are the relevant insurance group (Grimard, 1997).

<sup>8</sup> Studied during preliminary fieldwork in Madang, PNG.

<sup>9</sup> Specifically, Kukipi, which is the home village of former PNG Prime Minister, Sir Mekere Morauta.

traditional-type channels”. Similarly, according to Norwood (1984, p. 91) who studied squatter settlements in Port Moresby, “inhabitants of these poorer communities have developed support mechanisms to ensure that the community as a whole benefits from such money as can be earned.”

In contrast, Mounsell-Davis (1993) argues that there is a growing category of people in both Fiji and PNG for whom the *Wantok* system fails. This failure is especially in urban settlements where some households are too poor to practice reciprocity and so are left to fend for themselves. More recent results are reported by Gibson, Boe-Gibson, and Scrimgeour (1998) who find that transfers in an urban village in Port Moresby are targeted towards the poor, and households receive more of these transfers if they suffer sudden misfortune in the form of lost employment. However, it is notable that despite being in an urban area, this was a traditional village, where social and economic ties are long-standing and so the results may not apply in other urban areas.

There is a similar variety of claims about remittances. According to Ahlburg (1995) remittances in the Pacific have favoured more egalitarian development although there is no necessary reason why they could not be disequalising. Borovnik (2006) claims that remittances from seafarers act as a safety net in Kiribati.

### **III. Theoretic Framework and Model Specification**

Many studies of remittances and transfers in the literature rely on a variety of theoretical frameworks. While some are specific to remittances (Poirine, 1997), a common theme is that both remittances and domestic inter-household transfers can be viewed 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 may 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).

Of course there are also other motivations for remittances and transfers. For example, remittances from Samoan immigrants in New Zealand who aspire to return to leadership positions in their village have been described by Macpherson (1994, p.113) as creating ‘a stock of socio-political capital’.

The above discussion suggests that there are at least some reasons for believing 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 the empirical model of transfers introduced by Ravallion and Dearden (1988). This model is based on the following equation:<sup>10</sup>

$$\ln(\text{Transfers received}) = \beta_1 (\ln \text{ of income in recipient household}) + \text{other variables}$$

where  $\ln$  is the natural logarithm and the other variables include household size, age of household head, and dummy variables indicating whether the household had experienced ill health, births, or unemployment. Because transfers and the income variable are in logarithms,  $\beta_1$  is an elasticity, which shows what the percentage change in transfers would be for a one percent change in the recipient household's income.

Three scenarios for the value of  $\beta_1$  pose different interpretations on the preferences that the provider of transfers or remittances has over the resulting income distribution. If  $\beta_1 = 1$ , transfers rise or fall proportionate to recipient households' change in income, and therefore transfers are a constant share of recipient household income. For example, a donor giving to two households, one rich and one poor, makes transfers proportionate to each household's income so if before transfers the rich household was twice as rich as the poor household, it will also be twice as rich after the transfer. The distribution of income is not altered. Therefore, an elasticity of transfer receipts with respect to income equal to one implies no aversion to inequality on the part of people donating transfers. If  $\beta_1 < 1$ , transfers reduce disparities in income and make the distribution more equal because they do not fall as quickly as income falls, and so transfers are a rising share of recipient income following a negative shock. Therefore, an elasticity of transfer receipts with respect to income that is less than one implies aversion to inequality on the part of the people donating transfers. If  $\beta_1 > 1$ , transfers increase disparities in income and make the distribution more unequal than it was before, indicating donors' preference for inequality (or at least lack of concern that transfers motivated by other reasons may increase inequality).

Ravallion and Dearden (1988) also discuss the implications of using either gross or net transfer receipts in their model. Gross receipts are appropriate if donors do not know what use recipients make of the transfers (for example, whether they act as an intermediary passing some on to other households or to institutions in the wider community like churches). Net receipts are appropriate if donors are fully informed about return transfers and the passing on of transfers to others. Borovnik (2006) and Macpherson (1994) describe how the initial destination for remittances, which is often the parent of an immigrant, may act as a conduit through which part of the remittance becomes more widely distributed within extended families and the wider village economy. This passing on of remittances suggests that net transfers may be the appropriate concept in the Pacific, so although the results reported below use both gross and net receipts, most emphasis is placed on the regressions for net receipts.

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<sup>10</sup> A formal derivation of the model is presented in Appendix I.

#### IV. Data

Three separate datasets are used in the analyses. The first is the Tongan component of the Pacific Island-New Zealand Migration Survey (PINZMS), which was carried out in 2005 and covers 230 households in Tonga who come from four groups: (i) families of Tongan immigrants in New Zealand who were successful participants in the 2002/03 and 2003/04 Pacific Access Category (PAC) ballots, (ii) intending migrants who had been successful participants in the same PAC ballots but who were still in Tonga (iii) unsuccessful participants from the same PAC ballots who were still in Tonga, and (iv) a group of non-applicants to the PAC program. Households in all four groups receive remittances, although at different levels, representing their different degree of engagement with (and planned participation in) the Tongan diaspora. The PINZMS is a comprehensive survey designed to measure multiple aspects of the migration process. It has a detailed module on remittances, recording remittances received in the form of money and goods, and whether these were destined for any special purposes, such as church fundraising (*misinale*), school fees etc.

The second dataset is the 1996 Papua New Guinea Household Survey (PNGHS), which covered 1144 households in both rural ( $n=830$ ) and urban ( $n=314$ ) areas. The survey covers expenditures and the imputed value of own-production, net gifts received, and stock changes, for foods and other frequent consumption items over a two-week period. An annual recall covered infrequent expenses and an inventory of durable assets was used to estimate the value of the flow of services from these assets, including rental services from owner-occupied dwellings. The survey obtained comprehensive information on the private transfers between households, including inward and outward transfers of food and other frequent expenses over a two-week period, and in-kind gifts given and received during the previous 12 months. Details were also obtained on each inward and outward monetary transfer exceeding K50 in the previous 12 months.

The third dataset is the Papua New Guinea Urban Household Survey (UHS), which was carried out in the late 1980s in urban areas in six (of 20) provinces. Data available on 1093 households include food purchases and other recurring expenses (including actual and imputed dwelling rents) over a two-week period, consumption from own-production, and gifts given and received of goods, services and money. The survey also collected many details on the characteristics of dwellings and neighbourhoods and these are used to split the sample into two parts: (i) those households in urban squatter settlements, where the predominant dwelling type is “self-help” and “makeshift” ( $n=303$ ), and (ii) those households in formal housing areas (both “low cost” and “high cost”) and in traditional villages which have been engulfed by the expanding urban areas ( $n=790$ ).

It should be noted that there are important differences between each of these surveys, in terms of the way that information is collected and the reference period over which transfers and living standards are measured. These differences may have less effect on the econometric estimates of the elasticity of transfer receipts with respect to income than they do on descriptive statistics about the extent of participation in informal transfers networks and the monetary importance of remittance and transfer receipts. These differences should be kept in mind when interpreting the results, which are designed to reveal ‘stylized facts’ rather than underpin detailed comparisons between countries, or between time periods for the same country.

## V. Results

Table 1 presents descriptive statistics on the remittance and transfer receipts in the three samples. Approximately 90 percent of households in the Tongan and 1996 PNG samples were receiving transfers. About two-thirds of the urban PNG households in the late 1980s were receiving transfers, noting that the questionnaire used for the UHS only covered two-weeks of transfers rather than a whole year, which would tend to reduce the estimated participation rate. Households in urban squatter settlements appear to be more likely to be receiving (and making) transfers, even when comparing with a group having the same (low) income level. In all three surveys the median ratio of transfers to total expenditures is about ten percent for net recipients.

The results of the regression models of remittance and transfer receipts are reported in Tables 2a-2c. Appendix II describes the explanatory variables used in the models of transfers. Where possible, the variables used by Ravallion and Dearden (1998) are chosen. One exception was that none of the surveys obtained information on deaths within the household during the previous year. The replacement variable used is whether the household is headed by a female, which may reflect widowhood which is likely to motivate transfer receipts in the same way that a recent death does.

The income term in Ravallion and Dearden's model is a metric of each household's welfare *after* transfers, and in this regard it differs from other studies which focus on pre-transfer income (Cox and Jimenez, 1998). The empirical income variable used by Ravallion and Dearden was the predicted value of (log) total household consumption of all goods and services, to avoid simultaneity with transfer receipts since current period receipts could raise current period expenditures. The instrumental variables technique is used here to obtain this predicted value, with the instruments being some combination (which varies with data availability in each survey) of the education and occupation of the household head, household assets and dwelling characteristics.<sup>11</sup> The other feature of the estimation method is that it accounts for some households reporting zero transfer and remittance receipts (a Tobit model). If Ordinary Least Squares (OLS) was used, these households who did not receive any transfers could not have been included because the logarithm of zero is undefined. Excluding these households ("censoring" the dependent variable) might have biased the results because the households not receiving transfers may be different from those who did receive transfers, for example they may have higher income.

The results for Tonga in Table 2a suggest some aversion to inequality on the part of remitters. This table has results that treat income as both endogenous and exogenous because a comparison of the results of the two models (a Hausman test) did not reveal any significant endogeneity of household income with respect to remittances. Given that, the more precisely estimated results treating income as exogenous are to be preferred, and according to these, the hypothesis that  $\beta_1=1$  (no inequality aversion) is rejected for both gross and net receipts (at

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<sup>11</sup> One concern with using dwelling attributes as instruments for household expenditure is that remittances and transfers may be spent on dwelling improvements, so there could be a direct relationship between the instruments and the dependent variable, rather than one that operates only through the potentially endogenous total expenditure variable. Indeed, the importance of house building as an early motivation for remittances is stressed by Macpherson (1994). However, in both PINZMS and PNGHS, which ask if transfers are destined for special purposes such as house building, only two percent of remittances or transfers in each survey were for the purpose of house building or renovation. Moreover, in the PINZMS sample, only six percent of households in Tonga had made any improvements to their dwelling in the previous 12 months and the results are unchanged if these dwellings are removed from the sample. Thus this concern about a violation of the exclusion restrictions for valid instruments may not be too serious.

$p < 0.04$ ). The fact that  $\beta_1 < 1$  indicates that remittances will contribute a larger share of total recipient income as income falls. In other words, remittances act as somewhat of a safety net. It is also clear that remittances are directed towards households headed by the more elderly and by females although the effect of age disappears once net receipts are considered. This may indicate that households headed by older people (such as the parents of immigrants) are more likely to act as a conduit for passing remittances on to the rest of the community than are other recipient households. The results for unemployment, changes in health status and recent births (as examples of shorter term shocks) are less precisely estimated.

In contrast to the situation in Tonga, the receipt of transfers in the rural sector of Papua New Guinea does not appear to reduce inequality. Indeed, in Table 2b the hypothesis that  $\beta_1 = 1$  (no inequality aversion) is rejected at the  $p < 0.04$  level in favour of the alternative hypothesis that  $\beta_1 > 1$  (i.e., transfers are inequality increasing) when using gross receipts. The null of no inequality aversion is not rejected for the rural sector in the model using net receipts ( $p < 0.61$ ). In the urban sector, the null of no inequality aversion is not rejected for the model using gross receipts ( $p < 0.17$ ) but is only weakly rejected ( $p < 0.09$ ) in favour of the alternative hypothesis of inequality aversion when using net receipts.

To drill a little bit further into the result that transfers in Papua New Guinea don't seem to be inequality reducing and may even be inequality increasing, the transfer receipts were disaggregated into day-to-day transfers and those made over a longer term period, where the size of each transfer is typically larger.<sup>12</sup> For both urban and rural PNG the coefficient on  $\beta_1$  is smaller for day-to-day transfers than for the longer-term transfers. However, the pattern of transfers having a more equalising role in urban than rural sectors is repeated. Thus it is the bigger transfers which show the least aversion to inequality (especially in the rural sector). This may be because these individually larger transfers take place in ceremonial events (e.g. contributing to bride-price) where people are obligated to participate, even if it means poorer households donating to richer households.

The other factor relevant to transfer receipts in both rural and urban sectors of Papua New Guinea is female headship of the household (Table 2b). This may reflect remittances from absent husbands but could also reflect targeting of widows. Transfer receipts for rural households also rise if there was a birth in the last year, and if the household head has no source of cash income during the past year (for net receipts only).

Table 2c contains the results for urban Papua New Guinea, where squatter settlements are contrasted with other areas. A strong degree of inequality aversion is apparent from the pattern of receipts. In each of the four columns of the table, the hypothesis that  $\beta_1 = 1$  (no inequality aversion) is rejected at least at the  $p < 0.05$  level in favour of the alternative hypothesis that  $\beta_1 < 1$  (i.e., transfers are inequality reducing). It is also apparent that transfer exhibit the greatest degree of inequality aversion outside of the squatter settlements. A targeting of transfers towards households headed by more elderly people is also apparent.

## VI. Discussion and Conclusions

Statistical analysis of the pattern of transfer receipts in household survey data from three samples in the Pacific suggests that it is not possible to generalise about the impact of these transfers on the distribution of income, nor on the responsiveness of transfers to short term shocks. What is clear is that in the largest population studied (the rural sector of PNG),

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<sup>12</sup> Results for this disaggregation are available from the author.

informal transfers either leave the distribution of income unchanged or make it even more unequal.

In contrast, transfer receipts in the urban sector of PNG and remittance receipts in Tonga indicate some aversion to inequality on the part of donors. Thus the distribution of income in the urban sector is made more equal by the *Wantok* system although there is not very much responsiveness to short term shocks like births and unemployment. Similarly, although transfers in urban squatter settlements in PNG were not quite as well targeted towards the poor as they were in the non-settlement urban areas they still acted to reduce inequality. Thus, the overall picture from this statistical analysis is not one of the *wantok* system being much less effective in urban squatter areas than it is in other urban areas.

The results presented here suggest that policymakers would be wrong to assume that high rates of participation in the *Wantok* system or remittance networks throughout the Pacific imply equally good informal safety nets in all areas. Hence the adverse distributional effects of various policies cannot be ignored under the assumption that informal transfers will ameliorate the consequences. Moreover, it may be wrong to assume that these safety nets fail the most in settings that *seem* the most underprivileged without the benefit of detailed empirical investigation. Many outsiders are likely to view urban squatter areas in the Pacific as containing the most disadvantaged populations yet it appears to be amongst the more invisible poor in the rural sector that informal transfers are not acting as an effective safety net.

The research reported here also highlights the need for better distributional data in the Pacific which means enhanced programs of household surveys and improved access for researchers to these data. In particular, the results for urban PNG that are presented here are based on data that are 20 years old and it would be very useful to see if the apparent strength of the urban *Wantok* system has persisted in the face of considerable shocks from macroeconomic and social disturbances.

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Table 1a. Remittance Receipts, PINZMS Tonga, 2005 (All households,  $N=230$ )

<i>Percentage of households who:</i>	
Received private transfers	89.1
Gave private transfers	19.1
Either gave or received transfers	90.0
Percentage who are net recipients	79.6
Percentage who are net donors	10.0
Receipts as percentage of total expenditure (for net recipients) <sup>a</sup>	10.3

*Note:* Transfers include cash and in-kind goods. Transfers and expenditures are annualized.

<sup>a</sup>Median of the ratio of gross receipts to post-transfer cash income for all receiving households.

Table 1b. Private Transfers by Sector, PNG Household Survey, 1996

	All Households ( $N=1144$ )	Urban Households ( $N=314$ )	Rural Households ( $N=830$ )
<i>Percentage of households who:</i>			
Received private transfers	92.1	89.0	92.6
Gave private transfers	91.8	91.6	91.8
Either gave or received transfers	98.4	98.3	98.4
Percentage who are net recipients	50.5	48.7	50.7
Percentage who are net donors	47.6	49.6	47.3
Receipts as percentage of total expenditure (for net recipients) <sup>a</sup>	9.3	6.9	10.1

*Note:* Transfers include cash and in-kind goods. Transfers and expenditures are annualized.

<sup>a</sup>Median of the ratio of net receipts to post-transfer expenditure for households who were net recipients

Table 1c. Private transfers by dwelling group: PNG Urban Household Survey 1985/90

	All Households ( $N=1093$ )	Settlement Households ( $N=303$ )	Other Households ( $N=790$ )	Poor Other Households <sup>a</sup> ( $N=558$ )
<i>Percentage of households who:</i>				
Received private transfers	65.1	78.5	60.0	66.3
Gave private transfers	65.4	62.7	66.5	68.1
Either gave or received transfers	79.2	84.8	77.1	81.0
Percentage who are net recipients	40.2	51.8	35.7	40.3
Percentage who are net donors	38.5	32.3	40.9	40.3
Receipts as a percentage of total expenditure (for net recipients) <sup>b</sup>	9.0	12.0	7.6	8.8

*Note:* Transfers include cash and in-kind goods. Transfers and expenditures are for a period of two weeks.

<sup>a</sup>Non-settlement households whose per capita expenditure is below the average for the non-settlement sector.

<sup>b</sup>Median of the ratio of net receipts to post-transfer expenditure for households who were net recipients.

Table 2a: Tobit estimates of the receipts equation, PINZMS Tonga, 2005

	Gross Receipts				Net Receipts			
	Exogenous Income		Endogenous Income		Exogenous Income		Endogenous Income	
	$\beta$	$t$	$\beta$	$t$	$\beta$	$t$	$\beta$	$t$
ln income <sup>a</sup>	0.339	1.73	-1.712	1.07	0.408	1.49	-0.569	0.28
ln household size	-0.416	1.43	0.249	0.40	-0.955	2.35	-0.639	0.83
Health change	0.546	1.34	0.529	1.06	0.303	0.53	0.295	0.50
Births (=1)	0.455	0.94	0.050	0.07	1.367	2.04	1.174	1.48
Head's age	0.030	2.20	0.061	2.11	0.022	1.16	0.037	1.03
Female head (=1)	0.976	2.18	1.424	2.21	1.403	2.26	1.617	2.10
Unemployment (=1)	0.579	1.40	-1.546	0.91	0.732	1.27	-0.283	0.13
Constant	-1.877	1.07	19.108	1.43	1.230	0.50	9.439	0.56
Zero-slopes <i>F</i> -test	21.30		14.15		19.69		17.23	

*Note:* Dependent variable is the log of either gross or net transfer receipts.  $N=227$ .

<sup>a</sup> Instrumental variables procedure used in the columns headed "endogenous income". Instruments were dummy variables for the household head having less than Form 5 education and for the dwelling not having a flush toilet. These instruments raised the R-squared of the first stage equation from 0.307 to 0.323 and an F-test for excluding the instruments equals 2.60 ( $p < 0.08$ ). Tests of the exogeneity of income gave statistically insignificant chi-squared statistics of 1.71 (gross receipts) and 0.24 (net receipts) with one degree of freedom.

Table 2b: Two-stage Tobit estimates of the receipts equation, 1996 PNGHS

	Gross Receipts				Net Receipts			
	Rural		Urban		Rural		Urban	
	$\beta$	$ t $	$\beta$	$ t $	$\beta$	$ t $	$\beta$	$ t $
In expenditures <sup>a</sup>	1.544	6.27	0.483	1.31	1.265	2.46	-1.204	0.964
In household size	-0.498	2.44	0.048	0.13	-0.464	1.01	0.292	0.421
Ill-health	0.050	1.02	0.083	1.38	0.089	0.65	0.244	1.690
Births (=1)	0.726	4.11	0.068	0.26	2.016	3.56	0.658	0.636
Head's age	-0.047	1.34	-0.104	0.95	0.129	1.07	-0.104	0.490
[Head's age] <sup>2</sup>	0.001	1.35	0.001	1.08	-0.001	0.92	0.002	0.633
Female head (=1)	0.550	2.05	0.702	2.03	1.425	1.91	1.921	1.520
Unemployment (=1)	0.299	0.95	0.219	0.35	1.196	2.60	0.195	0.089
Papuan region (=1)	-0.654	1.50	..	..	-3.137	3.80	..	..
Highland region (=1)	-0.320	1.00	..	..	-1.411	2.16	..	..
Momase region (=1)	-0.662	1.74	..	..	-1.516	2.12	..	..
NCD region (=1)	..	..	0.376	0.83	..	..	0.790	0.63
Constant	-5.024	2.68	2.596	0.71	-10.53	2.09	11.778	1.27
Zero-slopes <i>F</i> -test	10.45		7.05		6.42		4.24	

*Note:* Reported absolute *t*-values are corrected for clustering, sampling weights and sample stratification.

*F*-test is an adjusted Wald (*W*) test:  $((d - k + 1)/kd)W \sim F(k, d - k + 1)$ , where *d* is the number of clusters minus the number of strata (60 for rural and 45 for urban), and *k* is the number of slope variables.

The excluded region in the rural sector is the New Guinea Islands, and in the urban sector it is all urban areas outside of the National Capital District (NCD).

<sup>a</sup> Instrumental variables were years of schooling of the household head, floor areas of the dwelling and a dummy variable for the dwelling having an iron roof, the value of agricultural capital goods and household durables owned and the number of pigs owned. An *F*-test for excluding these instruments equals 20.47 ( $p < 0.00$ ) for the rural sample and 77.50 ( $p < 0.00$ ) for the urban sample. Tests of the exogeneity of expenditures gave statistically significant chi-squared statistics of 6.12 (gross receipts) and 7.18 (net receipts) with one degree of freedom for the rural sample and statistically insignificant values of 2.25 and 0.29 for the urban sample.

Table 2c: Two-stage Tobit estimates of the receipts equation, PNG UHS

	Gross Receipts				Net Receipts			
	Squatters (N=303)		Others (N=790)		Squatters (N=303)		Others (N=790)	
	$\beta$	t	$\beta$	t	$\beta$	t	$\beta$	t
In expenditures <sup>a</sup>	-0.221	0.29	-3.603	7.83	-2.158	1.59	-4.720	6.20
In household size	0.914	1.70	3.232	8.60	1.089	1.17	3.556	5.69
Ill-health	1.298	0.77	2.845	1.30	3.291	1.18	0.825	0.24
Births (=1)	-0.375	0.59	-0.035	0.06	0.177	0.16	0.399	0.42
Head's age	0.034	1.56	0.042	2.11	0.085	2.28	0.089	2.82
Female head (=1)	1.302	0.94	0.025	0.03	2.883	1.25	0.764	0.48
Unemployment (=1)	1.616	1.32	-1.118	0.70	2.375	1.15	2.815	1.19
Constant	4.422	0.65	31.956	7.39	16.712	1.39	35.562	5.03
Zero-slopes <i>F</i> -test	12.3		105.8		14.1		68.2	

*Note:* Dependent variable is the log of either gross or net transfer receipts and absolute *t* statistics are calculated from robust standard errors.

<sup>a</sup> Instrumental variables were years of schooling of the household head, floor area and number of rooms in the dwelling, dummy variables for the dwelling having an iron roof, electricity, piped water and the type of dwelling, and dummy variables for the major occupation of the household head (wage work, formal business, informal sector activities). An *F*-test for excluding these instruments equals 66.47 ( $p < 0.00$ ). Tests of the exogeneity of expenditures gave statistically significant chi-squared statistics of 8.00 (the squatter sample) and 51.30 (other households) with one degree of freedom for the models of gross receipts, and values of 1.45 and 16.64 for the models of net receipts.

## Appendix I

### Formal Derivation of the Ravallion and Dearden Model of Transfers

If  $t_{dr}$  is the transfer made by donor  $d$  to recipient  $r$ , it is assumed that the values of  $t_{dr}$  are chosen by the donor to maximise the function:

$$u(Y_1, X_1, \dots, Y_d, X_d, \dots, Y_n, X_n) \quad (1)$$

where  $Y_i$  is the income after transfers of household  $i$  and  $X_i$  is a vector of other attributes of  $i$ . The maximization is constrained by:

$$Y_r = f(t_{dr}, X_r) \quad (2)$$

$$Y_d = \bar{Y}_d - \sum_{r=1}^n t_{dr} \quad (3)$$

where  $\bar{Y}_d$  is the donor's (fixed) pre-transfer income and it is assumed that  $\partial Y_r / \partial t_{dr}$  is non-negative.\*\*\*\* At an optimum, the donor's marginal utility from giving an extra dollar cannot exceed the donor's marginal utility of own-income (otherwise they will give the extra dollar so the previous state cannot have been optimal), thus:

$$\frac{\partial u}{\partial Y_d} \geq \frac{\partial u}{\partial Y_r} \cdot \frac{\partial Y_r}{\partial t_{dr}} \quad \text{and } t_{dr} \geq 0 \text{ with complementary slackness.} \quad (4)$$

To put explicit, and tractable, functional forms on the three derivatives in equation (4), Ravallion and Dearden assume that:

- (i) each donor's utility function is of constant elasticity of substitution (CES) in the vector of recipients' incomes, and the elasticity of substitution is constant across donors,
- (ii) donor's utility functions are separable between own-income and the incomes of others,
- (iii) donor's marginal utility of own-income is iso-elastic in own-income, with the same elasticity across donors
- (iv) recipient's incomes are iso-elastic in their total transfer receipts, with a constant elasticity across recipients.

Under these assumptions:

$$\begin{aligned} \frac{\partial u}{\partial Y_d} &= g(X_d) Y_d^{-\pi} \quad (\pi > 0) \\ \frac{\partial u}{\partial Y_r} &= h(X_r) Y_r^{-\varepsilon} \quad (\varepsilon > 0) \\ \frac{\partial Y_r}{\partial t_{dr}} &= k(X_r) Y_r / t_{dr} \end{aligned} \quad (5)$$

where  $\pi$  is the elasticity of the donor's marginal utility of own-income and  $\varepsilon$  is the coefficient of relative inequality aversion, with weight increasingly placed on the lowest income as  $\varepsilon \rightarrow \infty$  (i.e., the Rawlsian case).

If a transfer is made, the optimality condition (equation (4)) implies that:

$$t_{dr} = g(X_d)^{-1} h(X_r) k(X_r) Y_r^{1-\varepsilon} Y_d^\pi. \quad (6)$$

When equation (6) is summed over donors and recipients, the following allocation of transfer receipts is obtained:

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\*\*\*\* This does not rule out disincentive effects of transfers, which occur if the derivative is less than one, nor positive productivity effects of transfers, which occur if the derivative exceeds one.

$$T_i^r = \sum_{d=1}^n t_{di} = a \cdot h(X_i)k(X_i)Y_i^{1-\varepsilon} \quad \text{for } i \in R$$

$$= 0 \quad \text{otherwise} \quad (7)$$

where  $T_i^r$  is transfer receipts,  $a = \sum g(X_d)^{-1}Y_d^\pi$  and  $R$  is the set of all households with positive receipts. Taking logs of equation (7), assuming that the functions  $h$  and  $k$  are log-linear, and introducing stochastic error terms gives the following econometric model:

$$\log T_i^r = \alpha + \beta \log Y_i + X_i \gamma + \mu_i \quad \text{if } i \in R$$

$$T_i^r = 0 \quad \text{otherwise} \quad (8)$$

where  $\alpha$ ,  $\beta$ , and  $\gamma$  are parameters to be estimated and the  $\mu$ 's are normally, independently and identically distributed errors.

**Appendix II**  
**Definitions and Descriptive Statistics for the Variables Used in the Models of Transfers**

**Table II.1: Tongan Component of Pacific Island-New Zealand Migration Survey**

	Mean	Standard deviation	Description
Income	9.143	1.023	Logarithm of the total value of household annual income from earnings, agriculture and other sources.
Household size	1.534	0.649	Logarithm of the number of residents usually present in the household at the time of the survey.
Health change	0.215	0.412	Dummy variable =1 if the household head self-rates their health as "much better" over the previous 12 months.
Births	0.152	0.360	Dummy variable =1 if anyone in the household was born in the 12 months prior to the survey.
Female head	0.183	0.387	Dummy variable =1 if the household head is female.
Age	41.69	13.94	Years of age of the household head.
Unemployment	0.387	0.488	Dummy variable =1 if household head did not have a paid job or business in the week of the survey.

**Table II.2: Papua New Guinea Household Survey, 1996**

Variable	Mean (Std. Dev)		Description
	Rural	Urban	
Expenditures	3736 (3812)	11299 (8785)	Annual value of household total expenditure (including imputed value of stock changes, own-production, and gifts received) and excluding the value of gifts given.
Household size	5.709 (2.92)	6.552 (3.47)	Total number of residents usually present in the household at the time of the survey.
Ill-health	0.727 (1.33)	0.592 (1.70)	Average number of times treated at health facilities per person in the month prior to the survey.
Births	0.193 (0.39)	0.225 (0.42)	Dummy variable =1 if anyone in the household was born in the 12 months prior to the survey.
Head's age	40.4 (12.8)	38.8 (12.4)	Years of age of the household head.
Female head	0.079 (0.27)	0.087 (0.28)	Dummy variable =1 if the household head is female.
Unemployment	0.150 (0.36)	0.057 (0.23)	Dummy variable =1 if household head had no source of cash income in the 12 months prior to the survey.

**Table II.3:** Papua New Guinea Urban Household Survey

	Mean	Standard deviation	Description
Income	9.7954	0.7423	Logarithm of the total value of household expenditure during the surveyed fortnight.
Household size	1.5410	0.7041	Logarithm of the number of residents usually present in the household at the time of the survey.
Ill-health	0.0110	0.1043	Dummy variable =1 if illness prevented the household head from working in the week prior to the survey.
Births	0.1619	0.3686	Dummy variable =1 if anyone in the household was born in the 12 months prior to the survey.
Female head	0.0394	0.1945	Dummy variable =1 if the household head is female.
Age	37.39	10.76	Years of age of the household head.
Unemployment	0.0229	0.1496	Dummy variable =1 if household head was unemployed and actively job-seeking in the 4 weeks prior to the survey.