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**Working Paper**

## Motives and giving norms behind remittances: The case of Filipino overseas workers and their recipient households

UPSE Discussion Paper, No. 2009,07

**Provided in Cooperation with:**

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*Suggested Citation:* Alba, Michael M.; Sugui, Jessaine Soraya C. (2009) : Motives and giving norms behind remittances: The case of Filipino overseas workers and their recipient households, UPSE Discussion Paper, No. 2009,07, University of the Philippines, School of Economics (UPSE), Quezon City

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**UP School of Economics**  
**Discussion Papers**

Discussion Paper No. 0907

August 2009

**Motives and Giving Norms Behind Remittances:  
The Case of Filipino Overseas Workers and their Recipient Households**

by

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Motives and Giving Norms Behind Remittances:  
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Michael M. Alba and Jessaine Soraya C. Sugui

Abstract

The literature has focused on motives to explain remittance behavior. But as non-anonymous transfers, remittances are apt to be influenced by giving norms as well. We formulate an empirical specification that takes account of remittance motives involving worker-household pairs. We find that altruism dominates the exchange motive among overseas workers who are likely to be the primary breadwinners of their recipient households. We also find that, in the subsample in which overseas workers are likely to be secondary breadwinners, (a) household labor income is an endogenous explanatory variable and (b) the error covariance of the household income and remittance selection equations is positive. A possible reason for (a) is that secondary breadwinners use household income as an imperfect signal of opportunity cost or to detect unobserved effort, i.e., moral hazard, in generating income. As for (b), we surmise that it indicates the presence of incentive-compatible mechanisms against moral hazard. On giving norms, we find that, in samples that include overseas workers who are secondary breadwinners, remittance amounts are afflicted with negative selectivity. We present evidence that this is consistent with Filipino giving practices, in which everyone gives but in modest amounts.

Keywords: Remittances, remittance motives, giving norms.

JEL classification: F24

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Respectively, Visiting Research Fellow, Philippine Institute for Development Studies (PIDS), and Staff Consultant, Asian Development Bank. Please send comments to michael.alba@gmail.com. We are grateful to the Poverty and Economic Policy Research Network of the International Development Research Centre for financial support and DLSU-Angelo King Institute for Business and Economic Studies and the Philippine Institute for Development Studies (PIDS) for providing us with office space and, in the case of PIDS, for giving us ready access to its library and computer support services. We also thank Aniceto Orbeta Jr. for generously “wasting” his time on econometric discussions with us, Emmanuel Esguerra for tracking down the bibliographic information on the undated Fabella essay, and Mary Shirley for her comments on an earlier version of this paper. Pramila Krishanan and Hung Thai Pham were our discussants during the December 2008 PEP General Meeting in Manila. Their incisive observations were most helpful in challenging and clarifying our understanding of many issues, thus (we hope) vastly improving this version of the paper. We owe them a debt of gratitude.

## 1. Introduction

Teeming masses of workers streaming across national borders; torrents of remittances rushing back to the workers' countries of origin: These twin phenomena are among the most impressive forces that are shaping and are being shaped by the process of globalization today. United Nations estimates in 2000, cited in Kapur and McHale (2003) and by the World Bank (2006), placed the number of international migrants at between 150 and 175 million, or at 3 percent of the world population.<sup>1</sup> In developed countries where their numbers grew at 3 percent per year between 1980 and 2000, from 2.4 percent per year between 1970 and 1980, immigrants almost doubled their share in the population over the 30-year period. Concomitantly, remittances to developing countries have inexorably risen, from \$17.7 billion in 1980 to \$31.2 billion in 1990 to \$85.6 billion in 2000 and \$301 billion in 2006.<sup>2</sup>

These vastly shifting currents of men and monies notwithstanding, international migration and transfers are still not well understood. Who in the pool of migrants remit, to whom transfers are sent, in what amounts (and whether it is their nominal or real values that matter), with what regularity, and for how long are questions that as yet do not have stock answers. But the importance of resolving them cannot be overemphasized. As de la Brière et al. (2002) point out, distinguishing the different motives behind remittances affords understanding of the role these transfers play in the strategic behavior of households. Remittances may not merely be an additional source of income for the recipient households, they can be payments for services rendered to the migrant, payoffs of an insurance scheme that shields recipients from income shocks, returns on household investments in the migrants' human capital (including location), migrants' investment in inheritable assets, or various combinations thereof. Moreover, the policy implications of alternative motives can be very different. An economic shock that causes unemployment rates to rise in a remittance-receiving country, for instance, can be expected to increase both the incidence and the amounts of remittances if these funds are altruistically motivated (i.e., the migrants care for the recipients), but to reduce amounts remitted without necessarily affecting their frequency if transfers are payments for services rendered by the recipients (because their bargaining power diminishes). Thus, safety net schemes require more government and domestic resources to be mobilized if remittance inflows are service payments than if they represent charitable giving. On the other hand, government subsidies in education may need to be reexamined if emigration is found to be an investment in a higher income stream by the worker and her origin household, and schooling choices are part of a decision chain that culminates in brain drain. Specifically, policy requires that the full costs of training in careers (say, in nursing and medicine) that are pursued outside the country have to be fully borne by would-be emigrants to the extent that the origin country is unable to reap the social returns of such investments in human capital.

What the literature has also failed to realize thus far is that, being non-anonymous transactions, remittances may be governed by giving norms. In other words, remittance behavior may not be fully accounted for by motives alone, but may be framed by norms on giving of a community as well. Thus, remittance behavior may be constrained by informal and implicit rules that specify, say, the

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<sup>1</sup> Since the estimates are drawn from official census figures of destination countries, the World Bank deems even the 150 million estimate to be on the low end, contending that undocumented aliens are not likely to be forthcoming about their legal status.

<sup>2</sup> These estimates have to be taken with caution because, as the World Bank (2006) points out, there is as yet no consensus on what constitutes remittances, and, as IFAD (2007) observes, a significant proportion of the flows go through informal channels. The estimates cited come from Kapur and McHale (2003) for 1980, World Bank (2006) for 1990 and 2000, and IFAD (2007) for 2006. No attempt was made to determine the comparability of the data.

circumstances under which transfers may be expected, who may be the giving and receiving parties, and how much may be given. This perspective (that remittances are circumscribed by norms), in turn, has its own policy implications for a developing economy that is dependent on remittance inflows. For instance, if norms prescribe that it is giving that matters (i.e., everyone is expected to give), but amounts given may be modest, then interventions may focus on increasing average remittance amounts (e.g., by imposing a minimum amount requirement or setting a declining tax rate or transaction fee on transfer amounts). On the other hand, if norms stipulate that giving ought to be confined to a small circle of close relations, but amounts given should be substantial, then policies may need to be designed to help migrant workers save (e.g., by offering special deposit accounts that have higher interest rates, but also exact large penalties if funds are withdrawn before minimal levels are reached).

This paper explores the correlates of remittances. To do so, it formulates an empirical specification of remittance incidence and amounts that takes account of the various motives involving worker-household pairs that are found in the literature. The specification is developed for a cross-section data set drawn from the 2003 Family Income and Expenditures Survey (FIES) and the 2003 Survey of Overseas Filipinos (SOF) that matches the overseas worker with the origin or recipient household (since remittances are not anonymous transfers that depend on price and income signals alone). Because the literature suggests that household labor income is potentially an endogenous explanatory variable, the paper also presents a framework for testing this hypothesis in the remittance equations and provides for alternative estimation strategies, depending on the test outcomes.

Since the structural models that are derived require the estimation of error covariances, e.g., of remittance selection and amounts, or of the household income and the remittance equations, this feature is exploited by providing conjectures on what influences these covariances may be picking up. In particular, we interpret the correlation of the error terms of the remittance selection and amounts equations as reflecting the influence of Filipino norms on giving, and we provide evidence on Filipino giving practices to support this claim.

To address the possible heterogeneity of overseas workers with respect to remittance motives and contractual terms, we implement the hypothesis tests and the estimation of the empirical model on three groups of overseas workers and their households: the entire sample, the subsample consisting of overseas workers who are either household heads or spouses of heads, and the subsample consisting of overseas workers who are neither heads nor spouses of heads. The reasoning behind this strategy is that heads and their spouses are not likely to be impelled by investment and inheritance motives. Moreover, their remittance behavior may be dominated by the altruistic motive, which lowers their relative bargaining power (in the exchange motive) and which may cause them not to care very much about whether household income is tainted by moral hazard due to unobserved effort (in the insurance motive).

The focus on the Philippines is justified on the following grounds: The country has been one of the largest exporters of labor and, consequently, has benefited from strong remittance inflows. *Bangko Sentral ng Pilipinas*, the Philippine central bank, reports that, between 2000 and 2008, the country's remittance receipts rose by more than two-fold, from \$6.1 billion to \$16.4 billion, and that these transfers in 2008 were ranked by the World Bank to have been the fourth largest in the world. For the Philippine economy and the recipient households, the importance of these remittance flows cannot be overstated. In 2008, the transfers accounted for about 9.7 percent of gross domestic product (GDP), 13.8 percent of personal consumption expenditure, and 25.7 percent of total

exports.<sup>3</sup> Data from the 2003 FIES also indicate that roughly over 20 percent of households received income transfers from abroad.

The rest of this paper is organized as follows: The next section develops the empirical framework based on considerations culled from a survey of remittance motives that is provided in Appendix 1. The third section presents the data set and variables. The fourth section discusses our empirical findings, while the fifth argues that the negative correlation of the error terms of the remittance selection and amounts equations is consistent with other evidence on Filipino giving norms. The last section provides concluding remarks.

## 2. Empirical Model

Table 1 lists five remittance motives that, based on our survey of the literature, have to be accounted for in exploring the remittance behavior of worker-household pairs. The table also summarizes the specific hypotheses of each of these competing explanations for remittances and identifies the explanatory variables. A more detailed discussion of these motives is provided in Appendix 1.

From Table 1 (and the survey undertaken in Appendix 1), we draw the following implications for our empirical specification: First, it is likely that remittances are induced by a variety of motives in a sample of worker-household pairs and even for a given worker-household pair. Indeed, as is pointed out in Table 1, to be operative, the insurance and investment motives have to be supported by other considerations (including possibly other motives). Thus, the structural model must be sufficiently general to admit the competing motives.

Second, as has been mentioned, remittances are not anonymous transactions, behavioral information on which can be summarized by costs, incomes, and prices. Rather, they are manifestations of underlying relationships between workers and households. Consequently, the explanatory variables of remittance equations must include characteristics of both parties that possibly reflect the relationship. Otherwise, the specification may be tainted with omitted variable bias.

Third, remittance behavior is best studied using a (long) panel data set, since only then can the motives be differentiated using the incidence, regularity of recurrence (or lack thereof), duration, and amounts of remittances, on the one hand, and changes in environmental circumstances, on the other. Indeed, it is particularly difficult to discern the exchange and insurance motives with cross-section data.

Consider the exchange motive. Assuming that all worker-household pairs face the same environmental conditions, household pre-transfer labor incomes are either positively or negatively correlated with remittance amounts. Positive (Negative) correlation holds if the contracted services and household consumption are independent (complements) in household preferences. For the researcher, empirically verifying the preference relations of consumption and contracted services is thus a necessary step for the relationship between remittances and household pre-transfer income to be interpreted correctly. Information on services undertaken for the migrant worker, however, tends not to be available. On the other hand, if random shocks are allowed (which have the effect of changing the contractual terms for some worker-household pairs), it is virtually impossible to make household comparisons using cross-section data. For instance, (assuming that consumption and services rendered are independent in preferences) remittances may decline because either

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<sup>3</sup> See [www.bsp.gov.ph/statistics](http://www.bsp.gov.ph/statistics).

household incomes decrease (say, because some members of the households concerned lost their jobs, which lowers the households' bargaining power or opportunity costs) or locale- or sector-specific conditions take a negative turn (say, because of higher unemployment rates in occupations of some household members, even if household incomes are not affected).<sup>4</sup> Not privy to household (income and remittance) histories and changing environmental conditions, the researcher may not be able to find a systematic association between remittances and household incomes.

A similar argument can be made for the insurance motive. Assuming that the same environmental conditions prevail across worker-household pairs, remittances flow only in one direction (to workers if domestic conditions are good and to households if bad) or do not occur. With random shocks, however, high-income households may be recipients of remittance inflows and low-income households may be sources of transfers because the former suffered from a negative income shock while the latter benefited from a positive shock.

Thus, with a cross-section data set, researchers have to be sensitive to the limits of what can and cannot be explored. In particular, it is a mistake to conflate a cross-section effect (i.e., a systematic variation across households at a point in time) and a longitudinal effect (i.e., a systematic variation in a household over time).<sup>5</sup>

The upshot of this discussion then is that it may be impossible to sort out remittance motives with cross-section data. The best (and more modest) outcome that researchers can hope for with such data is that they are able to obtain unbiased estimates of correlates of remittance behavior.

Fourth, the discussion in Appendix 1 of the exchange, insurance, and investment motives suggests that household pre-transfer (labor) income is potentially an endogenous explanatory variable in the remittance equations for at least two reasons: It is a correlate of household opportunity costs and relative bargaining powers (in the exchange motive), which may not be fully accounted for in the specification, and it is affected by unobserved effort, i.e., moral hazard, in generating income (in the insurance and investment motives).<sup>6</sup>

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<sup>4</sup> In the exchange model, the key factor that explains remittance amounts is the household's opportunity cost or bargaining power. Given a set of prevailing conditions at a point in time, this bargaining power is proxied by household pre-transfer income, so that household income and remittance amounts would be positively or negatively correlated, depending on the nature of the household's preference relations between consumption and services rendered. Holding its pre-transfer income fixed over time, however, a household's bargaining power may change with changes in environmental conditions. In effect, with cross-section data, the relationship between remittance amounts and household incomes may be muddled by the omitted variable effects of changing environmental conditions.

<sup>5</sup> An example is a regression of remittance amount using cross-section data whose specification includes an environmental variable such as provincial or district employment rate, the hypothesis being that (under the exchange motive) employment rate as a measure of opportunity cost has a direct bearing on remittance amounts. Such a specification, however, fails to appreciate a fine point in the hypothesized relationship: At a given point in time, the effect of environmental conditions is fully reflected in the positive or negative correlation between household labor income and remittances, so that environmental indicators are redundant or ignorable in a cross-section setting; only when environmental conditions facing a given household change over time (in effect changing the parameters of the implicit contract) will they then have an effect on remittances beyond what is accounted for by temporal changes in household labor income.

<sup>6</sup> We are less concerned with the endogeneity of asset incomes. Since our data are on workers who have not been away for a long time (i.e., they left the country between October 1998 and September 2003), we believe that recipient households have not had sufficient time to use remittances to build up their assets. Moreover, times were relatively difficult for Filipino households in the aftermath of the 1997 Asian Financial Crisis, and conditions were not conducive to saving and investment in the early 2000s because of the political turmoil that forced the resignation of President Joseph Estrada in January 2001.

Fifth, following the empirical literature on remittances, we do not address the issue of migrant selection, i.e., who among the household members is *assigned* to migrate. Instead, we simply take the worker-household pairs as given. The estimates presented in this paper thus hold *conditional on the pool of migrants being given*; they may not be true for the Filipino population in general.

Sixth, the models suggest that remittance incidence and amounts may be explained by different factors, including unobserved influences. Under the exchange and investment motives, for instance, household income does not affect the frequency with which remittances are sent (which is set by contractual terms), but is positively correlated with remittance amounts (in the case of the investment motive or when, in the exchange motive, consumption and services rendered are independent in household preferences) or has a negative effect on the same (when, in the exchange motive, consumption and services rendered are complements in preferences). On the other hand, a random shock such as having a co-worker who goes on home leave may increase both remittance frequency (as these colleagues are used as conduits) and amounts because of lower transaction costs. If so, to address the second issue, the specification must allow for endogenous selection, since remittance amounts may not be independent of remittance incidence. But to be consistent with the implications of the first issue, it must not restrict the coefficients of explanatory variables to be identical in both the selection and amounts equations, which invalidates the Tobit model.

Seventh, the theoretical accounts of remittance motives, unfortunately, do not provide any leads on instrumental variables that can be used to identify remittance incidence from remittance amounts in a model of endogenous selection. This leaves identification on the basis of functional form as the only estimation strategy, as was resorted to in Funkhouser (1995) and Menjivar et al. (1998).

Accordingly, we specify our empirical model (which relies on cross-section data) as

$$y_1 = \beta' \mathbf{x} + \gamma_1 y_3 + u \quad \text{if } y_2 = 1 \quad (1)$$

$$y_2 = 1(\theta' \mathbf{x} + \gamma_2 y_3 + \varepsilon > 0) \quad (2)$$

where  $y_1$  is the natural logarithm of the amount remitted,  $y_2$  is remittance incidence,  $1(\cdot)$  is an indicator function that equals 1 when the condition inside the parenthesis is satisfied,  $\mathbf{x}$  is the set of regressors common to (1) and (2), which are explained in detail in the next section,  $\beta$ ,  $\theta$ ,  $\gamma_1$ , and  $\gamma_2$  are parameters to be estimated,  $u$  and  $\varepsilon$  are error terms, and  $y_3$  is the natural logarithm of the recipient household's labor income, which is potentially an endogenous explanatory variable, so that it is suspected that  $E(y_3 u) \neq 0$  and  $E(y_3 \varepsilon) \neq 0$ .

The procedure used to estimate the parameters of the model therefore depends on whether or not household labor income is an endogenous explanatory variable in either (1) or (2) or both. If it is not, the model is a standard Heckman selection model, which can be readily estimated by canned routines. If it is, then adjustments have to be made for unobserved heterogeneity arising from the correlations between  $y_3$  and the error terms. (See Rivers and Vuong, 1988, and Wooldridge, 2002: 472–477 and 567–570.)

Testing the endogeneity of the recipient household's labor income being an important step prior to parameter estimation, we adopt the following framework, which extends Wooldridge (2002: 567–570): Assume that there are instruments  $\mathbf{z} = [\mathbf{x}' \mathbf{z}_1']'$  such that  $E(\mathbf{z}' u) = E(\mathbf{z}' \varepsilon) = \mathbf{0}$ . Let the linear projection of  $y_3$  on  $\mathbf{z}$  be given by

$$y_3 = \pi' \mathbf{z} + v \quad (3)$$

$$E(\mathbf{z}' v) = \mathbf{0}, \quad (4)$$



where  $(u, \varepsilon, v)$  have a trivariate normal distribution with zero means and  $V(\varepsilon) = E(\varepsilon^2)$  is normalized to be equal to unity, which allows  $\theta$  and  $\gamma_2$  in (2) to be identified. Since  $u$  and  $\varepsilon$  are uncorrelated with  $\mathbf{z}$ , (3) implies that  $y_3$  is endogenous in (1) and (2) if and only if  $E(uv) \neq 0$  and  $E(\varepsilon v) \neq 0$ .

Write the linear projections of  $u$  and  $\varepsilon$  onto  $v$  in error form as

$$u = \tau_1 v + \varpi_1 \quad (5)$$

$$\varepsilon = \tau_2 v + \varpi_2, \quad (6)$$

where  $\tau_1 = E(uv)/[E(u^2)E(v^2)]$ ,  $\tau_2 = E(\varepsilon v)/E(v^2)$ ,  $E(v\varpi_1) = E(v\varpi_2) = 0$  (by construction), and  $E(\mathbf{z}'\varpi_1) = E(\mathbf{z}'\varpi_2) = \mathbf{0}$  (since  $\mathbf{z}$  is orthogonal to  $u$ ,  $\varepsilon$ , and  $v$ ). In effect,  $y_3$  is exogenous if and only if  $\tau_1 = 0$  and  $\tau_2 = 0$ .

Insert (5) and (6) into (1) and (2) to obtain

$$y_1 = \beta' \mathbf{x} + \gamma_1 y_3 + \tau_1 v + \varpi_1 \quad \text{if } y_2 = 1 \quad (7)$$

$$y_2 = 1(\theta' \mathbf{x} + \gamma_2 y_3 + \tau_2 v + \varpi_2 > 0). \quad (8)$$

Since  $\varpi_1$  and  $\varpi_2$  are not correlated with  $\mathbf{z}$ ,  $y_3$ , and  $v$ , (7) and (8) can be estimated as a standard Heckman selection model, and testing the exogeneity of  $y_3$  in (1) and (2) is tantamount conducting  $t$ -tests or a likelihood ratio test on the null hypothesis that  $\tau_1 = 0$  and  $\tau_2 = 0$ .

A problem is that  $v$  is not observed. But  $\hat{v}$  can be generated as the residual after ordinary least squares is performed on (3). Inserting  $\hat{v}$  in (7) and (8) in place of  $v$  then addresses this problem.

In case the null hypothesis is rejected, the estimations have to account for unobserved heterogeneity due to the correlations between  $y_3$  and the error terms. Using limited-information estimation strategies, one may address this problem as follows: Substitute  $y_3 - \pi' \mathbf{z}$  for  $v$  in (8) to obtain

$$y_2 = 1(\theta' \mathbf{x} + \gamma_2 y_3 + \tau_2(y_3 - \pi' \mathbf{z}) + \varpi_2 > 0). \quad (9)$$

Then (9) and (3) can then be estimated jointly as an instrumental variable probit model with log-likelihood function given by

$$\ln L = \sum_{i=1}^n \left\{ \ln \phi \left( \frac{y_{3i} - \pi' \mathbf{z}_i}{\sigma_v} \right) + (1 - y_{2i}) \left[ \ln \Phi \left( \frac{\theta' \mathbf{x}_i + \gamma_2 y_{3i} + \frac{\sigma_{\varepsilon v}}{\sigma_v^2} (y_{3i} - \pi' \mathbf{z}_i)}{\sqrt{1 - \frac{\sigma_{\varepsilon v}^2}{\sigma_v^2}}} \right) \right] + y_{2i} \left[ \ln \Phi \left( \frac{\theta' \mathbf{x}_i + \gamma_2 y_{3i} + \frac{\sigma_{\varepsilon v}}{\sigma_v^2} (y_{3i} - \pi' \mathbf{z}_i)}{\sqrt{1 - \frac{\sigma_{\varepsilon v}^2}{\sigma_v^2}}} \right) \right] \right\} - n \ln \sigma_v,$$

where  $\phi(\cdot)$  and  $\Phi(\cdot)$  are the standard normal density and distribution functions, respectively, and  $\text{Var}(\varpi_2) = 1 - \sigma_{\varepsilon v}^2 / \sigma_v^2$ , where  $\sigma_{\varepsilon v} \equiv E(\varepsilon v)$  and  $\sigma_v^2 \equiv E(v^2)$ .

In the same spirit, substitute  $y_3 - \pi' \mathbf{z}$  for  $v$  in (7) to obtain

$$y_1 = \beta' \mathbf{x} + \gamma_1 y_3 + \tau_1(y_3 - \pi' \mathbf{z}) + \varpi_1 > 0 \quad \text{if } y_2 = 1. \quad (10)$$

Then (10) can be estimated by generating the inverse Mills' ratio from the instrumental variable probit estimates of (9), adding it to the regressor set of (10), and estimating the following log-likelihood function using the subsample for which  $y_2 = 1$ :

$$\ln L = -n \left[ \ln(2\pi) + \ln \sigma_v \right] - \frac{n}{2} \ln \left( \sigma_u^2 - \frac{\sigma_{uv}^2}{\sigma_u^4 \sigma_v^2} \right) - \frac{1}{2} \sum_{i=1}^n \left\{ \left[ \frac{y_{1i} - \beta' \mathbf{x}_i - \gamma_1 y_{3i} - \sigma_{\varpi_1 \varpi_2} \lambda_i - \frac{\sigma_{uv}}{\sigma_u^2 \sigma_v^2} (y_{3i} - \boldsymbol{\pi}' \mathbf{z}_i)}{\sqrt{\sigma_u^2 - \frac{\sigma_{uv}^2}{\sigma_u^4 \sigma_v^2}}} \right]^2 + \left( \frac{y_{3i} - \boldsymbol{\pi}' \mathbf{z}_i}{\sigma_v} \right)^2 \right\}, \quad (11)$$

where  $\lambda$  is the inverse Mills' ratio,  $\sigma_{\varpi_1 \varpi_2} = \sigma_{ue} - \sigma_{uv} \sigma_{ev} / \sigma_v^2$  is the covariance between the error terms  $\varpi_1$  and  $\varpi_2$ ,  $Var(\varpi_1) = \sigma_u^2 - \sigma_{uv}^2 / (\sigma_u^4 \sigma_v^2)$ ,  $\sigma_{uv} \equiv E(uv)$ ,  $\sigma_u^2 \equiv E(u^2)$ , and  $\sigma_v^2 \equiv E(v^2)$ .

### 3. Data Set and Variables

Our data set is drawn primarily from the public use data files of the 2003 FIES and SOF. Both surveys are regular undertakings of the Philippine government's National Statistics Office (NSO). The FIES is a triennial, nationally- and regionally-representative survey that is intended to track income distribution, costs of living and spending patterns, and the thresholds and head counts of poverty. The SOF is an annual, nationally-representative survey that is implemented as a rider to the third quarter Labor Force Survey (LFS). It is triggered when an informant/interviewee reports that a member of the respondent household went abroad during the past five years. Questions are then asked about that member, including the purpose of her trip, the country where she is based, her socioeconomic characteristics, the amounts of transfers in cash and kind that she has remitted during the preceding six months, and the modes of remittance.

Both surveys implement the multi-stage sampling design of NSO's Integrated Survey of Households (ISH). Redesigned in 2003, the ISH uses the 17 administrative regions of the country as its primary strata.<sup>7</sup> Each region is then further stratified by province, highly-urbanized city (HUC), or independent-city component (ICC). In each stratum, *barangays*<sup>8</sup> constitute the primary sampling units (PSUs). Enumeration areas (EAs) are drawn from these *barangays*, and households are in turn sampled from these EAs.<sup>9</sup>

The 2003 FIES sample consists of 42,094 households, while the 2003 SOF sample includes 2,888 overseas workers. Although the surveys are implemented at different times—FIES interviews are conducted twice, in June of an FIES year and in January the year after, while SOF interviews are carried out in October of every year—in an FIES year, the samples of the FIES and LFS (on which the SOF is based) are identical.<sup>10</sup> It is thus possible to match the overseas worker with her origin household.

<sup>7</sup> In contrast, the sampling designs of earlier household surveys, including those of the 2000 FIES and SOF, used major cities and the urban and rural areas of provinces as the strata.

<sup>8</sup> Literally, village, which officially is the smallest political unit in the country.

<sup>9</sup> The 2003 Master Sample brochure of the NSO is available online at [www.census.gov.ph](http://www.census.gov.ph).

<sup>10</sup> LFS is a quarterly survey that normally has a rotating sample in which a respondent household remains part of the surveys for three consecutive quarters before being replaced. In an FIES year, however, the sample of the LFS is fixed for four quarters.

As may be expected, data on worker-related variables are taken from the SOF, while those pertaining to the origin household come from the FIES. Data on remittances, however, are available in both surveys. After due consideration, in contrast to Rodriguez (1996), we decided to use remittance data from the FIES rather than the SOF. The problem with the remittance variables in the SOF is that they are based on a six-month reference period prior to the survey. Since the reference period of FIES variables is the entire year, SOF remittance data are likely to be understated relative to the FIES income variables.

The FIES remittance variable, however, is not without its own shortcomings. First, although the survey questionnaire includes a specific question on remittance transfers, what is reported in the public use data file is a lumped category on international receipts that includes royalties and sales of assets. Fortuitously, international transfers other than remittances are not likely to be common occurrences among Filipino households. We thus deemed it reasonable to suppose that, among households with members who are overseas workers, transfer receipts can come only from those members.<sup>11</sup> A second problem is that, in households with multiple overseas workers, it is not possible to tag how much of total remittance receipts was sent by whom. Consequently, 625 observations had to be dropped from the data set.

Our regression sample consists of 1,669 observations. The drop off from the original SOF sample size of 2,888 may be accounted for as follows: In addition to the multiple worker households, 214 observations had missing data and 380 households reported having zero labor income.<sup>12</sup> These also were deleted.

Turning to our supplementary data sources, recall from the discussion in the previous section that identifying instrumental variables are needed to address the potential endogeneity of household labor income. Taking our cue from Paxson (1992) and Yang and Choi (2007), who use the variability of rainfall to estimate the variability of household incomes, we conjecture that weather disturbances are exogenous shocks to household labor incomes. In addition, we hypothesize that, being an indicator of local economic activity, the provincial employment rate exerts a positive exogenous effect on the same. The idea behind our choice of these two variables is as follows: Observed household labor income may be an endogenous variable in the remittance equations because it reflects the combined effects of opportunity costs (as suggested by the exchange motive), moral hazard (as indicated by the insurance and investment hypothesis), and sheer luck. To the extent that (good) weather conditions and economic activity are correlated with opportunity costs and the effectiveness of effort in generating income, however, conditioning labor income on them (along with the other explanatory variables) allows the effects of opportunity costs and effort to be distinguished from sheer luck.

To make the weather disturbances variable operative, we obtained data on tropical cyclones and the provinces affected from the Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA), the government's weather agency. We then counted the number of typhoons, storms, and depressions that hit each province and tagged the values to the sample households by their location of residence. Provincial employment rate was more readily derived from LFS data and was similarly attached to the household data.

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<sup>11</sup> A household with transfer receipts but which cannot be matched with an overseas worker is dropped from the sample.

<sup>12</sup> We considered these households as essentially constituting a different sample: Not only are they totally dependent on remittances for subsistence, they are also insulated from domestic income shocks. Being in a corner solution, their behavior would be motivated by a different set of factors compared to the other households. Unfortunately, their numbers may be too small for a separate investigation.

Our dependent variables are the probability of remittance incidence and remittance amounts from the overseas worker in 2003. Incidence is set equal to 1 if the household is observed to have received transfers from abroad, and is zero otherwise. Remittance amounts are assumed to be personal transfers from the overseas worker and not due to pensions, contributions, sale of assets, or investment dividends. They are expressed in nominal Philippine peso values.

We now turn to the explanatory variables and discuss our hypotheses on them.

The worker's relation to the household head is intended to be a rough correlate of remittance motives. Workers who are household heads or spouses of household heads tend to be the primary breadwinners of families and so may bear the greater burden of providing for the family's subsistence (i.e., they may be impelled by the altruistic and exchange motives). In contrast, workers who are sons or daughters may be driven by a wider variety of motives.<sup>13</sup> On the other hand, as Lucas and Stark (1985) suppose as the complement or absence of the investment motive, workers who are in-laws may be less motivated to remit because their schooling costs are not likely to have been financed by the origin households. In the context of the Filipino extended family, however, the twist is that workers who are not closely related to the household head may nevertheless owe their educations to the recipient households, so that their remittance behavior may be explained by the investment motive.<sup>14</sup>

The worker's gender may reflect either an income effect or an altruistic concern for the household. In the first case, it may be that gender wage differentials exist in the worker's host country. In the second case, the competing explanations are that a male household member is expected to be a better provider, but a female member is thought to be more attached to the origin household.

The worker's marital status is regarded as another indicator of the worker's attachment to the household: Married workers are hypothesized to be more attached.

The worker's age, educational attainment, work experience, and occupation are proxy measures of her income. Controlling for the other income determinants, age may account for the income effect of work experience in the Philippines. Age may reflect the significance of retirement as well. The older the worker and the closer she is to retirement age, the more services she may need to contract (e.g., to acquire and administer assets or to insure care during her retirement years) with the origin household. Analogously, the educational attainment variables may additionally reflect an investment-motive aspect in that if the effect of income is already fully captured by age, work experience, and occupational status, then residual variations in remittance incidence and amounts that are explained by (high) educational attainment may be repayments for past investments made by the origin household.

Type of visa is intended to account for how secure the worker's status is in the host country and therefore the size, variability, and duration of her income stream. As pointed out in Menjivar et al. (1998), an immigrant visa may reflect a different motive as well: Instead of sending remittances, the migrant may want to save up to bring family members to the host country.<sup>15</sup>

Dummy variables on the living standard and geographic location of the host country are intended to control for differences in wages, cost of living, and the efficiency of remittance infrastructure.

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<sup>13</sup> Relationship to the household head may also be an indication of relative bargaining powers. A household head or his spouse may have more bargaining power than a son or daughter, while an in-law may have less.

<sup>14</sup> Because high schools and colleges are located in cities, it is customary for urban-based Filipino families to house rural-based relatives past their primary schooling years.

<sup>15</sup> In our taxonomic scheme, this may be classified under the investment motive, except that resources are saved to cover future migration costs instead of remitted to the origin household.

Household labor income comprises income from wages and salaries as well as profits from entrepreneurial activities. The hypotheses on this variable are as follows: Household labor income is negatively correlated with remittance incidence in the altruistic and insurance motives—in the latter because poor households are less able to finance insurance-motivated migrations. On the other hand, the correlation is lower among poor and rich households compared to middle-class households in the investment motive, because both poor and rich households have lower investment-motivated migrations. In relation to remittance amounts, household labor income is negatively correlated in the altruistic, insurance, and investment motives (because lower income is associated with negative income shock in the insurance motive and implies a greater burden for the worker to contribute in the investment motive), and either positively or negatively correlated in the exchange motive, depending on how consumption and services rendered are related in household preferences.

Household asset income includes income from all sources other than compensation and entrepreneurial profit. It is supposed to take account of the inheritance motive.

Gender of the household head is meant to account for the dependency of the household as well as the depth of the emotional bonds between the worker and the household. The conventional wisdom is that male-headed households are less dependent on the overseas worker, because male heads have more extensive networks. Whether for this reason or independently, it is also claimed that members of female-headed households are more closely knit. In addition, it may be generally the case that, in Filipino families, the emotional bonds of sons and daughters have with the mother are stronger than those with the father.

Age in years of the household head is a measure of how established the household is. Like asset income, it is also supposed to account for the inheritance motive, since the older the household head is, the sooner bequests are likely to be made.

Household age composition variables control for household size as well as the dependency burden. For a given number of household members in the 25 years and older group, the more members are in the 14 years and younger or the 15 to 24 year old group, the heavier is the burden on each adult in the oldest age group. In addition, the numbers of household members in each age group may be correlated with the exchange motive. A common practice among Filipino families is for a young child to be informally adopted by an unmarried or widowed aunt or uncle or by an older sibling in the sense that the extra-ordinary needs of the child are borne by the secondary parent. In the case of the unmarried aunt or uncle, the burden is usually assumed in exchange for an implicit promise that the child will take care of her or him in old age; in the case of older siblings, the obligation is usually in payment for investments made by the parents in the human capital of the older child.<sup>16</sup> For the oldest age group, the exchange contract may be in terms of taking care of the migrant worker's assets and properties and other concerns.

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<sup>16</sup> In terms of our taxonomic scheme, it can be argued that both cases fall under the exchange motive, since transfers are made for the upkeep of the child. Note, however, that, in the case of the aunt or uncle, two implicit contracts are operative: one between the aunt or uncle and the child's parents, which is the exchange motive, and another between the aunt or uncle and the child for future care. The requirement of the first contract is that the financial support must redound to the benefit of the child, since the aunt's or uncle's fate in old age is tied to the child's socioeconomic status in adulthood. For this reason, these remittances are usually earmarked for verifiable expenditures that enhance socioeconomic success, such as school tuition and textbooks. The terms of the second contract, however, are nebulous, because fraught with uncertainty. Consequently, the aunt or uncle tries to become a secondary parent, showering the child with gifts to strengthen emotional bonds and deepen debts of gratitude. In the case of the older sibling, it may be said that remittances are due to the investment motive as well, with the care of a younger sibling simply being used by the parents as the ostensible reason for an older child to repay the investments made in him or her.

Dummy variables on the location of residence of the origin household are intended to account for location-specific effects, such as differences in environmental conditions, in general, and differences in remittance infrastructures and costs of living, in particular. Compared to the National Capital Region (NCR), CALABARZON, MIMAROPA,<sup>17</sup> and Central Luzon, for instance, other parts of the country may be less progressive, developed, or integrated with the market economy. Moreover, it may be more difficult and costly to send remittances to Mindanao Island, at the southern part of the Philippine archipelago. But costs of living may be lower in Mindanao and the rest of Luzon, so that the purchasing power parity of a U.S. dollar may be worth more.

Additionally, a separate hypothesis applies to Mindanao, certain areas of which have suffered intermittently from terrorist attacks as well as skirmishes between the military and Muslim insurgents. Given the variability in income that such an environment implies, the insurance motive predicts more out-migrations and remittance inflows than in other places in the country.

A final issue concerns the sampling distribution of our regression sample. Recall that the data collection procedures of the FIES and SOF are not based on a simple random sampling scheme. Unfortunately, because of the small size of the SOF sample, far too many PSUs had only one observation, which precluded the implementation of design-consistent estimation procedures. To address this problem, we report bootstrap standard errors of estimates of the sample means and structural equation parameters in addition to the more customary standard errors. The bootstrap estimates assume that our data are independently and identically distributed (which we believe is reasonable enough), but comes from an unknown distribution.

Descriptive statistics of the variables are presented in Tables 2a, 2b, and 2c. Table 2a reports the estimates for the entire sample, Table 2b for the subsample with overseas workers who are household heads or spouses of heads, and Table 2c for the subsample with overseas workers who are neither household heads nor spouses of household heads.

#### 4. Empirical Findings

Since remittance motives may roughly correspond to the stations that overseas workers occupy in their origin households, we present results for three groups of worker-household pairs: the entire sample, the subsample consisting of overseas workers who are either heads or spouses of heads, and the subsample of overseas workers who are neither heads nor spouses of heads. Our reasoning behind this strategy is that heads and heads' spouses are more likely to be motivated only by altruistic and exchange considerations. Moreover, their altruistic concerns are likely to dominate, which leaves them with low bargaining power relative to the household. In contrast, the remittance behavior of workers who are neither heads nor heads' spouses is apt to be explained by the insurance, investment, and inheritance motives as well. As secondary breadwinners, they may also be more strategic in their remittance behavior, e.g., in how their transfers advance their interests in the household.

To avoid having to make long-winded references to our samples, in the subsequent discussion we refer to the entire sample as the first sample, the sample consisting of overseas workers who are either heads or spouses of heads as the second sample, and the sample consisting of overseas workers who are neither heads nor spouses of heads as the third sample.

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<sup>17</sup> In 2002, the old Southern Tagalog Region of Luzon Island was divided into two: CALABARZON and MIMAROPA. CALABARZON includes Cavite, Laguna, Batangas, Rizal, and Quezon Provinces, while MIMAROPA consists of Occidental and Oriental Mindoro, Marinduque, Romblon, and Palawan.

*Is household labor income endogenous (in the remittance selection and amounts equations)?*

Recall from Section 2 that the structural model that is to be estimated depends on whether or not household labor income is an endogenous explanatory variable in the remittance selection and amounts equations. As emphasized in Wooldridge (2002), to establish endogeneity, it is not enough to simply show that the predicted residual  $\hat{v}$  is statistically significant in (7) and (8). More importantly, it must be demonstrated that the key identification condition of instrumental variables (IV) estimation is satisfied, which requires that in (3) the instruments  $\mathbf{z}_1$  do capture residual variations in household labor income even after the influences of the other explanatory variables in the structural model are accounted for.

Table 3 presents the crucial parts of our endogeneity tests, which are excerpted from the full results given in Appendix Tables 1a, 1b, and 1c. The second column of Table 3 shows the coefficient estimates of tropical cyclone occurrences in the locality and the provincial employment rate, our identifying instrumental variables. The third and fifth columns give the coefficient estimates of the predicted residual in the remittance selection equation (8), while the fourth and sixth columns show the coefficient estimates of the same residual in the remittance amount equation (7). The difference between columns 3 and 4, on the one hand, and columns 5 and 6, on the other, is that the numbers reported in the former are obtained by Heckman's two-step procedure, while the those in the latter are derived by maximum likelihood.

Looking first at column 2, notice that the estimated coefficient of weather disturbances is negative and significant in all three samples, while that of the provincial employment rate is negative but clearly significant only in the first sample. That at least one of the identifying instrumental variables is found to explain the residual variation in the (log of) household labor income means that the key identifying condition of IV estimation is satisfied.

The negative coefficient of tropical cyclone occurrences is as may be expected, but a question may be raised about whether a negatively-signed employment rate coefficient is reasonable. Given that (3) is a linear projection or a reduced-form specification, caution must be taken in interpreting and making too much of the results. This said, we argue that a negative partial correlation is plausible. After all, the correlation between the provincial mean of household labor incomes (calculated from the FIES) and provincial employment rates (from the LFS) is also negative ( $-0.1818$ ). Why this is so, however, remains to be explored. A plausible story is that, because of the promise of continuous employment that they offer, progressive or rapidly urbanizing areas may be acting as magnets of domestic in-migration, thus making labor markets in these areas more competitive and wage rates low or downward flexible. In contrast, rural and more traditional locales may have institutional rigidities that keep employment rates relatively lower and expected household labor income somewhat higher, though more variable and seasonal.<sup>18</sup>

Turning to columns 3 and 5 as well as columns 4 and 7, observe that the coefficient estimates of the predicted residual of (3) are not statistically significant in both the remittance selection and the remittance amount equations—for the first and second samples. These asymptotic  $z$ -statistics, however, only individually test the simple null hypothesis that one or the other coefficient of the predicted error is not different from zero. For completeness, we also perform a likelihood ratio test on the composite null hypothesis that the two coefficients are jointly equal to zero. The  $LR$  statistic turns out to be 1.043 for the first sample and 0.7636 for the second sample. Thus, in both cases the

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<sup>18</sup> This argument is consistent with the domestic-migration hypothesis of Fabella (undated), which extends the Harris-Todaro model of rural-to-urban migration and provides indirect evidence that the pattern of internal migration in the Philippines reflects the migrants' preference for low but steady urban wage income over a higher level of expected income in rural areas but which has a larger variance.

null hypothesis cannot be rejected at level of significance  $\alpha \leq 0.1$ , and we conclude that household labor income is exogenous in both remittance equations, which implies that the structural model consists of (1) and (2), a standard Heckman selection model.

In the third sample, however, note that the predicted residual term of the labor income equation is found to be statistically significant in the remittance selection equation as estimated by Heckman's two-step procedure and in the remittance amounts equation as estimated by maximum likelihood. Moreover, the likelihood ratio test statistic on the null hypothesis that the coefficients of the predicted error are not different from zero in the two equations turns out to be 5.358. This rejects the null hypothesis at level of significance  $\alpha = 0.1$ , which implies that household labor income is an endogenous explanatory variable.

What accounts for the difference in the findings on household income? We surmise that, because heads and heads' spouses tend to be the primary breadwinners in their origin households (and may be more altruistic toward the household), they have lower bargaining power, so that the household's opportunity cost counts for less in the exchange motive. Moreover, they may not care very much about whether household income is tainted with moral hazard due to unobserved effort. Indeed, for overseas workers who are heads or spouses of heads, household income may not be significant in the remittance selection and amounts equations—to the extent that altruism is the dominant motive. In contrast, overseas workers who are neither heads nor spouses of heads (and who may be dealing not so much with parents but with siblings, in-laws, and nephews and nieces) may be more sensitive about the omitted variable effect of luck in the correlation between household income and opportunity cost. Furthermore, they may have more qualms about the extent to which household income is influenced by the unobserved effort of household members.

In any case, to deal with the endogeneity of household labor income in the remittance selection equation, we apply the instrumental variable probit procedure on (9). To address the same problem in the remittance amount equation, we estimate the parameters of the log-likelihood function given in (11).

#### *What factors affect remittance incidence?*

Tables 4a, 4b, and 4c report the parameter estimates of the structural model for the first, second, and third samples, respectively. Since household income is found to be exogenous in the first two samples, the estimates reported in Tables 4a and 4b are based on (1) and (2) and estimated by Heckman's two-step procedure and maximum likelihood. In contrast, since household income is found to be endogenous in the third sample, the estimates reported in Table 4c are based on (9) and (10), with, as mentioned above, (9) estimated as an instrumental variable probit model and (10) estimated by maximum likelihood using the log-likelihood function (11) as the objective function.

What is readily observed from the tables is that, in each sample, the probability of remittance incidence and the natural logarithm of remittance amounts are explained by different sets of factors (which validates our strategy not to specify the structural equations as a Tobit model). Thus, in what follows, we discuss the results of each equation in turn.

Who in the given pool of migrant workers remit and which households receive these remittances? Our results indicate that the personal attribute variables (of the overseas worker) that exert a significant influence are being married in the second sample and being male in the third sample. Relative to the base profiles<sup>19</sup> against which the results are compared, being married increases the

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<sup>19</sup> These base profiles are as follows: In the first and second samples, the overseas worker is a 40-year old wife of a 50-year old household head. A college graduate who last left the country 30 months prior to the SOF



likelihood of remittances in the first sample by 3.8 percentage points, while being male decreases it in the second sample by 9.7 percentage points.<sup>20</sup> In the second sample, being married may indicate either closer ties to the household or lower bargaining power for the overseas worker since, whatever may be the agreed upon terms of the implicit exchange contract, her spouse or dependents may be able to exercise moral suasion over her. In the third sample, being male may reflect a lower attachment to the household, since (with the exception of those who already are household heads and who thus are not in this sample), unmarried men are expected to eventually form their own households.

Among the (highest) educational attainment variables, only attended high school is found to be statistically significant in the first and second samples, whereas only being a grade school graduate is found to be statistically insignificant in the third sample. Why, compared to being a college graduate, attending but not graduating from high school is the only educational attainment variable that exerts a negative and significant effect in the first and second samples and why being a grade school graduate is the only educational attainment variable that does not exert a statistically different effect in the third sample are difficult to explain. Easier to justify are the converse results that the educational attainment variables generally are not significant in the first two samples and are significant in the third sample: Remittance incidence may be less correlated with the overseas worker's income or earning potential (which is proxied by the educational attainment variables) the more the household's subsistence depends on the worker's remittances. In other words, the likelihood of remittances may have less to do with the worker's income and more to do with the recipient household's needs when the overseas worker is the primary breadwinner. Conversely, remittance incidence may have more to do with the worker's income and less to do with the recipient household's subsistence needs when the overseas worker is a secondary breadwinner (possibly because of the investment and inheritance motives). And note that this explains as well why the coefficients of the educational attainment variables in the first two samples do not have the generally declining pattern that they show in the third sample: Being primary breadwinners, heads and heads' spouses are expected to remit on a regular basis; being secondary breadwinners, other overseas workers are expected to remit on the basis of their income, which is proxied by the education variables. On the marginal effects of education on the likelihood of remittances for the third sample, compared to the base profile in general and being a college graduate in particular, these turn out to be 48.1 percentage points lower when the worker has only attended grade school, 28.7 percentage points lower when she has only attended high school, 19.3 percentage points lower when she has a high school diploma, 20.7 percentage points lower when she has only attended a post-secondary (vocational) program,<sup>21</sup> and 12.8 percentage points lower when she has only attended college.

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survey and who also has 30 months of work experience abroad, she is in a high-income country in the Asia and Pacific region, categorized as an unskilled worker. Located in the environs of the National Capital Region, her origin household earns P80,000 a year in labor income and P3,000 in asset income, has a household member younger than 15 years, another between 15 and 24 years old, and two members who are older. In the third sample, the only difference is that the overseas worker is a 40-year old daughter-in-law.

<sup>20</sup> We calculate the marginal effects of a dummy variable as  $\Phi(b + \mathbf{bx}^0) - \Phi(\mathbf{bx}^0)$ , where  $\Phi(\cdot)$  is the standard normal distribution function,  $b$  is the coefficient estimate of the dummy variable,  $\mathbf{b}$  is the vector of coefficient estimates, and  $\mathbf{x}^0$  is the profile of our reference person and her recipient household.

<sup>21</sup> The larger marginal effect (in absolute terms) of post-secondary school attendance relative to that of a high school diploma may be due to small number of workers who report attending in a post-secondary school program as their highest attainment. Note that the standard error of the coefficient estimate of post-secondary school attendance is larger than that of being a high school graduate, which implies that the former coefficient is estimated less precisely.

A second proxy variable of the worker's income or earning potential, work experience abroad turns out to be significant only in the first sample and then only with Heckman's two-step procedure. Its marginal effect on the likelihood of remittances is measured to be small—about half a percentage point per month. It may be that work experience reflects residual variations in the probability of remittances that are due to income variations that are not captured by the educational attainment variables—an effect that is more relevant for the third sample. But it is not found to be statistically significant in the third sample, perhaps because of the small sample size, which causes the coefficient estimates to be measured less precisely.

Like work experience, the number of months since the worker last left the country, which is a measure of her (waning) attachment to the recipient household, is found to be significant only in the first sample. Again, this may be because the variable is really germane for the third sample, but the size of that sample is too small for the effect to be measured precisely there. In other words, the variable may be less applicable to overseas workers in the second sample, whose attachment to the origin household can be expected not to weaken (or not to weaken as fast). Unlike work experience, this emotional attachment variable is indicated to exert a quadratic marginal effect on remittance probability that increases at a decreasing rate. At 30 months, its marginal effect on the likelihood of remitting is calculated to be about 0.7 percentage points.

Yet another result that is found only for the first sample is that, when the worker has a nonworking and non-immigrant visa, she is 22.5 to 23.5 percentage points less likely to remit compared to the base profile. This may be due to the worker's poor income or earning potential because of her less stable status or to the higher cost of remitting, for instance because doing so using formal channels requires divulging personal information that the worker would rather keep secret.

The sets of dummy variables on the worker's occupation in the host country and the classification of the host country in terms of per capita income and geographic location do not show robust results across the three samples. The sense the results provide is that there are too many categories for the sample sizes. But then, with Filipino overseas workers being deployed everywhere in the world and practicing so many occupations, it is difficult to find the classification schemes for occupations and host countries that strike the right balance with the sample size.

Turning to the recipient household variables, notice that household labor income is found to be negative and significant in the first and third samples, but not in the second. These results are consistent with our earlier interpretation of the outcomes on the endogeneity of this variable. Only the remittance incidence of overseas workers who are the secondary breadwinners of their origin households reacts to household labor income, because only for these workers is the labor income of the recipient household a strategic variable of remittance behavior. As for the negative sign of household labor income, this is consistent with the altruistic and insurance motives. Compared to the base profile, a ten thousand peso increase in household labor income is calculated to reduce the likelihood of receiving remittances by about 0.5 and 3.0 percentage points in the first and third samples, respectively.

Intended to negatively account for the dependency of the household or the sense of closeness of household members, male headship is supposed to be more relevant for the third sample. Instead, it is found to be negative and significant only in the first two samples, reducing the likelihood of observing remittances by 7.6 to 8.2 percentage points in the first sample and 13.1 to 13.3 percentage points in the second sample (compared to the base profiles). Hence, it cannot be inferred that, among secondary breadwinners, remittance incidence is higher in female-headed households. But why would remittance incidence be higher for female-headed households when the overseas worker is either the head or the spouse of the head? This may be because male headship is highly correlated with the existence of a spouse or partner who is also a primary breadwinner in

the origin household and who shares the household's dependency burden. In contrast, a female-headed household may be associated with an unmarried head, on whom the household is more dependent for its subsistence.

On the age composition of household members, it turns out that only the number of household members who are between 15 and 24 years old is statistically significant in the first sample and then only with Heckman's two-step estimator, whereas only the number of household members younger than 15 years old is not statistically significant in the third sample. What these results may be suggesting is as follows: For overseas workers who are the primary breadwinners, the need for their remittances may be greatest when household members are between 15 and 24 years old, which is the age span during which a person graduates from high school, attends and graduates from college, and begins a fledgling career.<sup>22</sup> In contrast, for overseas workers who are secondary breadwinners, remittances may have to do more with payment for services rendered, insurance payoffs, returns to the household for investing in the worker's relocation, and the worker's investment in inheritance. Indeed, the exchange motive would be consistent with positive coefficients for household members who are between 15 and 24 years old and who are 25 years and older, while the other motives would be consistent with a positive coefficient for the latter group only. If so, the marginal effect of the older group of household members would be larger in the third sample, while that of the 15 to 24 year old group would be larger in the first sample (which "averages" the effects over the two subsamples)—as in fact they are: Compared to the base profile, the likelihood of observing remittances in the first sample increases by 1.7 percentage points when one more member between 15 and 24 years old is added to the household (while the other age groups do not have a marginal effect, since their coefficients are not statistically different from zero). In the third sample, the probability increases by 4.2 percentage points when one more person is added to the 15 and 24 year old age group, and by 9.0 percentage points when the person is 25 years or older.

Finally, remittance incidence is reported to be affected by the geographic location of the recipient household only in the third sample. Again, the reason may be that only for secondary breadwinners do the monetary and non-monetary costs of remitting matter. By necessity, primary breadwinners have to work through the difficulties, since their recipient households are more dependent on their remittances. For the third sample, the marginal effects of being located in the Visayas and in Mindanao are calculated to be, respectively, 20.7 and 27.4 percentage points lower than the base profile.

#### *What factors affect remittance amounts?*

Before making sense of the estimation results, notice first that, in the third sample, none of the explanatory variables is estimated to have a statistically significant coefficient. This is because, having virtually the same set of explanatory variables, the reduced-form household labor income equation introduces collinearity problems that increase the standard errors of the coefficient estimates in the remittance amount equation. Hence, in the discussion that follows, we need only consider the coefficient estimates of the remittance amounts equations in the first and second samples.

What are the determinants of (the natural logarithm of) remittance amounts? In the first sample, the personal attribute variables (of the overseas worker) that turn out to have statistically

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<sup>22</sup> Note that this interpretation is consistent with the result that, for the second sample, only the coefficient of household members who are between 15 and 24 years old is positive in the probit model. Those of household members who are younger than 15 years or older than 24 years are negative. Again, small sample size may be the reason for the non-significance of the coefficient estimates.

significant coefficient estimates are being an extended relative or even a non-relation and being male. Compared to a son or daughter of the household head, a worker who is not a close relation remits 53 percent less, on average, to her recipient household. Compared to a female counterpart, a male worker sends 16 percent more. The negative effect of the former variable may be due to the worker's being less attached to the household, while the positive effect of the latter variable may be due to the higher earning capacities of men or to gender wage differentials favoring men in the host countries of the overseas workers.

In the case of the second sample, the attributes that are statistically significant are being male and married. Compared to female peers (who in this sample would tend to be spouses of heads), male workers (who would tend to be household heads) remit 23 percent more, which is a higher percentage than that of male workers in the first sample. Possibly, this is because male household heads tend to be *the* primary breadwinners in their recipient households. Compared to an unmarried household head, a married head or spouse remits between 62 and 71 percent more. This may be because having a partner left behind in the origin household lowers the effective bargaining power of the overseas worker. Alternatively, being married may be associated with greater attachment to the recipient household.

Unlike in the remittance selection equation, the educational attainment variables are generally statistically significant in the first and second samples. Moreover, the extent of attainment is more or less positively related to amounts remitted. In the first sample, compared to a colleague who graduated from college, a worker who only attended grade school remits at least 58 percent less, one who only finished grade school 56 percent less, one who only attended high school 32 percent less, one who graduated from high school 31 percent less, and one who did not graduate from college 20 percent less. In the second sample, the marginal effects are quite similar: 63 percent less for a worker who did not finish grade school, 67 percent less for one who did, 30 percent less for one who either only attended or graduated from high school, and 23 percent for one who only attended college. Thus, unlike remittance incidence, remittance amounts are highly (partially) correlated with educational attainment (or the worker's income or earning potential). But the reason for the overseas worker's education's lack of correlation with the first dependent variable and its high correlation with the second dependent variable may be the same: the great degree of dependence of the recipient household on remittances from its primary workers. Since the origin household cannot have invested in the education of its head or its head's spouse (which invalidates the investment motive), the positive (partial) correlation of education with remittance amount may be attributed to the altruistic motive.

Work experience abroad, another proxy variable of the worker's income or earning potential, is estimated to exert a positive linear effect in the first sample and a quadratic effect in the second sample. Specifically, in the first sample, each month of work experience increases amounts remitted by one percent, while in the second sample, the marginal effect of work experience at 30 months is only 1.3 percent. This difference in the magnitudes of the marginal effects notwithstanding, the result remains that proxy variables of the worker's income are positively correlated with remittance amounts, as predicted by the altruistic motive. Moreover, to the extent that education and work experience really measure the worker's income, the results may also be consistent with the exchange motive, under the further assumption that heads and spouses of heads have low bargaining power relative to their households of origin.

The length of time since the worker last left the country is estimated in the second sample to have a quadratic effect that peaks at around 49 months. In effect, after about four years, the attachment even of the head or the head's spouse to the recipient household—as measured by the remittance amounts he or she sends—starts to wane. Nonetheless, the fact that this emotional-attachment variable is found to have a statistically significant quadratic effect implies that the remittance

behavior of heads and heads' spouses is consistent with the altruistic motive. At 30 months, the marginal effect of this duration variable is to increase the remittances of a household head or a head's spouse by 1.3 to 1.6 percent.

Type of work in the host country is reported to exert effects on amounts remitted that generally seem consistent with the expected earning power of the occupation. In the first sample, compared to unskilled workers, business managers tend to remit 58 percent more, professionals 31 percent more, technicians 40 percent more, service or sales workers 23 percent more, tradesmen 16 percent more, and machine operators 24 percent more. In the second sample, compared to unskilled workers, managers remit at least 67 percent more and technicians 32 percent more, while remittances from service workers, tradesmen, and plant operators are 23 percent, 22 percent, and 29 percent higher, respectively.

The host-country dummy variables exhibit rather surprising effects. In the first sample, workers in upper middle-income and other-income countries remit 17 percent and 57 percent more, respectively, compared to their peers in high-income countries. And relative to workers based in East Asia, South Asia, Australia, or Guam, those in Africa or Eastern or Central Europe remit 40 percent more, those in America or Western Europe remit 30 percent more, while those in the Middle East 24 percent less. In the second sample, relative to workers based in South or East Asia, those based in the Middle East remit 20 percent less, while those in America or Western Europe send back amounts that are 30 percent higher. These results may reflect the combined influences of the monetary and non-monetary costs of remitting, the availability of saving instruments or opportunities (and stability of financial markets), and "intercept" differences in incomes due to differences in host-country living standards.

Similar to the results in remittance incidence, male headship in the recipient household is found to have a negative and statistically significant effect on remittance amount in the first and second samples. The marginal effect of the variable is estimated to be between -15.5 percent and -16.8 percent in the first sample and -23.2 percent and -25.7 percent in the second. Again, the reason is possibly that, in samples where most overseas workers are either the head or the spouse of the head, female headship may be associated with an unmarried household head, so that the dependency burden of the overseas worker is heavier, hence the larger remittances.

Of the age-composition-of-household-membership variables, only the number of members who are 25 years or older is found not to be statistically significant in the first two samples. In the first sample, each member who is 14 years or younger is estimated to increase remittances by 7.6 to 7.8 percent, whereas each member who is between 15 and 24 years old is reported to do so by 6.6 to 6.7 percent. In the second sample, the marginal effects are 5.3 to 5.4 percent and 6.1 to 6.5 percent, respectively. It may thus be inferred that remittances are intended for the dependent members of the household. Notice, though, that the marginal effects of the 15 to 24 year old group in the two samples are more or less equal, whereas, in the 14 years and younger group, the first sample is measured to have a higher marginal effect. This may be because the remittances of secondary breadwinners (i.e., older siblings, uncles, or aunts) may be directed more toward the younger household members (as described in footnote 16).

Finally, on the geographic location of the recipient household, the results indicate the following: In the first sample, compared to residents of NCR and the contiguous regions of CALABARZON, MIMAROPA, and Central Luzon, the remittance receipts of households in the rest of Luzon are 20 percent lower, while those of households in Mindanao are 50 percent lower. In the second sample, compared to the same base, households in Mindanao are estimated to receive 28 percent less. The lower receipts of households outside of NCR and its neighboring regions may reflect higher remittance costs. That remittances to Mindanao and the rest of Luzon are much lower when the

sample of overseas workers includes secondary breadwinners is consistent with this reason: Driven by the altruistic motive, overseas workers who are primary breadwinners and on whose remittances the subsistence of their recipient households depends are less responsive to remittance costs than overseas workers who may just be supplementary income earners.

*What do the error covariances mean?*

The final interesting results concern the estimated error covariances of the structural models. Note that, in Table 3c,  $\rho_{\varepsilon v}$  is estimated to be positive (at 0.81) and statistically significant. This means that, for the third sample, the error terms of the probit (remittance selection) and the (endogenous) household labor income equations are highly positively correlated. In other words, unobserved factors that increase household income also increase the likelihood of remittance. What this result possibly implies is that remittance arrangements between the migrant worker and the recipient household are incentive compatible, so that variables unobserved by researchers, such as the intensity of job search or of turning an additional buck, which potentially increase household labor income are rewarded with higher remittance incidence.

Note, too, that, in Table 3a,  $\sigma_{\varepsilon u}$  and  $\rho_{\varepsilon u}$  are both estimated to be negative (-0.74 and -0.67, respectively) and statistically significant, and in Table 3c,  $\sigma_{1\pi 2}$  is estimated to be negative (-3.89) and significant as well.  $\sigma_{\varepsilon u}$  and  $\sigma_{1\pi 2}$  are the covariances and  $\rho_{\varepsilon u}$  the correlation between the error terms of the probit (remittance selection) and remittance amounts equations. That they are negative in the first and third samples implies unobserved factors that increase the likelihood of remitting also decrease the natural logarithm of amounts remitted, so that, in terms of (1) and (2),  $E(y_1 | \mathbf{x}, y_3) > E(y_1 | \mathbf{x}, y_3, y_2 = 1)$ , i.e., on average, the natural logarithm of amounts remitted in a random sample of overseas workers and their recipient households would be greater than in one where worker-household pairs are able to choose whether or not to be in the remitting sample. We conjecture that this result reflects Filipino giving practices, in which the social obligation is to give, but to do so in modest amounts.

## 5. Giving Norms

The insight that remittances are set in the context of norms on giving has not been explored in the literature. But there have certainly been hints on it. In the inheritance motive, for instance, parents are thought to judge the remittance behaviors of sons and daughters against certain norms. Ultimately favored with bequests are those whose transfers exceed the norms.

But why should remittances in general be circumscribed by norms on giving? As has been pointed out, remittances are not anonymous transfers, behavior on which can be parsimoniously described by incomes, prices, or costs. Rather, they are manifestations of underlying and possibly multidimensional relationships between the overseas worker and the recipient household. Behavior then must be bound not only by market signals or even by participation- and incentive-compatible contractual rules implied by principal-agent models, but also by more general rules of the community on how to relate with others and particularly with members of the family.

A problem in exploring norms (in remittance behavior), however, is that, since more or less everyone adheres to them, their effects are unlikely to be correlated with the observed characteristics of workers and households, and so will remain in the error terms. Consequently, only in estimates of error covariances of structural models are hints of their effects liable to be obtained—as we believe we have in this paper.

Why do we think that the negative covariance or correlation of the error terms of our selection and amounts equations captures the influence on remittances of Filipino giving norms? There is the

evidence on contemporary giving practices. Drawing on a survey on Filipino giving and volunteering behaviors conducted in 1999 to 2000, Fernan (2002) reports that, despite dismal economic conditions due to the 1997 Asian financial crisis, 86 percent of the respondent households still claimed to have given to an organization during the reference period of the survey (i.e., the past 12 months prior to the interview) and 74 percent of them stated that they gave directly to persons in need—both of which compare favorably with the U.S. giving incidence of 75 percent that Fernan cites from Hodgkinson and Weitzman (1996). Amounts given, however, were quite small. Average giving per household was P2,100 (US\$41), P1,214 (US\$24) of which were given directly to persons in need and P893 (US\$18) of which were given to organizations. Relative to average household income, average giving per household amounted to only 1.8 percent.

Similar behavior may also be gleaned from the 2003 FIES data. While 76.5 percent (12.6 million of 16.5 million) of Filipino households claimed to have given to gifts and contributions to others, the average proportion of these gifts and contributions to total consumption expenditure amounted to only 1.0 percent. Indeed, for the richest expenditure quintile, the average of this ratio was only 1.8 percent.

Why do Filipinos give indiscriminately but in small amounts? We conjecture that these practices must be based on social norms, as defined in Fehr and Gächter (2000), which emerge from considerations of reciprocity. Peterson (1993) provides accounts of how poor Filipino families are able to cope and materially prosper by drawing on the resources of a wide network blood and affinal relations. A distinctive aspect of the strategies that the family network uses is that, when in need, a family is not necessarily assisted by clan members it has specifically helped in the past, but by those who have extra resources at that time—the objective of the assistance apparently being, not so much to repay past kindnesses, as to raise the average welfare of the clan.

What conditions are conducive of such giving practices that eventually become norms? In Appendix II, we provide a simple model that shows that, if the disaster probability is small and incomes during good times are not very much bigger than disaster incomes, a large network and small payoffs characterize the viable insurance scheme.

## 6. Concluding Remarks

The literature on remittances has thus far focused on motives to explain behavior. As non-anonymous transfers, however, remittances are apt to be influenced by giving norms as well. To explore the correlates of remittance motives in terms of observed worker and household characteristics as well as the effect on remittances of giving norms, we formulate an empirical specification of remittance selection and amounts that takes account of the various motives involving worker-household pairs. Because household labor income is regarded as a potentially endogenous explanatory variable, we also develop a framework for testing this hypothesis and provide for alternative estimation strategies, depending on test outcomes.

To address the possible heterogeneity of overseas workers with respect to remittance motives, we implement the hypothesis tests and the estimation of the empirical model on three groups of overseas workers and their recipient households: the entire sample, the subsample consisting of overseas workers who are either household heads or spouses of heads, and the subsample consisting of overseas workers who are neither heads nor spouses of heads.

We find that household labor income is endogenous in the third, but not in the second sample. The non-endogeneity of income in the second sample may be because, as the primary breadwinners in their origin households (and possibly being more altruistic toward the household), heads and heads' spouses have lower relative bargaining power, so that the household's opportunity cost

counts for less in the exchange motive. Moreover, heads and heads' spouses may not care very much about whether household income is tainted with moral hazard due to unobserved effort. In contrast, the endogeneity of income in the third sample may indicate that overseas workers who tend not to be the primary breadwinners in their origin households may be more sensitive about the omitted variable effect of luck in the correlation between household income and opportunity costs. Moreover, they may be concerned about whether household income is tainted by moral hazard from the unobserved effort of household members.

We also find that remittance incidence and amounts are explained by different factors. Moreover, in the second sample, altruism seems to dominate the exchange motive, perhaps because the household's subsistence depends on the worker's remittances to a greater degree. As a consequence, however, the overseas worker has low bargaining power and remittances are positively correlated with her income. This is evidenced by the following: First, very few explanatory variables are found to be statistically significant in the remittance selection equation. In other words, the likelihood of remittance is not systematically (partially) correlated with the explanatory variables, because almost all heads and heads' spouses remit. Second, household labor income is not statistically significant in both the probit and remittance amounts equations, which indicates that heads and heads' spouses do not predicate their remittance behavior on household labor income. Third, what apparently matters more for heads and heads' spouses are, on the one hand, the needs of the young household members, as reflected by the number of members 14 years and younger and the number of members between 15 and 24 years old—the first of which is statistically significant in the remittance amount equation and the second of which is statistically significant in both equations, and, on the other, their capability to send remittances as reflected in proxy variables of income, such as education, work experience, and occupation.

In contrast, the remittance behavior of the third sample seems more strategic. First, when overseas workers who are neither heads nor spouses of heads are included in the sample, household income is found to be negative and statistically significant, which is consistent with the altruistic and insurance motives. Second, remittance incidence is correlated with educational attainment, which suggests that the frequency with which overseas workers who are neither heads nor spouses of heads are expected to remit depends on their ability to earn incomes. Third, the number of "adult" household members is found to have a significant effect on the likelihood of remittances, which may be interpreted as evidence of the exchange motive. Fourth, the likelihood of remittances is sensitive to cost, as reflected by the location of household residence variable. Fifth, the covariance of the error terms of the household income and probit equations is estimated to be positive and significant, which may be taken to imply that incentive-compatible mechanisms are in place that reward efforts to increase household income with a higher likelihood of receiving remittances.

Finally, we also find that the covariance of the error terms of the probit and remittance amounts equations is negative and statistically significant in the first and third samples. This implies that the remittance behavior of overseas workers who are neither heads nor spouses of heads is afflicted with negative selectivity. We interpret this result as reflecting the effect of giving norms, and we show evidence that it is consistent with Filipino charitable-giving practices.

The policy implications of these findings are as follows: First, to the extent that altruism dominates in the remittance behavior of heads and spouses of heads and altruism and the insurance motive explain the behavior of the other overseas workers, a negative shock to the Philippine economy will be met by larger remittance inflows. (The remittance effect of a worldwide economic slump, however, are another matter. In the altruistic motive, transfers will adjust to maintain the equality at the new (lower) income levels of the ratio of marginal felicities to the ratio of reduced-form preference weights. In the exchange motive, transfers will depend on the effects of the income losses on relative bargaining powers and opportunity costs.) Second, overseas workers have



different cost sensitivities. In particular, those who are not primary breadwinners have higher elasticities, so that remittance inflows can be expected to increase the lower are the transaction costs of remitting. Third, if remittance behavior is consistent with Filipino giving norms, then interventions should focus on increasing average remittance amounts (e.g., by imposing a minimum amount requirement or setting a declining tax rate or transaction fee on transfers).

**Table 1. Remittance Motives, Predictions, and Variables**

Motive	Implications	Variables
<p><b>Altruism</b></p> <p>Remittance behavior reflects the degree of relative care that the worker and the origin household have for each other.</p> <p>The worker uses remittances to adjust her and the household's consumption levels such that, at the last currency unit transferred, the ratio of her and the household's marginal felicities of consumption is exactly matched by the ratio of her reduced-form preference weights for the household and for herself.</p>	<p>Remittance amounts</p> <ul style="list-style-type: none"> <li>• are positively correlated with the migrant worker's pre-transfer income and earning potential.</li> <li>• are negatively correlated with the recipient household's pre-transfer income.</li> <li>• decline over time as the worker's sense of closeness to the household wanes.</li> </ul> <p>A one-dollar increase in the migrant worker's pre-transfer income coupled with a one-dollar decline in the recipient household's pre-transfer income is predicted to increase transfers by one dollar. In effect, remittances insulate consumption from income shocks, so that consumption expenditures and pre-transfer incomes of migrant workers and recipient households are statistically independent.</p> <p>Remittance incidence is negatively correlated with the household's pre-transfer income, since there is less need for transfers as the recipient household's income rises. This implies that remittance incidence and amounts are positively correlated.</p>	<ul style="list-style-type: none"> <li>• worker's pre-transfer income</li> <li>• proxy measures of the worker's earning potential</li> <li>• recipient household's pre-transfer income</li> <li>• duration since the worker's last visit</li> <li>• proxy variables on sense of closeness between worker and recipient household</li> </ul>
<p><b>Exchange</b></p> <p>Remittances are contractual payments for services rendered by the recipient household to the migrant worker.</p> <p>Remittances (and other terms) of</p>	<p>Remittance amounts increase with the diversity or range, quantity, intensity, and quality of contracted services.</p> <p>Remittances are observed only for the duration of the contract. The transfers stop altogether once the contract expires or is terminated.</p> <p>Being the outcomes of contractual terms, remittance incidence and</p>	<ul style="list-style-type: none"> <li>• correlates of services undertaken for the migrant</li> <li>• worker's pre-transfer income (endogenous)*</li> </ul>

\* If relative bargaining powers and the notional remittance ceiling are correlated only with the worker's pre-transfer income (and its correlates), but not with the other regressors, then the bias toward zero of the coefficient of the worker's income (or its correlates) in the remittance amounts equation may be an indication that the exchange hypothesis cannot be rejected.

**Table 1. Remittance Motives, Predictions, and Variables**

<b>Motive</b>	<b>Implications</b>	<b>Variables</b>
<p>an explicit or implicit pay-for-service contract are used to make the divergence of interests between the worker and the household compatible.</p>	<p>amounts show a discernible pattern or cycle over stretches of time. Changes occur only when contractual parameters (such as opportunity costs) change.</p> <p>The recipient household's pre-transfer income has an ambiguous effect on remittance amounts. If the household's level of consumption and the contracted services are</p> <ul style="list-style-type: none"> <li>• independent in preferences, an increase in pre-transfer income induces larger remittance amounts due to the higher opportunity cost to the household of rendering the same set of services to the worker.</li> <li>• complements in preferences (e.g., because working for the worker lends prestige or opens more income-generating opportunities), an increase in pre-transfer income leads to a reduction in remittance amounts.</li> </ul> <p>Changes in general economic and political conditions that affect the recipient household's opportunity costs or relative bargaining power change remittance amounts (but not necessarily remittance incidence or frequency).</p> <p>Relative to remittance amounts, remittance incidence (or frequency) is affected by different considerations (e.g., the household's cash flow, whether it faces liquidity or credit constraints, and the fixed costs associated with remittance incidence versus the marginal cost of each currency unit transferred).</p>	<ul style="list-style-type: none"> <li>• recipient household's pre-transfer income (endogenous if opportunity costs and relative bargaining powers not fully accounted for)</li> <li>• proxy variables on relative bargaining powers of the worker and the recipient household</li> </ul>
<p><b>Insurance (and moral hazard)</b></p> <p>To minimize its overall exposure to spatial income risk, a family diversifies its labor portfolio by strategically locating members in different places such that their incomes are uncorrelated.</p>	<p>If moral hazard is precluded, (just like in the altruistic motive) remittance amounts</p> <ul style="list-style-type: none"> <li>• are positively correlated with the migrant worker's pre-transfer income.</li> <li>• are negatively correlated with the recipient household's pre-transfer income.</li> </ul>	<ul style="list-style-type: none"> <li>• worker's pre-transfer income</li> <li>• recipient household's pre-transfer income (endogenous due to unobserved effort)</li> </ul>

**Table 1. Remittance Motives, Predictions, and Variables**

Motive	Implications	Variables
<p>Remittances are intra-family insurance payoffs for negative income shocks.</p> <p>The problem of “credible commitment” and the need for a second party enforcement mechanism imply that the insurance motive has to be buttressed by other motives (e.g., altruism or inheritance) or by giving norms.</p>	<p>But (unlike in the altruistic motive) remittance amounts are highly variable. Moreover, remittance incidence is intermittent, since remittances occur only when certain conditions hold.</p> <p>Remittances come to an abrupt stop as soon as the worker’s contractual obligations are fulfilled.</p> <p>Remittances to poor households are less likely to be due to the insurance motive because poor households are less able to finance insurance-motivated migrations. This implies that remittance incidence in poor households is lower than in wealthier households.</p>	
<p><b>Investment</b></p> <p>To maximize its wealth (or income), the household uses migration to exploit spatial differences in earning opportunities.</p> <p>The investment motive points out that migration can be a long-term goal involving a series of preparatory activities and decisions, such as choice of school, years of schooling, occupation, career, and work experience.</p> <p>The number of household members who are sent out to migrate depends on the resources of the household to finance such migrations and the net profitability</p>	<p>Remittance incidence</p> <ul style="list-style-type: none"> <li>• is constant and regular, since remittances represent payments to the migrant’s foregone contribution to the family enterprise or income.</li> </ul> <p>Remittance amounts</p> <ul style="list-style-type: none"> <li>• are larger the larger is the pre-transfer income of the migrant and the lower is the pre-transfer income of the household (just like in the altruistic and insurance hypotheses).</li> <li>• increase at a decreasing rate with the number of household members who migrate, so that remittance amounts averaged over migrant household members fall as the number of migrant members increases. (This also means that, holding the number of migrant members fixed, remittance amounts are lower, the larger is the household size.)</li> </ul> <p>If a child’s education is part of an investment-motivated migration financed by the family, the (partial) correlation between remittance</p>	<ul style="list-style-type: none"> <li>• worker’s pre-transfer income</li> <li>• recipient household’s pre-transfer income (endogenous due to unobserved effort)</li> <li>• number of working-age household members</li> <li>• migrant worker’s education</li> <li>• migrant worker’s relationship to head of recipient household</li> </ul>

**Table 1. Remittance Motives, Predictions, and Variables**

<b>Motive</b>	<b>Implications</b>	<b>Variables</b>
<p>of such relocations.</p> <p>Remittances represent returns to migration-as-investment.</p> <p>The problem of “credible commitment” and the need for a second party enforcement mechanism imply that (like the insurance motive) the investment motive has to be buttressed by other motives (e.g., altruism or inheritance) or by giving norms.</p>	<p>amount and education will be higher among sons and daughters than among in-laws and extended relatives.</p> <p>Investment-motivated migrations are likely to be low among the poorest and the richest households, the former because of a binding liquidity constraint and the latter because of the higher profitability of the family enterprise. This implies that remittance incidence in the poorest and richest households will be lower than in middle-class households.</p>	
<p><b>Inheritance</b></p> <p>Migrant workers as sons and daughters use remittances as stakes on inheritance claims; parents use bequests to secure remittances.</p>	<p>Remittance incidence is higher and remittance amounts are larger</p> <ul style="list-style-type: none"> <li>• the higher is the value of household assets not yet bequeathed</li> <li>• the wealthier is the worker</li> <li>• the higher is the likelihood that the worker (as the source of the transfers) would be named the major beneficiary.</li> <li>• the less risky the investment in inheritance is perceived to be compared to other investment opportunities</li> </ul>	<ul style="list-style-type: none"> <li>• recipient household’s assets</li> <li>• correlates of the worker’s wealth</li> <li>• age of the household head</li> <li>• household size</li> <li>• living standard in the host country</li> <li>• relationship between household head and worker</li> </ul>

Table 2a  
Descriptive Statistics of Variables for All Overseas Workers

Variable	All workers					Workers with remittance				
	Mean	Sample St. Error	Boot-strap Std. Error	Min	Max	Mean	Sample St. Error	Boot-strap Std. Error	Min	Max
Remittance indicator ln (Amount remitted)	0.86579	0.341	0.008	0	1	11.17969	2.928	1.028	6.21461	14.57632
<b>Characteristics of overseas worker</b>										
Household head or spouse	0.46555	0.499	0.012	0	1	0.48374	0.500	0.013	0	1
Son or daughter	0.05273	0.224	0.005	0	1	0.04983	0.218	0.006	0	1
Son- or daughter-in-law	0.41642	0.493	0.012	0	1	0.40692	0.491	0.013	0	1
Grandson or granddaughter	0.05812	0.234	0.006	0	1	0.05329	0.225	0.006	0	1
Other relative and non relative	0.00539	0.073	0.002	0	1	0.00484	0.069	0.002	0	1
Male	0.44398	0.497	0.012	0	1	0.45052	0.498	0.013	0	1
Married	0.58598	0.493	0.012	0	1	0.59862	0.490	0.012	0	1
Age in years <sup>a</sup>	35.10365	9.268	0.218	17	84	35.44498	9.257	0.233	17	84
Attended grade school	0.01019	0.100	0.002	0	1	0.00900	0.094	0.002	0	1
Grade school graduate	0.03595	0.186	0.004	0	1	0.03668	0.188	0.005	0	1
Attended high school	0.06171	0.241	0.006	0	1	0.05536	0.229	0.006	0	1
High school graduate	0.27262	0.445	0.011	0	1	0.27682	0.448	0.012	0	1
Attended post-secondary school	0.04254	0.202	0.005	0	1	0.04152	0.200	0.005	0	1
Attended college	0.25285	0.435	0.011	0	1	0.25398	0.435	0.011	0	1
College graduate	0.32355	0.468	0.012	0	1	0.32664	0.469	0.012	0	1
Work experience abroad (in months) <sup>b</sup>	28.79389	18.316	0.448	0	96	29.99723	18.411	0.489	0	96
Last left the country (in months) <sup>b</sup>	43.18814	14.036	0.349	0	59	44.25675	12.951	0.354	0	59
<b>Type of visa</b>										
Immigrant visa	0.02636	0.160	0.004	0	1	0.02768	0.164	0.004	0	1
Working visa	0.95446	0.209	0.005	0	1	0.95848	0.200	0.005	0	1
Other visa	0.01917	0.137	0.003	0	1	0.01384	0.117	0.003	0	1

Table 2a  
Descriptive Statistics of Variables for All Overseas Workers

Variable	All workers					Workers with remittance				
	Mean	Sample St. Error	Boot-strap Std. Error	Min	Max	Mean	Sample St. Error	Boot-strap Std. Error	Min	Max
<b>Kind of work in host country</b>										
Corporate executive, manager, or proprietor	0.02097	0.143	0.004	0	1	0.02076	0.143	0.004	0	1
Professional	0.08328	0.276	0.007	0	1	0.09066	0.287	0.008	0	1
Technician or associate professional	0.08089	0.273	0.006	0	1	0.07543	0.264	0.007	0	1
Clerk	0.03295	0.179	0.004	0	1	0.03114	0.174	0.004	0	1
Service or sales workers	0.10605	0.308	0.007	0	1	0.10727	0.310	0.008	0	1
Farmer, forestry worker, or fisherman	0.00419	0.065	0.002	0	1	0.00346	0.059	0.002	0	1
Tradesman or related worker	0.13960	0.347	0.009	0	1	0.14325	0.350	0.009	0	1
Plant & machine operator or assembler	0.14200	0.349	0.008	0	1	0.14048	0.348	0.009	0	1
Special occupation	0.00479	0.069	0.002	0	1	0.00415	0.064	0.002	0	1
Unskilled worker	0.38526	0.487	0.012	0	1	0.38339	0.486	0.013	0	1
<b>Charateristics of host country</b>										
<i>By income</i>										
High income country	0.65249	0.476	0.011	0	1	0.65398	0.476	0.012	0	1
Low income country	0.00419	0.065	0.002	0	1	0.00415	0.064	0.002	0	1
Lower middle-income country	0.02576	0.158	0.004	0	1	0.02491	0.156	0.004	0	1
Upper middle-income country	0.30377	0.460	0.011	0	1	0.30242	0.459	0.012	0	1
Other income country	0.01378	0.117	0.002	0	1	0.00623	0.079	0.002	0	1
<i>By location</i>										
In the Middle East	0.35470	0.479	0.012	0	1	0.35433	0.478	0.013	0	1
In America and Western Europe	0.17975	0.384	0.009	0	1	0.19031	0.393	0.011	0	1
In South Asia, East Asia, and the Pacific	0.45596	0.498	0.012	0	1	0.44637	0.497	0.013	0	1
In Africa, Eastern and Central Europe	0.00959	0.097	0.002	0	1	0.00900	0.094	0.003	0	1
<b>Characteristics of origin household</b>										
ln (Labor income)	10.30880	1.848	0.044	3.40120	14.30262	10.20753	1.865	0.050	3.40120	14.30262
Asset income	3365.92	27065.760	673.695	0	703000	3055.81	23344.500	611.936	0	703000
Male household head	0.67825	0.467	0.011	0	1	0.65675	0.475	0.012	0	1
Age in years of the household head	50.24086	13.414	0.331	17	95	50.12526	13.484	0.350	17	95

Table 2a  
Descriptive Statistics of Variables for All Overseas Workers

Variable	All workers					Workers with remittance				
	Mean	Sample St. Error	Boot-strap Std. Error	Min	Max	Mean	Sample St. Error	Boot-strap Std. Error	Min	Max
Number of household members 14 years and younger	1.46854	1.346	0.033	0	7	1.47474	1.341	0.034	0	7
Number of household members between 15 and 24 years old	1.10186	1.238	0.030	0	7	1.10934	1.235	0.031	0	7
Number of household members 25 years and older	2.38946	1.268	0.031	1	8	2.33702	1.273	0.033	1	8
Resides in the rest of Luzon	0.28400	0.451	0.012	0	1	0.29619	0.457	0.013	0	1
Resides in the Visayas	0.16177	0.368	0.009	0	1	0.16194	0.369	0.010	0	1
Resides in Mindanao	0.17256	0.378	0.009	0	1	0.16471	0.371	0.010	0	1
Resides in NCR CALABARZON, MIMAROPA, Central Luzon	0.38167	0.486	0.012	0	1	0.37716	0.485	0.013	0	1
Number of observations		1669					1445			



Table 2b  
Descriptive Statistics of Variables for Overseas Workers who are Heads or Spouses of Heads of Households

Variable	All workers					Workers with remittance				
	Mean	Sample St. Error	Boot-strap Std. Error	Min	Max	Mean	Sample St. Error	Boot-strap Std. Error	Min	Max
Remittance indicator ln (Amount remitted)	0.89817	0.303	0.011	0	1	11.47361	1.004	0.038	7.09008	14.57632
<b>Characteristics of overseas worker</b>										
Male	0.55744	0.497	0.018	0	1	0.57267	0.495	0.019	0	1
Married	0.98303	0.129	0.005	0	1	0.98837	0.107	0.004	0	1
Age in years	40.11227	8.153	0.298	22	68	40.18895	8.043	0.302	22	68
Attended grade school	0.01305	0.114	0.004	0	1	0.01163	0.107	0.004	0	1
Grade school graduate	0.04830	0.215	0.008	0	1	0.04942	0.217	0.008	0	1
Attended high school	0.07441	0.263	0.009	0	1	0.06250	0.242	0.010	0	1
High school graduate	0.31332	0.464	0.017	0	1	0.31686	0.466	0.017	0	1
Attended post-secondary school	0.04047	0.197	0.007	0	1	0.03924	0.194	0.007	0	1
Attended college	0.22585	0.418	0.015	0	1	0.23110	0.422	0.015	0	1
College graduate	0.28460	0.452	0.017	0	1	0.28924	0.454	0.017	0	1
Work experience abroad (in months)	31.65796	18.314	0.670	0	96	32.62645	18.319	0.714	0	96
Last left the country (in months)	42.60705	14.427	0.531	0	59	44.21221	13.027	0.490	1	59
<b>Type of visa</b>										
Immigrant visa	0.02480	0.156	0.005	0	1	0.02616	0.160	0.006	0	1
Working visa	0.95431	0.209	0.007	0	1	0.95785	0.201	0.008	0	1
Other visa	0.02089	0.143	0.005	0	1	0.01599	0.126	0.005	0	1
<b>Kind of work in host country</b>										
Corporate executive, manager, or proprietor	0.02742	0.163	0.006	0	1	0.02616	0.160	0.006	0	1
Professional	0.05483	0.228	0.008	0	1	0.05814	0.234	0.009	0	1
Technician or associate professional	0.06919	0.254	0.009	0	1	0.05959	0.237	0.009	0	1
Clerk	0.01828	0.134	0.005	0	1	0.01890	0.136	0.005	0	1
Service or sales workers	0.10966	0.313	0.011	0	1	0.11483	0.319	0.012	0	1
Tradesman or related worker	0.19582	0.397	0.015	0	1	0.19767	0.399	0.015	0	1
Plant & machine operator or assembler	0.17232	0.378	0.014	0	1	0.17442	0.380	0.015	0	1
Unskilled workers	0.35248	0.478	0.017	0	1	0.35029	0.477	0.018	0	1

Table 2b  
 Descriptive Statistics of Variables for Overseas Workers who are Heads or Spouses of Heads of Households

Variable	All workers					Workers with remittance				
	Mean	Sample St. Error	Boot-strap Std. Error	Min	Max	Mean	Sample St. Error	Boot-strap Std. Error	Min	Max
<b>Charateristics of host country</b>										
<i>By income</i>										
Lower middle-income country	0.02219	0.147	0.005	0	1	0.02180	0.146	0.006	0	1
Upper middle-income country	0.34987	0.477	0.017	0	1	0.34884	0.477	0.019	0	1
High income country	0.61358	0.487	0.018	0	1	0.61337	0.487	0.019	0	1
<i>By location</i>										
In the Middle East	0.40601	0.491	0.017	0	1	0.41134	0.492	0.019	0	1
In America and Western Europe	0.18538	0.389	0.014	0	1	0.19622	0.397	0.015	0	1
In South Asia, East Asia, and the Pacific	0.39687	0.490	0.018	0	1	0.38227	0.486	0.019	0	1
In Africa, Eastern and Central Europe	0.01175	0.108	0.004	0	1	0.01017	0.100	0.004	0	1
<b>Characteristics of origin household</b>										
ln (Labor income)	10.17543	1.931	0.072	3.951	13.95160	10.09079	1.948	0.074	3.95124	13.95160
Asset income	2776.76	15399.170	552.995	0	240480	2820.21	16016.060	605.057	0	240480
Male household head	0.63577	0.482	0.017	0	1	0.60901	0.488	0.019	0	1
Age in years of the household head	41.15274	8.718	0.309	23	87	41.17733	8.637	0.322	23	87
Number of household members 14 years and younger	1.65796	1.307	0.048	0	7	1.63954	1.290	0.049	0	7
Number of household members between 15 and 24 years old	1.02480	1.240	0.044	0	7	1.05378	1.233	0.048	0	7
Number of household members 25 years and older	1.74021	0.873	0.032	1	7	1.69767	0.878	0.033	1	7
Resides in the rest of Luzon	0.31071	0.463	0.016	0	1	0.31541	0.465	0.017	0	1
Resides in the Visayas	0.14099	0.348	0.012	0	1	0.14680	0.354	0.013	0	1
Resides in Mindanao	0.12010	0.325	0.012	0	1	0.11773	0.323	0.012	0	1
Resides in NCR CALABARZON, MIMAROPA, Central Luzon	0.42820	0.495	0.018	0	1	0.42006	0.494	0.019	0	1
Number of observations			766					688		

Table 2c  
Descriptive Statistics of Variables for Overseas Workers who are neither Heads nor Spouses of Heads of Households

Variable	All workers					Workers with remittance				
	Mean	Sample St. Error	Boot-strap Std. Error	Min	Max	Mean	Sample St. Error	Boot-strap Std. Error	Min	Max
Remittance indicator ln (Amount remitted)	0.84000 ***	0.367	0.013	0	1	10.89747 ***	1.063	0.039	6.21461	13.75364
<b>Characteristics of overseas worker</b>										
Son or daughter	0.10057	0.301	0.010	0	1	0.09796	0.297	0.011	0	1
Son- or daughter-in-law	0.77714	0.416	0.014	0	1	0.78776	0.409	0.015	0	1
Grandson or granddaughter	0.10857	0.311	0.010	0	1	0.10204	0.303	0.011	0	1
Other relative	0.01029	0.101	0.003	0	1	0.00952	0.097	0.011	0	1
Male	0.33600 ***	0.473	0.016	0	1	0.32653 ***	0.469	0.017	0	1
Married	0.24000 ***	0.427	0.014	0	1	0.23129 ***	0.422	0.015	0	1
Age in years	30.77371 ***	7.895	0.262	17	84	31.01905 ***	8.051	0.306	17	84
Attended grade school	0.00686	0.083	0.003	0	1	0.00544	0.074	0.003	0	1
Grade school graduate	0.02514 **	0.157	0.005	0	1	0.02585 **	0.159	0.006	0	1
Attended high school	0.05143 *	0.221	0.007	0	1	0.04898	0.216	0.008	0	1
High school graduate	0.23886 ***	0.427	0.015	0	1	0.24218 ***	0.429	0.016	0	1
Attended post-secondary school	0.04571	0.209	0.007	0	1	0.04490	0.207	0.008	0	1
Attended college	0.27429 **	0.446	0.015	0	1	0.27211 *	0.445	0.016	0	1
College graduate	0.35657 ***	0.479	0.016	0	1	0.36054 ***	0.480	0.018	0	1
Work experience abroad (in months from)	26.38857 ***	17.973	0.622	0	75	27.64082 ***	18.173	0.684	0	75
Last left the country (in months)	43.55771	13.709	0.455	0	59	44.16735	12.972	0.489	0	59
<b>Type of visa</b>										
Immigrant visa	0.02629	0.160	0.006	0	1	0.02857	0.167	0.006	0	1
Working visa	0.95657	0.204	0.007	0	1	0.95918	0.198	0.008	0	1
Other visa	0.01714	0.130	0.004	0	1	0.01224	0.110	0.004	0	1
<b>Kind of work in host country</b>										
Unskilled worker	0.42629 ***	0.495	0.017	0	1	0.42585 ***	0.495	0.018	0	1
Other occupations	0.57371	0.495	0.017	0	1	0.57415	0.495	0.018	0	1

Table 2c  
Descriptive Statistics of Variables for Overseas Workers who are neither Heads nor Spouses of Heads of Households

Variable	All workers					Workers with remittance				
	Mean	Sample St. Error	Boot-strap Std. Error	Min	Max	Mean	Sample St. Error	Boot-strap Std. Error	Min	Max
<b>Characteristics of host country</b>										
<i>By income</i>										
Lower middle-income country	0.02971	0.170	0.006	0	1	0.02857	0.167	0.006	0	1
Upper middle-income country	0.26971 ***	0.444	0.015	0	1	0.26395 ***	0.441	0.016	0	1
High income country	0.69371 ***	0.461	0.016	0	1	0.70068 ***	0.458	0.017	0	1
<i>By location</i>										
In the Middle East	0.31543 ***	0.465	0.016	0	1	0.30476 ***	0.461	0.017	0	1
In America and Western Europe	0.17714	0.382	0.013	0	1	0.18776	0.391	0.014	0	1
In South Asia, East Asia, and the Pacific	0.50171 ***	0.500	0.017	0	1	0.50204 ***	0.500	0.019	0	1
In Africa, Eastern and Central Europe	0.00571	0.075	0.003	0	1	0.00544	0.074	0.003	0	1
<b>Characteristics of origin household</b>										
ln (Labor income)	10.43077 ***	1.757	0.060	3	14	10.31800 **	1.772	0.066	3.40120	14.30262
Asset income	3513.05	33651.410	1127.038	0	703000	2920.47	27799.310	1027.940	0	703000
Male household head	0.72114 ***	0.449	0.015	0	1	0.70748 ***	0.455	0.016	0	1
Age in years of the household head	58.12800 ***	11.716	0.383	17	95	58.47347 ***	11.764	0.430	17	95
Number of household members 14 years and younger	1.30057 ***	1.361	0.047	0	7	1.31020 ***	1.370	0.053	0	7
Number of household members between 15 and 24 years old	1.17257 **	1.235	0.041	0	7	1.16599 *	1.234	0.048	0	7
Number of household members 25 years and older	2.95886 ***	1.286	0.041	1	8	2.94014 ***	1.293	0.046	1	8
Resides in the rest of Luzon	0.26057 **	0.439	0.015	0	1	0.27755	0.448	0.016	0	1
Resides in the Visayas	0.17600 *	0.381	0.013	0	1	0.17415	0.379	0.014	0	1
Resides in Mindanao	0.21600 ***	0.412	0.014	0	1	0.20544 ***	0.404	0.014	0	1
Resides in NCR CALABARZON, MIMAROPA, Central Luzon	0.34743 ***	0.476	0.016	0	1	0.34286 ***	0.475	0.018	0	1
Number of observations			875					735		

## Note:

\*-- different from the mean of overseas workers who are heads and spouses of heads at two-tailed  $\alpha = 0.1$ .  
 \*\*-- different from the mean of overseas workers who are heads and spouses of heads at two-tailed  $\alpha = 0.05$ .  
 \*\*\*-- different from the mean of overseas workers who are heads and spouses of heads at two-tailed  $\alpha = 0.01$ .

Table 3  
Testing for the endogeneity of household labor income

	OLS	Heckman's Selection (Two-step)		Maximum likelihood	
	Labor Income (Log)	Selection	Amount	Selection	Amount
<b><u>All overseas workers</u></b>					
Tropical cyclone occurrences	-0.06956 0.024 *** 0.024 ***				
Provincial employment rate	-0.0262 0.013 ** 0.014 *				
Predicted residual		0.36353 0.249 0.284	-0.1408 0.149 0.149	0.31777 0.268 0.287	-0.1408 0.155 0.148
<b><u>Heads or spouses of heads</u></b>					
Tropical cyclone occurrences	-0.08174 0.037 ** 0.039 **				
Provincial employment rate	-0.038 0.022 * 0.024				
Predicted residual		-0.29868 0.342 0.478	0.00832 0.144 0.133	-0.29812 0.353 0.49	-0.00034 0.124 0.133
<b><u>Neither heads nor spouses of heads</u></b>					
Tropical cyclone occurrences	-0.06176 0.033 * 0.029 **				
Provincial employment rate	-0.02007 0.016 0.016				
Predicted residual		0.92911 0.402 ** 0.468 **	-0.7007 0.465 0.331 **	0.56979 0.41 0.521	-0.61405 0.298 ** 0.33 *

Excerpted from Appendix Table 1.

Note:

The numbers below the coefficient/parameter estimates are robust (Huber/White/sandwich) standard errors. The first is generated from one regression run based on the applicable sample; the second from bootstrapping based on 1,000 replications.

- \* -- significant at two-tailed  $\alpha = 0.1$ .
- \*\* -- significant at two-tailed  $\alpha = 0.05$ .
- \*\*\* -- significant at two-tailed  $\alpha = 0.01$ .

Table 4a  
 Factors affecting the Incidence and Amount of Remittances, All Overseas Workers

Variable	Heckman's Selection (Two-step)		Heckman's Selection (ML)	
	Selection	Amount	Selection	Amount
<b>Characteristics of overseas worker</b>				
(Dummy base category: Son or daughter)				
Household head or spouse	0.23809	0.09420	0.20165	0.10446
	0.245	0.141	0.241	0.146
	0.264	0.147	0.261	0.146
Son- or daughter-in-law	-0.33825	-0.18350	-0.33130	-0.19394
	0.217	0.140	0.217	0.150
	0.239	0.154	0.243	0.151
Grandson or granddaughter	-0.12322	0.13901	-0.30105	0.11481
	0.540	0.362	0.547	0.249
	1.992	0.289	2.411	0.271
Other relative and non-relative	-0.13507	-0.53403	-0.09005	-0.52746
	0.249	0.154 ***	0.256	0.183 ***
	0.260	0.184 ***	0.264	0.183 ***
Male	-0.12097	0.16634	-0.16492	0.15575
	0.125	0.074 **	0.115	0.075 **
	0.125	0.075 **	0.127	0.075 **
Married	0.11142	0.12250	0.09841	0.12654
	0.163	0.098	0.167	0.104
	0.185	0.105	0.188	0.104
Age in years	0.01945	0.00734	0.01076	0.00824
	0.035	0.019	0.034	0.018
	0.038	0.020	0.038	0.020
Age in years squared	-0.00028	0.00001	-0.00015	-0.00001
	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000
(Dummy base category: College graduate)				
Attended grade school	-0.31630	-0.58356	-0.32266	-0.60628
	0.374	0.265 **	0.362	0.232 ***
	0.898	0.258 **	1.025	0.242 **
Grade school graduate	-0.18716	-0.55779	-0.21145	-0.56526
	0.259	0.144 ***	0.278	0.139 ***
	0.303	0.140 ***	0.305	0.138 ***
Attended high school	-0.49279	-0.32126	-0.45793	-0.33761
	0.188 ***	0.126 **	0.217 **	0.136 **
	0.204 **	0.132 **	0.210 **	0.130 ***

Table 4a  
 Factors affecting the Incidence and Amount of Remittances, All Overseas Workers

Variable	Heckman's Selection (Two-step)		Heckman's Selection (ML)	
	Selection	Amount	Selection	Amount
High school graduate	-0.05053 0.132 0.134	-0.30585 0.074 *** 0.072 ***	-0.08532 0.125 0.136	-0.30897 0.070 *** 0.071 ***
Attended post-secondary school	-0.26813 0.219 0.240	-0.26422 0.133 ** 0.167	-0.15910 0.268 0.256	-0.26327 0.165 0.167
Attended college	0.01952 0.126 0.131	-0.20378 0.071 *** 0.072 ***	0.00608 0.122 0.131	-0.20463 0.071 *** 0.071 ***
Work experience abroad (in months from 10/1998)	0.02463 0.010 ** 0.011 **	0.01005 0.006 * 0.006 *	0.01918 0.012 0.012	0.01064 0.006 * 0.006 *
Work experience abroad (in months from 10/1998) squared	-0.00004 0.000 0.000	-0.00006 0.000 0.000	0.00003 0.000 0.000	-0.00006 0.000 0.000
Last left the country (in months from 10/1998)	0.06091 0.013 *** 0.014 ***	0.01245 0.012 0.013	0.05954 0.015 *** 0.014 ***	0.01506 0.017 0.015
Last left the country (in months from 10/1998) squared	-0.00047 0.000 ** 0.000 **	-0.00019 0.000 0.000	-0.00048 0.000 ** 0.000 **	-0.00022 0.000 0.000
<b>Type of visa</b> (Dummy base category: Working visa)				
Immigrant visa	0.04699 0.355 0.818	-0.27785 0.164 * 0.180	0.25992 0.424 0.897	-0.27001 0.175 0.180
Other visa	-0.74309 0.271 *** 0.302 **	0.08512 0.228 0.282	-0.73899 0.260 *** 0.304 **	0.05526 0.260 0.263
<b>Kind of work in host country</b> (Dummy base category: Unskilled worker)				
Special occupation	-0.15203 0.626 1.965	0.14078 0.381 0.427	-0.18958 0.565 5.027	0.15877 0.372 0.421
Corporate executive, manager, or proprietor	0.15288 0.334 0.627	0.58245 0.185 *** 0.156 ***	0.09486 0.359 0.699	0.58327 0.148 *** 0.153 ***
Professional	0.69916 0.222 *** 0.254 ***	0.30204 0.113 *** 0.117 **	0.65929 0.238 *** 0.261 **	0.31685 0.125 ** 0.118 ***

Table 4a  
Factors affecting the Incidence and Amount of Remittances, All Overseas Workers

Variable	Heckman's Selection (Two-step)		Heckman's Selection (ML)	
	Selection	Amount	Selection	Amount
Technician or associate professional	-0.04157	0.40299	0.01373	0.40374
	0.169	0.106 ***	0.178	0.111 ***
	0.179	0.106 ***	0.187	0.106 ***
Clerk	-0.12481	0.05939	-0.10635	0.06333
	0.251	0.151	0.215	0.157
	0.232	0.167	0.233	0.166
Service or sales workers	0.11515	0.23005	0.15261	0.23593
	0.165	0.090 **	0.164	0.090 ***
	0.176	0.088 ***	0.177	0.087 ***
Farmer, forestry worker, or fisherman	-1.19593	-0.09051	-1.11941	-0.13744
	0.551 **	0.428	0.575 *	0.443
	2.326	0.495	2.795	0.487
Tradesman or related worker	0.11822	0.15840	0.15701	0.16360
	0.172	0.095 *	0.160	0.094 *
	0.173	0.095 *	0.171	0.094 *
Plant & machine operator or assembler	-0.10625	0.24027	-0.07934	0.24029
	0.167	0.097 **	0.154	0.096 **
	0.174	0.097 **	0.173	0.096 **
<b>Charateristics of host country</b>				
<i>By income</i>				
(Dummy base category: High income country)				
Low income country	-0.21119	0.50599	-0.32218	0.49999
	0.678	0.398	0.548	0.331
	2.798	0.384	3.515	0.374
Lower middle-income country	-0.07348	-0.08068	-0.00935	-0.07265
	0.297	0.170	0.314	0.173
	0.381	0.182	0.387	0.180
Upper middle-income country	-0.06076	0.16876	-0.05511	0.16694
	0.136	0.079 **	0.135	0.080 **
	0.143	0.081 **	0.145	0.079 **
Other income country	0.31716	0.56474	0.24925	0.57368
	0.445	0.215 ***	0.407	0.185 ***
	1.876	0.198 ***	2.401	0.194 ***
<i>By location</i>				
(Dummy base category: In Asia and the Pacific)				
In Africa, Eastern and Central Europe	-0.15661	0.41215	-0.37603	0.39163
	0.495	0.286	0.501	0.197 **
	1.133	0.210 **	1.329	0.205 *



Table 4a  
Factors affecting the Incidence and Amount of Remittances, All Overseas Workers

Variable	Heckman's Selection (Two-step)		Heckman's Selection (ML)	
	Selection	Amount	Selection	Amount
In the Middle East	0.10213	-0.24212	0.11223	-0.23740
	0.130	0.077 ***	0.132	0.081 ***
	0.150	0.085 ***	0.149	0.082 ***
In America and Western Europe	0.36468	0.28386	0.38024	0.29497
	0.157 **	0.084 ***	0.170 **	0.082 ***
	0.177 **	0.076 ***	0.180 **	0.076 ***
<b>Characteristics of origin household</b>				
Labor income (Log)	-0.16683	-0.00340	-0.14989	-0.00656
	0.032 ***	0.018	0.058 **	0.022
	0.039 ***	0.018	0.044 ***	0.019
Asset income	0.00000	0.00000	0.00000	0.00000
	0.000	0.000	0.000 *	0.000
	0.000	0.000	0.000	0.000
Male household head	-0.29933	-0.15526	-0.29987	-0.16780
	0.110 ***	0.063 **	0.111 ***	0.063 ***
	0.122 **	0.065 **	0.122 **	0.064 ***
Age in years of the household head	-0.00766	-0.00368	-0.00686	-0.00395
	0.026	0.014	0.023	0.015
	0.026	0.016	0.026	0.016
Age in years of the household head squared	0.00010	-0.00001	0.00010	-0.00001
	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000
Number of household members 14 years and younger	0.02806	0.07623	0.02602	0.07755
	0.035	0.020 ***	0.039	0.020 ***
	0.039	0.021 ***	0.039	0.020 ***
Number of household members between 15 and 24 years old	0.08054	0.06578	0.06110	0.06748
	0.039 **	0.022 ***	0.040	0.023 ***
	0.041 **	0.024 ***	0.042	0.024 ***
Number of household members 25 years and older	-0.00474	0.02153	0.02699	0.02373
	0.044	0.025	0.053	0.029
	0.044	0.030	0.049	0.029
(Dummy base category: Resides in NCR, CALABARZON, MIMAROPA, and Central Luzon)				
Resides in the rest of Luzon	0.11663	-0.20534	0.13912	-0.19947
	0.122	0.066 ***	0.120	0.066 ***
	0.127	0.066 ***	0.129	0.066 ***
Resides in the Visayas	-0.18253	0.00731	-0.15569	0.00505
	0.138	0.078	0.136	0.077
	0.147	0.073	0.147	0.073
Resides in Mindanao	-0.20303	-0.50379	-0.15474	-0.50829
	0.129	0.080 ***	0.166	0.091 ***
	0.131	0.088 ***	0.137	0.087 ***

Table 4a  
Factors affecting the Incidence and Amount of Remittances, All Overseas Workers

Variable	Heckman's Selection (Two-step)		Heckman's Selection (ML)	
	Selection	Amount	Selection	Amount
Constant	0.54555	10.79206	0.54052	10.70289
	1.011	0.597 ***	0.934	0.655 ***
	1.042	0.679 ***	1.031	0.681 ***
$\rho_{\varepsilon u}$			-0.66607	
			0.391 *	
			0.377 *	
$\sigma_u$			0.92214	
			0.079 +++	
			0.048 +++	
$\sigma_{\varepsilon u}$ (coefficient of inverse Mills' ratio $\lambda$ )		-0.74462		
		0.325 **		
		0.374 **		
Log Pseudo Likelihood Function			-2370.428	
Number of observations	1669	1445	1669	1445

Note:

The numbers below the coefficient/parameter estimates are robust (Huber/White/sandwich) standard errors. The first is generated from one regression run based on the applicable sample; the second from bootstrapping based on 1,000 replications.

- \* (+) -- significant at two(one)-tailed  $\alpha = 0.1$ .  
 \*\* (++) -- significant at two(one)-tailed  $\alpha = 0.05$ .  
 \*\*\* (+++) -- significant at two(one)-tailed  $\alpha = 0.01$ .

Table 4b  
 Factors affecting the Incidence and Amount of Remittances,  
 Overseas Workers who are Heads or Spouses of Heads of Households

Variable	Heckman's Selection (Two step)		Heckman's Selection (ML)	
	Selection	Amount	Selection	Amount
<i>Characteristics of overseas worker</i>				
Male	0.23409 0.277 0.354	0.23174 0.115 ** 0.122 *	0.23138 0.247 0.375	0.23867 0.115 ** 0.121 **
Married	1.51202 0.464 *** 0.881 *	0.62358 0.314 ** 0.410	1.51097 0.457 *** 0.909 *	0.70693 0.371 * 0.402 *
Age in years	-0.05450 0.101 0.150	0.01727 0.041 0.051	-0.05579 0.099 0.156	0.01592 0.047 0.051
Age in years squared	0.00041 0.001 0.002	-0.00021 0.000 0.001	0.00042 0.001 0.002	-0.00020 0.001 0.001
(Dummy base category: College graduate)				
Attended grade school	-0.51720 0.558 2.143	-0.63458 0.301 ** 0.393	-0.50641 0.550 2.504	-0.65973 0.343 * 0.385 *
Grade school graduate	0.07021 0.467 1.523	-0.66767 0.164 *** 0.173 ***	0.07601 0.440 1.824	-0.66534 0.166 *** 0.172 ***
Attended high school	-0.93442 0.328 *** 0.407 **	-0.29687 0.159 * 0.164 *	-0.93254 0.285 *** 0.429 **	-0.33892 0.142 ** 0.159 **
High school graduate	-0.15075 0.251 0.295	-0.30241 0.094 *** 0.097 ***	-0.14727 0.211 0.307	-0.30778 0.094 *** 0.097 ***
Attended post-secondary school	-0.53551 0.415 1.213	-0.11452 0.177 0.201	-0.54050 0.371 1.375	-0.13801 0.189 0.201
Attended college	0.10965 0.266 0.333	-0.23259 0.095 ** 0.106 **	0.11171 0.237 0.345	-0.23340 0.100 ** 0.106 **
Work experience abroad (in months from 10/1998)	0.02556 0.019 0.025	0.02277 0.006 *** 0.006 ***	0.02526 0.018 0.026	0.02353 0.006 *** 0.006 ***
Work experience abroad (in months from 10/1998) squared	-0.00001 0.000 0.000	-0.00016 0.000 * 0.000 *	-0.00001 0.000 0.000	-0.00016 0.000 ** 0.000 *

Table 4b  
 Factors affecting the Incidence and Amount of Remittances,  
 Overseas Workers who are Heads or Spouses of Heads of Households

Variable	Heckman's Selection (Two step)		Heckman's Selection (ML)	
	Selection	Amount	Selection	Amount
Last left the country (in months from 10/1998)	0.04624 0.023 ** 0.031	0.03614 0.014 *** 0.018 **	0.04623 0.023 ** 0.033	0.04117 0.016 ** 0.018 **
Last left the country (in months from 10/1998) squared	-0.00009 0.000 0.001	-0.00038 0.000 ** 0.000 *	-0.00009 0.000 0.001	-0.00042 0.000 ** 0.000 *
<b>Type of visa</b> (Dummy base category: Working visa)				
Immigrant visa	-0.24222 0.626 3.519	-0.13268 0.208 0.265	-0.22313 0.823 4.134	-0.14612 0.245 0.263
Other visa	-0.74006 0.431 * 0.820	-0.26809 0.261 0.401	-0.73462 0.390 * 0.911	-0.32132 0.371 0.389
<b>Kind of work in host country</b> (Dummy base category: Unskilled worker)				
Corporate executive, manager, or proprietor	-0.26854 0.529 1.640	0.69012 0.217 *** 0.211 ***	-0.26214 0.588 1.924	0.67084 0.201 *** 0.211 ***
Professional	0.08320 0.530 2.032	0.28246 0.164 * 0.189	0.08262 0.380 2.466	0.27762 0.184 0.189
Technician or associate professional	-1.01429 0.358 *** 0.441 **	0.36344 0.167 ** 0.179 **	-1.01250 0.303 *** 0.461 **	0.32338 0.162 ** 0.175 *
Clerk	0.13050 0.714 2.651	0.26012 0.240 0.246	0.12873 0.484 3.279	0.27273 0.218 0.244
Service or sales workers	0.09381 0.324 0.711	0.23642 0.116 ** 0.118 **	0.09415 0.340 0.736	0.23407 0.112 ** 0.118 **
Tradesman or related worker	-0.24495 0.330 0.378	0.22926 0.123 * 0.114 **	-0.24443 0.283 0.392	0.21740 0.109 ** 0.114 *
Plant & machine operator or assembler	-0.53021 0.328 0.402	0.30671 0.129 ** 0.124 **	-0.52433 0.295 * 0.426	0.28759 0.117 ** 0.123 **

Table 4b  
 Factors affecting the Incidence and Amount of Remittances,  
 Overseas Workers who are Heads or Spouses of Heads of Households

Variable	Heckman's Selection (Two step)		Heckman's Selection (ML)	
	Selection	Amount	Selection	Amount
<b>Charateristics of host country</b>				
<i>By income</i>				
(Dummy base category: High income country)				
Lower middle-income country	-0.28971	0.27373	-0.27165	0.26338
	0.568	0.223	0.684	0.211
	2.600	0.246	2.969	0.243
Upper middle-income country	-0.64087	0.10642	-0.63832	0.08504
	0.260 **	0.103	0.258 **	0.089
	0.368 *	0.101	0.372 *	0.096
<i>By location</i>				
(Dummy base category: In the Middle East)				
In Africa, Eastern and Central Europe	-0.15656	0.29615	-0.17789	0.28540
	0.790	0.325	0.748	0.197
	2.492	0.260	2.888	0.258
In America and Western Europe	-0.21787	0.52214	-0.21282	0.51111
	0.347	0.119 ***	0.345	0.108 ***
	0.629	0.119 ***	0.653	0.117 ***
In South Asia, East Asia, and the Pacific	-0.58627	0.22389	-0.58901	0.20231
	0.248 **	0.102 **	0.269 **	0.098 **
	0.375	0.108 **	0.384	0.104 *
<b>Characteristics of origin household</b>				
Labor income (Log)	-0.12163	-0.01813	-0.12009	-0.02160
	0.053 **	0.018	0.054 **	0.017
	0.079	0.018	0.083	0.017
Asset income	0.00000	0.00000	0.00000	0.00000
	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000
Male household head	-0.81092	-0.23284	-0.81705	-0.25679
	0.240 ***	0.091 **	0.250 ***	0.081 ***
	0.455 *	0.089 ***	0.473 *	0.086 ***
Age in years of the household head	0.10449	0.03426	0.10356	0.03771
	0.096	0.032	0.085	0.031
	0.131	0.037	0.138	0.037
Age in years of the household head squared	-0.00105	-0.00032	-0.00103	-0.00036
	0.001	0.000	0.001	0.000
	0.002	0.000	0.002	0.000

Table 4b  
 Factors affecting the Incidence and Amount of Remittances,  
 Overseas Workers who are Heads or Spouses of Heads of Households

Variable	Heckman's Selection (Two step)		Heckman's Selection (ML)	
	Selection	Amount	Selection	Amount
Number of household members 14 years and younger	-0.01040 0.066 0.079	0.05396 0.026 ** 0.028 *	-0.01131 0.059 0.082	0.05315 0.026 ** 0.027 *
Number of household members between 15 and 24 years old	0.18531 0.079 ** 0.118	0.06064 0.029 ** 0.032 *	0.18456 0.083 ** 0.122	0.06522 0.031 ** 0.032 **
Number of household members 25 years and older	-0.17577 0.097 * 0.117	-0.01916 0.040 0.049	-0.17484 0.082 ** 0.120	-0.02683 0.046 0.049
(Dummy base category: Resides in NCR, CALABARZON, MIMAROPA, and Central Luzon)				
Resides in the rest of Luzon	0.11122 0.216 0.265	-0.07273 0.081 0.087	0.11465 0.204 0.276	-0.06538 0.081 0.086
Resides in the Visayas	-0.15636 0.281 0.474	-0.03387 0.098 0.106	-0.15071 0.249 0.577	-0.03332 0.097 0.106
Resides in Mindanao	-0.02245 0.255 0.367	-0.27976 0.108 *** 0.125 **	-0.03149 0.262 0.379	-0.28246 0.118 ** 0.125 **
Constant	-0.52521 1.860 2.498	8.33060 0.859 *** 1.063 ***	-0.49063 1.667 2.633	8.11773 0.974 *** 1.044 ***
$\rho_{\epsilon_{11}}$			-0.05139 0.089 1.378	
$\sigma_{\epsilon_{11}}$			0.78394 0.032 *** 0.037 ***	
$\sigma_{\epsilon_{11}}$ (coefficient of inverse Mills' ratio $\lambda$ )		-0.26081 0.311 0.365		
Log Pseudo Likelihood Function			-966.266	
Number of observations	766	688	766	688

## Note:

The numbers below the coefficient/parameter estimates are robust (Huber/White/sandwich) standard errors. The first is generated from one regression run based on the applicable sample; the second from bootstrapping based on 1,000 replications.

- \* (+) -- significant at two(one)-tailed  $\alpha = 0.1$ .  
 \*\* (++) -- significant at two(one)-tailed  $\alpha = 0.05$ .  
 \*\*\* (+++) -- significant at two(one)-tailed  $\alpha = 0.01$ .

Table 4c  
 Factors affecting the Incidence and Amount of Remittances,  
 Overseas Workers who are neither Heads nor Spouses of Heads of Households

Variable	Probit Selection	ML Amount
<b><i>Endogenous variable</i><sup>a</sup></b>		
Labor income (Log)	-0.65251 0.072 *** 0.213 ***	1.28803 0.977
<b><i>Characteristics of overseas worker</i></b> (Dummy base category: Son or daughter)		
Son- or daughter-in-law	-0.02722 0.178 0.222	-0.10677 0.294
Grandson or granddaughter	0.65565 0.399 0.612	-1.49319 1.317
Other relative and non-relative	-0.01601 0.193 0.261	-0.48550 0.354
Male	-0.25379 0.121 ** 0.135 *	0.51770 0.276
Married	-0.11053 0.127 0.164	0.35599 0.248
Age in years	-0.00603 0.037 0.055	0.00052 0.046
Age in years squared	0.00017 0.001 0.001	-0.00011 0.001
(Dummy base category: College graduate)		
Attended grade school	-1.32811 0.430 *** 0.540 **	1.56537 1.513

Table 4c  
 Factors affecting the Incidence and Amount of Remittances,  
 Overseas Workers who are neither Heads nor Spouses of Heads of Households

Variable	Probit Selection	ML Amount
Grade school graduate	-0.78012 0.310 ** 0.479	1.06149 1.226
Attended high school	-0.73634 0.221 *** 0.345 **	0.90709 1.185
High school graduate	-0.49592 0.137 *** 0.231 **	0.68355 0.864
Attended post-secondary school	-0.53112 0.226 ** 0.314 *	0.40919 0.697
Attended college	-0.33281 0.119 *** 0.180 *	0.41287 0.498
Work experience abroad (in months from 10/1998)	0.02120 0.011 * 0.014	-0.04712 0.031
Work experience abroad (in months from 10/1998) squared	-0.00014 0.000 0.000	0.00047 0.000
Last left the country (in months from 10/1998)	0.01784 0.021 0.027	-0.01003 0.031
Last left the country (in months from 10/1998) squared	-0.00004 0.000 0.000	-0.00030 0.000



Table 4c  
 Factors affecting the Incidence and Amount of Remittances,  
 Overseas Workers who are neither Heads nor Spouses of Heads of Households

Variable	Probit Selection	ML Amount
<b><i>Type of visa</i></b>		
(Dummy base category: Working visa)		
Immigrant visa	0.06568 0.299 0.571	-0.13851 0.562
Other visa	-0.29379 0.337 0.449	1.05030 0.688
<b><i>Kind of work in host country</i></b>		
(Dummy base category: Unskilled worker)		
Other occupations	-0.27939 0.102 *** 0.135 **	0.27122 0.364
<b><i>Charateristics of host country</i></b>		
<b><i>By income</i></b>		
(Dummy base category: High income country)		
Lower middle-income country	0.09263 0.217 0.692	-0.20381 0.525
Upper middle-income country	0.18946 0.146 0.163	-0.18959 0.309
<b><i>By location</i></b>		
(Dummy base category: In Asia and the Pacific)		
In the Middle East	0.08349 0.141 0.181	-0.34909 0.312
In Africa, Eastern and Central Europe	0.43864 0.422 0.969	-0.13899 1.150
In America and Western Europe	0.30216 0.165 * 0.208	-0.35527 0.423

Table 4c  
 Factors affecting the Incidence and Amount of Remittances,  
 Overseas Workers who are neither Heads nor Spouses of Heads of Households

Variable	Probit Selection	ML Amount
<b><i>Characteristics of origin household</i></b>		
Asset income	0.00000 0.000 0.000	0.00000 0.000
Male household head	-0.13274 0.106 0.142	0.01544 0.184
Age in years of the household head	0.00284 0.026 0.037	-0.04995 0.049
Age in years of the household head squared	-0.00008 0.000 0.000	0.00052 0.000
Number of household members 14 years and younger	0.00876 0.036 0.048	0.06541 0.059
Number of household members between 15 and 24 years old	0.11572 0.036 *** 0.060 *	-0.15211 0.183
Number of household members 25 years and older	0.24636 0.047 *** 0.102 **	-0.43482 0.367
(Dummy base category: Resides in NCR, CALABARZON, MIMAROPA, and Central Luzon)		
Resides in the rest of Luzon	-0.33998 0.159 ** 0.238	0.47483 0.689
Resides in the Visayas	-0.53196 0.130 *** 0.197 ***	1.22258 0.905
Resides in Mindanao	-0.70400 0.128 *** 0.234 ***	0.71778 1.035

Table 4c  
 Factors affecting the Incidence and Amount of Remittances,  
 Overseas Workers who are neither Heads nor Spouses of Heads of Households

Variable	Probit Selection	ML Amount
Constant	6.46528 1.348 *** 2.658 **	2.67370 9.351
$\rho_{ev}$	0.81366 0.162 *** 0.165 ***	
$\sigma_{\epsilon_1\epsilon_2}$ (coefficient of inverse Mills' ratio $\lambda$ )		-3.89097 1.662 **
$\sigma_{uv}$		-9.92397 20.716
$\sigma_v$	1.49964 0.047 +++ 0.048 +++	1.03492 0.036 +++
$\sigma_u$		1.95188 1.242 +
Log Pseudo Likelihood Function	-1922.620	2321.660
Number of observations	875	735

Note:

<sup>a</sup>Labor income is used as endogenous variable in the probit and maximum likelihood estimations of the nonheads subsample.

The numbers below the coefficient/parameter estimates are robust (Huber/White/sandwich) standard errors. The first is generated from one regression run based on the applicable sample; the second from bootstrapping based on 1,000 replications.

- \* (+) -- significant at two(one)-tailed  $\alpha = 0.1$ .  
 \*\* (++) -- significant at two(one)-tailed  $\alpha = 0.05$ .  
 \*\*\* (+++) -- significant at two(one)-tailed  $\alpha = 0.01$ .

## Appendix I Models of Remittance Motives

In this section, we present five models of remittance motives that constitute the bases of our empirical specification in the main text. Drawn from the survey articles of Rapoport and Docquier (2007) and Alba (2008), these models we believe exhaust the competing explanations of migrant worker-origin household transfers that can be explored with worker-household data sets.<sup>23</sup> Our intent here is to reproduce the formal accounts of Rapoport and Docquier (2007)—not because theirs are the canonical versions, but to set precisely what in this paper we mean by each remittance motive and what behavioral implications can be drawn from these particular formulations.

Our admittedly narrowly circumscribed research strategy is meant to address the following three problems: First, in the literature, (a) there is still no standard scheme for labeling the motives<sup>24</sup> and (b) each motive has several model variants. Second, writing a general model that is able to differentiate among the motives is a difficult if not virtually impossible task. Third, in coming to grips with the estimation issues, empirical researchers cannot simply rely on an enumeration of predictions from different formulations of a given motive, since such a listing provides no assurance that the implications are mutually consistent; instead, they need internally consistent analytical models (such as the ones provided here, which can all be cast in terms of the principal-agent framework) as heuristic devices and springboards for their empirical model.

### Altruism

The base motive against which the rival explanations of the other models are tested, the altruistic model posits that remittances are a manifestation of the concern that a migrant worker has for the recipient household. A simple account may be given as follows: Let  $i = h$ (household),  $m$ (migrant), and  $-i$  be the other agent. Define the utility function of the  $i$ th party as

$$U^i(C^h, C^m) = (1 - \beta^i)V^i(C^i) + \beta^i U^{-i}(C^h, C^m),$$

where  $C^i$  is the consumption of party  $i$ ,  $V^i(\cdot)$  is the felicity function over own consumption with  $V^i \geq 0$  and  $V^{i''} \leq 0$ , and  $\beta^i \in [0, 1/2]$  is the original preference weight that party  $i$  assigns to the other (implying that the other party can be neither despised, since  $\beta^i$  cannot be negative, nor preferred to the self since  $\beta^i$  cannot be greater than  $1/2$ ).<sup>25</sup>

Under full information, both parties are aware of how each regards the other as well as of the specific forms of the utility functions. Thus, the migrant worker in particular can factor in the origin household's preferences when deciding how much of her income to consume and to remit to the

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<sup>23</sup> We discard the strategic-motive model because transfers under the said motive are not between workers and origin households, but from migrant workers to individuals or organizations that keep low-productivity workers from migrating and depressing wages in the host country.

<sup>24</sup> For instance, Lucas and Stark (1985) fuse as the self-interest motive what we label as the exchange, inheritance, and insurance motives, and de la Brière et al. (2002) call the investment hypothesis what we refer to as the inheritance motive.

<sup>25</sup> We assume that these preference weights are not correlated with the endowments of the parties, since this would possibly taint altruism with inheritance motives.

household.<sup>26</sup> In the process, she derives a new expression for her utility function, which is a linear combination of felicities over own consumption of the two parties,

$$U^m(C^h, C^m) = (1 - \gamma^m)V^m(C^m) + \gamma^m V^h(C^h),$$

where

$$0 \leq \gamma^m = \frac{\beta^m(1 - \beta^h)}{1 - \beta^m\beta^h} \leq \frac{1}{2}$$

is a “reduced-form” preference weight that the worker assigns to the household, which factors in the importance,  $\beta^h$ , that the household accords to the worker.

This reduced-form preference weight has interesting implications. First, when the worker does not care for the household, the weight is zero, as may be expected. Second, as both parties increasingly care for each (so that the original preference weights each approach 1/2), the reduced-form weight approaches 1/3. Third, when the household does not care for the worker but the worker cares deeply for the household—a case of unrequited love—the reduced-form weight is 1/2. Thus, the specification yields the paradoxical result that the worker assigns a higher reduced-form preference weight to the household when it does not care for her than when it does. The reason for this is that the worker, aware that the household is pained when she demonstrates care for it (since this occurs at the cost of some self-sacrifice), takes account of this negative feedback effect.

Given this set-up, the worker uses transfers so that the resulting consumption pair—hers and the household’s—maximizes the value of her utility function. Let  $C^m = I^m - T$  and  $C^h = I^h + T$ , where  $I^i$  stands for the  $i$ th party’s pre-transfer income and  $T$  is the amount remitted. Then the worker’s utility function can be rewritten as

$$U^m(C^h, C^m) = (1 - \gamma^m)V^m(I^m - T) + \gamma^m V^h(I^h + T),$$

and the necessary conditions for obtaining the optimum consumption pair are that

$$-(1 - \gamma^m)V^{m'} + \gamma^m V^{h'} < 0 \text{ if } T = 0 \quad \text{and} \quad -(1 - \gamma^m)V^{m'} + \gamma^m V^{h'} = 0 \text{ if } T > 0.$$

Thus, when remittances are observed, it must be that, at the last currency unit transferred,

$$\frac{V^{m'}}{V^{h'}} = \frac{\gamma^m}{1 - \gamma^m},$$

i.e., the ratio of marginal felicities of the migrant and the recipient household is exactly matched by the ratio of the worker’s reduced-form preference weights for the household to that for herself.

The altruistic model has the following hypotheses: Remittances are positively correlated with the migrant worker’s actual income, earning potential, and sense of closeness to the recipient household, but negatively correlated with the recipient household’s income. In addition, the model predicts that if the worker’s income increases by one currency unit and the household’s income decreases by the same amount, transfers would increase by one currency unit. To see this, totally differentiate the necessary condition for maximization (assuming  $T > 0$ ). This yields

$$-(1 - \gamma^m) \frac{\partial^2 V^m}{\partial C^{m2}} (dI^m - dT) + \gamma^m \frac{\partial^2 V^h}{\partial C^{h2}} (dI^h + dT) = 0,$$

which implies that

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<sup>26</sup> We assume that transfers go only from the migrant worker to the household and not vice versa. Our data set does not cover transfers that go the other way anyway.

$$\frac{dT}{dI^m} = \frac{(1-\gamma^m) \frac{\partial^2 V^m}{\partial C^{m2}}}{(1-\gamma^m) \frac{\partial^2 V^m}{\partial C^{m2}} + \gamma^m \frac{\partial^2 V^h}{\partial C^{h2}}} \quad \text{and} \quad -\frac{dT}{dI^h} = \frac{\gamma^m \frac{\partial^2 V^h}{\partial C^{h2}}}{(1-\gamma^m) \frac{\partial^2 V^m}{\partial C^{m2}} + \gamma^m \frac{\partial^2 V^h}{\partial C^{h2}}}.$$

Adding the two expressions then gives the desired result:

$$\frac{dT}{dI^m} - \frac{dT}{dI^h} = \frac{(1-\gamma^m) \frac{\partial^2 V^m}{\partial C^{m2}}}{(1-\gamma^m) \frac{\partial^2 V^m}{\partial C^{m2}} + \gamma^m \frac{\partial^2 V^h}{\partial C^{h2}}} + \frac{\gamma^m \frac{\partial^2 V^h}{\partial C^{h2}}}{(1-\gamma^m) \frac{\partial^2 V^m}{\partial C^{m2}} + \gamma^m \frac{\partial^2 V^h}{\partial C^{h2}}} = 1.$$

In turn, this prediction implies that transfers insulate consumption from income shocks, so that consumption expenditures and (pre-transfer) incomes of recipient households and migrant workers are statistically independent.

### Exchange

To set this motive in stark contrast to the previous one, suppose now that the migrant worker and the remittance-receiving household are non-altruistic agents who are bound not necessarily by kinship ties but by a contractual arrangement. Thus, remittance transfers are not about the migrant worker's concern for the welfare of the recipient household but payments for services rendered, which may be as varied as managing the migrant's assets, handling her affairs, or taking care of her family.<sup>27</sup>

Two features of the contractual arrangement are noteworthy: First, the engagement is not simply an anonymous market transaction, but (as would be noted in the new institutional economics literature) is rather imbued with issues of mutual trust, credible commitments, and (second-party) enforcement mechanisms. More than the hiring of a financial manager, a personal lawyer, or a household caretaker is involved. Either no market at all exists for these services in the local economy so that special arrangements have to be made or the transaction costs of contracting such services are much lower than the available market alternatives.<sup>28</sup> Thus, in empirical validations of the exchange motive, incorporating specific institutional details that provide the backdrop for the contractual arrangements in a given community takes on heightened importance. Second, the contract must be Pareto-improving, i.e., the arrangement must be mutually beneficial, which implies that the participation constraints are satisfied (i.e., both parties find the provisions of the contract acceptable). Operationally, this means that the transfer payment can neither be greater

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<sup>27</sup> Migrant investments in the home country, which are mentioned in Lucas and Stark (1985) and explored in Osili (2007), may be classified under this motive in the sense that the origin household is tasked implicitly or explicitly to tend these investments.

<sup>28</sup> For instance, it may be well nigh impossible to specify, monitor, and enforce the quality and extent of services to be rendered under all possible contingencies, so that it is difficult to draw up a formal contract. In contrast, there may be long-standing norms that dictate the appropriate conduct and that prescribe how gains from the exchange may be divided between parties in a service arrangement given a particular set of circumstances. Or quid pro quo or bundled contractual arrangements may be involved to get around weak enforcement of property rights, such as when a caretaker household is allowed to live on the property of the migrant to secure it against encroachment by squatters. It may even be that the exchange contract is a specific application of the Coase Theorem, such as when the migration decision of parents with young children creates a negative spillover effect on the rest of the clan in the form of having to provide childcare services.

than the maximum amount that the migrant worker is willing to remit for the services contracted nor less than what the household can receive in an alternative activity.

To account for the pay-for-services contract, write the utility functions of the migrant and the household as  $V^m(C^m, X)$ , where  $X$  is the amount of services of a given quality that is contracted. For the migrant, it is posited that increases in each of these two factors are associated with a higher level of welfare:

$$V_{C^m}^m(C^m, X) = \frac{\partial V^m(C^m, X)}{\partial C^m} > 0 \quad \text{and} \quad V_X^m(C^m, X) = \frac{\partial V^m(C^m, X)}{\partial X} > 0.$$

For the household, it is assumed that increases in consumption imply better well-being, but increases in services rendered are a disutility:

$$V_{C^h}^h(C^h, X) = \frac{\partial V^h(C^h, X)}{\partial C^h} > 0 \quad \text{and} \quad V_X^h(C^h, X) = \frac{\partial V^h(C^h, X)}{\partial X} < 0.$$

There is thus a divergence of interests between the two parties with respect to the second factor, and it is the pay-for-service contract that makes them compatible.

Under full information and the assumption that bargaining power rests entirely with the migrant<sup>29</sup> (as is customary in principal-agent models), the optimal contract that the migrant offers the household on a take-it-or-leave-it basis sets the amount of the transfer payment to be such that the household is just indifferent between accepting the contract and rejecting it for the alternative activity. In other words, the contract sets the household at  $V^h(I^h + T, \bar{X}) - V^h(I^h, 0) = 0$ . In effect, the migrant sets the contractual terms to exact the least sacrifice from herself in terms of lower resources for consumption that the transfer amount represents, while at the same time ensuring that they satisfy the household's participation constraint (that the benefit-cost ratio of accepting the contract is just the same as that of the alternative activity).<sup>30</sup>

Note that totally differentiating  $V^h(I^h + T, \bar{X}) - V^h(I^h, 0) = 0$  gives

$$\left[ \frac{\partial V^h(I^h + T, \bar{X})}{\partial C^h} - \frac{\partial V^h(I^h, 0)}{\partial I^h} \right] dI^h + \frac{\partial V^h(I^h + T, \bar{X})}{\partial \bar{X}} d\bar{X} + \frac{\partial V^h(I^h + T, \bar{X})}{\partial T} dT = 0$$

so that

$$\left. \frac{dT}{d\bar{X}} \right|_{dI^h=0} = \frac{\partial T}{\partial \bar{X}} = - \frac{\frac{\partial V^h(I^h + T, \bar{X})}{\partial \bar{X}}}{\frac{\partial V^h(I^h + T, \bar{X})}{\partial C^h}} > 0$$

and

<sup>29</sup> This assumption is adopted to simplify the analysis. Its effect is to change the results only marginally to account for the difference in the relative bargaining powers of the parties.

<sup>30</sup> The greater the bargaining power of the household, the more the contractual terms offered would favor its interests. When bargaining power lies entirely with the household, the migrant offers to remit the maximum amount of funds that she is willing to pay for the given services. This is the amount of transfers that just satisfies the migrant's participation constraint, i.e., that just makes the migrant indifferent between contracting and not contracting the services,  $V^h(I^h + T^{\max}, \bar{X}) - V^h(I^h, 0) = 0$ .

$$\left. \frac{dT}{dI^h} \right|_{d\bar{X}=0} = \frac{\partial T}{\partial I^h} = - \frac{\frac{\partial V^h(I^h + T, \bar{X})}{\partial C^h} - \frac{\partial V^h(I^h, 0)}{\partial C^h}}{\frac{\partial V^h(I^h + T, \bar{X})}{\partial C^h}} = - \left[ 1 - \frac{\frac{\partial V^h(I^h, 0)}{\partial C^h}}{\frac{\partial V^h(I^h + T, \bar{X})}{\partial C^h}} \right] = \frac{\frac{\partial V^h(I^h, 0)}{\partial C^h}}{\frac{\partial V^h(I^h + T, \bar{X})}{\partial C^h}} - 1 \begin{matrix} > \\ < \end{matrix} 0.$$

The first result implies that transfers increase with the diversity or range, quantity, intensity, and quality of services contracted. The second states that a unit increase in the recipient household's pre-transfer income has an ambiguous effect on remittances: If household consumption and the contracted services are independent in preferences, then  $V_{C^h}^h(I^h, \cdot) > V_{C^h}^h(I^h + T, \cdot)$ , which implies that  $\partial T / \partial I^h > 0$ , i.e., increases in pre-transfer income induce larger transfers due to the household's higher opportunity costs. On the other hand, if household consumption and the contracted services are complements in preferences (perhaps because being the migrant's agent lends prestige or opens more income-generating opportunities), then it is possible that  $V_{C^h}^h(I^h, 0) < V_{C^h}^h(I^h + T, \bar{X})$ , so that  $\partial T / \partial I^h < 0$ , i.e., increases in pre-transfer income may be associated with smaller transfers.

In addition, the exchange model suggests that the maximum amount of transfers that the migrant is willing to pay increases with her income, although this amount tends to be different from the actual transfer that she offers, which depends on relative bargaining powers.

Based on differences in their predictions, the following distinctions can thus be made between the altruistic and exchange models: First, (actual) transfers are unequivocally positively correlated with the migrant's income in the first model, but are not necessarily so in the second model. This is because what covaries with migrant's income in the exchange model is the maximum transfer amount. This latter variable, however, is observed in the data (as actual transfers) only when the household's bargaining power is strong, which itself is difficult to ascertain. Thus, in general and particularly when households generally have poor bargaining power, observed transfers may not show any covariation with migrant's income.

Second, transfers are unambiguously negatively correlated with the household's income in the altruistic model, whereas the covariation between the variables in the exchange model depends on how household consumption and services are related in the household's preference function. If preferences over consumption and services are independent, then transfers are positively correlated with household income; if the two are complements, then transfers and household income may be negatively correlated.

Third, the likelihood and amount of transfers are positively correlated in the altruistic model, but are not necessarily so in the exchange model. In the first model, when the migrant's income rises or when the recipient household's income falls, the likelihood of remitting increases (because of the migrant's concern for the household). Thus, the probability of remitting and the amount remitted both move in the same direction as a result of changes in the circumstances of the migrant and the household. The same cannot be said in the second model. If the household's opportunity costs rise and this prompts the migrant to increase transfer amounts, this change in circumstances need not increase the likelihood of remittances, which may be dictated by other factors (e.g., by contractually set dates on which the payments have to be received by the household).

Fourth, changes in general economic and political conditions that affect the opportunity cost or bargaining power of the household change the amount of transfers in the exchange model, but do not have an impact in the altruistic model. If the unemployment rate rises in the country of origin, for instance, which in turn lowers the opportunity cost of the household and weakens its bargaining power, then transfer amounts should decrease under the exchange model. To the extent that this



labor shock does not directly affect the consumption resources of the recipient household, however, it does not have an effect on transfers in the altruistic model.<sup>31</sup>

### Insurance and moral hazard

Unlike the first two models, the insurance model presents migration and remittances as interdependent behaviors arising from a single integrated decision-making framework. Drawing on the observation that incomes in less developed countries tend to be more volatile (and all the more so in rural and agricultural locales), the model maintains that migration is a coping mechanism adopted by families in such settings to insure themselves against geographic risk.<sup>32</sup> The insight is that, by strategically locating members in a variety of places such that their incomes end up being uncorrelated, these families in effect are able to spatially diversify their portfolios of labor resources, thus minimizing their overall exposure to an income shock in any one place. Remittances then represent intra-family insurance payoffs meant to counter the vicissitudes of fortune experienced by family members where they are and to smooth out their levels of consumption (or maintain their standards of living) over good times and bad.

A simple account of the insurance model of remittances may be given as follows: Consider a two-period world ( $t = 0, 1$ ) consisting of two individuals,  $m$  and  $h$ . Let per capita income in the home country be  $I^0$  during the initial period,  $L$  in period 1 if times are bad, and  $\bar{L}$  if good. (It is assumed that  $L < \bar{L}$ .) As a simplifying convenience, suppose that  $m$  and  $h$  have identical, risk-averse utility functions, the component felicity functions of which are additively separable over time periods and states of the world, so that expected utility is given by

$$E[V(I^0, L, \bar{L})] = v(I^0) + pv(L) + (1 - p)v(\bar{L}),$$

where  $p$  is the probability of the bad state of the world.

Exploring her options,  $m$  discovers that migrant workers in a neighboring country earn  $I^m \gg L$  with certainty. Unfortunately, migrating to that country costs  $c$ , where  $I^0 < c < 2I^0$ , so that it is more than she can afford. Moreover, there is neither an option to borrow against future income (i.e.,  $m$  is liquidity constrained) nor a facility to avail of a loan (i.e., she is also credit constrained).  $m$ , however, can try to convince  $h$  to pool their first-period resources to enable her to migrate in return for a state-contingent share in her second-period income, so that both of them will each have a higher overall welfare, whatever  $h$ 's second-period outcome turns out to be.

Formally,  $m$ 's offer can be described as follows: Let  $\omega$  be  $m$ 's share of her migration cost, and  $\underline{T}$  and  $\bar{T}$  be the transfers that  $m$  commits to provide  $h$  in the bad and good states of the world, respectively.  $m$  has a principal-agent problem of the form

$$\max_{\omega, \underline{T}, \bar{T}} E(V^m) \text{ s.t. } E(V^h) \geq \underline{V}^h,$$

where  $\underline{V}^h$  is  $h$ 's minimum level of utility that is guaranteed by the contract. The set of Pareto-efficient insurance contracts for this problem consists of the triple  $(\omega^*, \underline{T}^*, \bar{T}^*)$  that jointly maximizes

$$E(V^m) + \lambda[E(V^h) - \underline{V}^h],$$

where  $\lambda$  is the relative bargaining power of  $h$ . Using the expected utility function described above, we may rewrite this objective function as

<sup>31</sup> This issue underscores the importance of exploring remittances using panel data sets, where changes in household incomes and in prevailing conditions can be sorted out.

<sup>32</sup> An early paper that points out the risk-dispersing feature of migration is Stark and Levhari (1982).

$$v(I^0 - \omega c) + pv(I^m - \underline{T}) + (1-p)v(I^m - \bar{T}) + \lambda\{v[I^0 - (1-\omega)c] + pv(\underline{I} + \underline{T}) + (1-p)v(\bar{I} + \bar{T})\},$$

the first-order conditions of which are:

$$-v'(I^0 - \omega c) + \lambda v'[I^0 - (1-\omega)c] = 0$$

$$-v'(I^m - \underline{T}) + \lambda v'(\underline{I} + \underline{T}) = 0$$

$$-v'(I^m - \bar{T}) + \lambda v'(\bar{I} + \bar{T}) = 0.$$

In effect, the necessary conditions of the optimal insurance arrangement can be summarized as

$$\frac{v'(I^0 - \omega c)}{v'[I^0 - (1-\omega)c]} = \frac{v'(I^m - \underline{T})}{v'(\underline{I} + \underline{T})} = \frac{v'(I^m - \bar{T})}{v'(\bar{I} + \bar{T})} = \lambda.$$

In other words, maximization of the objective function requires that, in period 0 as well as in each of the two states of the world, the ratio of  $m$ 's marginal felicity to that of  $h$  must be equal to the bargaining power of  $h$ .

As an illustration, suppose that  $\lambda = 2$ . Then the first equation of the first-order conditions implies that, at the last unit of net period-0 resources consumed, the marginal felicity of  $m$  must be twice that of  $h$ . Since  $m$  and  $h$  are risk averse, their marginal felicities decline as income rises. Consequently,  $m$ 's net period-0 resources must be less than  $h$ 's. But any difference in period-0 resources between  $m$  and  $h$  can only come from  $\omega$  and  $(1-\omega)$ . Hence, it must be that  $\omega > (1-\omega)$  or  $\omega > 1/2$ , i.e.,  $m$  bears more than half of the cost of her migration if  $h$ 's bargaining power is twice hers. (A similar analysis can be carried out on each of the other two equations. If  $\lambda = 2$ , they yield the results that  $\underline{T} > (I^m - \underline{I})/2$  and  $\bar{T} > (I^m - \bar{I})/2$ .)

There are two problems with the insurance arrangement, however. The first concerns the credibility of  $m$ 's promise to remit transfers, and the second has to do with the case in which  $h$ 's actions may have a bearing on his income in the second period.

With regard to the first issue, the question may be raised: After obtaining her benefits from the deal, what is to keep  $m$  from reneging on her commitment to  $h$ ? Without assets that can be used as collateral, which indeed is why  $m$  is unable to avail of a loan from formal sector sources to finance her migration in the first place, and absent any guarantor who can be made to bear the burden of such a loan,<sup>33</sup> the informal contract between  $m$  and  $h$ —at least when it is an anonymous transaction—suffers from a lack of second-party enforcement mechanisms (i.e., schemes by which  $h$  can compel  $m$  to honor her promise regarding the transfers).

Such sanctions, though, are readily available within a family setting or a kinship group. If  $m$  and  $h$  are not merely bound by a business deal but are members of a kinship network, news that  $m$  failed to comply with the terms of the agreement may cause her to lose face, not only among immediate members of the family, but in the larger community as well. Worse, she may be ostracized by the family or disinherited by her forebears as a result.

The upshot then is that the insurance motive is unable to stand on its own merits, but needs to be buttressed by other motives (e.g., altruism or inheritance) to be practicable.<sup>34</sup> But this “coupling”

<sup>33</sup> A page that can be taken from medieval bargaining practices, noted in North (1990), is that  $m$  can send a kin (whose closeness to her is indisputable) as a “hostage” in  $h$ 's household. The kin gains his freedom only after it is established that  $m$  has honored her end of the deal.

<sup>34</sup> de la Brière et al. (2002) tests the relative importance of the insurance and inheritance motives using panel data on migrants and origin households from the Dominican Sierra.

requirement, in turn, makes it difficult to verify the insurance model in empirical settings and to measure the extent to which it influences remittance behavior independently of other motives.

Turning to the second issue, suppose that, instead of home-country income being exogenously determined by Nature, it depends to some extent on  $h$ 's effort. For instance, it may well be that, in the good state of the world, income is an increasing function of effort, but, in the bad state, effort has no effect on income. Assume that effort itself causes a disutility that increases at an increasing rate. Then, for as long as  $m$  can be counted on to deliver her end of the deal,  $h$ 's problem may be cast as finding the effort level that maximizes the value of his expected preference index over income.

Formally, let  $h$ 's preferences over consumption and effort  $e$  be described by

$$V^h(C^h, e) = C^h - \frac{\beta}{2}e^2,$$

where  $\beta > 0$ . Let

$$C^h = \begin{cases} \bar{C}^h & \text{with probability } 1-p \\ \underline{C}^h & \text{with probability } p, \end{cases}$$

where  $\underline{C}^h < \bar{C}^h$ .

Then  $h$ 's expected utility function may be expressed as expected consumption less his disutility of effort:

$$E[V^h(C^h, e)] = (1-p)\left(\bar{C}^h - \frac{\beta}{2}e^2\right) + p\left(\underline{C}^h - \frac{\beta}{2}e^2\right) = E(C^h) - \frac{\beta}{2}e^2.$$

Suppose that  $h$ 's income  $I$  depends on effort only in the good state of the world, but is zero otherwise, so that

$$I = \begin{cases} \alpha e & \text{with probability } 1-p \\ 0 & \text{with probability } p, \end{cases}$$

where  $\alpha > 0$  is the marginal product of effort, and transfers from  $m$  are triggered when income falls below a mutually agreed upon level, i.e.,  $I < I^{\min}$ . Then  $h$ 's expected utility function may be rewritten in terms of effort for a given level of minimum guaranteed income as

$$E[V^h(e | I^{\min})] = (1-p)(\alpha e + \max\{I^{\min} - \alpha e, 0\}) + pI^{\min} - \frac{\beta}{2}e^2$$

$$= \begin{cases} (1-p)\alpha e + pI^{\min} - \frac{\beta}{2}e^2 & \text{if } \alpha e \geq I^{\min} \\ I^{\min} - \frac{\beta}{2}e^2 & \text{if } \alpha e < I^{\min}. \end{cases}$$

The first-order conditions of the problem are therefore given by

$$\frac{\partial E(V^h)}{\partial e} = \begin{cases} (1-p)\alpha - \beta e \leq 0 & \text{if } \alpha e \geq I^{\min} \\ -\beta e \leq 0 & \text{if } \alpha e < I^{\min}, \end{cases}$$

which yield the following solutions:

$$e^* = \begin{cases} e_1^* = (1-p)\frac{\alpha}{\beta} & \text{if } \alpha e \geq I^{\min} \\ e_2^* = 0 & \text{if } \alpha e < I^{\min}. \end{cases}$$

Moral hazard is precluded when, conditional on  $I^{\min}$ ,  $e_1^*$  yields a higher value of the expected preference function than  $e_2^*$ , i.e., when  $E[V^h(e_1^* | I^{\min})] \geq E[V^h(e_2^* | I^{\min})]$ , which in turn implies that  $(1-p)\alpha^2/(2\beta) \geq I^{\min}$ . Under this “no moral hazard” scenario, the following conditions obtain:

$$E(C^h) = \frac{[(1-p)\alpha]^2}{\beta} + pI^{\min}$$

$$E(T) = pI^{\min}$$

$$E(C^m) = (1-p)I^m + p(I^m - I^{\min}) = I^m - pI^{\min}.$$

In contrast, under the moral hazard scenario, the conditions are:

$$E(C^h) = E(T) = I^{\min} \quad \text{and} \quad E(C^m) = I^m - I^{\min}.$$

Some predictions that can be drawn from the insurance model are as follows: First, for as long as  $I^{\min}$  is low enough so that moral hazard is precluded, just as in the altruistic model, remittance amounts increase with the migrant’s (pre-transfer) income and decrease as the origin household’s (pre-transfer) income increases. Moreover, as in the altruistic model, a one currency-unit increase in the migrant’s (pre-transfer) income and a one currency-unit decrease in the origin household’s (pre-transfer) income generates a one-currency unit increase in remittances. Second, emigration from and remittances to places with more volatile incomes are more likely. Third, in contrast to the altruistic model, amounts remitted are highly variable and the frequency of remittances is intermittent. Moreover, while it can be argued in the case of the altruistic model that, over time, remittances gradually decline in amount and regularity as the migrant’s emotional attachment with the origin family fades, in the insurance model, remittances come to an abrupt stop as soon as the migrant’s contractual obligations are fulfilled. Fourth, again unlike in the altruistic model, remittance incidence among poor households is likely to be low, since poor households are less able to afford the migration costs of their members. Thus, in the insurance model, migrants are more likely to come from wealthy households with risky asset portfolios.<sup>35</sup> Fifth, if informal insurance contracts do not preclude moral hazard, the proportion of adult members who are not gainfully employed is likely to be higher among families with migrant members.<sup>36</sup> Sixth, the higher the burden of the migration cost the household agrees to bear relative to the value of its assets, the more likely it will engage in morally hazardous behavior.

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<sup>35</sup> Note a fine point on the implication for empirical testing: For a given household, it may well be that a decrease in income increases the amount remitted (as in the altruistic model)—a longitudinal effect. Across households, however, a lower income may mean lower remittance frequencies (because of a lower capacity to finance migrations)—a cross-section effect. This implies that panel data are needed to sort out these contrasting effects when empirically verifying the insurance model.

<sup>36</sup> Note that this does not mean that a higher unemployment rate among families with migrant members per se implies that they are engaged in morally hazardous behavior. A higher unemployment rate is only a necessary—not a sufficient—condition for moral hazard to be present. In addition, effort in generating labor income needs to be accounted for.

## Investment

As its name suggests, the investment model views migration as an opportunity for a family to increase its wealth. The idea is that a family may exploit spatial differences in wages by financing a member's costs of migration (as well as other preparatory or complementary activities, such as education and job search, that enhance her employability and earning potential in the host country) and in recompense receive annuities in the form of remittance payments.

As the investment model shares certain features with the insurance model, it is useful to point out the similarities as well as the fine distinctions between the two in order to appreciate each in starker relief. The most obvious similarity is that both are concerned with the spatial placements of family members. Unlike in the insurance model, however, the underlying reason for migrations in the investment model is not to minimize risk, but to take advantage of the wage differential between the origin and host countries. In effect, in the investment model, the family has no apprehensions about the geographic concentration of its members' relocations.

A second similarity is that the gamut of issues that beset the insurance model, e.g., the liquidity and credit constraints faced by the potential migrant (at least with respect to formal sector sources), the credibility of her commitment to remit payments once she has migrated, the personal (i.e., non-anonymous) nature of the contractual arrangement, and the norms, sanctions, and enforcement mechanisms that are in play in a family or kinship setting, attend the investment model as well. This has two implications: First, it serves as a reminder that, in studying the investment model (as well as the insurance model) in specific empirical settings, the researcher must pay particular attention to the institutional constraints—especially the specific expressions or formulations of norms, sanctions, and enforcement mechanisms that lend the informal contract a non-anonymous character. Moreover, the researcher needs to be sensitive to the possibility that other motives, such as altruism and inheritance, may be operative as well, as supportive enforcement mechanisms. Second, there is no need to rehash these issues in the exposition that follows.

An account of the investment model may be given thus: Assume that the production function of the family enterprise in the origin country is given by  $\alpha(\ell - \beta\ell^2/2)$ , where  $\ell$  is the number of household members and  $\alpha > 0$  and  $0 < \beta < 1$  are parameters. Suppose that there are two periods, 0 and 1, and each person needs at least  $I^{\min}$  to survive in each period. The household considers migrating in period 1. Let  $c$  be the cost of migration per person. If all household members work in period 0, then the number of migrants that can be financed by the household is given by

$$m^c = \left\lfloor \frac{\ell}{c} \left[ \alpha \left( 1 - \frac{\beta}{2} \ell \right) - I^{\min} \right] \right\rfloor,$$

where  $\lfloor x \rfloor$  is the floor function of (a generic) variable  $x$ . The liquidity constraint with respect to migration cost is binding if  $m^c < \ell$ . This is more likely to happen the smaller is the value of  $\alpha$  and the larger are the values of  $I^{\min}$  and  $c$ . As for household size, its effect on  $m^c$  is less straightforward. In general, for a given configuration of the parameters (including  $\ell$ ), migration cost would tend to be a binding constraint the larger  $\ell$  is. This is because, treating  $\ell$  as a real number rather than an integer, the second derivative of the expression in the floor function with respect to  $\ell$  is negative, which implies the following: If steps (i.e., the values of  $m^c$ ) are rising (falling), the half close-half open interval  $[\ell^*, \ell^*)$  over which a given value of  $m^c$  remains the same tends to be longer (shorter) the higher (lower)  $m^c$  is.

On the other hand, the liquidity constraint does not bind if  $m^c \geq \ell$ . For households that are thus unconstrained, it is the profitability of migration that matters. Let  $I^m$  be the income of a migrant in a host country. Then the problem of liquidity-unconstrained households is to

$$\max_m \alpha \left( \ell - \frac{\beta}{2} \ell^2 \right) - mc + \alpha \left[ (\ell - m) - \frac{\beta}{2} (\ell - m)^2 \right] + mI^m,$$

where  $m$  is the number of migrants. From the first-order conditions, the optimal number of migrants may be derived as

$$m^* = \begin{cases} 0 & \text{if } I^m - c < \alpha(1 - \beta\ell) \\ \frac{I^m - c}{\alpha\beta} - \frac{1 - \beta\ell}{\beta} & \text{if } I^m - c = \alpha(1 - \beta\ell) \\ \ell & \text{if } I^m - c > \alpha. \end{cases}$$

In other words, for liquidity unconstrained households, the number of members who are sent to migrate to maximize profits is (a) zero if a migrant's income net of migration cost is less than the value of her marginal product in the family enterprise, (b) that level ( $0 < m^* < \ell$ ) where, for the last household member who migrates, the net marginal benefits of migration and of working in the family enterprise are just offsetting, and (c) the entire household if the net benefits of migration per person exceed the productivity parameter  $\alpha$  of the family enterprise. It can be readily inferred from this optimizing rule that  $m^*$  is higher the larger are  $I^m$  and  $\ell$  and the smaller are  $\alpha$  and  $c$ .

The observed number of migrants thus depends on both the liquidity constraint and the profitability conditions. It is given by  $m^o = \min\{m^c, m^*\}$ .

When  $m^o < \ell$ , transfers will be observed. Assuming that total income is equally shared among household members, transfers will be the difference between mean household income and the origin-country income per household member left behind, i.e.,

$$\begin{aligned} T &= \frac{1}{\ell} \left\{ \alpha \left[ (\ell - m^o) - \frac{\beta}{2} (\ell - m^o)^2 \right] + m^o I^m \right\} - \frac{\alpha}{\ell - m^o} \left[ (\ell - m^o) - \frac{\beta}{2} (\ell - m^o)^2 \right] \\ &= \frac{m^o}{\ell} \left\{ I^m - \alpha \left[ 1 - \frac{\beta}{2} (\ell - m^o) \right] \right\}. \end{aligned}$$

The interesting predictions of the investment model concerns the technical efficiency of the family enterprise in the origin country, which has opposing impacts on liquidity-constrained and profitability-motivated migrations. As may be noted, when the family enterprise is unproductive, what limits the number of migrants is the binding liquidity constraint. Accordingly, improvements in productivity relax this constraint and afford more migrations. In contrast, when the family enterprise is productive, the family's consideration turns to whether or not a member's relocation increases total family income. The more productive the family enterprise is, however, the less likely working elsewhere can do so. Thus, the investment model predicts that, as a proportion of family size, the fewest migrations will be observed among the poorest and richest families—the former because they cannot afford it, the latter because it is not sufficiently profitable.<sup>37</sup>

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<sup>37</sup> An interesting implication for the Philippines that may be inferred from this prediction concerns the beneficiaries of agrarian reform, on the one hand, and the families whose landholdings were appropriated, on the other hand. Since greater asset holdings improve the income-generating capacity of the family enterprise, the liquidity constraint with respect to migration cost is relaxed for the beneficiaries. Since reduced asset holdings worsen the income-generating capacity of the family enterprise, the profitability of migration is enhanced for the displaced landowners. Hence, if the investment model is correct, proportionately more family members of agrarian reform beneficiaries and of the displaced landowners can be expected to migrate than members of families taken at random.

A related set of implications concerns differences in the distributions of factor payments or of wages between the host and origin countries. Specifically, the fewest migrations will be observed in those professions and occupations with the narrowest earnings differentials or with the least harmony in technical standards. Professionals and skilled workers in occupations that have common technical standards and rules and have the highest wage differentials have the greatest incentives to migrate. In contrast, workers whose talents, skills, and habits are less well adapted to the host-country environment do not find relocating as attractive.

As for remittances, the implications of the investment model are that these disbursements will be (a) constant (i.e., will not diminish over time) and regular (i.e., not intermittent) to the extent that transfers represent payments for the migrant's foregone contribution to the family enterprise or, what amounts to the same thing, her foregone contribution to family income, (b) larger the larger is the income of the migrant and the lower is the pre-transfer income of the household, and (c) increasing at a decreasing rate with respect to number of migrants (implying that the amount remitted by each migrant falls as the number of members who migrate increases). In addition, the model predicts that, on a per member basis, transfers will decrease at a decreasing rate as the household size increases.

Finally, among all the remittance-motives models, the investment model is the only one that reminds that migration can be a long-term goal involving a series of preparatory activities and related decisions, such as choice of school, years of schooling and educational attainment, occupation, career, and work experience.<sup>38</sup> Indeed, the test proposed in Lucas and Stark (1985) for discerning an investment motive in remittances relies on this insight: Since the immediate family usually finances a person's education, the coefficient of a son's or daughter's education in a remittance equation should be higher than that of an in-law's education. Similarly, Hoddinott (1994) interprets the positive and statistically significant coefficient of the migrant-son's earnings in his remittance regressions as repayments for past parental investments in the sons' education (reinforced by the prospect of bequests).

An implication of the investment motive is that the marginal effects of preparatory activities on migration must be accounted for in calculations of the social and private costs and benefits of migration. Policies should then see to it that, at the last worker who emigrates due to the investment motive, the marginal social benefits of the decision chain (that may include schooling choices) just equal its marginal social cost. Obviously, this is easier said than done. Nonetheless, glaring examples ought to be curbed, such as the subsidized costs of medical education.

### Inheritance

The inheritance model posits that remittances are a—if not *the*—criterion by which migrant sons and daughters are judged when parental bequests are formulated. Strategic behavior is assumed on both sides of the generational divide: Parents use bequests to reward good behavior, measured by the degree to which the migrant has honored his or her contractual obligations (in the cases of the exchange, insurance, and investment motives) and exhibited his care and concern for the family (beyond minimum accepted standards); migrant sons and daughters use remittances as stakes on inheritance claims.<sup>39</sup> In effect, parents use bequests (or the withholding thereof) as a means to

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<sup>38</sup> Given the Philippines' long record of emigrating workers, it may be interesting to explore to what extent choices on schooling, occupation, career, and work experience are or have been motivated by the desire to emigrate or work overseas.

<sup>39</sup> Obviously, the behaviors of both parents and offspring are culturally delimited to some extent. Under primogeniture, for instance, daughters and low birth-order sons do not have an incentive to make inheritance investments, and the "game" would be between the parents and oldest son only.

secure remittances from migrant sons and daughters, and migrant sons and daughters use remittances as investments in inheritance.

The inheritance model makes the following predictions: The amount remitted by a migrant son or daughter is larger and more regular (a) the higher the value of household assets not yet bequeathed, (b) the higher the likelihood of being named the major beneficiary, and (c) the wealthier the migrant worker. It is smaller and more intermittent the riskier the investment in inheritance is perceived to be compared to other investment opportunities.

Lucas and Stark (1985) discuss the inheritance motive and find that sons who are more likely to inherit family owned assets than daughters do remit more when the household owns more cattle, the main inheritable asset. The interpretation of the result, however, cannot disentangle the inheritance motive from the exchange motive, since cattle herds of families are combined. Hodinott (1994) finds empirical support for the inheritance motive using data from rural Western Kenya.



## Appendix II A Model of Giving Practices

In the main text, we contend that Filipino giving practice (which is characterized by high incidence but small contributions) must be based on social norms, as defined in Fehr and Gächter (2000), which emerged and have persisted from considerations of reciprocity. Peterson (1993) provides accounts of how poor Filipino families are able to cope and materially prosper by drawing on the resources of a wide network blood and affinal relations: A distinctive aspect of these strategies is that, when in need, a family is not necessarily assisted by clan members it has specifically helped in the past, but by those who have extra resources at that time—the intent of assistance apparently being the raising up of the average welfare of the clan rather than helping particular members.

What accounts for such giving practices in poor rural settings, which in time give way to norms that persist even after the original conditions no longer hold? What conditions and parameters in “imagined communities” make it conducive for giving norms to emerge such that, when asked, those families who have something extra are impelled to give but in small amounts? This section presents a simple model of giving behavior in an insurance network and explores the conditions under which such giving practices are plausible.

Suppose that, in a poor economy, each family earns  $y$  with probability  $(1 - p)$  and 0 with probability  $p$  and that it needs at least  $c$  for its upkeep, which in a bad year sets it back by  $-d$  (perhaps because members have to do hard labor, forage, or travel long distances). The family’s expected income is therefore  $y_0 = (1 - p)y - pd$ .

Suppose that outcomes are independent across family units, and networks have formed to pool resources. Let the insurance scheme be as follows: When a family has a good year, it is required to contribute  $xc/(n + 1 - x)$  to an assistance fund if  $y - xc/(n + 1 - x) \geq c$ , and  $y - c > 0$  otherwise, where  $n + 1$  is the size of the network and  $x$  is the number of other families experiencing a bad year. (Note that when  $y - xc/(n + 1 - x) < c$ , the network appropriates  $y - c$ , even if excess resources are not sufficient to cover the  $xc$  that families in need require.) When a family has a bad year, it receives  $c$  if the network collects  $(x + 1)c$ , but is set back by  $-d$  otherwise, notwithstanding the  $(n - x)(y - c) < (x + 1)c$  that the network raises. (In other words,  $-d$  is a fixed cost that a family suffers when it receives less than  $c$  in resources.) The family’s expected income under the insurance scheme is therefore

$$y_1 = p \left[ \sum_{x=0}^{x^*} \Pr(x)c - \sum_{x=x^{**}+1}^n \Pr(x)d \right] + (1-p) \left[ \sum_{x=0}^{x^*} \Pr(x) \left( y - \frac{xc}{n+1-x} \right) + \sum_{x=x^{**}+1}^n \Pr(x)c \right]$$

$$= p[Q^{**}c - (1-Q^{**})d] + (1-p) \left\{ Q^*y - c \sum_{x=1}^{x^*} \frac{q_x x}{n+1-x} + (1-Q^*)c \right\},$$

where

$$q_x \equiv \Pr(x) = \frac{n!}{(n-x)!x!} p^x (1-p)^{n-x} \quad \text{for } x = 0, \dots, n,$$

is the (binomial) probability that  $x$  of the  $n$  other families experience bad outcomes,

$$Q^* = \sum_{x=0}^{x^*} q_x$$

is the probability that (when the family of interest has a good year) the needs of the families in need are met,

$$Q^{**} = \sum_{x=0}^{x^{**}} q_x$$

is the probability that (when the family of interest has a bad year) the network is able to support its needs,

$$x^* \equiv \max \left\{ x \mid y - \frac{xc}{n+1-x} \geq c \right\}$$

is the maximum number of other families in need whose requirements can be funded for a given configuration of  $y$ ,  $c$ , and  $n$  (when the family of interest has a good year), and

$$x^{**} \equiv \max \left\{ x \mid y - \frac{(x+1)c}{n-x} \geq c \right\}$$

is the maximum number of other families in need whose requirements plus that of the family of interest (when it experiences a bad year) can be funded for a given configuration of  $y$ ,  $c$ , and  $n$ .

It is helpful to explore the components of  $y_1$ . Note that it is a weighted sum of expected income in a bad year,  $Q^{**}c - (1 - Q^{**})d$ , and in a good year,  $Q^*y - c \sum_{x=1}^{x^*} q_x x / (n+1-x) + (1 - Q^*)c$ , where the weights are the probabilities  $p$  and  $(1 - p)$ . In turn, expected income in a bad year is a weighted sum of  $c$ , the amount meted out to each family in need when excess resources in the network are sufficient to cover total needs, which obtains with probability  $Q^{**}$ , and  $-d$ , the cost incurred by a family in need when network resources are insufficient, which occurs with probability  $(1 - Q^{**})$ . Similarly, expected income in a good year is a weighted sum of the expected income when income in excess of the contribution asked for,  $Q^*y - c \sum_{x=1}^{x^*} q_x x / (n+1-x)$ , is at least as large as income for getting by,  $c$ , and when it is not,  $(1 - Q^*)c$ .

Accordingly, a family will opt to remain in a network if and only if  $y_1 \geq y_0$ , or

$$(1-p)(1-Q^*)(y-c) \leq pQ^{**}d, \tag{A2.1}$$

since  $pQ^{**} = (1-p) \sum_{x=1}^{x^*} q_x x / (n+1-x)$ . That is, a family will not opt out of the insurance scheme if and only if expected income that is appropriated by the insurance network  $(1-p)(1-Q^*)(y-c)$  (when the family has a good year but the other families in need exceed the number that can be adequately supported by the network) is at most as great as the reduction in the expected value of disaster income,  $pQ^{**}d$  (because resource pooling reduces the probability of the bad outcome, thereby increasing the expected value of income in that state).

It is readily inferred from (A2.1) that, because their coefficients are probabilities and therefore in the unit interval, the higher are the values of  $d$  and  $c$ , and the lower is the value of  $y$  (though, by assumption, it must be greater than  $c$ ), the more likely is (A2.1) satisfied for a given configuration of  $p$  and  $n$ . In other words, families are more likely to remain in an insurance network, the higher is the cost of a bad outcome or the value of “guaranteed” income, conditional on excess resources being generated by the network, and the lower is income in a good year.

For our purposes, the parameter whose impact is important to explore is the size of the network,  $n$ . Note that in (A2.1) it enters in  $Q^{**}$  and  $Q^*$ , both directly through the component probabilities  $q_x$  and indirectly through  $x^{**}$  in the case of  $Q^{**}$  and through  $x^*$  in the case of  $Q^*$ . While the effect of  $n$  can be derived in principle, it is difficult to do so in practice, involving as it does derivatives of factorials, which do not have closed form solutions.

To get a sense of the complexity of this problem, let

$$q_z = \Pr(z) = \frac{n!}{(n-z)!z!} p^z (1-p)^{n-z} \quad \text{for } z = 0, \dots, x^* \text{ or } x^{**}.$$

Then the effect of  $n$  on  $q_z$  is given by

$$dq_z = \left\{ \left[ \frac{\Gamma(n+1)\psi(n+1)}{(n-z)!z!} - \frac{n!\Gamma(n-z+1)\psi(n-z+1)}{(n-z)!^2 z!} \right] p^z (1-p)^{n-z} + \frac{n!}{(n-z)!z!} p^z (1-p)^{n-z} \ln(1-p) \right\} dn$$

if  $z < x^*$  or  $x^{**}$ , and

$$dq_z = p^z (1-p)^{n-z} \left\{ \left[ \frac{\Gamma(n+1)\psi(n+1) + n! \ln(1-p)}{(n-z)!z!} - \frac{n!z!\Gamma(n-z+1)\psi(n-z+1)}{[(n-z)!z!]^2} \right] dn \right. \\ \left. + \frac{n! \left\{ z!\Gamma(n-z+1)\psi(n-z+1) \left[ z'(n)dn \right] - (n-z)!\Gamma(z+1)\psi(z+1) \left[ z'(n)dn \right] \right\}}{[(n-z)!z!]^2} \right. \\ \left. + \frac{n! \{ \ln p - \ln(1-p) \} \left[ z'(n)dn \right]}{(n-z)!z!} \right\}$$

if  $z = x^*$  or  $x^{**}$ , where

$$\Gamma(n+1) = \int_0^\infty x^n e^{-x} dx = n!$$

is the Euler gamma function,

$$\psi(n+1) = \frac{\Gamma'(n+1)}{\Gamma(n+1)}$$

is the digamma function or the logarithmic derivative of the gamma function, and

$$\left[ z'(n)dn \right] = \left[ x''(n)dn \right] = \left[ x^{**'}(n)dn \right] = \left[ \left( 1 - \frac{c}{y} \right) dn \right],$$

which implies that  $0 < z'(n) < 1$  or that  $x^*$  and  $x^{**}$  do not increase as fast as  $n$ .

To get around this problem, we therefore work with the general form of the derivatives of  $n$  through  $Q^*$  and  $Q^{**}$  instead of  $q_x$ . Note that if (A2.1) holds, the effect of  $n$  for the condition to continue to hold is given by

$$-\frac{\frac{\partial Q^*}{\partial x^*} \frac{\partial x^*}{\partial n} + \frac{\partial Q^*}{\partial n}}{\frac{\partial Q^{**}}{\partial x^{**}} \frac{\partial x^{**}}{\partial n} + \frac{\partial Q^{**}}{\partial n}} \leq \frac{p}{1-p} \cdot \frac{d}{y-c} \quad \text{if } \frac{\partial Q^{**}}{\partial x^{**}} \frac{\partial x^{**}}{\partial n} + \frac{\partial Q^{**}}{\partial n} > 0$$

and

$$\left| \frac{\frac{\partial Q^*}{\partial x^*} \frac{\partial x^*}{\partial n} + \frac{\partial Q^*}{\partial n}}{\frac{\partial Q^{**}}{\partial x^{**}} \frac{\partial x^{**}}{\partial n} + \frac{\partial Q^{**}}{\partial n}} \right| \geq \frac{p}{1-p} \cdot \frac{d}{y-c} \quad \text{if } \frac{\partial Q^{**}}{\partial x^{**}} \frac{\partial x^{**}}{\partial n} + \frac{\partial Q^{**}}{\partial n} < 0.$$

(A2.2)

To get a sense of (A2.2), observe first the effect of  $n$  on the probability of the “sufficiently insured” outcomes  $Q$  (i.e., either  $Q^*$  or  $Q^{**}$ ). Note that it is the sum of two quantities: First,  $(\partial Q/\partial z)(\partial z/\partial n)$ , where  $z = x^*$  or  $x^{**}$ , measures the possible increase in  $Q$  because, holding the shape of the (binomial) probability distribution fixed, the maximum number of families that can be covered may increase with  $n$ , as indicated by

$$dz = \left[ x^*(n)dn \right] = \left[ x^{**}(n)dn \right] = \left[ \left( 1 - \frac{c}{y} \right) dn \right],$$

which implies that  $0 \leq dz/dn < 1$  or that there is a “bottling up” effect until  $dn$  is sufficiently large to effect an integer-unit effect on  $dz$ . Second,  $\partial Q/\partial n$  measures the change in  $Q$  because, holding  $x^*$  or  $x^{**}$  fixed, the shape of the binomial probability distribution becomes more and more that of the normal distribution as  $n$  increases. In other words, the effect of  $n$  on the binomial probability distribution is that it reduces the probabilities of (extremely) small and large values of  $x$  and increases the probabilities of its mid-range values. The net effect of  $n$  on  $Q$  can therefore be positive, negative, or zero, depending on whether  $x^*$  or  $x^{**}$  extends out at a rate faster than, slower than, or equal to the “normalizing” shape of the binomial probability distribution. The net effect is more likely to be positive, the closer the value of  $p$  is to 0, since this implies that the positive skewness of the probability distribution disappears more slowly.

We can now explore the four possible cases of (A2.2). Suppose that  $Q^{**}[x^{**}(n)] + Q^{**}(n) > 0$ . Then  $Q^*[x^*(n)] + Q^*(n) > 0$  automatically satisfies (A2.2). That is, the insurance scheme continues to be viable if, as  $n$  increases, the rates of change in the probabilities of events in which insurance coverage is adequate, both when the family of interest is a transfer provider and when it is a transfer recipient, are positive. This is because  $Q^{**}[x^{**}(n)] + Q^{**}(n) > 0$  decreases the expected value of disaster income, and  $Q^*[x^*(n)] + Q^*(n) > 0$  decreases the expected value of appropriated income. In contrast, if  $Q^*[x^*(n)] + Q^*(n) < 0$ , then the insurance scheme remains viable only if, as  $n$  increases, the rate of decrease in this probability per unit of increase in  $Q^{**}[x^{**}(n)] + Q^{**}(n)$  is less than or equal to the ratio of the expected value of disaster income averted  $[-(-pd)]$ , to that of foregone income, which is the marginal benefit to marginal cost ratio. If this were not so, so that the rate at which the probability of outcomes that are not adequately covered by the insurance scheme (when the family of interest has a good year),  $1 - Q^*$ , relative to the rate at which the probability of outcomes covered by the insurance scheme (when the family has a bad year),  $Q^{**}$ , rises faster than the marginal benefit to marginal cost ratio, then the family of interest would be giving up more to the insurance scheme in the form of the expected value of foregone income than it gets in return in terms of the expected value of disaster income averted.

Suppose that  $Q^{**}[x^{**}(n)] + Q^{**}(n) < 0$ . Then the insurance scheme remains viable if  $Q^*[x^*(n)] + Q^*(n) > 0$  and the rate of increase in this probability per unit of change in the absolute value of  $Q^{**}[x^{**}(n)] + Q^{**}(n)$  is greater than the expected value of disaster income averted per unit of the expected value of income foregone. In other words, if  $Q^{**}$  is falling as  $n$  increases,  $1 - Q^*$  should fall at a faster rate for the insurance scheme to remain viable. The last case—that  $Q^*[x^*(n)] + Q^*(n) < 0$ , given  $Q^{**}[x^{**}(n)] + Q^{**}(n) < 0$ —is not possible, since then the inequality

$$-\left( \frac{\partial Q^*}{\partial x^*} \frac{\partial x^*}{\partial n} + \frac{\partial Q^*}{\partial n} \right) (1-p)(y-c) \leq \left( \frac{\partial Q^{**}}{\partial x^{**}} \frac{\partial x^{**}}{\partial n} + \frac{\partial Q^{**}}{\partial n} \right) pd$$

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cannot be satisfied.

A final issue remains to be considered. What configuration of parameters gave rise to the Filipino giving norm which impels everyone to give but in small amounts? The model suggests that the difference between  $y$  and  $c$  cannot be too large relative to  $d$ ; otherwise, (A2.1) cannot be satisfied. This explains why the insurance scheme can only work in poor environments. In addition, the model suggests that  $p$  must be small for  $n$  to be large, for a given (small) difference between  $y$  and  $c$ . The small value of  $p$  allows the number of adequately insured families to grow at a faster rate than the roll out of the binomial probability distribution, as the number of insured family units increases. The consequence of a large  $n$  is then that everyone who is better off gives, but because the difference between  $y$  and  $c$  is small, the amounts given are not sizeable.

Appendix Table 1a  
Testing the Endogeneity of Labor Income, All Overseas Workers

Variable	OLS Labor Income (Log)	Predicted Heckman's Selection (Two step)		Predicted Heckman's Selection (ML)	
		Selection	Amount	Selection	Amount
Labor income (Log)		-0.52662 0.248 ** 0.284 *	0.13408 0.151 0.149	-0.46515 0.286 0.290	0.13231 0.162 0.149
Predicted residuals		0.36353 0.249 0.284	-0.14075 0.149 0.149	0.31777 0.268 0.287	-0.14080 0.155 0.148
<b>Instrumental Variables</b>					
Tropical cyclone occurrences (Total number in a year)	-0.06956 0.024 *** 0.024 ***				
Provincial employment rate	-0.02620 0.013 ** 0.014 *				
<b>Characteristics of overseas worker</b> (Dummy base category: Son or daughter)					
Household head or spouse	0.35581 0.229 0.213 *	0.38618 0.266 0.290	0.03970 0.154 0.157	0.33214 0.270 0.289	0.04717 0.162 0.156
Son- or daughter-in-law	0.22066 0.219 0.199	-0.24554 0.227 0.251	-0.22331 0.143 0.156	-0.24918 0.230 0.256	-0.22986 0.154 0.152
Grandson or granddaughter	1.19107 0.578 ** 0.316 ***	0.31846 0.621 2.035	-0.03050 0.400 0.315	0.08407 0.694 2.418	-0.05281 0.309 0.307
Other relative and non-relative	0.41369 0.245 * 0.228 *	0.02260 0.272 0.291	-0.60084 0.167 *** 0.189 ***	0.04530 0.274 0.292	-0.59368 0.188 *** 0.188 ***
Male	-0.22522 0.119 * 0.115 *	-0.19719 0.135 0.139	0.19100 0.080 ** 0.081 **	-0.22834 0.127 * 0.138 *	0.18287 0.084 ** 0.081 **
Married	-0.02102 0.158 0.145	0.08466 0.164 0.184	0.13141 0.098 0.105	0.07636 0.167 0.188	0.13443 0.104 0.104
Age in years	-0.02641 0.032 0.029	0.00969 0.035 0.039	0.01146 0.020 0.021	0.00171 0.035 0.039	0.01214 0.019 0.021
Age in years squared	0.00032 0.000 0.000	-0.00016 0.000 0.000	-0.00004 0.000 0.000	-0.00004 0.000 0.000	-0.00005 0.000 0.000
(Dummy base category: College graduate)					
Attended grade school	-0.09870 0.419 0.350	-0.38766 0.377 0.901	-0.56436 0.265 ** 0.258 **	-0.38524 0.364 1.024	-0.58302 0.236 ** 0.245 **
Grade school graduate	-0.82991 0.236 *** 0.236 ***	-0.48663 0.332 0.390	-0.44252 0.192 ** 0.191 **	-0.47488 0.365 0.391	-0.44785 0.194 ** 0.189 **

Appendix Table 1a  
Testing the Endogeneity of Labor Income, All Overseas Workers

Variable	OLS Labor Income (Log)	Predicted Heckman's Selection (Two step)		Predicted Heckman's Selection (ML)	
		Selection	Amount	Selection	Amount
Attended high school	-0.79146 0.190 *** 0.183 ***	-0.78969 0.277 *** 0.316 **	-0.21410 0.180 0.178	-0.71885 0.338 ** 0.323 **	-0.22454 0.205 0.179
High school graduate	-0.67376 0.120 *** 0.115 ***	-0.29035 0.211 0.237	-0.21274 0.124 * 0.126 *	-0.29517 0.219 0.236	-0.21535 0.128 * 0.125 *
Attended post-secondary school	-0.42701 0.215 ** 0.200 **	-0.44248 0.250 * 0.275	-0.20098 0.152 0.181	-0.31459 0.330 0.294	-0.19780 0.186 0.184
Attended college	-0.41170 0.117 *** 0.114 ***	-0.13573 0.165 0.180	-0.14474 0.094 0.093	-0.12742 0.161 0.180	-0.14558 0.090 0.092
Work experience abroad (in months from 10/1998)	-0.00821 0.009 0.008	0.02233 0.010 ** 0.011 **	0.01135 0.006 ** 0.006 **	0.01718 0.013 0.012	0.01164 0.006 * 0.006 **
Work experience abroad (in months from 10/1998) squared	0.00010 0.000 0.000	-0.00001 0.000 0.000	-0.00007 0.000 0.000	0.00006 0.000 0.000	-0.00007 0.000 0.000
Last left the country (in months from 10/1998)	-0.02611 0.014 * 0.013 *	0.05098 0.015 *** 0.015 ***	0.01746 0.012 0.014	0.05111 0.016 *** 0.016 ***	0.01923 0.018 0.015
Last left the country (in months from 10/1998) squared	0.00034 0.000 * 0.000 *	-0.00034 0.000 0.000	-0.00025 0.000 * 0.000	-0.00036 0.000 * 0.000	-0.00027 0.000 0.000
<b>Type of visa</b>					
(Dummy base category: Working visa)					
Immigrant visa	0.33799 0.276 0.290	0.16475 0.364 0.819	-0.32737 0.171 * 0.193 *	0.35511 0.433 0.898	-0.32033 0.187 * 0.194 *
Other visa	0.56952 0.306 * 0.253 **	-0.54491 0.303 * 0.333	-0.00929 0.237 0.281	-0.56485 0.299 * 0.333 *	-0.02816 0.268 0.266
<b>Kind of work in host country</b>					
(Dummy base category: Unskilled worker)					
Special occupation	1.17792 0.591 ** 0.504 **	0.27084 0.691 1.989	-0.02234 0.415 0.472	0.17004 0.644 2.482	-0.00561 0.408 0.467
Corporate executive, manager, or proprietor	0.75149 0.303 ** 0.320 **	0.42780 0.382 0.644	0.47406 0.218 ** 0.186 **	0.34292 0.433 0.709	0.47389 0.194 ** 0.187 **
Professional	0.39978 0.174 ** 0.185 **	0.84626 0.244 *** 0.288 ***	0.25046 0.133 * 0.139 *	0.79059 0.288 *** 0.297 ***	0.25917 0.161 0.140 *

Appendix Table 1a  
Testing the Endogeneity of Labor Income, All Overseas Workers

Variable	OLS Labor Income (Log)	Predicted		Predicted	
		Heckman's Selection Selection	Heckman's Selection (Two step) Amount	Heckman's Selection (ML) Selection	Heckman's Selection (ML) Amount
Technician or associate professional	0.48808 0.170 *** 0.163 ***	0.13405 0.208 0.233	0.33206 0.128 *** 0.125 ***	0.16666 0.217 0.235	0.33344 0.128 *** 0.124 ***
Clerk	0.43148 0.243 * 0.228 *	0.04133 0.277 0.259	-0.00153 0.162 0.178	0.03830 0.243 0.260	0.00303 0.168 0.177
Service or sales workers	0.22030 0.149 0.148	0.19032 0.173 0.189	0.19984 0.096 ** 0.095 **	0.21867 0.178 0.187	0.20441 0.096 ** 0.094 **
Farmer, forestry worker, or fisherman	-1.20932 0.639 * 0.993	-1.66470 0.637 *** 2.347	0.06846 0.475 0.525	-1.52799 0.705 ** 2.770	0.03693 0.517 0.521
Tradesman or related worker	0.36922 0.156 ** 0.154 **	0.24052 0.191 0.201	0.10996 0.109 0.111	0.26656 0.188 0.199	0.11343 0.113 0.111
Plant & machine operator or assembler	0.47972 0.158 *** 0.161 ***	0.07271 0.207 0.231	0.16886 0.121 0.120	0.07752 0.206 0.226	0.16929 0.119 0.120
<b>Characteristics of host country</b>					
<i>By income</i>					
(Dummy base category: High income country)					
Low income country	0.03332 0.650 0.566	-0.21315 0.678 2.803	0.50800 0.395 0.382	-0.33326 0.547 11.070	0.50322 0.333 0.375
Lower middle-income country	0.13269 0.278 0.283	-0.02877 0.299 0.385	-0.09931 0.170 0.181	0.03337 0.318 0.391	-0.09111 0.173 0.179
Upper middle-income country	-0.14881 0.130 0.141	-0.10728 0.140 0.151	0.18608 0.081 ** 0.081 **	-0.09715 0.141 0.152	0.18506 0.081 ** 0.080 **
Other income country	-0.57979 0.359 0.832	0.11842 0.466 1.890	0.64894 0.228 *** 0.219 ***	0.07496 0.432 2.335	0.65453 0.204 *** 0.216 ***
<i>By location</i>					
(Dummy base category: In Asia and the Pacific)					
In Africa, Eastern and Central Europe	0.12140 0.460 0.561	-0.10456 0.495 1.136	0.39177 0.285 0.209 *	-0.32805 0.534 1.352	0.37324 0.197 * 0.205 *
In the Middle East	0.37905 0.125 *** 0.125 ***	0.22478 0.155 0.181	-0.28824 0.093 *** 0.095 ***	0.22069 0.161 0.180	-0.28462 0.096 *** 0.094 ***
In America and Western Europe	0.11503 0.132 0.142	0.40235 0.159 ** 0.181 **	0.27474 0.086 *** 0.078 ***	0.41149 0.177 ** 0.183 **	0.28259 0.090 *** 0.078 ***



Appendix Table 1a  
Testing the Endogeneity of Labor Income, All Overseas Workers

Variable	OLS Labor Income (Log)	Predicted Heckman's Selection (Two step)		Predicted Heckman's Selection (ML)	
		Selection	Amount	Selection	Amount
<b>Characteristics of origin household</b>					
Asset income	0.00000 0.000 0.000	0.00000 0.000 0.000	0.00000 0.000 0.000	0.00000 0.000 0.000	0.00000 0.000 0.000
Male household head	0.07176 0.096 0.095	-0.27426 0.111 ** 0.121 **	-0.16796 0.062 *** 0.065 ***	-0.27680 0.111 ** 0.121 **	-0.17688 0.065 *** 0.065 ***
Age in years of the household head	0.02545 0.023 0.023	-0.00087 0.027 0.027	-0.00700 0.014 0.016	-0.00033 0.024 0.026	-0.00718 0.015 0.016
Age in years of the household head squared	-0.00026 0.000 0.000	0.00003 0.000 0.000	0.00002 0.000 0.000	0.00003 0.000 0.000	0.00003 0.000 0.000
Number of household members 14 years and younger	-0.02401 0.032 0.032	0.02063 0.035 0.039	0.07978 0.020 *** 0.021 ***	0.02032 0.040 0.040	0.08083 0.020 *** 0.021 ***
Number of household members between 15 and 24 years old	0.20808 0.035 *** 0.034 ***	0.15907 0.067 ** 0.072 **	0.03671 0.039 0.041	0.13009 0.074 * 0.075 *	0.03770 0.043 0.041
Number of household members 25 years and older	0.40271 0.040 *** 0.036 ***	0.14296 0.110 0.125	-0.03521 0.065 0.066	0.15541 0.114 0.126	-0.03309 0.067 0.065
(Dummy base category: Resides in NCR, CALABARZON, MIMAROPA, and Central Luzon)					
Resides in the rest of Luzon	-0.27087 0.155 * 0.163 *	-0.14086 0.214 0.242	-0.10130 0.125 0.125	-0.08682 0.240 0.247	-0.09662 0.123 0.123
Resides in the Visayas	-0.70246 0.133 *** 0.143 ***	-0.47846 0.246 * 0.286 *	0.11985 0.147 0.145	-0.41486 0.274 0.287	0.11953 0.158 0.145
Resides in Mindanao	-1.07002 0.171 *** 0.180 ***	-0.55821 0.275 ** 0.308 *	-0.37051 0.168 ** 0.170 **	-0.46762 0.346 0.318	-0.37248 0.185 ** 0.169 **
Constant	12.44301 1.412 *** 1.446 ***	4.18071 2.686 3.065	9.36386 1.562 *** 1.670 ***	3.71190 2.914 3.103	9.29882 1.599 *** 1.656 ***

Appendix Table 1a  
Testing the Endogeneity of Labor Income, All Overseas Workers

Variable	OLS Labor Income (Log)	Predicted Heckman's Selection (Two step)		Predicted Heckman's Selection (ML)	
		Selection	Amount	Selection	Amount
$\rho$ (Heckman ML)	-0.65614 0.477 0.347 *				
$\sigma$ (Heckman ML)	0.92013 0.092 +++ 0.048 +++				
$\lambda$ (Heckman Two step)			-0.69192 0.325 ** 0.368 *		
$R^2$	0.234				
Log Pseudo Likelihood Function				-2369.366	
Number of observations	1669	1669	1445	1669	1445

Note:

The numbers below the coefficient/parameter estimates are robust (Huber/White/sandwich) standard errors. The first is generated from one regression run based on the applicable sample; the second from bootstrapping based on 1,000 replications.

- \* (+) -- significant at two(one)-tailed  $\alpha = 0.1$ .  
 \*\* (++) -- significant at two(one)-tailed  $\alpha = 0.05$ .  
 \*\*\* (+++) -- significant at two(one)-tailed  $\alpha = 0.01$ .

Appendix Table 1b  
 Testing the Endogeneity of Labor Income,  
 Overseas Workers who are Heads or Spouses of Heads of Households

Variable	OLS Labor Income (Log)	Predicted Heckman's Selection (Two step)		Predicted Heckman's Selection (ML)	
		Selection	Amount	Selection	Amount
Labor income (Log)		0.16896	-0.02636	0.16993	-0.02126
		0.336	0.142	0.348	0.122
		0.474	0.131	0.484	0.130
Predicted residuals		-0.29868	0.00832	-0.29812	-0.00034
		0.342	0.144	0.353	0.124
		0.478	0.133	0.490	0.133
<b>Instrumental Variables</b>					
Tropical cyclone occurrences (Total number in a year)	-0.08174				
	0.037 **				
	0.039 **				
Provincial employment rate	-0.03800				
	0.022 *				
	0.024				
<b>Characteristics of overseas worker</b>					
Male	-0.38123	0.31925	0.23006	0.31636	0.23886
	0.234	0.295	0.122 *	0.281	0.120 **
	0.220 *	0.405	0.126 *	0.426	0.125 *
Married	-0.36648	1.68064	0.62187	1.67972	0.70725
	0.521	0.503 ***	0.324 *	0.450 ***	0.371 *
	0.357	0.851 **	0.415	0.882 *	0.406 *
Age in years	-0.22915	0.00258	0.01568	0.00117	0.01607
	0.083 ***	0.120	0.054	0.120	0.056
	0.092 **	0.174	0.060	0.178	0.060
Age in years squared	0.00234	-0.00016	-0.00019	-0.00015	-0.00020
	0.001 **	0.001	0.001	0.001	0.001
	0.001 **	0.002	0.001	0.002	0.001
(Dummy base category: College graduate)					
Attended grade school	0.55996	-0.63113	-0.63264	-0.61969	-0.66012
	0.598	0.577	0.309 **	0.575	0.347 *
	0.391	2.151	0.398	2.525	0.389 *
Grade school graduate	-0.56599	0.22554	-0.67203	0.23135	-0.66500
	0.346	0.495	0.187 ***	0.501	0.182 ***
	0.348	1.550	0.189 ***	1.815	0.188 ***
Attended high school	-0.45055	-0.80529	-0.30135	-0.80337	-0.33876
	0.295	0.359 **	0.171 *	0.334 **	0.155 **
	0.291	0.465 *	0.175 *	0.487 *	0.171 **
High school graduate	-0.50157	-0.00723	-0.30633	-0.00424	-0.30755
	0.196 **	0.300	0.119 **	0.290	0.112 ***
	0.203 **	0.394	0.115 ***	0.406	0.115 ***

Appendix Table 1b  
 Testing the Endogeneity of Labor Income,  
 Overseas Workers who are Heads or Spouses of Heads of Households

Variable	OLS Labor Income (Log)	Predicted Heckman's Selection (Two step)		Predicted Heckman's Selection (ML)	
		Selection	Amount	Selection	Amount
Attended post-secondary school	0.00018 0.358 0.345	-0.49362 0.420 1.221	-0.11649 0.177 0.202	-0.49843 0.376 1.408	-0.13816 0.189 0.202
Attended college	-0.29884 0.200 0.207	0.19863 0.286 0.348	-0.23502 0.104 ** 0.112 **	0.20032 0.246 0.359	-0.23332 0.105 ** 0.111 **
Work experience abroad (in months from 10/1998)	-0.02153 0.013 * 0.011 *	0.03160 0.020 0.028	0.02261 0.007 *** 0.007 ***	0.03132 0.019 0.029	0.02353 0.006 *** 0.007 ***
Work experience abroad (in months from 10/1998) squared	0.00030 0.000 0.000 *	-0.00009 0.000 0.000	-0.00016 0.000 * 0.000 *	-0.00008 0.000 0.000	-0.00016 0.000 ** 0.000 *
Last left the country (in months from 10/1998)	-0.02168 0.022 0.023	0.05186 0.024 ** 0.032	0.03623 0.014 ** 0.019 *	0.05182 0.023 ** 0.033	0.04121 0.017 ** 0.018 **
Last left the country (in months from 10/1998) squared	0.00024 0.000 0.000	-0.00015 0.000 0.001	-0.00038 0.000 ** 0.000 *	-0.00015 0.000 0.001	-0.00042 0.000 ** 0.000 *
<b>Type of visa</b>					
(Dummy base category: Working visa)					
Immigrant visa	0.93089 0.445 ** 0.412 **	-0.56532 0.726 3.621	-0.12624 0.251 0.290	-0.54659 0.896 4.213	-0.14668 0.269 0.287
Other visa	0.75123 0.466 0.393 *	-0.95123 0.493 * 0.887	-0.26273 0.283 0.406	-0.94405 0.464 ** 0.970	-0.32151 0.368 0.391
<b>Kind of work in host country</b>					
(Dummy base category: Unskilled worker)					
Corporate executive, manager, or proprietor	0.81081 0.442 * 0.471 *	-0.51303 0.604 1.682	0.69550 0.252 *** 0.238 ***	-0.50635 0.656 1.953	0.67029 0.227 *** 0.239 ***
Professional	0.85412 0.348 ** 0.392 **	-0.16302 0.599 2.079	0.28885 0.205 0.225	-0.16396 0.487 2.474	0.27723 0.220 0.225
Technician or associate professional	0.52250 0.310 * 0.332	-1.16729 0.400 *** 0.486 **	0.36545 0.185 ** 0.189 *	-1.16501 0.343 *** 0.502 **	0.32292 0.174 * 0.184 *

Appendix Table 1b  
 Testing the Endogeneity of Labor Income,  
 Overseas Workers who are Heads or Spouses of Heads of Households

Variable	OLS Labor Income (Log)	Predicted Heckman's Selection (Two step)		Predicted Heckman's Selection (ML)	
		Selection	Amount	Selection	Amount
Clerk	0.55282 0.508 0.585	-0.04012 0.737 2.677	0.26526 0.252 0.256	-0.04032 0.517 11.277	0.27262 0.227 0.254
Service or sales workers	0.37620 0.244 0.229	0.00878 0.339 0.730	0.23872 0.128 * 0.122 *	0.00966 0.358 0.754	0.23383 0.120 * 0.122 *
Tradesman or related worker	0.63701 0.252 ** 0.234 ***	-0.41407 0.383 0.481	0.23315 0.152 0.132 *	-0.41297 0.359 0.494	0.21702 0.130 * 0.132 *
Plant & machine operator or assembler	0.82868 0.259 *** 0.261 ***	-0.76896 0.428 * 0.577	0.31197 0.178 * 0.160 *	-0.76232 0.423 * 0.602	0.28708 0.157 * 0.160 *
<b>Charateristics of host country</b>					
<i>By income</i>					
(Dummy base category: High income country)					
Lower middle-income country	0.04230 0.467 0.503	-0.31678 0.572 2.610	0.27316 0.223 0.247	-0.29984 0.687 2.966	0.26322 0.211 0.244
Upper middle-income country	-0.32669 0.207 0.215	-0.56265 0.275 ** 0.405	0.10358 0.110 0.105	-0.56034 0.285 ** 0.410	0.08512 0.091 0.100
<i>By location</i>					
(Dummy base category: In the Middle East)					
In Africa, Eastern and Central Europe	-0.34730 0.643 0.871	-0.06529 0.803 2.501	0.29323 0.328 0.263	-0.08646 0.767 3.029	0.28546 0.201 0.262
In America and Western Europe	-0.34606 0.252 0.279	-0.12710 0.362 0.648	0.51958 0.127 *** 0.125 ***	-0.12204 0.363 0.670	0.51126 0.114 *** 0.124 ***
In South Asia, East Asia, and the Pacific	-0.45495 0.204 ** 0.212 **	-0.47363 0.279 * 0.413	0.22025 0.115 * 0.115 *	-0.47664 0.302 0.424	0.20243 0.105 * 0.113 *

Appendix Table 1b  
 Testing the Endogeneity of Labor Income,  
 Overseas Workers who are Heads or Spouses of Heads of Households

Variable	OLS Labor Income (Log)	Predicted		Predicted	
		Heckman's Selection Selection	Heckman's Selection (Two step) Amount	Heckman's Selection (ML) Selection	Heckman's Selection (ML) Amount
<b>Characteristics of origin household</b>					
Asset income	0.00000 0.000 0.000	0.00000 0.000 0.000	0.00000 0.000 0.000	0.00000 0.000 0.000	0.00000 0.000 0.000
Male household head	0.18044 0.173 0.178	-0.86869 0.250 *** 0.433 **	-0.23214 0.095 ** 0.092 **	-0.87495 0.240 *** 0.447 *	-0.25691 0.084 *** 0.088 ***
Age in years of the household head	0.10662 0.067 0.074	0.08925 0.096 0.132	0.03492 0.035 0.040	0.08859 0.084 0.138	0.03764 0.034 0.039
Age in years of the household head squared	-0.00086 0.001 0.001	-0.00097 0.001 0.002	-0.00033 0.000 0.000	-0.00096 0.001 0.002	-0.00036 0.000 0.000
Number of household members 14 years and younger	-0.04411 0.054 0.057	0.00414 0.068 0.084	0.05359 0.027 ** 0.028 *	0.00306 0.062 0.087	0.05317 0.026 ** 0.028 *
Number of household members between 15 and 24 years old	0.28121 0.058 *** 0.055 ***	0.10390 0.122 0.174	0.06318 0.050 0.050	0.10333 0.121 0.179	0.06514 0.049 0.050
Number of household members 25 years and older	0.39666 0.080 *** 0.071 ***	-0.29850 0.171 * 0.227	-0.01593 0.070 0.070	-0.29720 0.160 * 0.233	-0.02695 0.067 0.069
(Dummy base category: Resides in NCR, CALABARZON, MIMAROPA, and Central Luzon)					
Resides in the rest of Luzon	-0.30037 0.233 0.244	0.35630 0.355 0.496	-0.07919 0.149 0.139	0.35939 0.367 0.511	-0.06498 0.125 0.138
Resides in the Visayas	-0.70400 0.219 *** 0.253 ***	0.09855 0.404 0.664	-0.04100 0.163 0.156	0.10333 0.411 0.715	-0.03295 0.143 0.155
Resides in Mindanao	-1.04221 0.295 *** 0.319 ***	0.25941 0.411 0.587	-0.28736 0.178 0.171 *	0.25011 0.428 0.611	-0.28203 0.161 * 0.170 *
Constant	17.06698 2.366 *** 2.526 ***	-4.61133 5.037 6.963	8.43127 2.180 *** 2.085 ***	-4.57381 5.018 7.136	8.11137 1.941 *** 2.057 ***

Appendix Table 1b  
 Testing the Endogeneity of Labor Income,  
 Overseas Workers who are Heads or Spouses of Heads of Households

Variable	OLS Labor Income (Log)	Predicted		Predicted	
		Heckman's Selection Selection	Heckman's Selection (Two step) Amount	Heckman's Selection (ML) Selection	Heckman's Selection (ML) Amount
$\rho_{\epsilon u}$	-0.05063 0.091 1.225				
$\sigma_u$	0.78394 0.032 *** 0.038 ***				
$\sigma_{\epsilon u}$ (coefficient of inverse Mills' ratio $\lambda$ )			-0.25380 0.311 0.364		
$R^2$	0.223				
Log Pseudo Likelihood Function				-965.884	
Number of observations	766	766	688	766	688

## Note:

The numbers below the coefficient/parameter estimates are robust (Huber/White/sandwich) standard errors. The first is generated from one regression run based on the applicable sample; the second from bootstrapping based on 1,000 replications.

- \* (+) -- significant at two(one)-tailed  $\alpha = 0.1$ .  
 \*\* (++) -- significant at two(one)-tailed  $\alpha = 0.05$ .  
 \*\*\* (+++) -- significant at two(one)-tailed  $\alpha = 0.01$ .

Appendix Table 1c  
 Testing the Endogeneity of Labor Income,  
 Overseas Workers who are neither Heads nor Spouses of Heads of Households

Variable	OLS Labor Income (Log)	Predicted		Predicted	
		Heckman's Selection Selection	(Two step) Amount	Heckman's Selection (ML) Selection	Amount
Labor income (Log)		-1.11812	0.74490	-0.69620	0.63753
		0.402 ***	0.487	0.414 *	0.295 **
		0.468 **	0.339 **	0.530	0.334 *
Predicted residuals		0.92911	-0.70065	0.56979	-0.61405
		0.402 **	0.465	0.410	0.298 **
		0.468 **	0.331 **	0.521	0.330 *
<b>Instrumental Variables</b>					
Tropical cyclone occurrences (Total number in a year)	-0.06176 0.033 * 0.029 **				
Provincial employment rate	-0.02007 0.016 0.016				
<b>Characteristics of overseas worker</b> (Dummy base category: Son or daughter)					
Son- or daughter-in-law	0.15465 0.214 0.212	-0.04768 0.236 0.253	-0.26211 0.240 0.182	-0.17737 0.224 0.269	-0.29125 0.169 * 0.178
Grandson or granddaughter	1.23739 0.553 ** 0.356 ***	1.12182 0.757 2.250	-0.90408 0.836 0.525 *	0.38885 0.644 2.499	-0.85677 0.470 * 0.521
Other relative and non-relative	0.20146 0.251 0.244	-0.02774 0.280 0.295	-0.79077 0.286 *** 0.206 ***	0.07514 0.239 0.298	-0.76095 0.199 *** 0.206 ***
Male	-0.11780 0.132 0.132	-0.43666 0.150 *** 0.157 ***	0.28123 0.182 0.129 **	-0.38137 0.124 *** 0.164 **	0.20606 0.100 ** 0.114 *
Married	-0.01670 0.162 0.160	-0.18909 0.176 0.192	0.21210 0.179 0.124 *	-0.06619 0.159 0.204	0.20974 0.118 * 0.124 *
Age in years	0.01144 0.039 0.041	-0.01084 0.057 0.061	-0.00781 0.040 0.031	-0.01947 0.042 0.062	-0.00841 0.023 0.030
Age in years squared	-0.00014 0.000 0.001	0.00030 0.001 0.001	0.00015 0.001 0.000	0.00038 0.001 0.001	0.00017 0.000 0.000



Appendix Table 1c  
 Testing the Endogeneity of Labor Income,  
 Overseas Workers who are neither Heads nor Spouses of Heads of Households

Variable	OLS Labor Income (Log)	Predicted		Predicted	
		Heckman's Selection Selection	(Two step) Amount	Heckman's Selection (ML) Selection	Amount
(Dummy base category: College graduate)					
Attended grade school	-1.42831 0.650 ** 0.443 ***	-2.27924 0.835 *** 2.318	0.71086 1.107 0.723	-1.73324 0.714 ** 2.549	0.36083 0.550 0.633
Grade school graduate	-1.17740 0.349 *** 0.400 ***	-1.33771 0.615 ** 1.560	0.45940 0.679 0.495	-0.92053 0.617 1.654	0.31278 0.426 0.475
Attended high school	-1.05373 0.257 *** 0.263 ***	-1.26261 0.503 ** 0.594 **	0.22421 0.610 0.434	-0.58295 0.545 0.695	0.13520 0.386 0.426
High school graduate	-0.79433 0.151 *** 0.145 ***	-0.85010 0.356 ** 0.415 **	0.17146 0.409 0.293	-0.50022 0.357 0.466	0.09710 0.258 0.287
Attended post-secondary school	-0.65649 0.264 ** 0.241 ***	-0.91017 0.392 ** 0.501 *	0.10688 0.458 0.338	-0.37061 0.389 0.558	0.03338 0.305 0.331
Attended college	-0.46450 0.140 *** 0.143 ***	-0.57045 0.246 ** 0.286 **	0.12581 0.284 0.180	-0.31124 0.240 0.331	0.06440 0.160 0.173
Work experience abroad (in months from 10/1998)	0.00683 0.012 0.013	0.03649 0.014 *** 0.015 **	-0.02124 0.017 0.012 *	0.02067 0.013 0.017	-0.01522 0.009 * 0.011
Work experience abroad (in months from 10/1998) squared	-0.00009 0.000 0.000	-0.00024 0.000 0.000	0.00027 0.000 0.000 *	-0.00002 0.000 0.000	0.00022 0.000 0.000
Last left the country (in months from 10/1998)	-0.02809 0.018 0.016 *	0.03081 0.022 0.025	0.01369 0.026 0.021	0.03940 0.020 * 0.026	0.02043 0.018 0.020
Last left the country (in months from 10/1998) squared	0.00045 0.000 * 0.000 *	-0.00007 0.000 0.000	-0.00042 0.000 0.000	-0.00024 0.000 0.000	-0.00047 0.000 * 0.000 *
<b>Type of visa</b>					
(Dummy base category: Working visa)					
Immigrant visa	-0.09763 0.364 0.405	0.11283 0.493 1.982	-0.23206 0.377 0.270	0.37409 0.379 2.177	-0.20899 0.254 0.264
Other visa	0.34983 0.422 0.337	-0.50737 0.395 0.665	0.41200 0.543 0.446	-0.76650 0.379 ** 0.676	0.17985 0.357 0.401

Appendix Table 1c  
 Testing the Endogeneity of Labor Income,  
 Overseas Workers who are neither Heads nor Spouses of Heads of Households

Variable	OLS Labor Income (Log)	Predicted		Predicted	
		Heckman's Selection Selection	(Two step) Amount	Heckman's Selection (ML) Selection	Amount
<b>Kind of work in host country</b>					
(Dummy base category: Unskilled worker)					
Other occupations	-0.30106	-0.47964	0.05781	-0.37813	-0.00037
	0.127 **	0.183 ***	0.218	0.186 **	0.136
	0.125 **	0.215 **	0.152	0.229 *	0.145
<b>Charateristics of host country</b>					
<i>By income</i>					
(Dummy base category: High income country)					
Lower middle-income country	0.11585	0.15919	-0.39926	-0.03586	-0.37104
	0.350	0.372	0.376	0.307	0.245
	0.347	0.847	0.297	0.855	0.278
Upper middle-income country	0.09622	0.32523	-0.01864	0.18407	0.02990
	0.167	0.180 *	0.202	0.159	0.131
	0.179	0.187 *	0.153	0.209	0.146
<i>By location</i>					
(Dummy base category: In Asia and the Pacific)					
In the Middle East	0.29101	0.14289	-0.36316	0.08231	-0.35533
	0.157 *	0.194	0.202 *	0.193	0.149 **
	0.166 *	0.219	0.159 **	0.222	0.157 **
In Africa, Eastern and Central Europe	0.81362	0.75229	0.23444	-0.03996	0.20271
	0.779	0.926	0.924	0.627	0.417
	0.578	2.934	0.491	3.424	0.468
In America and Western Europe	0.18048	0.52000	0.02837	0.39604	0.08970
	0.171	0.211 **	0.230	0.200 **	0.123
	0.170	0.245 **	0.151	0.247	0.141
<b>Characteristics of origin household</b>					
Asset income	0.00000	0.00000	0.00000	0.00000	0.00000
	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000
Male household head	-0.08915	-0.22830	-0.02119	-0.18516	-0.05298
	0.126	0.142	0.147	0.136	0.091
	0.125	0.166	0.100	0.165	0.097
Age in years of the household head	0.00369	0.00476	-0.05455	0.02942	-0.05218
	0.034	0.039	0.036	0.030	0.025 **
	0.035	0.042	0.026 **	0.044	0.026 **
Age in years of the household head squared	-0.00016	-0.00014	0.00051	-0.00028	0.00049
	0.000	0.000	0.000	0.000	0.000 **
	0.000	0.000	0.000 **	0.000	0.000 **

Appendix Table 1c  
 Testing the Endogeneity of Labor Income,  
 Overseas Workers who are neither Heads nor Spouses of Heads of Households

Variable	OLS Labor Income (Log)	Predicted		Predicted	
		Heckman's Selection Selection	(Two step) Amount	Heckman's Selection (ML) Selection	Amount
Number of household members 14 years and younger	-0.01624 0.041 0.041	0.01501 0.045 0.057	0.10649 0.043 ** 0.034 ***	0.02134 0.047 0.059	0.10858 0.032 *** 0.033 ***
Number of household members between 15 and 24 years old	0.17230 0.045 *** 0.042 ***	0.19841 0.089 ** 0.097 **	-0.06062 0.100 0.068	0.10945 0.088 0.114	-0.03960 0.062 0.067
Number of household members 25 years and older	0.39687 0.045 *** 0.042 ***	0.42215 0.169 ** 0.193 **	-0.25543 0.198 0.141 *	0.30722 0.168 * 0.209	-0.20538 0.124 * 0.139
(Dummy base category: Resides in NCR, CALABARZON, MIMAROPA, and Central Luzon)					
Resides in the rest of Luzon	-0.33481 0.211 0.191 *	-0.58229 0.328 * 0.379	0.19790 0.363 0.262	-0.33806 0.333 0.410	0.14598 0.240 0.258
Resides in the Visayas	-0.58680 0.170 *** 0.180 ***	-0.91178 0.323 *** 0.377 **	0.55573 0.392 0.265 **	-0.65225 0.323 ** 0.413	0.45341 0.230 ** 0.256 *
Resides in Mindanao	-1.06414 0.211 *** 0.214 ***	-1.20700 0.423 *** 0.489 **	0.06507 0.516 0.358	-0.69785 0.436 0.564	-0.05245 0.306 0.347
Constant	12.32214 1.891 *** 1.867 ***	11.08637 4.388 ** 5.144 **	6.07014 4.835 3.502 *	6.01389 4.617 5.943	6.66097 3.221 ** 3.503 *
$\rho_{\epsilon u}$	-0.90854 0.047 *** 0.513 *				
$\sigma_u$	1.06212 0.044 *** 0.075 ***				
$\sigma_{\epsilon u}$ (coefficient of inverse Mills' ratio $\lambda$ )			-1.54308 0.851 * 0.631 **		
$R^2$	0.271				
Log Pseudo Likelihood Function				-1296.179	
Number of observations	875	875	735	875	735

## Note:

generated from one regression run based on the applicable sample; the second from bootstrapping based on 1,000

- \* (+) -- significant at two(one)-tailed  $\alpha = 0.1$ .  
 \*\* (++) -- significant at two(one)-tailed  $\alpha = 0.05$ .  
 \*\*\* (+++) -- significant at two(one)-tailed  $\alpha = 0.01$ .

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