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No. 135 | November 2008

Asian Development Bank

ADB Economics Working Paper Series No. 135

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Asian Development Bank

Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org/economics

November 2008
ISSN 1655-5252
Publication Stock No.:

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Abstract

This paper investigates the role of gender in remittance behavior among migrants using data drawn from the 2004 Vietnam Migration Survey. The gender dimension to remittance behavior is not an issue that has featured strongly in the existing literature and our findings thus contain novel appeal. In addition, we use estimates from both homoscedastic and heteroscedastic tobit models to decompose the observed gender differences in remittances into treatment and endowment components. The paper finds little evidence that gender differences in remittances are attributable to behavioral differences between men and women. Instead, the empirical results show that endowment differences, such as gender differences in household head status and labor market earnings, are more important in explaining the overall gender difference in the remittance level.

I. Introduction

Remittances have attracted increasing attention from policymakers as a major development issue in recent years. One reason for this growing interest is that remittances sent by migrants who have moved to urban areas or to more developed countries can represent a key element in the array of livelihood strategies used by rural households in developing countries (de la Briere et al. 2002). Nevertheless, there has been very limited systematic analysis investigating remittance issues from a gender perspective. This is unfortunate given an increased recognition among development agencies of the importance of gender equality both in providing a path to more rapid development and in being a powerful tool in poverty reduction (see, for example, Asian Development Bank 2008, World Bank 2008). In addition, in the case of international migration, women represented almost one half of the world's migrant population in 2005 (United Nations 2006). Ramirez et al. (2005), for instance, argue that because the decision to migrate, the destination, the type of jobs, and the wage level at the destination are all likely to be, at least partially, determined by gender, the ability and motives to send remittances are equally likely to be influenced by gender. It is, therefore, potentially useful to adopt a gendered approach in the examination of remittance issues in order to formulate the most appropriate policy responses toward male and female migrants.

The main objective of the current paper is to provide a better understanding of a migrant's remittance behavior from a gender perspective. Among the few existing studies that examine differences in remittance behavior between male and female migrants, empirical evidence suggests that the determinants of remittances do indeed vary with gender (e.g., de la Briere et al. 2002, Vanwey 2004). By investigating the case of internal migrants in Viet Nam using recently available data, this paper places an empirical emphasis on the role of gender in remittance behavior, an issue that has not been a central theme within existing studies. The availability of detailed information on migrants themselves, which is often absent from conventional household surveys such as Living Standard Measurement Surveys, renders the Viet Nam case ideal for analyzing remittance behavior.

Migration flows in Viet Nam in the past tended to be strictly controlled by a combination of governmental migration policies and the household registration system (*ho khau*) (Dang et al. 2003). Since the middle of the 1990s, however, organized migration has been increasingly replaced by a more spontaneous migration phenomenon (Hardy 2000). The *doi moi* (renovation) program has been the main driving force behind the apparent shift observed in Viet Nam. According to the 1999 Population and Housing Census data, 6.5% of the population over 5 years of age (about 4.5 million people) changed their place of

residence between 1994 and 1999, and more than one half of these (54%) were female. It should be noted, though, that these data do not include short-term, unregistered movements, or movements within the 6 months preceding the census date.

The provinces with the highest population density (in the Red River Delta) and those with low household incomes in the central regions (the North and South Central Coast) were found to have the highest rates of net outward migration. The country's three largest cities—Hanoi, Da Nang, and Ho Chin Minh City—were the main destinations for migrants. For instance, out of a total of nearly 1 million inward migrants to the Southeast region, Ho Chin Minh City absorbed nearly one half of them. Dang et al. (2003) note that women's larger representation more recently among migrants reflects emerging employment opportunities for young, often unmarried, women in the country's foreign-capital dominated industries.

An important implication of the increased internal population movement is the significant amount of remittances repatriated by migrants. Le and Nguyen (1999), using the 1992–1993 Viet Nam Living Standards Surveys data, report that about one fifth of households received remittances during the 12 months prior to the survey interview date, and these were equivalent to, on average, about 38% of their household expenditures. Moreover, data from the 2004 Viet Nam Migration Survey suggest that more than one half of migrants sent money/goods home to their relatives during the 12 months prior to interview. Among those who remit, the total value amounted to, on average, about 17% of migrants' labor market earnings, reflecting the potential importance of remittances to the origin households.

Niimi et al. (2009) examine some of the key determinants of internal migrant remittance behavior using the 2004 Viet Nam Migration Survey data. Their results reveal that altruism alone does not provide a sufficient explanation for Viet Nam's remittance behavior. They find that migrants act as risk-averse economic agents and send remittances as part of an insurance exercise in the face of economic uncertainty. Their work highlights the important role played by remittances as an effective means of risk-coping and mutual support within the family. The present paper aims to extend their analysis using these same survey data and examine whether substantial remittance behavioral differences exist between male and female internal migrants.

The remainder of the paper is structured as follows. The next section provides a review of the existing literature on remittance motives with a particular emphasis on the gender dimension. Section III discusses the 2004 Viet Nam Migration Survey data, which is followed by a section detailing the econometric methodology. A penultimate section presents the empirical results, and a final one offers some concluding remarks.

II. Literature Review

There have been a number of theoretical models adduced to explain the motives underlying remittance behavior, including altruism, exchange or self-interest, and insurance. In the case of altruism, migrants primarily send remittances because they care about the well-being of those left behind. The altruistic behavior is thus modeled by allowing the utility of a remitter to be derived from the well-being or consumption level of the recipients (Becker 1974). McGarry and Shoeni (1995) and Aggarwal and Horowitz (2002), for example, find some support for the presence of such altruism. Cox (1987), on the other hand, suggests the importance of an exchange motive for remittances where private transfers are taken to represent payments for services rendered. A typical example is that migrants send remittances to their parents who, in turn, look after their grandchildren in the absence of the migrant parents of the children (e.g., Secondi 1997). The empirical findings of Cox (1987), Cox and Rank (1992), and Cox et al. (1998) indicate that exchange is stronger than altruism in explaining income transfers among family members.

The above motives are certainly not mutually exclusive and an individual migrant may have more than one motivation for remitting home at any given point in time. Lucas and Stark (1985), for instance, propose “tempered altruism” or “enlightened self-interest” to refer to transfers motivated by a combination of altruism and self-interest. This is based on the view that remittances are part of a mutually beneficial self-enforcing contractual arrangement between a migrant and their family. The migrant adheres to the arrangement as long as it is in their interest to do so (Lucas and Stark 1985).

In a similar context to the contractual arrangement, Stark (1991) suggests a model incorporating risk-sharing motives. In this model, remittances allow risk-averse households to diversify their income sources and thus minimize the adverse effects of income shocks (Stark 1991, Gubert 2002). Amuedo-Dorantes and Pozo (2006) also argue that migrants are likely to behave as risk-averse economic agents and purchase insurance in the face of economic uncertainty. In this way, remittances can be considered as a payment to insure against risky income outcomes in the destination region or country. Based on data for Mexican migrants in the United States, Amuedo-Dorantes and Pozo (2006) find that income risk proxies (e.g., being an undocumented immigrant or not having social networks within the United States) are associated with a higher propensity to remit and with a higher level of remittances. Hoddinott (1994) also proposes that the migrant and his or her family enter into a contractual arrangement, but this is to secure a future bequest. The bequest motive suggests that migrants remit home to win favor from the head of household and ensure a larger share of any future inheritance. Hoddinott (1994) for Kenya and Regmi and Tisdell (2002) for Nepal find some evidence that favors this argument.

There has been a growing body of theoretical and empirical studies examining the motives underlying remittance behavior. However, there is a limited literature that investigates the gender dimension of remittance behavior, and within these studies there are conflicting findings. On one hand, it is often argued that female migrants are more reliable and send a greater volume of remittances home (e.g., Blue 2004, de la Cruz 1995, Osaki 1999). Osaki (1999), for example, finds that Thai women are likely to remit more than men because of Buddhist traditions, arguing women accrue religious merit for their financial or material support of their families. On the other hand, there are some studies that reveal men send more remittances than women (e.g., Semyonov and Gorodzeisky 2005). Using data from the 1999–2000 Survey of Households and Children of Overseas Workers conducted in the Philippines, Semyonov and Gorodzeisky (2005) find that male migrants send more money home than female migrants, which may be partly attributable to the gender gap in earnings in the destination labor market. Their findings are at variance with previous studies on Filipino overseas workers that reveal female migrants exhibit a more responsible behavior toward their families and send more remittances (e.g., Tacoli 1999, Trager 1981 and 1984). Semyonov and Gorodzeisky (2005) suggest that the conflict in results can be explained, at least partly, by the differences in the sample data used. Their study focuses mainly on mature married overseas workers with children, whereas the data used in previous studies were based on younger cohorts of female migrants. As a result, while it is possible that the commitment level of daughters to the household is higher than that of sons, the economic commitment of fathers to their households and to their children is no lower than the commitment of mothers (Semyonov and Gorodzeisky 2005). Unfortunately, this particular argument is not empirically tested in their analysis.

There are also a small number of studies that examine the motivations underlying remittance behavior using a gendered approach. Vanwey (2004), for instance, examines the propensity of migrants to remit from Nang Rong, a predominantly rural district in the Northeast region of Thailand. The author finds a higher propensity to remit for women than men. Further decomposition analysis reported by the author reveals that gender differences in treatment are more important than gender differences in endowments in explaining the overall gender differential in the remittance rates. Vanwey (2004) concludes that women's remittance behavior is more strongly motivated by altruism, which is consistent with the findings of Osaki (1999) that Thai women are responding to ingrained norms stemming from a Buddhist tradition.

De la Briere et al. (2002) also examine whether the motivations to remit vary with gender. They develop two separate models: one that focuses on insurance for parents and the other on investment by children as motives to remit (i.e., insurance in response to health shocks to parental work capacity and investment towards increasing future inheritance). Based on data from a survey of 400 farm households in the Dominican Sierra, they estimate a censored remittance model using Powell's Censored Least Absolute Deviations estimator. Their analysis reveals the importance of migrant heterogeneity

in explaining remittance behavior and provides evidence that the determinants of remittances vary with the migrant's gender, destination, and household composition. The remittances of female migrants from the United States respond most strongly to parental health shocks. In contrast, male migrants fulfill this insurance function only if they are the sole migrant in their family (de la Briere et al. 2002).

Although the studies of Vanwey (2004) and de la Briere et al. (2002) highlight how the determinants of remittances are affected by gender, their analyses are not without limitations. Vanwey (2004), for example, only examines the propensity (or probability) to remit, rather than the level of remittances. Moreover, in the empirical analysis of de la Briere et al. (2002), a gender dimension is only examined through the insertion of a gender dummy in their estimation model. The relatively small sample sizes available by gender understandably prevent a complete separation of their sample by gender group and the implementation of decomposition analysis. By examining the case of internal migrants in Viet Nam, the current paper attempts to improve the conventional treatment of gender in the empirical analysis of remittance behavior.

III. Data

The empirical evidence reported in this paper is based on data drawn from the 2004 Viet Nam Migration Survey. The survey was undertaken by the General Statistical Office (GSO) of Viet Nam with the objective of providing detailed information on internal migration in the post *doi moi* era (GSO 2005). It was conducted in areas identified with high immigration rates based on the 1999 Population and Housing Census, and the sample was selected using the sampling frame of the Population Census (see GSO 2005). They included some enumeration areas of Hanoi, the Northeast Economic Zone (Hai Phong, Hai Duong, and Quang Ninh); the Central Highlands (Gia Lai, Dac Lac, Dak Nong, and Lam Dong); Ho Chi Minh City; and the Southeast Industrial Zone (Bing Duong and Dong Nai).

The survey interviewed both migrants and nonmigrants in the destination areas within the 15–59 age group category. In this survey we restrict our analysis to migrants defined as those who had moved from one district to another in the 5-year period immediately prior to the interview but not more recently than a month before the interview date. The survey covered a wide range of topics including information on the migration process, socioeconomic characteristics of migrants, demographic composition of the household (at the destination), housing conditions, and personal history of migrants (e.g., their migration and employment activity).

The key dependent variable is expressed in millions of Dong and is defined as the total value of money/goods a migrant sent home to relatives in the 12-month period prior to the survey interview date. It should be noted that in this paper we define a remitter as a migrant who sent any money/goods home to their relatives and/or gave any money/goods to the relatives during their visits. The data do not allow discrimination between these two types of activity. Hence the value of remittances is the total value of the money/goods that the migrant sent/gave to their relatives during the 12-month period immediately prior to the survey interview. It should also be noted that for a large number of individuals in the sample, the variable is censored at zero, requiring use of a customized econometric approach for the empirical analysis. This is discussed in detail in the next section.

The survey data are not without other limitations. For example, the survey does not contain any information on the household from which the migrant originated. This means that we have no information on the potential recipients of migrant remittances, or for what purpose the remittances were actually used. It is also unfortunate that nonmigrants are those found in the destination areas only and this essentially prevents any analysis of the process governing the migration decision. Nevertheless, the data do contain detailed information on migrants themselves, and this allows for an investigation of the effects of various factors on migrant remittance behavior. Given the relatively large sample size available and the fact that female migrants represent more than one half of the data points available, we are in a strong position to conduct a more detailed empirical analysis of remittance behavior from a gender perspective than has hitherto been the case in existing studies on this topic.

The empirical models specified in this study are eclectic in nature and guided by some of the theoretical considerations outlined in an earlier section. However, they also strongly reflect Viet Nam's context within which our analysis is situated. Niimi et al. (2009) provide a detailed rationale for the inclusion of particular variables or sets of variables, but these specification issues are not explored further here. Table 1 provides a description of the variables used in the empirical analysis.

Table 1: Variable Names and Descriptions

Variable	Description
REMIT	Dummy variable =1, if individual sends money/goods back to relatives in the 12 month-period prior to the survey interview date, and 0 otherwise
REMITTANCE	Total value of money/goods a migrant sent back to relatives in the 12-month period prior to the survey interview date
FEMALE	Dummy variable =1, if female and 0 otherwise
AGE_1	Dummy variable =1, if aged < 25 and 0 otherwise
AGE_2	Dummy variable =1, if aged between 25 but less than 35 and 0 otherwise
AGE_3	Dummy variable =1, if aged between 35 but less than 55 and 0 otherwise
AGE_4	Dummy variable =1, if aged 45 years or more
HHEAD	Dummy variable =1, if head of household and 0 otherwise
KINH	Dummy variable =1, if member of Kinh ethnic group and 0 otherwise
MARRIED	Dummy variable =1, if individual married and 0 otherwise
SPOUSE	Dummy variable =1, if spouse present and 0 otherwise
CHILD	Dummy variable =1, if school age (5 to 18) children present and 0 otherwise
PARENTS	Dummy variable =1, if parent(s) present and 0 otherwise
HH_SIZE	Total number of household members living with migrant at the destination
EDU1	Dummy variable =1, if illiterate and 0 otherwise
EDU2	Dummy variable =1, if primary education and 0 otherwise
EDU3	Dummy variable =1, if lower secondary education and 0 otherwise
EDU4	Dummy variable =1, if upper secondary education and 0 otherwise
EDU5	Dummy variable =1, if college degree or higher and 0 otherwise
SECTOR1	Dummy variable =1, if working for government and 0 otherwise
SECTOR2	Dummy variable =1, if working for private organization and 0 otherwise
SECTOR3	Dummy variable =1, if working for foreign company and 0 otherwise
SECTOR4	Dummy variable =1, if working for any other type and 0 otherwise
EARNINGS	Monthly labor market earnings (in millions of Dong)
BONUS	Dummy variable =1, if receiving any bonus at work and 0 otherwise
HOUSING	Dummy variable =1, if receiving housing benefits at work and 0 otherwise
URBAN	Dummy variable =1, if living in a large city and 0 otherwise
RURAL	Dummy variable =1, if originating from a rural area and 0 otherwise
OWNHOUSE	Dummy variable =1, if living in house that migrant owns and 0 otherwise
PERM_DWELL	Dummy variable =1, if dwelling of a permanent type and 0 otherwise
REGIS_1	Dummy variable =1, if not being registered at the destination and 0 otherwise
REGIS_2	Dummy variable =1, if having K1 (permanent) registration status and 0 otherwise
REGIS_3	Dummy variable =1, if having K2 (permanent) registration status and 0 otherwise
REGIS_4	Dummy variable =1, if having K3 (temporary) registration status and 0 otherwise
REGIS_5	Dummy variable =1, if having K4 (temporary) registration status and 0 otherwise
SPLINE_1	Spline for 1–12 months at destination
SPLINE_2	Spline for 13–24 months at destination
SPLINE_3	Spline for 25–48 months at destination
RELATIVES	Dummy variable =1, if had relatives at the destination on arrival and 0 otherwise.
FRIENDS	Dummy variable =1, if had friends at the destination on arrival and 0 otherwise
DIFFICULTIES	Dummy variable =1, if encountered difficulties on arrival and 0 otherwise
LOANS_1	Dummy variable =1, if raised no loans to migrate and 0 otherwise
LOANS_2	Dummy variable =1, if raised loans to migrate from relatives and 0 otherwise
LOANS_3	Dummy variable =1, if raised loans to migrate from financial institutions and 0 otherwise
LOANS_4	Dummy variable =1, if raised loans to migrate from other sources and 0 otherwise
INSURANCE	Dummy variable =1, if migrant has health insurance card and 0 otherwise
VISITS	Number of visits paid to relatives during the last 12 months prior to the interview

Note: Provincial dummy variables are also included for Hanoi, Hai Phong, Hai Duong, Quang Ninh, Gia Lai, Dac Lac, Dak Nong, Lam Dong, Ho Chi Minh City, Bing Duong, and Dong Nai. Five dummy controls for the month of interview are also included.

IV. Econometric Methodology

Tobit models have been used to model migrant remittance functions in a number of applications (Brown 1997, Hoddinott 1994, Liu and Reilly 2004, Markova and Reilly 2007). The underlying structure of the remittance equation is generally defined as follows:

$$\begin{aligned} R_i &= R_i^* \quad \text{if } R_i^* > 0 \\ R_i &= 0 \quad \text{otherwise} \end{aligned} \tag{1}$$

where R_i is the amount of money that the i^{th} individual remits, which is observed if R_i^* is positive. The latter is an unobservable latent dependent variable that captures the i^{th} individual's propensity to remit. It is defined as follows:

$$R_i^* = \mathbf{x}_i \boldsymbol{\beta} + u_i \qquad \text{where } u_i \sim N(0,\sigma^2) \tag{2}$$

$\mathbf{x}_i$ is a 1×k vector of independent variables where k represents the number of variables including a constant term, $\boldsymbol{\beta}$ is a k×1 vector of unknown parameters, and u_i is an independently and normally distributed error term with mean zero and constant variance σ^2. This model is regarded as a censored regression model because observations on R_i^* at or below zero are censored. In other words, R_i is either positive ($R_i > 0$) or zero ($R_i = 0$). The use of ordinary least squares may yield biased coefficients in the presence of such censoring. However, using the information on censoring, the structure of the likelihood function that caters for such a problem is expressed as:

$$L = \prod_{R_i|R_i=0} \left[1 - \Phi\left(\frac{\mathbf{x}_i\boldsymbol{\beta}}{\sigma}\right)\right] \cdot \prod_{R_i|R_i>0} \left[\frac{\phi\left(\left(R_i - \mathbf{x}_i\boldsymbol{\beta}\right)/\sigma\right)}{\sigma}\right] \tag{3}$$

where $\Phi(\cdot)$ and $\phi(\cdot)$ denote the operators for the cumulative distribution and probability density functions of the standard normal respectively, and $\boldsymbol{\Pi}$ denotes the product operator. It is conventional to log this function to facilitate estimation, and standard algorithms can be used to obtain the maximum likelihood (ML) estimates for the $\boldsymbol{\beta}$ vector and σ. The inverse of the regression model's information matrix provides the asymptotic variance-covariance matrix for the parameter estimates.

The unconditional expectation of remittances in this model is then expressed as follows:

$$E[R_i \mid \mathbf{x}_i; \boldsymbol{\beta}, \sigma] = \mathbf{x}_i \boldsymbol{\beta} \Phi\left(\frac{\mathbf{x}_i\boldsymbol{\beta}}{\sigma}\right) + \sigma\phi\left(\frac{\mathbf{x}_i\boldsymbol{\beta}}{\sigma}\right) \tag{4}$$

The censored tobit model estimates are known to be subject to bias and inconsistency in the presence of heteroscedasticity. The homoscedasticity assumption can be tested using parametric score tests (see Chesher and Irish 1987). In the presence of heteroscedasticity, a modification to the conventional model is required with a fairly general and popular form of heteroscedasticity provided by:

$$\sigma_i = \sigma \exp(\mathbf{w}_i \gamma) \tag{5}$$

where σ is a constant, $\mathbf{w}_i$ comprises a matrix of variables found to be the source for the residual dispersion, and γ is a vector of unknown parameters**.** These variables can comprise all or a subset of the $\mathbf{x}_i$ variables. The likelihood function incorporating this multiplicative form of heteroscedasticity is then re-expressed as:

$$L_{HET} = \prod_{R_i|R_i=0}\left[1-\Phi\left(\frac{\mathbf{x}_i\boldsymbol{\beta}}{\sigma\exp(\mathbf{w}_i\boldsymbol{\gamma})}\right)\right]\cdot\prod_{R_i|R_i>0}\left[\frac{\phi\left(\left(R_i-\mathbf{x}_i\boldsymbol{\beta}\right)/\sigma\exp(\mathbf{w}_i\boldsymbol{\gamma})\right)}{\sigma\exp(\mathbf{w}_i\boldsymbol{\gamma})}\right] \tag{6}$$

The standard algorithms can again be used to obtain the ML estimates for the mean function ($\boldsymbol{\beta}$), the variance function (γ), and the ancillary parameter σ. The inverse of the regression model's information matrix again provides the asymptotic variance-covariance matrix for the two parameter vectors and σ.

The unconditional expectation of remittances in this model is then re-expressed as:

$$E[R_i \mid \mathbf{x}_i, \mathbf{w}_i; \boldsymbol{\beta}, \sigma, \gamma] = \mathbf{x}_i\boldsymbol{\beta}\,\Phi\left(\frac{\mathbf{x}_i\boldsymbol{\beta}}{\sigma\exp(\mathbf{w}_i\boldsymbol{\gamma})}\right) + \sigma\exp(\mathbf{w}_i\gamma)\,\phi\left(\frac{\mathbf{x}_i\boldsymbol{\beta}}{\sigma}\right) \tag{7}$$

The primary theme of the current paper is the decomposition of average remittances by gender into their treatment and endowment components. These decompositions have been popularized by Blinder (1973) and Oaxaca (1973) within the linear regression model framework; Gomulka and Stern (1983) for binary dependent variable models; and McNabb, Pal, and Sloane (2002) and Reilly and Bachan (2005) for ordered probit models. Bauer and Sinning (2005) outline the decomposition procedure for the general case of homoscedastic tobit-type models.

The decomposition procedure involves separate estimation of remittance functions by gender, which requires justification on the basis of preliminary statistical testing. If we denote the gender specific concepts by the superscripts m and f for male and female respectively, the unconditional expectations for the male case can be rewritten in compact form as $E_m[R_i \mid \mathbf{x}_i^m; \boldsymbol{\beta}^m, \sigma^m]$ for the homoscedastic tobit model, and $E_m[R_i \mid \mathbf{x}_i^m, \mathbf{w}_i^m; \boldsymbol{\beta}^m, \sigma^m, \gamma^m]$ for the heteroscedastic tobit model, where $E(\cdot)$ denotes the expectations operator, and the subscript on this operator identifies the gender group of interest. The corresponding expressions for the female case are given by $E_f[R_i \mid \mathbf{x}_i^f; \boldsymbol{\beta}^f, \sigma^f]$ and $E_f[R_i \mid \mathbf{x}_i^f, \mathbf{w}_i^f; \boldsymbol{\beta}^f, \sigma^f, \gamma^f]$ respectively.

The raw differential in expected remittances using the homoscedastic censored tobit can be expressed as:

$$\Delta = E_m[R_i \mid \mathbf{x}_i^m ; \boldsymbol{\beta}^m, \sigma^m] - E_f[R_i \mid \mathbf{x}_i^f ; \boldsymbol{\beta}^f, \sigma^f] \quad (8)$$

This can be decomposed into endowment and treatment components under the assumption of a male parameter structure as follows:

$$\Delta_1 = \{E_m[R_i \mid \mathbf{x}_i^m ; \boldsymbol{\beta}^m, \sigma^m] - E_f[R_i \mid \mathbf{x}_i^f ; \boldsymbol{\beta}^m, \sigma^m]\} + \{E_f[R_i \mid \mathbf{x}_i^f ; \boldsymbol{\beta}^m, \sigma^m] - E_f[R_i \mid \mathbf{x}_i^f ; \boldsymbol{\beta}^f, \sigma^f]\} \quad (9)$$

where the first term in braces denotes the endowment component and the second the treatment. Under the assumption of a female parameter structure, the constituent parts are:

$$\Delta_2 = \{E_m[R_i \mid \mathbf{x}_i^m ; \boldsymbol{\beta}^m, \sigma^m] - E_m[R_i \mid \mathbf{x}_i^m ; \boldsymbol{\beta}^f, \sigma^f]\} + \{E_m[R_i \mid \mathbf{x}_i^m ; \boldsymbol{\beta}^f, \sigma^f] - E_f[R_i \mid \mathbf{x}_i^f ; \boldsymbol{\beta}^f, \sigma^f]\} \quad (10)$$

where the first term in braces now denotes the treatment and the second the endowment. The analogous expression for the heteroscedastic tobit under a male parameter structure is:

$$\Delta_3 = \{E_m[R_i \mid \mathbf{x}_i^m , \mathbf{w}_i^m ; \boldsymbol{\beta}^m, \sigma^m, \gamma^m] - E_f[R_i \mid \mathbf{x}_i^f , \mathbf{w}_i^f ; \boldsymbol{\beta}^m, \sigma^m, \gamma^m]\} + \{E_f[R_i \mid \mathbf{x}_i^f , \mathbf{w}_i^f ; \boldsymbol{\beta}^m, \sigma^m, \gamma^m] - E_f[R_i \mid \mathbf{x}_i^f , \mathbf{w}_i^f ; \boldsymbol{\beta}^f, \sigma^f, \gamma^f]\} \quad (11)$$

and under a female parameter structure:

$$\Delta_4 = \{E_m[R_i \mid \mathbf{x}_i^m , \mathbf{w}_i^m ; \boldsymbol{\beta}^m, \sigma^m, \gamma^m] - E_m[R_i \mid \mathbf{x}^m_i , \mathbf{w}^m_i ; \boldsymbol{\beta}^f, \sigma^f, \gamma^f]\} + \{E_m[R_i \mid \mathbf{x}^m_i , \mathbf{w}^m_i ; \boldsymbol{\beta}^f, \sigma^f, \gamma^f] - E_f[R_i \mid \mathbf{x}_i^f , \mathbf{w}_i^f ; \boldsymbol{\beta}^f, \sigma^f, \gamma^f]\} \quad (12)$$

The component parts are computed using the ML estimates in conjunction with either the male or female subsamples. For example, in the context of the homoscedastic tobit, the sample counterpart corresponding to Δ_1 is expressed as:

$$\hat{\Delta}_1 = \{\frac{1}{N_m}\sum_{i=1}^{N_m} [R_i \mid \mathbf{x}_i^m ; \hat{\boldsymbol{\beta}}^m, \hat{\sigma}^m] - \frac{1}{N_f}\sum_{i=1}^{N_f} [R_i \mid \mathbf{x}_i^f ; \hat{\boldsymbol{\beta}}^m, \hat{\sigma}^m]\} + \{\frac{1}{N_f}\sum_{i=1}^{N_f} [R_i \mid \mathbf{x}_i^f ; \hat{\boldsymbol{\beta}}^m, \hat{\sigma}^m] - \frac{1}{N_f}\sum_{i=1}^{N_f} E_f[R_i \mid \mathbf{x}_i^f ; \hat{\boldsymbol{\beta}}^f, \hat{\sigma}^f]\} \quad (9')$$

where the "hats" denote the ML estimates, N_m denotes the male sample size, N_f the female sample size, and equation (4) is used to compute the gender specific remittances in this case. The purpose of the exercise is to compute numerical values for equations (8) to (12).

V. Empirical Results

Table 2 reports summary statistics for the data used in our analysis, and reveals that the female sample proportion remitting is higher by about 6 percentage points compared to men. This differential in point estimates is found to be statistically significant at a conventional level with the z-score value of 4.16 (prob-value=0.000). In addition, women have made more trips home than men in the 12 months preceding the interview date with an absolute t-ratio of 4.43, suggesting the point estimate for the differential is well determined. Both these findings appear in comport with arguments contained in some existing studies that female migrants are more reliable compared to their male counterparts (e.g., Blue 2004, de la Cruz 1995, Osaki 1999). However, using the raw data, the sample average of remittances is higher for men by about 144,000 Dong, and this gender differential is found to be statistically significant with a t-test of 2.58 (prob-value = 0.010). Thus, although women are more likely to remit than men on average over the relevant 12-month time frame, they actually remit less than men. This may be due to the fact that men generally earn more than women at the destination as asserted by Semyonov and Gorodzeisky (2005) in their study of overseas Filipino workers. There may well be some content in this notion for Viet Nam as the female/male earnings ratio for our sample is 0.77, and the average gender difference in labor market earnings is statistically significant at a conventional level (t-test =13.86).

Table 3 reports the ML estimates for three remittance functions based on the homoscedastic tobit model using data pooled across gender and data from the two gender-specific subsamples. As noted earlier, the variables included in the specification are influenced by theoretical and other considerations emphasized in Niimi et al. (2009) and are not the subject of further discussion here. However, it is worth noting that the estimated female coefficient in the pooled model, though positive, is not well determined. In addition, a greater degree of residual dispersion is found to characterize the male compared to the female regression model with the F-test for a common residual variance rejected by the data with F (1891, 2389) = 1.53 (prob-value=0.000), perhaps suggesting a more reliable flow of remittance from female migrants.

In all three cases the null hypothesis of homoscedastic errors is decisively rejected by the data using the score tests suggested by Chesher and Irish (1987). This prompts use of the alternative heteroscedastic tobit model. After some experimentation, the only set of explanatory variables that failed to feature as statistically significant in the variance functions for any of the three regression models was the set of educational controls. These are thus excluded from the variance function, although all other variables from the mean regression model are retained in the variance function. The estimates for these models are reported in Table 4. The female estimate in the mean regression using the pooled data again fails to achieve statistical significance at a conventional level, though the estimate is better determined compared to the homoscedastic model. Using a likelihood ratio test (LRT), the imposition of null restrictions on all the parameters in the

Table 2: Summary Statistics

Variable	Pooled	Male	Female
REMIT	0.547	0.512	0.575
REMITTANCE	1.078	1.159	1.014
FEMALE	0.557	0.000	1.000
AGE_1§	0.402	0.331	0.459
AGE_2	0.376	0.419	0.342
AGE_3	0.155	0.169	0.144
AGE_4	0.066	0.081	0.055
HHEAD	0.541	0.715	0.402
KINH	0.899	0.881	0.915
MARRIED	0.574	0.606	0.548
SPOUSE	0.412	0.451	0.381
CHILD	0.244	0.249	0.239
PARENTS	0.136	0.171	0.108
HH_SIZE	3.546	3.595	3.507
EDU1§	0.029	0.028	0.029
EDU2	0.103	0.115	0.095
EDU3	0.487	0.424	0.537
EDU4	0.309	0.348	0.279
EDU5	0.072	0.085	0.061
SECTOR1	0.131	0.142	0.122
SECTOR2§	0.652	0.733	0.589
SECTOR3	0.208	0.116	0.282
SECTOR4	0.820	0.009	0.007
EARNINGS	0.908	1.038	0.805
BONUS	0.351	0.315	0.380
HOUSING	0.012	0.008	0.014
URBAN	0.386	0.363	0.404
RURAL	0.785	0.779	0.790
OWNHOUSE	0.317	0.326	0.309
PERM_DWELL	0.159	0.157	0.161
REGIS_1	0.041	0.041	0.041
REGIS_2§	0.116	0.118	0.115
REGIS_3	0.063	0.041	0.080
REGIS_4	0.316	0.358	0.282
REGIS_5	0.464	0.442	0.482
SPLINE_1	10.784	10.737	10.823
SPLINE_2	7.395	7.367	7.417
SPLINE_3	8.314	8.483	8.178
RELATIVES	0.599	0.591	0.605
FRIENDS	0.330	0.332	0.329
DIFFICULTIES	0.461	0.471	0.452
LOANS_1§	0.776	0.766	0.784
LOANS_2	0.084	0.088	0.081
LOANS_3	0.040	0.037	0.043
LOANS_4	0.100	0.110	0.093
INSURANCE	0.369	0.319	0.409
VISITS	2.548	2.262	2.775
Sample Size	4388	1945	2443

§ = omitted category in regression estimation.

Note: Provincial dummy variables are also included for Hanoi, Hai Phong, Hai Duong, Quang Ninh, Gia Lai, Dac Lac, Dak Nong, Lam Dong, Ho Chi Minh City, Bing Duong, and Dong Nai. Five dummy controls for the month of interview are also included.

Source: Calculations based on the 2004 Viet Nam Migration Survey data.

Table 3: Maximum Likelihood Estimates for Homoscedastic Tobit Remittance Functions

Variable	Pooled	Male	Female
CONSTANT	−6.813***	−8.941***	−5.218***
	(0.771)	(1.250)	(0.960)
FEMALE	0.102	§	§
	(0.095)		
AGE_2	0.026	0.074	−0.034
	(0.115)	(0.205)	(0.135)
AGE_3	0.307*	0.206	0.343*
	(0.164)	(0.282)	(0.199)
AGE_4	0.067	0.021	0.016
	(0.209)	(0.346)	(0.264)
HHEAD	0.168	0.543***	0.036
	(0.095)	(0.193)	(0.115)
KINH	0.246	0.448	0.012
	(0.214)	(0.355)	(0.263)
MARRIED	0.180	0.232	0.039
	(0.130)	(0.236)	(0.155)
SPOUSE	0.009	−0.294	0.250*
	(0.128)	(0.216)	(0.155)
CHILD	−0.377***	0.007	−0.639***
	(0.137)	(0.227)	(0.169)
PARENTS	−1.367***	−1.426***	−1.230***
	(0.155)	(0.246)	(0.201)
HH_SIZE	0.042*	0.043	0.069**
	(0.025)	(0.041)	(0.031)
EDU2	1.674***	1.557**	1.814***
	(0.501)	(0.782)	(0.650)
EDU3	2.085***	1.987***	2.187***
	(0.490)	(0.765)	(0.637)
EDU4	1.896***	1.822***	2.009***
	(0.495)	(0.772)	(0.644)
EDU5	2.016***	2.220***	1.838***
	(0.527)	(0.819)	(0.688)
SECTOR1	−0.486***	−0.412	−0.411**
	(0.156)	(0.259)	(0.192)
SECTOR3	0.379***	0.374	0.346**
	(0.139)	(0.270)	(0.156)
SECTOR4	0.219	0.516	0.102
	(0.440)	(0.726)	(0.541)
EARNINGS	1.286***	1.226***	1.345***
	(0.087)	(0.134)	(0.116)
BONUS	0.295***	0.377*	0.262**
	(0.111)	(0.197)	(0.129)
HOUSING	0.191	0.003	0.186
	(0.384)	(0.781)	(0.415)
URBAN	0.422*	0.081	0.672***
	(0.233)	(0.386)	(0.284)
RURAL	0.259***	0.447**	0.136
	(0.106)	(0.180)	(0.128)

continued.

Table 3 (continued).

Variable	Pooled	Male	Female
OWNHOUSE	−0.333**	−0.690***	−0.135
	(0.146)	(0.241)	(0.181)
PERM_DWELL	−0.245*	−0.259	−0.156
	(0.130)	(0.219)	(0.157)
REGIS_1	0.475*	0.711	0.343
	(0.270)	(0.472)	(0.318)
REGIS_3	−0.131	0.155	−0.167
	(0.260)	(0.489)	(0.294)
REGIS_4	0.439**	0.623**	0.280
	(0.172)	(0.297)	(0.205)
REGIS_5	1.162***	1.382***	0.971***
	(0.202)	(0.351)	(0.238)
SPLINE_1	0.119***	0.158***	0.088***
	(0.019)	(0.032)	(0.023)
SPLINE_2	0.021**	0.049***	0.006
	(0.010)	(0.017)	(0.012)
SPLINE_3	−0.009*	−0.015*	−0.007
	(0.005)	(0.009)	(0.006)
RELATIVES	0.433***	0.574***	0.262**
	(0.088)	(0.150)	(0.106)
FRIENDS	0.009	0.254*	−0.216**
	(0.091)	(0.153)	(0.109)
DIFFICULTIES	−0.235**	−0.383	−0.119
	(0.093)	(0.162)	(0.110)
LOANS_2	−0.306*	−0.257	−0.324*
	(0.160)	(0.263)	(0.196)
LOANS_3	0.540**	0.843**	0.304
	(0.237)	(0.419)	(0.274)
LOANS_4	0.066	0.047	0.041
	(0.167)	(0.266)	(0.212)
INSURANCE	0.098	−0.292	0.297**
	(0.122)	(0.219)	(0.143)
VISITS	0.196***	0.248***	0.162***
	(0.013)	(0.023)	(0.015)
Observations	4388	1945	2443
Homoscedasticity Test	339.3***	160.3***	342.8***
	(0.000)	(0.000)	(0.000)
R2 – ANOVA	0.216	0.271	0.203
R2 – Decomposition	0.305	0.329	0.293
Log Likelihood	−6548.1	−2848.0	−3631.5
σ	2.386***	2.640***	2.134***
	(0.036)	(0.062)	(0.042)

***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively, using two-tailed tests.

§ = not applicable.

R^2 – ANOVA = variance in predicted conditional mean over variance in the dependent variable.

R^2 – Decomposition = variance in predicted mean over variance in predicted + plus model residual variation.

Note: See Table 1 for a description of the variables used in the regression model. The scale factor used for the computation of the impact/marginal effects is 0.488 for the pooled model, 0.457 for the male subsample, and 0.512 for the female subsample. The ML estimates are based on maximizing equation (3) in the text. The homoscedasticity test is based on the score test suggested by Chesher and Irish (1987). The prob-values for the test values are reported in parentheses.

Source: Calculations based on the 2004 Viet Nam Migration Survey data.

variance function is decisively rejected in all three cases yielding LRT values of 672 with degrees of freedom (d.o.f.) = 50, 190 (d.o.f. = 49), and 619 (d.o.f. = 49) for the pooled, male, and female subsamples, respectively. In addition, the separation of the data by gender is also upheld on the basis of LRTs using either the homoscedastic tobit model with an LRT value = 137 (d.o.f = 54), or its heteroscedastic counterpart with an LRT value = 274 (d.o.f. = 102). These final set of results confirm the presence of systematic gender differences in remittance behavior and indicate the need for the separate estimation of male and female regression models.

The variance function estimates from Table 4 provide some further empirical insights on the remittance process. It is clear from the pooled estimates reported in this table that residual dispersion is considerably lower for women compared to men, again suggesting that female migrants are potentially more reliable and less risky in their remittance sending behavior than their male counterparts. Higher remittance dispersion is also positively associated with variations in labor market earnings and in number of annual visits a migrant makes home. The possession of temporary registration cards also increases the residual dispersion in remittance behavior, again emphasizing the comparative riskiness associated with such status.

Table 5 examines the evidence for gender differences in the mean regression estimates using both the homoscedastic and heteroscedastic regression models. There is some consensus among the two regression models as to where the estimated gender differences in parameter estimates are located. In regard to the former, and using a 90% confidence interval, statistically significant gender differentials in the estimates are detected in terms of the head of household measure, the set of splines capturing the time spent at the destination, the variables relating to conditions and circumstances when the individual first arrived, the number of visits home, and the possession of a health insurance card. In terms of the latter model, gender differential effects are present for the head of household, the set of household demographics, the number of visits home, the possession of a health insurance card, and the set of provincial effects.

Table 6 reports the estimates for the mean decomposition analysis. Using the homoscedastic tobit model and assuming the male parameter structure, the unconditional average difference in remittances suggests that men remitted 128,000 Dong more than women in the 12 months prior to the interview date. Of this, 91,000 Dong was attributable to gender differentials in endowments and the remaining 37,000 Dong to gender differentials in treatment. The finding is relatively insensitive to the use of the female parameter structure. The raw gender gap in remittances narrows with the use of the heteroscedastic tobit model estimates but the endowment effect widens regardless of whether the male or female parameter structure is used for the computations. In particular, male migrants are found to remit annually between 134,000 and 176,000 Dong more than women migrants due to their superior array of endowments.

Table 4: Maximum Likelihood Estimates for Heteroscedastic Tobit Remittance Functions

	Pooled		Male		Female	
Variable	**Mean**	**Variance**	**Mean**	**Variance**	**Mean**	**Variance**
CONSTANT	−4.196***	§	−4.636***	§	−3.381***	§
	(0.962)		(0.917)		(0.953)	
FEMALE	0.116	−0.139***	§	§	§	§
	(0.086)	(0.030)				
AGE_2	0.082	−0.042	0.340*	−0.149*	0.033	0.028
	(0.096)	(0.038)	(0.186)	(0.077)	(0.107)	(0.054)
AGE_3	0.385*	−0.074	0.605**	−0.151	0.326**	−0.033
	(0.143)	(0.051)	(0.224)	(0.108)	(0.156)	(0.077)
AGE_4	0.230	0.026	0.188	−0.010	0.175	0.157
	(0.183)	(0.070)	(0.335)	(0.129)	(0.221)	(0.116)
HHEAD	0.043	0.035	0.716	−0.054	−0.115	0.117***
	(0.081)	(0.030)	(0.174)	(0.070)	(0.086)	(0.045)
KINH	0.029	0.034	−0.162	0.217	0.005	−0.012
	(0.186)	(0.087)	(0.229)	(0.149)	(0.221)	(0.121)
MARRIED	0.111	0.141***	0.224	0.059	−0.033	0.187***
	(0.110)	(0.044)	(0.190)	(0.087)	(0.122)	(0.064)
SPOUSE	−0.187	0.198***	−0.560***	0.174**	−0.094	0.280***
	(0.121)	(0.043)	(0.196)	(0.070)	(0.137)	(0.043)
CHILD	−0.176	−0.144***	−0.041	0.058	−0.129	−0.354***
	(0.135)	(0.045)	(0.222)	(0.081)	(0.146)	(0.068)
PARENTS	−1.140***	0.123**	−0.308*	−0.228**	−1.341***	0.348**
	(0.170)	(0.062)	(0.174)	(0.105)	(0.254)	(0.104)
HH_SIZE	0.044*	−0.005	0.079**	−0.023	0.038	0.004
	(0.021)	(0.007)	(0.031)	(0.015)	(0.024)	(0.010)
EDU2	0.996***	§	0.637***	§	1.304***	§
	(0.381)		(0.511)		(0.648)	
EDU3	1.364***	§	0.981**	§	1.654***	§
	(0.368)		(0.500)		(0.638)	
EDU4	1.145***	§	0.929*	§	1.388**	§
	(0.375)		(0.510)		(0.642)	
EDU5	1.206***	§	0.765**	§	1.577**	§
	(0.405)		(0.562)		(0.673)	
SECTOR1	−0.373***	0.026	−0.336***	0.084	−0.395***	0.006
	(0.131)	(0.050)	(0.235)	(0.088)	(0.133)	(0.079)
SECTOR3	0.290***	0.116**	0.103*	0.201**	0.211*	0.145**
	(0.117)	(0.051)	(0.288)	(0.096)	(0.115)	(0.069)
SECTOR4	0.029	−0.421***	−0.349	−0.042***	0.053	−0.650***
	(0.275)	(0.145)	(0.727)	(0.216)	(0.273)	(0.221)
EARNINGS	1.092***	0.487***	1.034***	0.313***	0.884***	0.602***
	(0.126)	(0.031)	(0.164)	(0.047)	(0.164)	(0.054)
BONUS	0.294***	0.004	0.317***	0.038	0.326***	−0.038
	(0.094)	(0.036)	(0.180)	(0.067)	(0.098)	(0.052)
HOUSING	0.121	−0.049	0.669*	−0.469	−0.034	0.096
	(0.264)	(0.176)	(0.404)	(0.390)	(0.299)	(0.213)
URBAN	0.342	−0.236***	0.119	0.073	0.306	−0.445***
	(0.215)	(0.067)	(0.315)	(0.133)	(0.249)	(0.105)
RURAL	0.264***	−0.057*	0.304*	−0.031	0.227**	−0.086*
	(0.097)	(0.034)	(0.178)	(0.063)	(0.108)	(0.050)

continued.

Table 4 (continued).

	Pooled		Male		Female	
Variable	**Mean**	**Variance**	**Mean**	**Variance**	**Mean**	**Variance**
OWNHOUSE	−0.160**	−0.146***	−0.286	−0.243***	−0.201	−0.116***
	(0.138)	(0.049)	(0.228)	(0.081)	(0.152)	(0.077)
PERM_DWELL	−0.124	−0.053	−0.257	−0.028	−0.016	−0.024
	(0.109)	(0.044)	(0.197)	(0.080)	(0.115)	(0.069)
REGIS_1	0.035	0.057	0.248	0.044	−0.113	0.110
	(0.214)	(0.099)	(0.346)	(0.198)	(0.214)	(0.143)
REGIS_3	−0.384	−0.014	−0.241	−0.037	−0.492**	0.205*
	(0.211)	(0.101)	(0.421)	(0.194)	(0.202)	(0.128)
REGIS_4	−0.081	0.245***	−0.144	0.297**	−0.165	0.332***
	(0.144)	(0.067)	(0.198)	(0.126)	(0.157)	(0.089)
REGIS_5	0.514***	0.173**	0.640	0.238*	0.262	0.188*
	(0.169)	(0.074)	(0.263)	(0.136)	(0.173)	(0.108)
SPLINE_1	0.074***	0.018***	0.070***	0.030**	0.065***	0.018***
	(0.014)	(0.006)	(0.025)	(0.012)	(0.014)	(0.006)
SPLINE_2	0.011	0.004	0.023	0.009	0.004	0.008*
	(0.009)	(0.003)	(0.015)	(0.006)	(0.009)	(0.005)
SPLINE_3	−0.009*	0.001	−0.017	0.002	−0.006	−0.002
	(0.005)	(0.002)	(0.008)	(0.003)	(0.005)	(0.002)
RELATIVES	0.270***	0.091***	0.334**	0.037	0.187**	0.101**
	(0.077)	(0.027)	(0.143)	(0.052)	(0.080)	(0.043)
FRIENDS	−0.004	−0.089*	0.033	0.034	−0.095	−0.134*
	(0.078)	(0.030)	(0.141)	(0.052)	(0.082)	(0.044)
DIFFICULTIES	−0.103	−0.122***	0.023	−0.153***	−0.051	−0.164***
	(0.080)	(0.028)	(0.152)	(0.052)	(0.079)	(0.042)
LOANS_2	−0.110	0.028	−0.183	−0.063	−0.199	0.202***
	(0.151)	(0.049)	(0.245)	(0.091)	(0.197)	(0.076)
LOANS_3	0.288	−0.058	−0.038	0.238	0.217	−0.086
	(0.184)	(0.089)	(0.376)	(0.164)	(0.190)	(0.122)
LOANS_4	−0.003	0.101*	0.085	0.132	−0.161	0.142
	(0.159)	(0.059)	(0.224)	(0.087)	(0.190)	(0.092)
INSURANCE	0.142	0.045	−0.201	−0.131	0.192*	0.113
	(0.099)	(0.041)	(0.211)	(0.080)	(0.102)	(0.060)
VISITS	0.147***	0.012***	0.227***	0.010	0.112***	0.019***
	(0.010)	(0.004)	(0.021)	(0.007)	(0.011)	(0.005)
Observations	4388		1945		2443	
R2 – ANOVA	0.096		0.165		0.121	
R2 – Decomposition	0.103		0.171		0.115	
Log Likelihood	−6212.1		−2753.0		−3322.2	
σ	0.943***		0.543***		0.754***	
	(0.179)		(0.217)		(0.207)	

***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively, using two-tailed tests.

§ = not applicable.

$\mathbf{R^2}$ – ANOVA = variance in predicted conditional mean over variance in the dependent variable.

$\mathbf{R^2}$ – Decomposition = variance in predicted mean over variance in predicted + plus model residual variation.

Note: See Table 1 for a description of the variables used in the regression model. The scale factor used for the computation of the impact/marginal effects is 0.546 for the pooled model, 0.515 for the male subsample, and 0.569 for the female subsample. The ML estimates are based on maximizing equation (6) in the text.

Source: Calculations based on the 2004 Viet Nam Migration Survey data.

Table 5: Wald Tests for Gender Differences in Estimated Effects

Variables	Homoscedastic Tobit Models	Heteroscedastic Tobit Models
Age Controls	0.876	2.574
	(0.831)	(0.462)
Head of Household	5.086**	18.263***
	(0.024)	(0.000)
Kinh	0.973	0.273
	(0.324)	(0.601)
Household Demographics	8.262	16.550***
	(0.142)	(0.005)
Education Controls	2.368	3.224
	(0.668)	(0.521)
Job Sector Controls	0.217	0.517
	(0.975)	(0.915)
Earnings	0.447	0.421
	(0.504)	(0.516)
Miscellaneous	7.137	3.507
	(0.308)	(0.743)
Registration Controls	1.049	2.407
	(0.902)	(0.661)
Duration Splines	13.968***	1.997
	(0.003)	(0.573)
Arrival Controls	9.643**	1.483
	(0.022)	(0.686)
Loan Controls	1.191	1.302
	(0.755)	(0.729)
Visits	9.858***	24.596***
	(0.002)	(0.000)
Insurance Card	5.056**	2.801*
	(0.025)	(0.094)
Provincial Controls	12.047	17.970*
	(0.282)	(0.055)
Month Controls	6.741	4.413
	(0.150)	(0.353)

***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 level, respectively.

Note: The Household Demographics category comprises the variables Married, Spouse, Child, Parents, and Household Size. The Miscellaneous category comprises the variables Bonus, Housing, Urban, Rural, Ownhouse, and Perm_Dwell. The Wald tests are computed as $d'V^{-1}d$ where d is the gender difference in the set of relevant estimated mean parameters and V is the sum of the corresponding variance-covariance submatrices across the two gender groups. The prob-values for the tests are reported in parentheses.

Source: Calculations based on the 2004 Viet Nam Migration Survey data.

Table 6: Mean Decompositions Using Tobit Models

Model	Total Differential	Treatment Differential	Endowment Differential
Homoscedastic Tobit and Male Parameter Structure (Δ_1)	0.128	0.037	0.091
Homoscedastic Tobit and Female Parameter Structure (Δ_2)	0.128	0.043	0.085
Heteroscedastic Tobit and Male Parameter Structure (Δ_3)	0.088	−0.043	0.134
Heteroscedastic Tobit and Female Parameter Structure (Δ_4)	0.088	−0.088	0.176

Note: For Δ_1, see equation (9) in the text.
For Δ_2, see equation (10) in the text.
For Δ_3, see equation (11) in the text.
For Δ_4, see equation (12) in the text.
Source: Calculations based on the 2004 Viet Nam Migration Survey data.

Table 7 attempts to analyze further the underlying factors that drive the endowment differentials reported in Table 6. The factors that are found to impact positively on the endowment effect include the set of age controls, head of household status, labor market earnings, possession of a health insurance card, and provincial controls. There is a statistically significant gender difference in the sample average age with men over 2 years older than women (t-test = 7.7). The percentage of men who are heads of household is almost twice that of women (71% compared to 40%) with the z-score for the test of this differential computed at 20.6. As noted earlier, the average gender difference in labor market earnings is statistically significant at a conventional level (see above). These latter two variables appear to be the most important in explaining the endowment effects that drive the observed gender differences in remittance levels.

Table 7: Endowment Effects using Tobit Models

Variables	Homoscedastic Tobit and Male Parameter Structure	Heteroscedastic Tobit and Male Parameter Structure
Overall	0.091	0.134
Age Controls	0.008	0.020
Head of Household	0.120	0.100
Kinh	−0.011	0.001
Household Demographics	−0.065	−0.016
Education Controls	−0.009	−0.003
Job Sectoral Controls	−0.049	−0.010
Earnings	0.202	0.108
Miscellaneous	−0.030	−0.016
Registration Controls	−0.010	−0.012
Duration Splines	−0.015	−0.005
Arrival Controls	−0.010	−0.002
Loan Controls	−0.005	0.000
Visits	−0.089	−0.054
Insurance Card	0.018	0.008
Provincial Controls	0.039	0.018
Month Controls	−0.003	−0.003

Note: The shares of each subcategory are computed using the approach suggested by Even and MacPherson (1993) but modified for the tobit application. The Household Demographics category comprises the variables Married, Spouse, Child, Parents, and Household_Size. The Miscellaneous category comprises the variables Bonus, Housing, Urban, Rural, Ownhouse, and Perm_Dwell.

Source: Calculations based on the 2004 Viet Nam Migration Survey data.

VI. Conclusions

This paper has explicitly examined the role of gender in remittance behavior of migrants using data drawn from the 2004 Viet Nam Migration Survey. The gender dimension to such remittance behavior is not an issue that has featured strongly within the existing literature, thus our findings contain novel appeal. In addition, we use estimates from both homoscedastic and heteroscedastic tobit models to decompose the raw gender difference in remittances into treatment and endowment components.

Our empirical work for Viet Nam has revealed that women are more likely to remit than men, but that the latter remit a greater monetary amount. This seems more in line with the findings of Semyonov and Gorodzeisky (2005). The key finding of our econometric work suggests that endowment differences are more important than treatment differences in explaining the overall gender difference, and this finding is invariant to whether the homoscedastic or heteroscedastic tobit is used in estimation. The most prominent factors that drive the endowment differentials relate to head of household status and labor market earnings, and to a much lesser extent age differences. Given that the gender differences in treatment effects are either small compared to the overall gap (as in the

homoscedastic tobit model) or negative (as in the heteroscedastic tobit model), there is little evidence that the gender differences in remittances are attributable to behavioral differences between men and women. In other words, the evidence that the motives driving male remittance behavior are distinct from those that determine female remittance behavior is found to be largely unpersuasive in the current application. The findings suggest, however, that both male and female migrants remit home due to both altruism and for insurance purposes. And female migrants are also found to be more reliable remittance senders than their male counterparts.

These results have some important policy implications and provide an agenda for future research. First, the fact that women exhibit a more reliable remittance behavior than men suggests that the contribution of female migrants to the well-being and risk-coping ability of their household at the origin should not be underestimated. The absence of information on the origin household in the current dataset does not allow us to do so, but it would be interesting to see whether the gender of remitters plays any role in the effect these remittances exert on the origin household's welfare. Second, given that women's relatively large representation among internal migrants in Viet Nam reflects emerging employment opportunities for young women in foreign-capital dominated industries, migration could be considered as a potential channel to gender equity. This, however, needs further research on the labor market performance of women at both the origin and destination locations. On the other hand, given that the earnings differential between male and female migrants largely explains the greater amount of remittances sent by men, it is also worth examining whether there is any evidence of unequal treatment faced by female migrants at the destination labor market.

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About the Paper

This paper examines the role of gender in remittance behavior among migrants using data drawn from the 2004 Viet Nam Migration Survey—an issue that has not featured strongly in the existing literature. It finds little evidence that gender differences in remittances are attributable to behavioral differences between men and women. Instead, the empirical results show that endowment differences, such as gender differences in household head status and labor market earnings, are more important in explaining the overall gender difference in the remittance level.

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Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org/economics
ISSN: 1655-5252
Publication Stock No.:

Printed in the Philippines