

Remittances and Subjective Welfare in a Mixed-Motives Model: Evidence from Fiji

Eliana V. Jimenez and Richard P.C. Brown, School of Economics Discussion Paper No. 370, June 2008, School of Economics, The University of Queensland. Australia.

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EPrint Type: Departmental Technical Report

Keywords:

Subjects: 340000 Economics;

ID Code: JEL Classification:

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The authors wish to acknowledge the following University of Queensland colleagues for their invaluable comments and suggestions: Gareth Leeves, Flavio Menezes, Chris O'Donnell, Alicia Rambaldi, and Rodney Strachan. We also thank the World Bank for permission to use the survey data on which the empirical analysis is based.

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ABSTRACT

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Keywords: Remittances; Private transfers; Altruism; Exchange; Subjective welfare; Social protection; Fiji.

JEL classification: H55; I30; J14; O15; O16

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1. Introduction

Much of the recent literature on the remittances of migrants focuses on the modelling and empirical testing of the donors' motives, especially, in relation to the responsiveness of these transfers to the recipients' pre-transfer welfare or income.¹ This focus is motivated by the concern that if remittances are driven predominantly by altruism, it can be expected that the level of remittances sent to a household will be negatively related to its pre-transfer income level. In this case, poverty alleviation and income redistributive interventions targeting poorer households could be thwarted by compensating reductions in remittances. This possibility was first raised by Becker (1974) and Barro (1974) in relation to private transfers within a developed country context. In a developing country context in which private transfers are often dominated by international migrants' remittances, a reduction in the flow of such transfers caused by rising income levels among the poorer households would have the additional consequence of reducing the inflow of foreign exchange. Possible tensions could therefore arise between the goals of poverty alleviation on the one hand, and, and supplementing foreign exchange earnings through migrants' remittances on the other.

In an important departure from earlier models of private transfer determinants Cox and others introduced a mixed-motives model (Cox, 1987; Cox, Eser and Jimenez, 1998; Cox, Hansen and Jimenez, 2004).² For them, the donor's transfers are driven potentially by both altruism and exchange motives. At low income levels below some threshold, altruism is the dominant motive and the relationship between the recipient's income and the level of transfers is negative. Once the threshold level is reached and the exchange motive takes over, the relationship changes. It could become positive or remain negative as discussed below, but the main implication is the hypothesized non-linear relationship between transfers and recipient income. They test their model by estimating a spline function, using data from the Philippines. Their spline model uncovers a much stronger, negative relationship for pre-transfer recipient income below the threshold than that estimated in previous studies that assume a conventional linear model. They thus conclude that crowding-out of private transfers is likely to

¹ For a comprehensive overview of this literature see Rapoport and Docquier (2006).

² For an extensive synthesis of the theoretical and applied literature on private, inter-household transfers, see Cox and Fafchamps (2008).

thwart public welfare programs for the poor. However, they find no evidence of a strong relationship between transfers and income for those households above the threshold, indicating little support for their hypothesized switch to exchange-motivated transfers at higher income levels. In this case there could indeed be a trade-off between the competing objectives of poverty alleviation and fostering remittance inflows.

In this paper we extend the mixed-motives model of Cox *et al* (2004) by incorporating explicitly, subjectively-assessed recipient need in place of an absolute income threshold at which the donor's dominant motive switches from altruism to exchange. This refinement has the advantage of providing a theoretically justifiable basis for setting the knot-point of the estimated spline function that is consistent with recent literature on relative deprivation and subjective welfare, and amenable to empirical measurement independently of the econometric estimation of the model.

We then test the extended mixed-motives model with household data compiled by the authors from the main island of Fiji, Viti Levu, based on a customized questionnaire that included questions relating to remittances and income including some designed specifically to gauge households' self-assessed 'adequate' level of income.³ We then use this survey-based estimate of 'required income' to construct a measure of household need (or welfare) which we label the '*Subjective Income Gap*'. To our knowledge no previous study has applied such a measure of self-assessed welfare to testing models of private transfer motivations, and nor has a mixed-motives model been previously applied to the analysis of international migrants' remittances.

Like Cox *et al* (2004) we find evidence of a strong negative relationship for income levels below the threshold level, but, in addition, we find a statistically significant *positive* relationship between transfers and recipients' welfare for income levels above the threshold level. The conventional linear model applied to the same sample uncovers neither relationship. This we interpret as evidence of the exchange motive dominating transfer behavior once the welfare of the household ceases to be the main concern of the donor.

³ See World Bank (2006) for further details of this study.

We conclude that either crowding-out or crowding-in of remittances can occur when recipient welfare improves, depending on where the household's pre-transfer welfare level is in relation to the subjectively-assessed threshold level. This also has potential implications for the distributional impact of remittances, depending on the relative strength of these effects (see Stark *et al*, 1986; Taylor, 1992). The net effects of recipients' welfare improvements on remittances, and the effects of remittances on poverty alleviation and income distribution are consequently more complex and ambiguous than previous studies suggest.

Section 2 presents the mixed motives model of transfers and its empirical testing while section 3 introduces the concept of subjectively-assessed need, showing how subjective welfare can be formally incorporated in a Cox-type model. Section 4 discusses the 2005 household survey data from Fiji and presents descriptive statistics, including our measure of household self-assessed need used to define the threshold income level and knot-point in the spline function. Section 5 presents and discusses the econometric results. In section 6 conclusions are presented.

2. The mixed-motives framework

The formal model

The mixed-motives model nests Becker's (1974) altruism model and exchange in a single theoretical framework. The donor is thus altruistic and as such incorporates in her utility function the household's, but she also consumes services (S) provided by the household. Therefore the donor will choose the level of transfers (T) and services (S) that maximizes his/her utility. Formally the maximization program of the donor is given by:

$$\text{Max}_{T,S} U_d[C_d, S, V(C_h, S)] \quad (1)$$

where,

U_d = donor's utility

T = transfers provided by the donor to the recipient household

S = services provided to recipient household to the donor

C_d = donor's consumption

V = recipient household's utility from the donor's point of view

C_h = recipient household's income from all sources, excluding transfers

If, at the extreme, a sudden drop in a household's income pushes them into poverty, altruism is likely to dominate the donor's behavior in the sense that transfers are driven by nothing more than concern for the recipient's welfare. Once the recipient's pre-transfer income recovers, reducing their need for additional income support, the donor's altruistic motives can be expected to diminish if not to disappear altogether. However, for Cox *et al* (2004) this does not necessarily imply that transfers will cease. One of the implications of their model is that there is some threshold level of recipient's pre-transfer income at which the altruism motive disappears, and the "exchange" motive becomes dominant, taking over as the main driver of the donor's transfer behavior at the margin. Where the exchange motive dominates, the donor is driven by self-interest. Transfers are aimed at providing compensation for household services rather than at increasing the household's standard of living. In making a transfer the donor expects to receive some good or service in exchange.

Cox *et al* (2004) show that under exchange transfers could increase or decrease with recipient pre-transfer income, depending on the donor's price elasticity of demand for the household's services. If it is assumed that there is no close market substitute for the household's services, the donor's demand for these services is likely to be relatively price inelastic in which case a positive relationship between the recipient's income and the donor's transfers can be expected.

When the transfers models are extended to the context of international migration the migrant is treated as the donor and remittances as the transfers. Most of the remittances empirical literature still assumes the relationship between remittances and household welfare variables is monotonic. However, when private transfers are driven by alternating altruistic and exchange motivations it would be reasonable to expect a non-linear pattern as predicted by Cox's mixed-motives framework. There have been very few empirical tests of the mixed motives model.

Tests of the mixed-motives model

To test their non-linear model Cox *et al* (2004) estimate a spline function as opposed to the conventional linear model, with the knot-point of the spline given by the threshold level of income at which the motives switch. They use cross-sectional household survey data a large dataset with 18,922 households from the Philippines, a low-income country where there is not a formal system of social protection, in which transfers are dominated by private, intra-familial transfers. In comparison with previous estimates, they find a much stronger negative relationship between transfers and pre-transfer income at income levels below the knot-point. But, at income levels above the threshold their results indicate no statistically significant relationship, suggesting that the exchange motive is non-existent or at best, very weak.

In a similar vein, Kazianga (2006) uses a dataset of 8,474 households in Burkina Faso to analyze the effect of the recipient's income on internal transfers. The main finding of this study is that altruism does not operate at low but at middle income levels, although the coefficients on the recipient's income are rather small.

Gibson, Olivia and Rozelle (2006) test the mixed-motives framework of Cox, *et al* (2004) analyzing internal transfers in four developing countries (Indonesia, Vietnam, China and Papua New Guinea). Their results show very limited support for the main predictions of the mixed-motives model; a weak relationship between transfers and recipients' income in only one of the four countries, Papua New Guinea.

One of the main aims of this paper is to examine the extent to which the explicit incorporation of subjectively-assessed need in the specification of the threshold welfare level at which the donors' dominant motive switches is amenable to empirical measurement and provides a more robust method for testing the mixed-motives model. Apart from Cox *et al* (2004) there have been very few empirical tests of the mixed motives model (see Kazianga, 2006; Gibson *et al*, 2006), and to our knowledge this is the first instance in which it tested specifically in relation to the remittance transfers of international migrants.

3. Introducing subjectively-assessed need into a mixed-motives model

In estimating their model Cox *et al* (2004) had no basis for determining *a priori* the threshold level of income at which to set the knot-point of their spline function. Instead, they estimate the model using a non-linear least squares (NLLS) technique in which the threshold income level is treated as an unknown parameter. One limitation of this approach is the somewhat arbitrary basis on which the knot-point is determined, which is difficult to justify on theoretical grounds. In defence of this approach they argue that because the estimated threshold was very close to the official poverty line for the Philippines, it could be interpreted as a reasonable indicator of the households' perceived threshold poverty line; that is, it represents an estimate of a subjectively-assessed 'minimum consumption bundle' (Cox *et al*: 2210). The case for a transfer derivatives model based on recipients' subjectively-determined needs is appealing. However, rather than inferring a threshold from an econometrically-derived knot-point, the main objective of this study is to test an alternative method of deriving the threshold income level, in line with current economics literature on subjective welfare. We retain most of the ingredients and propositions of Cox *et al* (2004), but with one important difference; the use of a self-assessed measure of household welfare. This, we argue, has a number of advantages. First, it can be theoretically justified in relation to current literature on subjective welfare and relative deprivation. Second, it can be measured independently of the estimation of the model itself, using a suitably customized household survey questionnaire. Third, it allows for the possibility that the threshold level of "adequate" income can be set at a household-specific level which can be expected to vary between households from different networks or reference groups, which is indeed the case of other privately-funded social protection mechanisms such as superannuation (Holzmann and Jorgensen, 2000).

The notion that private transfers could be motivated by recipient households' subjectively assessed needs, rather than by some externally-derived 'objective' poverty line, is not new to the income transfers literature. Indeed, in a much earlier and somewhat neglected paper, Kaufman and Lindauer (1986) posit and test empirically a model of private transfers in which they introduce the notion of a 'required' income level that varies across households belonging to different reference

groups or ‘networks’. Each network has its own subjectively-determined required income level. In their single-motive model, unlike Cox *et al* (2004), once the recipient household’s threshold level of income is reached, income transfers to it will cease; i.e. at some subjectively-determined threshold level, determined by the tastes and means of the reference group or ‘network’ with which the household identifies.

In support of a subjectively-determined threshold income level it has been argued that when individuals make judgments about their well-being, they compare their objective welfare level with a ‘*subjective living norm*’, which is strongly influenced by the average level of living enjoyed by their peers or reference group (Easterlin, 1995). The sociological and psychological literature on subjective welfare and relative deprivation posits that individuals compare themselves with ‘*like*’ individuals, so that when an individual’s level of living falls below that enjoyed by the reference group, feelings of poverty and deprivation are evoked (Runciman, 1966; Stewart, 2005; Townsend, 1979). Similarly, an important strand of the poverty literature argues that poverty is a relative concept requiring the use of relative poverty lines that take account of the types of diet, clothing and housing that are considered adequate to function in the society in which they live (Townsend, 1979; Sen, 1981; 1983; Ruggeri *et al*, 2003; Bourguignon and Fields, 1997; Atkinson, 1989). What a middle-income family, living in an urban center considers adequate to provide for their basic needs would most probably be higher than the official poverty line.

Recent empirical studies have also shown that household welfare depends positively on one’s own consumption but negatively on the average consumption level of the household’s reference group (Easterlin, 2001; Blanchflower and Oswald, 2004; Luttmer, 2005; Fafchamps and Shilpi, 2008). In the mixed-motives model advanced here it is assumed similarly that the household compares its consumption level with a ‘*subjective living norm*’, that is, with what it, in comparison with other households within the same reference group, considers adequate to get by. If, for each household, the subjectively-assessed needs and associated threshold income level are known, the main regressor in the model can be expressed as the *difference* between the household’s subjectively-assessed threshold and pre-transfer income level. From the donor’s point of view the recipient household’s utility is a function of a variable

($CGAP_h$) that measures the difference between the household's actual consumption levels (C_h) and this 'subjective living norm' (A_h).

The equivalent of this variable in income terms is the *Subjective Income Gap* (we use the acronym $IGAP_h$), that is, the difference between household income from all sources (Y_h), and what the donor considers to be the amount required for the provision of an adequate standard of living of the household (I_{min}). We introduce this revision to the mixed-motives model which we label the *Subjective Income Gap* variant. Our subjective measure of welfare also provides an obvious and explicit threshold income level for determining, in a mixed-motives model, the point at which the donor's dominant motive switches from altruism to exchange. Below this threshold, altruistic concerns prevail because the donor regards the household's resources to be inadequate to provide for the required standard of living. It is then reasonable to assume that transfers are aimed at increasing the household's welfare.⁴ At pre-transfer income levels above the threshold the donor has no reason to be concerned about the recipient household's level of welfare, which is deemed adequate, which allows the exchange motive to become dominant at the margin.⁵

The basic elements of the donor's maximization program in the model of Cox *et al* (2004) therefore remain unchanged. The only difference is that in this modified version the household's pre-transfer consumption variable (C_h) is substituted by a new subjective welfare variable measuring the subjective needs gap ($CGAP_h$). Equation (1) then needs to be re-written:

$$Max_{T,S} U_d[C_d, S, V(CGAP_h, S)] \quad (2)$$

where,

$CGAP_h$ = recipient household's subjective consumption gap.

Likewise, household income (Y_h) is substituted by the subjective income gap variable ($IGAP_h$). In effect, the predictions of the mixed motives model of Cox *et al* (2004) regarding the relationship between household welfare and transfers remain the same,

⁴ In the model of Cox *et al* (2004) that is indeed the reason why the recipient household's participation constraint will be non-binding in the altruistically-driven donor's program.

⁵ Under exchange the recipient household's participation constraint will be binding in the donor's program.

but with household welfare now measured using the subjective income gap, rather than absolute income level. This also provides a theoretically justifiable knot-point for the spline function, where $IGAP_h$ is equal to zero.

The objective of the empirical analysis to estimate a remittances model that on the one hand uses subjective income gap, rather than income, as the independent variable and on the other, takes into account the non-linear relationship between subjective income gap and remittances. The relationship between remittances and subjective income gap ($IGAP_h$) is depicted in Figure 1. For the ‘subjective poor’ households, that is those with a negative income gap, remittances are hypothesized to be driven by altruism. However once the threshold K is reached, at subjective income gap equal to zero, remittances become exchange driven. As discussed by Cox *et al* (2004), not accounting for this non-linearity could lead to an underestimation of the responsiveness of transfers to recipient’s welfare, or worse, that the hypothesized relationship is found to be not statistically significant.

[insert Figure 1 about here]

Following this theoretical model, a spline rather than linear specification for the subjective income gap variable is used in formulating the remittances equation (2). The threshold at which migrants switch from altruism to exchange is identified at zero values of the subjective income gap variable. Formally, the objective is to estimate the following remittances equation:

$$R_h = \beta_1 + \beta_2 X_h + \beta_3 Z_h + \beta_4 IGAP_h + \beta_5 [(IGAP_h - K_h) * dK_h] + u_h \quad (3)$$

Where:

R_h = international remittances received by the household⁶

X_h = Vector of household variables

Z_h = Vector of migrant variables

$IGAP_h$ = Household subjective income gap = actual income *less* required income

⁶ As the survey did not collect data on the transfers of each individual migrant this study focuses on total remittances received by households from international migrants.

$K_h = \text{Knot-point} = 0$

$dK_h = 1$ if $IGAP_h \geq K_h$, 0 otherwise

4. Survey data and descriptive statistics

The survey

We use data from a customized household survey designed and implemented by the authors on the main island of Fiji, Viti Levu, during the first half of 2005.⁷ Fiji is a relatively poor country with a virtually non-existent public welfare system and with households highly dependent on private transfer income, almost exclusively from international migrants. The survey instrument was structured around the household, which is taken as the basic unit of analysis⁸. In spite of socio-cultural institutions encouraging strong kinship and clan ties, the households are the basic social units with command over economic resources and responsibility for their members' welfare. This view of the household as the basic unit of South Pacific society is also supported by the national statistical agencies, which use the household as the unit of analysis for the purpose of collecting data on assets ownership, farming and other economic activities (UNDP, 1997). The customized questionnaire adopted the local definition of household, that is, "those who cook and eat from the same pot". Information about external income shocks suffered by the household in 2004 was also collected.

Most surveys in the migration and remittances literature either assume that household members and relatives are equivalent concepts or leave the definition open to the interpretation of individual interviewers and respondents. As the main focus of the survey was on migrant households and the international transfers they receive, the questionnaire included numerous questions to assist respondents in identifying migrant household members and recalling the receipt of cash and in-kind transfers in all forms and sent via all channels, both formal and informal. To adhere to a consistent definition of the migration status of the household, the survey set clear parameters to define who the household migrant members were. For instance, using the adopted

⁷ For details of the design of the survey instrument, selection of enumeration areas, sampling and survey administration, see Appendix C in World Bank (2006).

⁸ The migration literature has traditionally taken the household as the unit of analysis in migration and remittances research (Rosenzweig and Stark, 1989; Stark, 1991; Massey, 1990; Stark and Bloom, 1985; Stark and Lucas, 1988).

definition of household, migrants by definition would not be counted as household members, as they do not cook and eat from the same pot. Two criteria were used to identify a migrant household member; (a) *retrospective condition*: the individual was a household member before migrating; or, (b) *future condition*: the migrant would cook and eat from the same pot as the household if she were to return to her home country in the near future. The questionnaire also contained some questions about individual migrants but these were of a more general nature since the pilot survey had found that respondents were most unlikely to possess detailed and accurate knowledge about international migrants.

The sections on household income and transfers applied to the year 2004. The questions about international migrant transfers received were asked of all interviewed households, including those that reported not having a household member abroad, and covered all forms of transfers including cash, goods, payments for household members' overseas travel and bills paid on behalf of the household. These transfers were treated as separate supplements to income from all other sources.

The income section of the questionnaire included the 'minimum income question', which asked the respondent about the amount of cash income that "a household like yours' would require just to get by". In other words, this question asked the respondent what amount of income was required to provide for the basic needs of a household in her reference group and was included specifically to allow for the empirical estimation of a knot-point for the spline function in a mixed-motives model. This estimate of the minimum required income was then used to estimate the subjective income gap variable ($IGAP_h$) as previously discussed

In this study we use two measures of $IGAP_h$; a household-specific measure and a community-specific measure. For the first, we use each households' stated 'required income' and declared income level to compute $IGAP_h$, while for the second, we use the median of the stated 'required income' across the entire community of Viti Levu. Our assumption here is that if the networks and social groups on the island of Viti Levu are considered sufficiently diverse to have significantly different 'subjective living norms', the first measure might be considered more appropriate. If the community shares reasonably similar subjective living norms then it might make

better sense to use a common ‘required income’ level across the community.⁹ We test both of these in the econometric estimation of the model.

The sample was made up of 418 households, with information collected for the household and for each individual within the household giving a total of 1,937 individuals. Fiji comprises 322 islands, with approximately 110 of them inhabited. The main island of Viti-Levu has a population of approximately 600 thousand. The sample consisted of urban and rural enumeration areas, scattered across the island. They cover the capital city, Suva; the five major towns in both provinces (Nausori, Lautoka, Nadi, Ba and Sigatoka); nine villages and twelve settlements.

Descriptive statistics and explanatory variables

Table 1 shows the mean levels of transfers for households in the poorest 40%, the middle 40% and the richest 20%, categorized in accordance with the size of the subjective income gap variable ($IGAP_h$), using the household-specific and community-specific measures. As predicted by our modified version of the mixed-motives model, the poorest 40% of those classified using household-specific $IGAP_h$ reported average transfers per household more than double (\$704) the level of those in the middle 40% group (\$345)¹⁰. When comparing the transfers received by the middle and richest $IGAP_h$ groups, it can be seen that the latter were almost double the former¹¹.

[insert Table 1 about here]

In comparison, when households are classified using the community-specific $IGAP_h$ welfare measure, the poorest 40% reported mean transfers slightly higher than those in the middle income category, but the difference is not statistically significant.¹² Transfers to the richest 20% were about 20% higher than those observed for households in the middle income category, but again this difference was not

⁹ Using a community-specific measure with the knot-point set at the median of the required income across the community is equivalent to using a fixed absolute measure of household income as in Cox *et al* (2004). The main difference is that in our case this is derived from the survey data rather than the estimation process.

¹⁰ Difference significant at the 1% level: t-statistic =1.81, degrees of freedom = 332, p-value 0.04.

¹¹ Difference significant at the 1% level: t-statistic =-1.80 degrees of freedom = 248, p-value 0.04.

¹² Difference not statistically significant at conventional levels: t-statistic =0.85, degrees of freedom = 337, p-value 0.20.

statistically significant.¹³ These differences suggest that the household-specific subjective income gap version of the mixed motives model might better uncover the donors' motives than when a common, community-level measure is used. We test and compare the two models econometrically in the next section.

A description of the variables used in the empirical estimation is provided in Table 2. The means and standard deviations of these variables are reported in Table 3, which also shows separate values for the sub-samples of transfer-receiving and non-receiving households.

[insert Tables 2 & 3 about here]

Four alternative econometric models were estimated, the results of which are reported in section 5. In the first two models the main regressor is the household-specific $IGAP_h$ variable. In the second set of models the principal regressor is the community-specific $IGAP_h$ variable. Within each of these models we estimate two specifications; a linear and a non-linear, spline model. We estimate the alternative regressions for comparative purposes and to test the robustness of the results for our $IGAP$ model, specifically, in relation to: (i) a non-linear spline specification following Cox *et al* (2004) compared with the more conventional linear specification; and, (ii) the use of a household-specific measure of the subjective income gap as opposed to one which assumes a common level of subjectively-assessed welfare across all households in the community. The method used by Cox *et al* is, in effect, equivalent to what we label a community-specific measure. Although they do not derive their knot-point in the same way as we do, using a customized survey question, they suggest that their econometrically-derived knot-point, which is set a common income level across all households in their sample from the Philippines, can be interpreted as a reasonable indicator of the households' perceived threshold poverty line; that is, as some form of subjectively-assessed 'minimum consumption bundle' a poverty line 'perceived by households' (p.2210).

¹³ Difference not statistically significant at conventional levels: t-statistic = -0.52, degrees of freedom = 248, p-value 0.30.

Although in both cases the knot-point is set where the variable $IGAP_h$ is equal to zero, the procedure for setting the knot-point of the spline differs between the two approaches. For the household-specific measure the knot-point is set for each household where actual, pre-transfer income is equal to the particular household's subjective 'required income'. For the community-specific measure the knot-point is set for each household where actual pre-transfer income is equal to a common threshold income level equal to the median value of the community's 'required income'. In the case of Viti Levu this is equal to US\$3,000 per household per annum, and could be interpreted as a poverty line based on a subjective assessment of need.

An explanation for the choice of control variables is in order. The model also controls for household size, as it is expected that the larger the household, the more requests for transfers the migrants will receive.¹⁴ A dummy variable identifying those households that had at least one of their members living abroad was also included. Although a high proportion of households without migrants also received transfers, preliminary descriptive analysis showed that the level of transfers received by households with international migrants is substantially higher (World Bank, 2006).

To control for the income level of the donor, as we did not have data on the individual migrants' income,¹⁵ we used the presence of migrants in the Gulf states or Canada as a proxy. The model also controls for migrants' length of stay abroad, as there is a general concern in the migration literature over so-called 'remittance' decay' as the migrants' length of absence from the home community increases.

5. Econometric estimation

Due to transfers being a censored variable, Tobit, rather than OLS models are commonly estimated. However, we use instrumental variable techniques to test for possible endogeneity of the subjective income gap variables in the linear specifications. The excluded instrument is a variable measuring the number of

¹⁴ Due to potential endogeneity concerns, this variable was excluded in alternative specifications and reassuringly the results did not change. Results available from the authors on request.

¹⁵ As discussed in Kazianga (2006), if the incomes of donors and recipients are correlated, failing to control for the donor's income could lead to omitted variable bias. See also Altonji *et al* (1997) where altruism is modelled and tested in relation to simultaneous changes in income of both donor and recipient.

negative income shocks the household suffered during the year.¹⁶ We expect this variable to be correlated to the subjective income gap, implying that households suffering a negative income shock in 2004 would be more likely to have lower levels of relative welfare as measured by their subjective income gap ($IGAP_h$). On the other hand, since we are controlling for the presence of overseas migrants in the household, we do not expect this instrument to be correlated with remittances due to unobserved characteristics of the household, such as entrepreneurial capacities and risk aversion. Statistical tests found that the instrument was strong in both models, with a first-stage F-statistic¹⁷ of 18.2 for the household-specific variant of the model and 14.1 for the community-specific variant. Therefore we proceeded to test the null hypothesis that the main variables of interest were exogenous in the respective remittances equation. In both cases the Wald test of exogeneity could not reject the null hypothesis, with a robust Chi-Square statistic of 0.71 (p-value = 0.40) for the household-specific variant of the model and a robust Chi-Square statistic of 0.60 (p-value = 0.44) for the community-specific variant of the model.¹⁸

The results of the four Tobit¹⁹ models are reported in Table 4. In all cases the equations were estimated using standard Tobit regression analysis as discussed previously, and where the standard errors were calculated taking into account a possible correlation of errors across households from the same community.

[insert Table 4 about here]

Turning first to the results of the two spline models, we expect the coefficient on the variable for income below the threshold to be negative, since altruism is the dominant motive for these households. Conversely, for income above the threshold we expect a positive relationship, as the exchange motive is hypothesized to dominate. These predictions are confirmed by the results which show, in both specifications, that the

¹⁶ This variable is based on a question in the survey in which the respondents were required to indicate whether they had suffered an unexpected drop in one or more components of household income in the preceding year.

¹⁷ Statistic robust to heteroskedasticity and clustering.

¹⁸ Furthermore, similar results for the endogeneity tests were obtained when the censoring of the dependent variable was ignored. Results available from the authors on request.

¹⁹ To test the sensitivity of the results to this functional form OLS models were also estimated. The results were very similar. See Appendix Table A.1.

coefficients on income levels below the threshold level ($IGAP_h$) are negative and statistically significant, and above the threshold ($Positive\ IGAP_h$) they are positive and significant. Conversely, in the linear models, the coefficients are very much smaller, and are not statistically significant. The lack of statistical significance for the main variables of interest in both linear models indicate that failing to allow for non-linearity in the relationship between household welfare and transfers could lead to the misleading conclusion that there is not a strong relationship between remittances and the recipient household's level of pre-transfer welfare.

On the other hand, the results also indicate that setting the knot-point using a theoretically justifiable and empirically estimated subjective threshold income level produces results that are more consistent with the predictions of the mixed-motives model than in the other empirical studies reported earlier in this paper. To examine the strength of the estimated relationships from the Tobit regression results we use the respective marginal effects shown in Table 5.

[insert Table 5 about here]

The marginal effects for the linear specifications of the Tobit models are not statistically significant in either case, and are also considerably smaller in comparison with the marginal effects for the spline specifications. Comparing the two variants of the spline model, we observe, first, that altruistically-motivated transfers appear to be more responsive to household need when the household-specific measure of subjective welfare measure is used. Remittances increase (decrease) by \$84 for every \$1,000 drop (rise) in recipient household income as opposed to \$64 when a community-specific measure is used. Second, bearing in mind that the responsiveness of transfers to recipient income changes for households above the threshold is given by the sum of the two coefficients $\beta_4 + \beta_5$ in equation (3), both variants of the subjective income model indicate a positive, albeit a much weaker, relationship in comparison with the negative relationship for households below the threshold. In other words, altruistically-motivated remittances are considerably more responsive than exchange-motivated remittances to recipient income changes. Remittances increase (decrease) by relatively more when the household-specific measure of the

subjective income gap model is used; \$2.6 for every \$1,000 increase (decrease) in recipient household income, as opposed to \$1.5 when the community-specific measure is used.

These results indicate that crowding-out effects of welfare gains among lower income groups are much stronger than those estimated by other studies using empirically-based objective measures of household need (Cox *et al*, 2004; Kazianga, 2006; Gibson *et al* 2006). To some extent these effects will be offset by crowding-in of exchange-motivated remittances among the wealthier households, but in this instance the effects are rather weak, suggesting that welfare improvements among lower-income households are likely to reduce the net inflow of remittances *ceteris paribus*.

The control variables all have the expected signs. In all four models the variables capturing households living in the capital city (*Capital City*), and those with at least one migrant (*Migration Status*), are positive and significant at the 1% level. Households with a migrant member not in Australia or New Zealand (*Non-Australasian Migrant*) is positive and significant at the 5% or 10% level. The variable capturing migrants' length of stay abroad (*Migrant Length of Stay*) is negative in all models, but statistically significant in only one instance (at the 10% level), the spline model with the community-specific measure of household need, indicating possible presence of remittance decay over time.

6. Conclusions

The mixed-motives model uncovers a much stronger and statistically significant relationship between transfers and recipient household welfare than a single-motive (linear) model for altruistically-motivated transfers tested using the same sample. This implies that remittances provide a form of family-based, social protection coverage to households below the required income threshold. It also follows that the crowding-out effect on remittances of improved welfare levels among the poorer households might be stronger than previously estimated when using a linear, single-objective model to estimate migrants' motives to remit.

We also find that using a theoretically justified subjective measure of recipient household welfare provides stronger support for the presence of motive-switching (i.e. to the exchange motive), for households above the threshold welfare level, when we compare these with estimates from other studies of mixed-motives using objective measures of welfare, such as poverty lines. This suggests importantly that a degree of *crowding-in* of private transfers, driven by the hypothesized exchange motive, applies to households above the threshold. However, in this study, the crowding-in effect is considerably weaker than the crowding-out effect making it highly unlikely that the former could offset the latter. Effective policy alleviation interventions could also have the unexpected effect of reducing a country's foreign exchange earnings.

It also appears that whether a household-specific or a community-specific measure of subjectively-assessed welfare is used does not affect the main conclusions. In this case the two measures of subjectively-assessed welfare were based on survey data from households on one island in the South Pacific, Viti Levu, with a total population of only 600 thousand. If the reference norms for this population in relation to subjective welfare comparisons are fairly standard across the different networks and social groups it is perhaps to be expected that the household-specific and community-specific measures yield quite similar results. However, in larger and more diverse societies this is less likely to be the case.

Where mixed motives with opposite effects on remittances apply, the net effect of pre-transfer welfare improvements on remittance flows will depend partly on the relative magnitude of such welfare gains between those above and below the threshold, and on how the migrant households are distributed between those below and above the threshold welfare level. This raises the further possibility that effective poverty-alleviation policy interventions that reduce the proportion of households below the threshold, could be accompanied by a shift in the distribution of remittances in favor of those above the threshold. The net effects of recipients' welfare improvements on remittances, and the effects of remittances on poverty alleviation and income distribution are consequently more complex and ambiguous than previous studies suggest.

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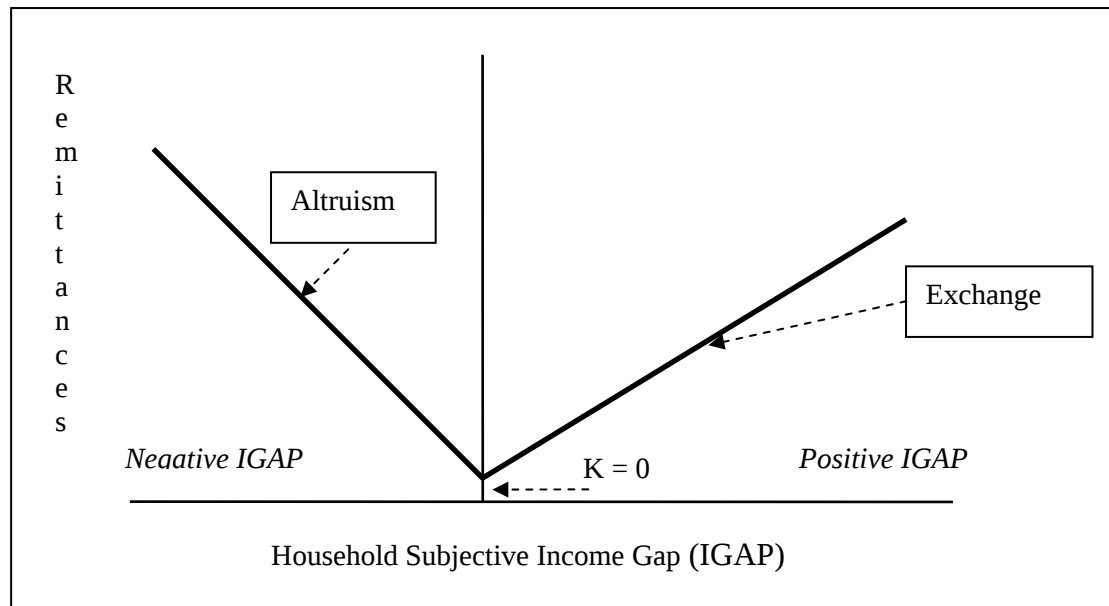


Figure 1 Relationship between Remittances and the Subjective Income Gap

Table 1 Remittances Received by Income Category (US\$, 2004)

Household Category	Mean Household Remittances Received*	
	Household-Specific IGAP	Community-Specific IGAP
Poorest 40%	703.8 (2,342.4)	644.5 (2,350.1)
Middle 40%	345.0 (1,020.8)	463.7 (1,483.6)
Richest 20%	673.5 (1,862.0)	559.8 (1,046.2)

*Standard deviations in parentheses.

Table 2 Variable Definitions

Variable	Variable description
Remittances	International transfers received by household in all forms, cash and in-kind (US\$)
Household income	Total household income from all sources excluding migrant transfers (US\$)
Subjective Income Gap (IGAP _h)	Required income minus household income excluding migrant transfers (US\$)
Capital City	Dummy for household in capital city (=1 if yes, otherwise 0)
Indo-Fijian	Dummy for household of Indo-Fijian ethnicity (=1 if yes, otherwise 0)
Household Size	Number of household members, excluding migrants (No.)
Migration Status	Dummy for household with migrant overseas (=1 if yes, otherwise 0)
Migrant Length of Stay	Average length of stay of overseas migrants for the household (yrs)
Non-Australasian Migrant	Dummy for migrant in country other than Australia or New Zealand (=1 if yes, otherwise 0)

Table 3 Descriptive Statistics

	Sample (n = 417)		Recipients (n= 174		Non-Recipients (n = 243)	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Remittances	554.07	1,821.59	1,327.86	2,635.35	0.00	0.00
Household income	6,219.07	8,647.09	6,997.37	7,838.44	5,661.77	9,157.72
Subjective Income Gap (IGAP _h)	2,530.59	7,771.02	2,706.05	6,760.01	1,602.01	8,432.24
Capital City	0.21	----	0.28	----	0.16	----
Indo-Fijian	0.47	----	0.57	----	0.40	----
Household Size	4.70	2.29	4.63	2.48	4.76	2.15
Migration Status	0.35	----	0.70	----	0.09	----
Migrant Length of Stay	3.08	6.07	6.45	7.61	0.68	2.80
Non-Australasian Migrant	0.08	----	0.18	----	0.01	----

---- not applicable

Table 4 Tobit Regression Results: Subjective Income Gap Models

Dependent Variable (= Remittances)	Household Specific Need		Community Specific Need	
	Linear	Spline	Linear	Spline
Subjective Income Gap ($IGAP_h$)	-0.032 (0.026)	-0.318** (0.159)	-0.013 (0.020)	-0.244*** (0.095)
Positive $IGAP_h$	----	0.328** (0.163)	----	0.250*** (0.091)
Capital City	1443.046*** (454.120)	1111.923*** (426.117)	1453.981*** (477.334)	1334.846*** (412.257)
Indo-Fijian	-218.042 (420.184)	-270.319 (399.829)	-228.583 (413.596)	-179.216 (428.635)
Household Size	91.510 (65.809)	65.880 (63.000)	89.001 (67.313)	97.881 (70.327)
Migration Status	3846.987*** (949.647)	3777.161*** (882.815)	3847.96*** (965.675)	3947.046*** (979.724)
Migrant Length of Stay	-48.776 (30.471)	-42.444 (27.546)	-48.288 (31.585)	-53.109* (49.431)
Non-Australasian Migrant	1454.275** (737.947)	1267.361* (714.788)	1487.012** (743.507)	1395.681** (721.739)
Constant	-3225.435*** (771.545)	-3206.029*** (761.715)	-3260.397*** (801.984)	-3527.608*** (869.914)
No. Observations	417	417	417	417
F-stat	7.670	6.100	9.260	7.799
Prob > F	0.000	0.000	0.000	0.000

Robust standard errors in parentheses clustered at the community (PSU) level.

*** significant at 1%; ** significant at 5%; * significant at 10%

---- not applicable

Table 5 Tobit Regression Marginal Effects on Remittances

Dependent Variable (=\$ remittances per \$1000 income)	Household Specific Need		Community Specific Need	
	Linear	Spline	Linear	Spline
Subjective Income Gap ($IGAP_h$) ⁺	-0.852 (0.645)	-84.105** (41.160)	-3.326 (5.150)	-64.536** (23.720)
Positive $IGAP_h$ ⁺⁺	----	86.753** (42.480)	----	66.030 (22.980)***

Standard errors in parentheses clustered at the community (PSU) level.

*** significant at 1%; ** significant at 5%; * significant at 10%

---- not applicable;

+ in spline model this coefficient is for β_4 in equation (3), showing the relationship for households below the threshold level

++ the relationship for households above the threshold level is given by the sum of coefficients on $IGAP$ and $Positive\ IGAP_h$ or, $\beta_4 + \beta_5$ in equation (3).

Appendix Table 1 OLS Regression Results for Subjective Income Gap Model

Dependent Variable (= Remittances)	Household Specific Need		Community Specific Need	
	Linear	Spline	Linear	Spline
Subjective Income Gap ($IGAP_h$) ⁺ (per \$1000)	-16.043 (11.191)	-206.169 (132.065)	-9.660 (8.411)	-120.027** (55.529)
Positive $IGAP_h$ (per \$1000)	----	205.226 (132.392)	----	116.501*** (52.752)
Capital City	621.111*** (218.990)	468.731*** (169.104)	637.442*** (224.823)	606.029*** (206.477)
Indo-Fijian	-445.371* (420.184)	-463.377* (239.853)	-443.409* (239.002)	-408.986* (244.405)
Household Size	42.416 (38.126)	29.820 (36.891)	43.897 (38.515)	47.366 (40.316)
Migration Status	1599.673*** (504.105)	1579.574*** (474.528)	1606.219*** (510.538)	1650.237*** (516.098)
Migrant Length of Stay	-65.747* (33.491)	-61.758* (31.078)	-65.903* (33.943)	-68.086* (34.412)
Non-Australasian Migrant	1171.065* (663.528)*	1037.865 (652.843)	1176.329* (663.070)	1133.256* (655.481)
Constant	32.441 (218.950)	13.828 (239.545)	9.469 (221.660)	-114.261 (253.511)
No. Observations	417	417	417	417
R ²	0.204	0.237	0.201	0.207