

# THE IMPACT OF INTERNATIONAL AND INTERNAL REMITTANCES ON HOUSEHOLD WELFARE: EVIDENCE FROM VIET NAM

Nguyen Viet Cuong\*

*Using data from the Viet Nam household living standard surveys of 2002 and 2004, this paper measures the impact of international and internal remittances on the household welfare of remittance-receiving households. It finds that both the income and the consumption expenditures of the recipients increased as a result of international and internal remittances. The impact of remittances on non-food expenditures tended to be greater than the impact on food expenditures. For international remittances, the impact on income was much greater than the impact on consumption expenditures, meaning that a large proportion of international remittances were used for savings and investment. The impact of internal remittances on income was slightly greater than the impact on consumption expenditures. In other words, most of the internal remittances were used for consumption expenditures.*

## I. INTRODUCTION

It is often argued that remittances are an important source of household income, which can help households increase investments and cope with socio-economic shocks. Yet, there has been little quantitative research on the impact of remittances on household welfare. One reason might be the positive correlation that some researchers believe exists between remittances and household welfare. However, the causal effect of remittances on household welfare deserves more investigation at least for two reasons. Firstly, the impact of remittances on income should be equal to the difference in income between the state of remittances and the counterfactual state of no remittances. The impact is not simply equal to the amount of the remittances received. For example, the impact of remittances on

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\* Lecturer, Faculty of Trade and International Economics, National Economics University, Viet Nam.

income would be small if remittances reduced the recipients' incentive to work. Secondly, even if remittances lead to a substantial increase in household income, there is no guarantee that they will result in similar increases in household welfare aspects, such as consumption, education and health care. If remittances have a strong impact on savings and investment, the impact on consumption and household welfare will be mitigated.

There are several studies investigating the relationship between international or internal remittances and poverty. For example, Adams and Page (2005) found a strong positive correlation between international remittances and poverty reduction in developing countries. At the country level, positive impacts of remittances, especially international remittances, on poverty reduction were also found in some studies such as Adams (1991), Adams (2004), Lopez-Cordova (2005), Taylor and others (2005), Esquivel and Huerta-Pineda (2007), Adams (2006), and Acosta and others (2007).

However, there are only a few studies on the impact of migration and remittances on household welfare, such as education, health care, consumption and savings. In addition, the impact of migration and remittances on household welfare is not always to be found positive in these empirical studies. For example, Hildebrandt and McKenzie (2005) found that children in migrant households had lower ratios of infant mortality and higher birth-weights, but also had a lower level of preventative health care than children in non-migrant households. McKenzie and Rapoport (2006) found that migration had a negative impact on the schooling ratio of children in Mexico. In contrast, Adams (2005) showed that both international and internal remittances helped increase the health-care and educational expenditures of receiving households. Regarding the impact on investment, Adams (1991) found that international remittances had a positive impact on household spending and investment in rural Egypt. In Adams (1998), positive effects of international remittances on investment and asset accumulation were also found in rural Pakistan.

In most studies assessing the impact of remittances, the problem of the endogeneity of remittances is sometimes not solved. Most studies agree that international migration is costly for the poor, and international remittances are luxuries for them. There is no guarantee that remittances are exogenous. Failure to correct the endogeneity of remittances will lead to a biased estimation of remittance impacts on household welfare.

In Viet Nam, remittances, especially international remittances, have been increasing over time. It is often argued that remittances have contributed to economic development and improved welfare. Although there are a large number

of studies on the impact of migration (e.g., Guest 1998; Djamba and others 1999; Dang and others 1997; Dang 2001; Dang and others 2003; Brauw and Harigaya, 2007), there are only a few on the impact of remittances in Viet Nam. Two exceptions are Nguyen (2008) and Nguyen and others (2008), which measure the impacts of international remittances on poverty and inequality. The objective of the paper is to measure the extent to which remittances international (foreign) and internal (domestic) can affect the welfare of receiving households in Viet Nam. By doing so, the paper is expected to contribute empirical findings to the debate on the relationship between remittances and improved household welfare in developing countries.

Compared with previous studies on remittances in Viet Nam, this study has two special features. Firstly, it focuses on direct welfare indicators, including income, consumption expenditures, expenditures on food and non-food, education and health care. It does not estimate the impact of remittances on poverty and inequality, which is addressed by Nguyen (2008) and Nguyen and others (2008). Secondly, it compares the effects of both international and internal remittances, while other studies focus on one or the other.

This paper is structured into six sections. The second section introduces the data set used in the paper. The third section describes household welfare and remittances in Viet Nam. The fourth section presents the method to measure impacts of remittances. Next, the fifth section presents the empirical findings on remittance impacts. Finally, the sixth section presents conclusions.

## **II. DATA SET**

The paper relies on data from the two recent Viet Nam Household Living Standard Surveys (VHLSS), which were conducted by the General Statistics Office of Viet Nam (GSO) with technical support from the World Bank in the years 2002 and 2004.<sup>1</sup> The 2002 and 2004 VHLSS covered 29,530 and 9,188 households, respectively. The samples are representative for the national, rural and urban, and regional levels. The 2002 and 2004 VHLSS set up a panel of 4,008 households, which are representative for the whole country and for the urban and rural populations.

The surveys collected information through household and community-level questionnaires. Information on households includes basic demography, employment and labour force participation, education, health, income, expenditures, housing,

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<sup>1</sup> Information on VHLSS is available on the website of GSO at [www.gso.gov.vn](http://www.gso.gov.vn).

fixed assets and durable goods, participation of households in poverty alleviation programmes, and especially information on international and internal remittances that households had received during the past 12 months before the interview.

It should be noted that the remittances defined in VHLSS include all moneys and kinds that households receive from anyone. Remittances can be given to households not only by their relatives but also their friends, neighbours, etc. Thus, international and internal remittances have a broad definition in this paper. They can be regarded as international or internal private transfers to households.

In VHLSS, income and expenditures data are collected using very detailed questionnaires. Household income includes income from agricultural and non-agricultural production, salary, wage, pension, scholarship, income from loan interest and house rental, remittances and subsidies. Income from agricultural production comprises crop income, livestock income, aquaculture income, and income from other agriculture-related activities.

Consumption expenditures include food and non-food expenditures. Food expenditures include purchased food and foodstuffs and self-produced products of households. Non-food expenditures comprise expenditures on education, health care, houses and commodities, and expenditures on power, water supply and garbage.

Information on the characteristics of communes was collected from 2,960 and 2,181 communes in the 2002 and 2004 surveys, respectively. Data on commune characteristics consist of demography and general situation of communes, general economic conditions and aid programmes, non-farm employment, agriculture production, local infrastructure and transportation, education, health, and social affairs. Commune data can be linked with household data.

### **III. REMITTANCES AND HOUSEHOLD WELFARE IN VIET NAM**

Remittances can be an important source of household income, consumption and investments. In recent years, international remittances have become an increasing source of external funds for Viet Nam. During the period 2001-2006, international remittances increased from 26.1 billion to 75.2 billion Vietnamese dong.<sup>2</sup> The corresponding share of GDP increased from 5.5 to 7.5 per cent during the same period (Ratha and Xu 2007). Access to remittances at the household

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<sup>2</sup> The exchange rate in January 2007 was about 16,000 dong per United States dollar.

level is not well known. Using VHLSS 2002 and 2004, the receipt of international and internal remittances by households over the period 2002-2004 can be examined. Table 1 shows that the proportion of households receiving international remittances was small, at 5.9 and 7.1 per cent in 2002 and 2004, respectively. During the period 2002-2004, the value of per capita international remittances increased by 34 per cent, from 4,005,000 to 5,367,000 dong.<sup>3</sup> In 2004, the ratio of remittances to household income and consumption expenditures was 38.1 and 52.8 per cent, respectively. Table 1 also shows that urban households are more likely to receive international remittances than rural households.<sup>4</sup> In 2004, the proportion of households receiving international remittances was 13.8 per cent and 7.1 per cent in urban and rural areas, respectively. Per capita international remittances were also higher for recipients in rural areas than in urban areas.

**Table 1. International remittances received by households in 2002-2004**

	2002*			2004		
	Urban	Rural	Total	Urban	Rural	Total
Percentage of receiving households	11.3 [0.8]	4.2 [0.2]	5.9 [0.3]	13.8 [0.9]	4.7 [0.3]	7.1 [0.3]
Per capita remittances received by households (thousands of dong)	4 477.9 [677.3]	3 599.2 [747.9]	4 005.4 [513.2]	5 352.5 [633.1]	3 861.9 [392.5]	4 626.6 [379.9]
Ratio of remittances to household expenditures (percentage)	46.6 [6.5]	88.8 [17.4]	60.5 [7.3]	44.9 [4.8]	71.2 [6.9]	52.8 [4.0]
Ratio of remittances to household income (percentage)	35.7 [3.7]	49.4 [5.4]	41.2 [3.3]	35.4 [3.0]	42.3 [2.8]	37.9 [2.1]

Source: Estimation from VHLSS 2002 and 2004.

Notes: \* At 2004 prices.

Numbers within brackets indicate standard errors (standard errors are corrected for sampling weights and cluster correlation).

Compared to international remittances, internal remittances had much larger coverage (table 2). The proportion of households receiving internal remittances was 78.2 and 86.3 per cent in 2002 and 2004, respectively. Although, on average, internal remittances were smaller than international remittances, they experienced a very high growth rate during the period 2002-2004. Per capita internal remittances

<sup>3</sup> Per capita remittances are equal to the total of remittances divided by the number of household members.

<sup>4</sup> See Viet Nam (2001) for regulations on the classification of urban areas in Viet Nam. Urban areas include towns and wards. Each town/ward should have more than 4,000 people, and more than 65 per cent of labourers should have non-farm employment.

increased by about 57 per cent from 530,000 dong in 2002 to 831,000 dong in 2004. The ratio of the average internal remittances over household income and consumption expenditures was 11.6 and 15.1 per cent, respectively. The proportion of households receiving internal remittances is slightly higher in rural areas than urban areas. However, the average size of internal remittances in urban areas was much higher than that in rural areas.

**Table 2. Internal remittances received by households in 2002-2004**

	2002*			2004		
	Urban	Rural	Total	Urban	Rural	Total
Percentage of receiving households	74.9 [1.5]	79.3 [0.6]	78.2 [0.6]	84.9 [1.1]	86.9 [0.6]	86.3 [0.5]
Per capita remittances of receiving households (thousands of dong)	2 204.2 [131.7]	1 104.1 [34.9]	1 370.4 [43.4]	3 100.7 [231.1]	1 670.4 [55.6]	2 049.5 [75.1]
Ratio of remittances to household expenditures (percentage)	12.7 [0.9]	14.0 [0.4]	13.5 [0.5]	13.2 [0.8]	16.6 [0.8]	15.1 [0.6]
Ratio of remittances to household income (percentage)	10.6 [0.7]	10.7 [0.3]	10.6 [0.3]	10.9 [0.6]	12.0 [0.5]	11.5 [0.4]

Source: Estimation from VHLSS 2002 and 2004.

Notes: \* At 2004 prices.

Numbers within brackets indicate standard errors (standard errors are corrected for sampling weights and cluster correlation).

Tables 3 and 4 compare some welfare indicators between remittance recipients and non-recipients. According to table 3, households without international remittances were more likely to have lower income and consumption than households with international remittances. In these tables, total consumption expenditures are disaggregated into food expenditures, health-care and education expenditures, and other non-food expenditures. For the purposes of this paper, non-food expenditures do not include health-care or education expenditures. Table 3 shows that households without international remittances have much lower consumption expenditures on food, health care, education, and other non-food items than households with remittances.

Contrary to the case of international remittances, households with internal remittances have slightly lower per capita income than households without internal remittances (table 4). Consumption expenditures are quite similar between households with and without internal remittances.

Table 3. Welfare of recipients and non-recipients of international remittances  
(Thousands of Vietnamese dong)

Household indicators	2002*						2004					
	Urban			Rural			Urban			Rural		
	Recipient	Non-recipient	Total	Recipient	Non-recipient	Total	Recipient	Non-recipient	Total	Recipient	Non-recipient	Total
Per capita income	11 592.2 [817.7]	7 703.1 [272.6]	6 282.6 [458.3]	3 673.2 [40.3]	2 787.9 [40.3]	8 679.3 [500.6]	13 916.7 [888.9]	8 725.6 [663.8]	4 530.1 [63.3]	8 172.7 [416.9]	11 088.9 [435.3]	5 531.5 [153.2]
Per capita consumption expenditures	8 899.4 [362.3]	6 372.7 [194.5]	3 745.6 [118.1]	2 787.9 [24.6]	2 787.9 [24.6]	6 072.0 [262.2]	10 893.5 [554.3]	7 017.2 [616.1]	3 295.2 [28.8]	4 985.2 [233.3]	7 984.8 [339.5]	4 183.6 [117.7]
Per capita food consumption expenditures	3 103.3 [116.9]	2 458.4 [67.1]	1 645.9 [41.1]	1 445.6 [10.3]	1 445.6 [10.3]	2 303.7 [80.1]	3 604.9 [217.1]	2 576.6 [215.9]	1 564.0 [9.4]	1 930.8 [68.4]	2 780.8 [98.5]	1 805.7 [28.0]
Per capita health-care expenditures	455.5 [47.0]	263.0 [12.9]	276.6 [31.9]	162.2 [3.7]	162.2 [3.7]	357.4 [27.9]	737.1 [106.5]	410.9 [32.9]	237.5 [8.4]	569.1 [94.8]	654.4 [61.8]	278.9 [11.6]
Per capita educational expenditures	599.8 [42.9]	404.6 [15.4]	216.2 [17.4]	143.5 [3.1]	143.5 [3.1]	389.4 [24.9]	782.3 [121.9]	472.4 [38.6]	191.6 [5.2]	257.4 [18.9]	523.9 [60.6]	258.6 [10.6]
Per capita other non-food consumption expenditures	4 740.8 [262.2]	3 246.7 [121.4]	1 606.9 [68.3]	1 036.6 [13.5]	1 036.6 [13.5]	3 021.5 [173.3]	5 769.2 [266.0]	3 557.4 [338.9]	1 302.1 [18.6]	2 227.9 [131.7]	4 025.8 [198.6]	1 840.4 [73.6]

Source: Estimation from VHLSS 2002 and 2004.

Notes: \* At 2004 prices. Numbers within brackets indicate standard errors (standard errors are corrected for sampling weights and cluster correlation).

Table 4. Welfare of recipients and non-recipients of internal remittances  
(Thousands of Vietnamese dong)

Household indicators	2002*						2004					
	Urban			Rural			Urban			Rural		
	Recipient	Non-recipient	Total	Recipient	Non-recipient	Total	Recipient	Non-recipient	Total	Recipient	Non-recipient	Total
Per capita income	7 872.7 [296.2]	8 945.0 [524.1]	3 751.0 [45.8]	3 901.9 [108.2]	4 667.7 [90.5]	5 243.5 [195.1]	9 140.9 [654.0]	11 278.8 [1 451.5]	4 715.5 [71.7]	4 629.0 [144.1]	5 847.9 [154.3]	6 429.0 [341.4]
Per capita consumption expenditures	6 570.2 [192.1]	6 931.0 [352.2]	2 851.0 [27.6]	2 747.0 [46.2]	3 678.1 [65.1]	3 860.0 [133.8]	7 488.3 [622.4]	8 000.7 [958.9]	3 415.9 [37.0]	3 126.4 [73.6]	4 458.0 [127.8]	4 445.8 [185.5]
Per capita food consumption expenditures	2 494.4 [68.7]	2 642.0 [124.8]	1 459.8 [11.3]	1 433.5 [19.6]	1 689.9 [22.2]	1 755.0 [44.8]	2 684.4 [224.2]	2 935.5 [288.6]	1 591.0 [11.3]	1 522.6 [29.1]	1 870.8 [30.8]	1 905.0 [48.3]
Per capita health-care expenditures	297.8 [14.1]	249.2 [22.6]	174.0 [4.3]	141.9 [7.3]	201.5 [4.8]	170.4 [8.2]	458.7 [32.9]	446.7 [85.3]	259.3 [9.3]	216.4 [29.1]	310.3 [12.2]	278.8 [24.3]
Per capita educational expenditures	424.5 [15.0]	434.3 [31.7]	149.1 [3.6]	137.4 [5.7]	210.4 [5.2]	216.4 [11.1]	498.0 [35.2]	620.3 [138.3]	195.9 [5.7]	187.6 [9.8]	273.2 [11.7]	304.7 [27.1]
Per capita other non-food consumption expenditures	3 353.4 [120.9]	3 605.5 [212.9]	1 068.1 [15.1]	1 034.3 [25.3]	1 576.4 [39.4]	1 718.3 [81.2]	3 847.2 [341.5]	3 998.2 [502.2]	1 369.8 [23.5]	1 199.8 [37.8]	2 003.7 [81.3]	1 957.3 [112.8]

Source: Estimation from VHLSS 2002 and 2004.

Notes: \* At 2004 prices. Numbers within brackets indicate standard errors (standard errors are corrected for sampling weights and cluster correlation).



The tables also compare welfare between urban and rural households. They show that urban households have higher welfare outcomes than rural areas.

#### IV. IMPACT EVALUATION METHOD

##### Parameter of interest

In this paper, the main objective of evaluating the impact of remittances is to assess the extent to which receiving remittances has changed the outcomes of the recipients.<sup>5</sup> Remittances, international or internal, received by a household are denoted as  $D$ .  $D$  is a dummy variable, which is equal to one for the receiving household and zero otherwise. Let  $Y$  denote the observed value of the outcome, i.e., household income and expenditures in this paper. Further, let  $Y_1$  and  $Y_0$  denote potential outcomes in the state of remittances and no remittances, respectively. Then the impact of receiving remittances (international or internal) on a household  $i$  can be defined as:

$$\Delta_i = Y_{i1} - Y_{i0}. \quad (1)$$

The most popular parameter of the impact evaluation literature is Average Treatment Effect on the Treated (ATT) (Heckman and others, 1999), which is equal to:<sup>6</sup>

$$ATT = E(\Delta_i | D_i = 1) = E(Y_{i1} | D_i = 1) - E(Y_{i0} | D_i = 1), \quad (2)$$

where the term  $E(Y_{i0} | D_i = 1)$  is not observed and has to be estimated. This is called a counterfactual outcome, which is the outcome of the recipients if they had not received remittances.

##### Estimation method

To estimate  $E(Y_{i0} | D_i = 1)$ , the observed outcome of household  $i$  at the time  $t$  is assumed to have the following semi-log functional form:

$$\ln(Y_{it}) = \beta_0 + G_t \beta_1 + X_{it} \beta_2 + D_{it} \beta_3 + u_i + \varepsilon_{it}, \quad t = 1, 2 \quad (3)$$

where  $G_t$  is a dummy variable for the year  $t = 2$  (i.e., for the year 2004 in our data);  $X_{it}$  are control variables, i.e., households and communities characteristics of

<sup>5</sup> In the literature of impact evaluation, a broader term—"treatment"—instead of programme/project is sometimes used to refer to an intervention whose impact is evaluated.

<sup>6</sup> In some formulas, the subscript  $i$  is dropped for simplicity.

household;  $D_{it}$  are the dummy variables indicating receipt of international and internal remittances;  $u_i$  and  $\varepsilon_{it}$  are unobserved time-invariant and time-variant variables, respectively. In equation (3), the variable  $G_t$  is included to allow the intercept shift between the time  $t_1$  and  $t_2$ . It reflects the common macroeconomic effects on the households.

Empirical studies tend to use semi-log functions of income and expenditures, since income and expenditures often follow log-normal distribution (e.g., Glewwe, 1991). Once coefficients in equation (3) are estimated, we can estimate  $\hat{Y}_{it0}$  for a receiving household  $i$  at the time  $t$  as follows:

$$\begin{aligned}\hat{Y}_{it0} &= e^{[\ln(Y_{it0})]} \\ &= e^{(\hat{\beta}_0 + G_t \hat{\beta}_1 + X_{it} \hat{\beta}_2 + \hat{u}_i + \hat{\varepsilon}_{it})} \\ &= e^{[\ln(Y_{it}) - \hat{\beta}_3]} \\ &= Y_{it} e^{(-\hat{\beta}_3)}.\end{aligned}\quad (4)$$

As a result, ATT at the time  $t$  can be estimated as follows:

$$\begin{aligned}ATT_t &= \hat{E}(Y_{it1} \mid D_{it} = 1) - \hat{E}(\hat{Y}_{it0} \mid D_{it} = 1) \\ &= \frac{1}{n_t} \sum_{i=1}^{n_t} Y_{it} - \frac{1}{n_t} \sum_{i=1}^{n_t} Y_{it} e^{(-\hat{\beta}_3)} \\ &= \frac{1}{n_t} [1 - e^{(-\hat{\beta}_3)}] \sum_{i=1}^{n_t} Y_{it},\end{aligned}\quad (5)$$

where  $n_t$  is the number of the remittance recipients at the time  $t$ . ATT depends on outcomes at the time  $t$ , it can be different between different points of time. As a result, we can estimate ATT for both 2002 and 2004. The standard error of the estimates can be calculated using bootstrap techniques.<sup>7</sup>

It should be noted that if equation (3) is linear instead of semi-log, ATT will be equal to the coefficient of  $D$ , i.e.  $\beta_3$ , which is constant over time.

The main problem in estimating equation (3) is the endogeneity of the receipt of remittances. Recipients may have unobserved characteristics that can be different from those of non-recipients. For example, households with international remittances can have more favourable conditions or more information on

<sup>7</sup> Bootstrapping is a widely-used method to construct the repeated random samples of an estimator by resampling the available data. Suppose that we have a data sample and aim to calculate the standard error of an estimator. Then, we draw random samples with replacement from the original data sample, and for each replication we can compute a value of the estimator. After a number of bootstrap replications, we will have a sample of estimates, which can be used to calculate the standard error of the estimator.

international migration than households without remittances. In addition, members in households with international remittances could be more motivated for higher income and have been seeking overseas migration to rich areas. Failure to control for such unobserved factors leads to biased estimates of the impact of remittances. In this paper, we rely on fixed-effect regressions using panel data to avoid endogeneity bias. A main identification assumption of fixed-effect regression is that only unobserved time-invariant variables,  $u_i$ , in the outcome equation are correlated with the receipt of remittances. It is expected that the relevant variables, such as migration conditions or motivation for higher income, are time-invariant during such a short period of time. By taking the difference in household variables over time, fixed-effect regressions can remove the unobserved time-invariant variables to obtain unbiased estimates of coefficients in the outcome equation.

However, the main drawback of the impact evaluation approach taken in this paper is that it does not allow for indirect or spillover effects. Households can use remittances for investment and lending, which can have indirect effects on the economy and other households. Estimating the indirect effects is beyond the scope of the paper, since the paper relies on microdata in analysing remittances.

## V. EMPIRICAL RESULTS

This section presents empirical findings on the impact of the receipt of international and internal remittances. Remittances are expected to increase per capita income and consumption expenditures. Thus, the outcomes selected in the paper include per capita income, per capita consumption expenditure, and per capita expenditure on foods, health care, education and other non-food items. Data on the outcomes in 2002 are adjusted to the price in 2004 to eliminate the inflation effect and to allow for comparison of impacts over the period 2002-2004.

The explanatory variables in regressions consist of characteristics of households and villages, and geographic variables. The household variables include household demography, household assets and education. The village variables are the dummy variable of village road and the distance from villages to nearest markets. Geographic variables are dummy regional and urbanity variables. It should be noted that these explanatory variables should be exogenous and not be affected by the receipt of international or internal remittances.

The explanatory variables and regression results are presented in tables A.1 to A.3 in the appendix. Most of the explanatory variables have the expected signs. For example, in regressions of per capita income and expenditures (table A.1), households with remittances are more likely to have higher per capita

income and expenditures. Households having large ratios of children and old people have lower per capita income and expenditures. Education and land variables have positive effects on income and expenditures, as expected. The time-effect dummy variable is positive and statistically significant. It means that, given the control variables, per capita income and expenditures were increasing overtime.

We run both random and fixed-effect regressions, and use Hausman specification tests to test difference in coefficients between the random and fixed-effect regression. The test statistics strongly reject the null hypothesis that the difference in coefficients between two regressions is not systematic (the test results are presented in tables A.4 to A.9 in the appendix, and all the P-values of the tests are smaller than 0.01). Thus, we are inclined to use the fixed-effect regressions (with sampling weights and cluster correlation) to estimate ATT of remittances.

We also test whether there is a difference in the impact of remittance receipts on household welfare between urban and rural households. We include interactions between the receipt of remittances (international and internal) and the urban dummy variables. The regression results are presented in table A.10 in the appendix. It shows that most of the interaction terms are not statistically significant in outcome equations. It indicates that the difference in the impact of remittances between urban and rural households is not statistically significant. Thus, we will present the impact estimates of remittances on the welfare outcomes of all the receiving households (i.e., results from regressions without interaction between remittance receipts and urbanity).

Estimates of the ATT parameter for international remittances are presented in table 5. It shows that the receipt of international remittances increased the per capita income of the recipients by 1,425,000 and 1,820,000 dong in 2002 and 2004, respectively. The increases in income are lower than the remittances received by households. This means that simply deducting remittances from income does not reflect the counterfactual income in the absence of the remittances.

International remittances also had positive and statistically significant impact on per capita consumption expenditures. They increased per capita expenditures by 716,000 and 478,000 dong in 2002 and 2004, respectively. In other words, it helped the recipients increase per capita expenditures by about 9 and 7 per cent in 2002 and 2004, respectively. The receipt of international remittances also increased the non-food expenditures of the recipients. However, the effect estimates of international remittances on per capita expenditures on food, health care and education were not statistically significant. The reason international remittances had a small impact on expenditures might be that households with remittances

already had high enough consumption expenditures. Thus, additional remittances did not lead to large increases in consumption expenditures.

It should be noted that the impact of international remittances on income was much higher than that on expenditures. We also tested the equality of the impact on per capita income and the impact on per capita expenditures, and the test statistics strongly rejected the hypothesis on the equality of the impacts. This finding suggests that international remittances helped the receiving households increase savings or production investment.

**Table 5. Estimates of the impact of international remittances**  
(Thousands of Vietnamese dong)

Household indicators	2002			2004		
	$Y_1$	$Y_0$	Impact: ( $Y_1 - Y_0$ )	$Y_1$	$Y_0$	Impact: ( $Y_1 - Y_0$ )
Per capita income	8 679.3*** [500.6]	7 254.7*** [668.2]	1 424.6*** [286.4]	11 088.9*** [435.3]	9 268.8*** [514.7]	1 820.1*** [352.1]
Per capita consumption expenditures	6 072.0*** [262.2]	5 556.0*** [283.3]	516.0*** [132.5]	7 984.8*** [339.5]	7 507.2*** [359.1]	477.6*** [183.6]
Per capita food consumption expenditures	2 303.7*** [80.1]	2 164.0*** [89.4]	139.7** [53.5]	2 780.8*** [98.5]	2 712.2*** [112.5]	68.6 [69.2]
Per capita health-care expenditures	357.4*** [27.9]	350.3*** [58.1]	7.1 [32.6]	654.4*** [61.8]	588.1*** [114.2]	66.3 [67.9]
Per capita education expenditures	389.4*** [24.9]	336.7*** [59.8]	52.7 [51.5]	523.9*** [60.6]	485.8*** [67.4]	38.1 [51.3]
Per capita non-food consumption expenditures	3 021.5*** [173.3]	2 746.2*** [164.7]	275.3*** [87.9]	4 025.8*** [198.6]	3 759.4*** [243.7]	266.4*** [114.1]

Source: Estimation from VHLSS 2002 and 2004.

Notes: \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.

Standard errors in brackets.

Standard errors are corrected for sampling weights and estimated using bootstrap (non-parametric) with 200 replications.

Estimates of the impact of the receipt of internal remittances on the recipients are presented in table 6. The impact on per capita income of internal remittances was much lower than that of international remittances, since the value of internal remittances was lower than that of international remittances. The receipt of internal remittances increased the per capita income of the recipients by nearly 6 per cent, or equivalent to 243,000 and 305,000 dong in 2002 and 2004, respectively.

**Table 6. Estimates of the impact of internal remittances**  
(Thousands of Vietnamese dong)

Household indicators	2002			2004		
	$Y_1$	$Y_0$	Impact: ( $Y_1 - Y_0$ )	$Y_1$	$Y_0$	Impact: ( $Y_1 - Y_0$ )
Per capita income	4 667.7*** [90.5]	4 424.0*** [153.1]	243.7*** [91.0]	5 847.9*** [154.3]	5 542.7*** [136.5]	305.2*** [115.7]
Per capita consumption expenditures	3 678.1*** [65.1]	3 465.1*** [76.7]	213.0*** [55.3]	4 458.0*** [127.8]	4 199.8*** [75.7]	258.2*** [67.4]
Per capita food consumption expenditures	1 689.9*** [22.2]	1 652.0*** [41.3]	37.9 [27.6]	1 870.8*** [30.8]	1 829.0*** [32.6]	41.8* [28.1]
Per capita health-care expenditures	201.5*** [4.8]	173.2*** [11.9]	28.3** [14.0]	310.3*** [12.2]	266.8*** [19.3]	43.5*** [16.7]
Per capita education expenditures	210.4*** [5.2]	183.3*** [18.1]	27.1* [14.1]	273.2*** [11.7]	238.0*** [19.8]	35.2** [17.3]
Per capita non-food consumption expenditures	1 576.4*** [39.4]	1 430.4*** [49.2]	146.0*** [35.8]	2 003.7*** [81.3]	1 818.2*** [51.5]	185.5*** [41.1]

Source: Estimation from VHLSS 2002 and 2004.

Notes: \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.

Standard errors in brackets.

Standard errors are corrected for sampling weights and estimated using bootstrap (non-parametric) with 200 replications.

The effect of internal remittances on the expenditures of the recipients is slightly smaller than the effect on income. This means that most internal remittances were used for consumption rather than investment or savings. The effect of the receipt of internal remittance on the recipients' expenditure was estimated at 213,000 and 258,000 dong in 2002 and 2004, respectively. It is interesting that impact estimates on food consumption expenditure, and other expenditures on health care, education and other non-foods are positive and statistically significant in 2004 (at least at the 10 per cent level – table 6). Compared to international remittances, internal remittances are spent more on consumption items.

## VI. CONCLUSION

Remittances, especially international remittances, have been increasing over time in Viet Nam. Remittances are often mentioned as important resources for increasing income and smoothing consumption. Yet, little is known on the quantitative impact of remittances on household welfare in Viet Nam. Using panel

data from VHLSS 2002 and 2004, the paper investigates the access of households to international and internal remittances and measures the extent to which the receipt of remittances can affect the income and the consumption expenditures of the recipients.

It should be noted that international and internal remittances have broad definitions in this paper. More specifically, international and internal remittances are defined as all overseas and domestic private transfers to households, respectively. They can be sent to households not only by migrants from those households but also by friends and relatives.

International remittances are still considered luxuries for the people. About 5.9 and 7.1 per cent of households received international remittances in 2002 and 2004, respectively. By comparison, internal remittances had much larger coverage. The proportion of households receiving internal remittances was 78.2 and 86.3 per cent in 2002 and 2004, respectively. However, the average value of internal remittances was much smaller than that of international remittances.

With regard to impact, the receipt of international remittances increased the per capita expenditures of the recipients. International remittances also had positive and statistically significant impacts on expenditures on non-food consumption (excluding health-care and educational spending). However, the effects of the receipt of international remittances on per capita expenditures on food, education and health care were not statistically significant. The impact of international remittances on income was much higher than the impact on expenditures, which indicates that international remittances helped the recipients increase savings and production investment.

The receipt of internal remittances also increased the income and expenditure of households. The impact on income was slightly higher than that on expenditure. In other words, households are more likely to use internal remittances for consumption expenditure. Internal remittances also increased per capita food consumption expenditure and per capita expenditures on health care, education and other non-food consumption.

In short, international remittances covered a small proportion of the population, and the recipient household was often high-income. As a result, international remittances had an important role in increasing the income, savings and assets of the receiving households. By comparison, internal remittances covered a large proportion of the population. Households receiving internal remittances had smaller income than other households. Internal remittances helped the recipients increase consumption expenditure rather than savings or assets.

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APPENDIX

Table A.1. Regressions of logarithm of per capita income and expenditures

Explanatory variables	Logarithm of per capita income			Logarithm of per capita expenditures		
	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation
Receipt of international remittances (dummy variable)	0.3205*** [0.0260]	0.1955*** [0.0328]	0.1916*** [0.0374]	0.1942*** [0.0197]	0.1008*** [0.0234]	0.0897*** [0.0282]
Receipt of internal remittances (dummy variable)	0.0465*** [0.0154]	0.0631*** [0.0189]	0.0557*** [0.0213]	0.0707*** [0.0116]	0.0681*** [0.0135]	0.0656*** [0.0153]
Ratio of members younger than 16	-0.5319*** [0.0352]	-0.3534*** [0.0627]	-0.3615*** [0.0801]	-0.5014*** [0.0280]	-0.2988*** [0.0447]	-0.2920*** [0.0544]
Ratio of members who older than 60	-0.3521*** [0.0318]	-0.2849*** [0.0598]	-0.2920*** [0.0697]	-0.2626*** [0.0255]	-0.2460*** [0.0427]	-0.2304*** [0.0545]
Household size	-0.0638*** [0.0131]	-0.1022*** [0.0225]	-0.1074*** [0.0259]	-0.0825*** [0.0104]	-0.1341*** [0.0160]	-0.1368*** [0.0189]
Household size squared	-0.0001 [0.0012]	0.0033* [0.0019]	0.0036* [0.0020]	0.0016* [0.0009]	0.0061*** [0.0014]	0.0063*** [0.0017]
Ratio of household member with technical degree	0.7169*** [0.0467]	0.3021*** [0.0625]	0.2991*** [0.0641]	0.5819*** [0.0358]	0.2610*** [0.0446]	0.2687*** [0.0557]
Ratio of household member with post secondary	1.1421*** [0.0644]	0.4167*** [0.1110]	0.3662*** [0.1061]	1.0080*** [0.0511]	0.3286*** [0.0792]	0.3058*** [0.1139]

Table A.1. (continued)

Explanatory variables	Logarithm of per capita income			Logarithm of per capita expenditures		
	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation
Area of annual crop land per capita (m <sup>2</sup> )	0.4375*** [0.0495]	0.5112*** [0.0816]	0.4945*** [0.1550]	0.2309*** [0.0391]	0.3617*** [0.0582]	0.3295*** [0.0720]
Area of perennial crop land per capita (m <sup>2</sup> )	0.3974*** [0.0494]	0.1970*** [0.0684]	0.2132 [0.1456]	0.2128*** [0.0381]	0.1113** [0.0488]	0.1165* [0.0653]
Forestry land per capita (m <sup>2</sup> )	0.1281*** [0.0356]	0.1321*** [0.0456]	0.1811** [0.0719]	0.0642** [0.0271]	0.0692** [0.0325]	0.1035** [0.0491]
Area of aquaculture water surface per capita (m <sup>2</sup> )	0.7394*** [0.1142]	0.6758*** [0.1844]	0.7010** [0.2820]	0.4509*** [0.0901]	0.3806*** [0.1316]	0.3417** [0.1646]
Have road to village	0.013 [0.0171]	-0.0123 [0.0220]	-0.0225 [0.0245]	-0.0008 [0.0131]	-0.0189 [0.0157]	-0.0207 [0.0184]
Distance to nearest daily market (km)	-0.0055*** [0.0012]	0.0014 [0.0016]	0.0019 [0.0014]	-0.0045*** [0.0009]	0.0005 [0.0011]	0.0003 [0.0011]
Red River Delta	Base					
	-					
North East	-0.0858*** [0.0261]			-0.1050*** [0.0219]		
North West	-0.2648*** [0.0408]			-0.3385*** [0.0342]		
North Central Coast	-0.2140*** [0.0277]			-0.1266*** [0.0233]		

Table A.1. (continued)

Explanatory variables	Logarithm of per capita income			Logarithm of per capita expenditures		
	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation
South Central Coast	-0.0394 [0.0286]			-0.0071 [0.0241]		
Central Highlands	-0.0883** [0.0347]			-0.1902*** [0.0291]		
North East South	0.2895*** [0.0276]			0.2370*** [0.0232]		
Mekong River Delta	0.1154*** [0.0237]			0.0514*** [0.0198]		
Urban	0.3737*** [0.0236]			0.4775*** [0.0191]		
Time effect (dummy 2004)	0.1509*** [0.0090]	0.1657*** [0.0092]	0.1637*** [0.0103]	0.1168*** [0.0065]	0.1315*** [0.0066]	0.1321*** [0.0079]
Constant	8.4356*** [0.0447]	8.5858*** [0.0678]	8.6436*** [0.0819]	8.2889*** [0.0355]	8.4796*** [0.0484]	8.5174*** [0.0564]
Observations	8 016	8 016	8 016	8 016	8 016	8 016
Number of households	4 008	4 008	4 008	4 008	4 008	4 008
R-squared	0.38	0.20	0.20	0.48	0.22	0.22

Source: Estimation from panel data VHLSSs 2002-2004.

Notes: Standard errors in brackets.

\* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.

Table A.2. Regressions of logarithm of per capita food and health-care expenditures

Explanatory variables	Logarithm of per capita food expenditures			Logarithm of per capita health-care expenditures		
	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation
Receipt of international remittances (dummy variable)	0.1094*** [0.0170]	0.0468** [0.0215]	0.0371 [0.0248]	0.3405*** [0.0688]	0.1094 [0.0986]	0.1023 [0.1008]
Receipt of internal remittances (dummy variable)	0.0183* [0.0101]	0.0209* [0.0124]	0.0203 [0.0152]	0.2405*** [0.0413]	0.1405** [0.0567]	0.1278* [0.0657]
Ratio of members younger than 16	-0.3334*** [0.0230]	-0.2096*** [0.0412]	-0.2137*** [0.0459]	-0.3599*** [0.0867]	0.0661 [0.1886]	0.14 [0.2025]
Ratio of members who older than 60	-0.1880*** [0.0208]	-0.1530*** [0.0393]	-0.1340*** [0.0445]	0.6964*** [0.0777]	0.4538** [0.1800]	0.5366*** [0.2034]
Household size	-0.0982*** [0.0086]	-0.1292*** [0.0148]	-0.1283*** [0.0162]	-0.0832** [0.0325]	-0.0791 [0.0676]	-0.0825 [0.0750]
Household size squared	0.0035*** [0.0008]	0.0057*** [0.0013]	0.0058*** [0.0014]	0.001 [0.0029]	0.0043 [0.0058]	0.0046 [0.0062]
Ratio of household members with technical degree	0.3593*** [0.0305]	0.2036*** [0.0411]	0.2140*** [0.0458]	0.5600*** [0.1220]	0.2068 [0.1881]	0.192 [0.2271]
Ratio of household members with post secondary	0.6062*** [0.0421]	0.3621*** [0.0730]	0.3759*** [0.0856]	0.7595*** [0.1594]	0.093 [0.3339]	0.0923 [0.3910]
Area of annual crop land per capita (m <sup>2</sup> )	0.1816*** [0.0323]	0.2934*** [0.0536]	0.2891*** [0.0608]	-0.0696 [0.1234]	0.6678*** [0.2455]	0.5545* [0.3109]

Table A.2. (continued)

Explanatory variables	Logarithm of per capita food expenditures			Logarithm of per capita health-care expenditures		
	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation
Area of perennial crop land per capita (m <sup>2</sup> )	0.1708*** [0.0322]	0.0870* [0.0449]	0.1026 [0.0747]	0.2336* [0.1277]	0.1766 [0.2056]	0.1498 [0.1716]
Forestry land per capita (m <sup>2</sup> )	0.0723*** [0.0233]	0.0594** [0.0300]	0.0901** [0.0411]	-0.1467 [0.0943]	0.092 [0.1372]	0.1085 [0.1697]
Area of aquaculture water surface per capita (m <sup>2</sup> )	0.1739** [0.0747]	0.1807 [0.1212]	0.1538 [0.1555]	0.3595 [0.2853]	1.7710*** [0.5548]	1.5764** [0.7589]
Have road to village	-0.0062 [0.0112]	-0.0181 [0.0145]	-0.0111 [0.0201]	0.0437 [0.0452]	-0.0309 [0.0662]	-0.0323 [0.0778]
Distance to nearest daily market (km)	-0.0013* [0.0008]	0.0016 [0.0011]	0.0012 [0.0012]	-0.0124*** [0.0031]	-0.002 [0.0048]	-0.0005 [0.0055]
Red River Delta	Base					
	-					
North East	-0.017 [0.0171]			-0.4659*** [0.0606]		
North West	-0.2324*** [0.0267]			-0.2659*** [0.0948]		
North Central Coast	-0.1733*** [0.0181]			-0.1590** [0.0639]		

Table A.2. (continued)

Explanatory variables	Logarithm of per capita food expenditures			Logarithm of per capita health-care expenditures		
	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation
South Central Coast	-0.0924*** [0.0188]			0.1717*** [0.0660]		
Central Highlands	-0.2016*** [0.0227]			0.1497* [0.0805]		
North East South	0.1067*** [0.0180]			0.3319*** [0.0636]		
Mekong River Delta	0.0265* [0.0155]			0.3941*** [0.0549]		
Urban	0.2718*** [0.0154]			0.2805*** [0.0577]		
Time effect (dummy 2004)	0.0402*** [0.0059]	0.0457*** [0.0060]	0.0464*** [0.0081]	0.2943*** [0.0267]	0.3300*** [0.0277]	0.3503*** [0.0325]
Constant	7.7218*** [0.0292]	7.8082*** [0.0445]	7.8142*** [0.0502]	4.3093*** [0.1112]	4.3226*** [0.2038]	4.3548*** [0.2370]
Observations	8 016	8 016	8 016	8 016	8 016	8 016
Number of i	4 008	4 008	4 008	4 008	4 008	4 008
R-squared	0.36	0.20	0.20	0.15	0.05	0.05

Source: Estimation from panel data VHLSS 2002-2004.  
Notes: Standard errors in brackets.  
\* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.

Table A.3. Regressions of logarithm of per capita education expenditures and other non-food expenditures

Explanatory variables	Logarithm of per capita education expenditures			Logarithm of other non-food expenditures per capita		
	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation
Receipt of international remittances (dummy variable)	0.2511*** [0.0947]	0.0683 [0.1156]	0.0666 [0.1381]	0.2651*** [0.0316]	0.1332*** [0.0381]	0.1184*** [0.0414]
Receipt of internal remittances (dummy variable)	0.2320*** [0.0560]	0.1331** [0.0665]	0.1769** [0.0750]	0.1119*** [0.0187]	0.1189*** [0.0219]	0.1112*** [0.0228]
Ratio of members younger than 16	1.6769*** [0.1323]	1.2417*** [0.2210]	1.2686*** [0.2685]	-0.6653*** [0.0442]	-0.3462*** [0.0728]	-0.3266*** [0.0873]
Ratio of members who older than 60	-2.5045*** [0.1199]	-1.7791*** [0.2109]	-1.7965*** [0.2869]	-0.4134*** [0.0401]	-0.3541*** [0.0695]	-0.3600*** [0.1113]
Household size	0.9963*** [0.0492]	1.0030*** [0.0792]	1.0419*** [0.1205]	-0.0814*** [0.0165]	-0.1848*** [0.0261]	-0.1904*** [0.0310]
Household size squared	-0.0697*** [0.0043]	-0.0669*** [0.0068]	-0.0697*** [0.0104]	0.0004 [0.0014]	0.0095*** [0.0022]	0.0097*** [0.0026]
Ratio of household members with technical degree	0.2997* [0.1712]	-0.7428*** [0.2204]	-0.6542** [0.2682]	0.8651*** [0.0571]	0.3178*** [0.0726]	0.3166*** [0.1003]
Ratio of household members with post-secondary	1.0565*** [0.2416]	-1.1572*** [0.3913]	-0.9601 [0.6684]	1.5015*** [0.0807]	0.5002*** [0.1289]	0.4559*** [0.1653]



Table A.3. (continued)

Explanatory variables	Logarithm of per capita education expenditures			Logarithm of other non-food expenditures per capita		
	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation
Area of annual crop land per capita (m <sup>2</sup> )	-0.1508 [0.1851]	0.2737 [0.2877]	0.3104 [0.3353]	0.3632*** [0.0618]	0.4927*** [0.0948]	0.4345*** [0.1064]
Area of perennial crop land per capita (m <sup>2</sup> )	0.1585 [0.1817]	-0.2528 [0.2410]	-0.2955 [0.2207]	0.2847*** [0.0606]	0.0818 [0.0794]	0.0898 [0.0967]
Forestry land per capita (m <sup>2</sup> )	0.1518 [0.1300]	0.0695 [0.1608]	0.0142 [0.1328]	0.0538 [0.0434]	0.0719 [0.0530]	0.1406 [0.1066]
Area of aquaculture water surface per capita (m <sup>2</sup> )	0.2399 [0.4267]	-0.3779 [0.6503]	-0.5293 [0.7639]	0.7971*** [0.1425]	0.5879*** [0.2142]	0.5962*** [0.2694]
Have road to village	0.0737 [0.0626]	-0.034 [0.0776]	-0.0362 [0.0705]	0.023 [0.0209]	-0.0013 [0.0256]	-0.0076 [0.0282]
Distance to nearest daily market (km)	-0.0211*** [0.0043]	0.003 [0.0056]	0.0037 [0.0048]	-0.0102*** [0.0014]	-0.0011 [0.0019]	-0.0012 [0.0020]
Red River Delta	Base					
North East	-0.4414*** [0.1015]			-0.1912*** [0.0340]		
North West	-0.9670*** [0.1582]			-0.5341*** [0.0530]		
North Central Coast	-0.0146 [0.1077]			-0.1038*** [0.0361]		

Table A.3. (continued)

Explanatory variables	Logarithm of per capita education expenditures			Logarithm of other non-food expenditures per capita		
	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation
South Central Coast	-0.2661** [0.1114]			0.1156*** [0.0373]		
Central Highlands	-0.5384*** [0.1347]	-0.2576*** [0.0451]				
North East South	-0.3227*** [0.1071]	0.3976*** [0.0359]				
Mekong River Delta	-0.8614*** [0.0917]	0.1400*** [0.0307]				
Urban	0.8345*** [0.0896]	0.7240*** [0.0300]				
Time effect (dummy 2004)	0.2911*** [0.0318]	0.3093*** [0.0324]	0.2913*** [0.0357]	0.1860*** [0.0106]	0.2079*** [0.0107]	0.2048*** [0.0116]
Constant	0.4339*** [0.1675]	0.3495 [0.2389]	0.2563 [0.3564]	7.1211*** [0.0560]	7.4926*** [0.0787]	7.5664*** [0.0891]
Observations	8 016	8 016	8 016	8 016	8 016	8 016
Number of i	4 008	4 008	4 008	4 008	4 008	4 008
R-squared	0.32	0.22	0.22	0.45	0.18	0.18

Source: Estimation from panel data VHLSS 2002-2004.

Notes: Standard errors in brackets.

\* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.

Table A.4. Hausman tests of fixed-effect and random effect regressions of logarithm of per capita income (with control variables)

Explanatory variables	Fixed-effect regression	Random-effect regression	Difference	Std. err. of difference
Receipt of international remittances (dummy variable)	0.1955	0.3205	-0.1250	0.0208
Receipt of internal remittances (dummy variable)	0.0631	0.0465	0.0166	0.0113
Ratio of members younger than 16	-0.3534	-0.5319	0.1785	0.0530
Ratio of members older than 60	-0.2849	-0.3521	0.0671	0.0517
Household size	-0.1022	-0.0638	-0.0384	0.0186
Household size squared	0.0033	-0.0001	0.0034	0.0016
Ratio of household members with technical degree	0.3021	0.7169	-0.4149	0.0429
Ratio of household members with post-secondary education	0.4167	1.1421	-0.7254	0.0924
Area of annual crop land per capita (m <sup>2</sup> )	0.5112	0.4375	0.0737	0.0664
Area of perennial crop land per capita (m <sup>2</sup> )	0.1970	0.3974	-0.2004	0.0487
Forestry land per capita (m <sup>2</sup> )	0.1321	0.1281	0.0040	0.0295
Area of aquaculture water surface per capita (m <sup>2</sup> )	0.6758	0.7394	-0.0636	0.1482
Have road to village	-0.0123	0.0130	-0.0254	0.0143
Distance to nearest daily market (km)	0.0014	-0.0055	0.0069	0.0011
Time effect (dummy 2004)	0.1657	0.1509	0.0148	0.0024
Constant	8.5858	8.4356	0.1501	0.0523
Test: Ho: difference in coefficients not systematic				
Chi - square statistic	220.5			
P-value	0.000			

Source: Estimation from panel data of VHLSS 2002-2004.

Table A.5. Hausman tests of fixed-effect and random effect regressions of logarithm of per capita expenditures (with control variables)

Explanatory variables	Fixed-effect regression	Random-effect regression	Difference	Std. err. of difference
Receipt of international remittances (dummy variable)	0.1008	0.1942	-0.0934	0.0135
Receipt of internal remittances (dummy variable)	0.0681	0.0707	-0.0026	0.0073
Ratio of members younger than 16	-0.2988	-0.5014	0.2026	0.0361
Ratio of members older than 60	-0.2460	-0.2626	0.0166	0.0354
Household size	-0.1341	-0.0825	-0.0516	0.0126
Household size squared	0.0061	0.0016	0.0044	0.0011
Ratio of household members with technical degree	0.2610	0.5819	-0.3208	0.0282
Ratio of household members with post-secondary education	0.3286	1.0080	-0.6794	0.0627
Area of annual crop land per capita (m <sup>2</sup> )	0.3617	0.2309	0.1308	0.0448
Area of perennial crop land per capita (m <sup>2</sup> )	0.1113	0.2128	-0.1015	0.0322
Forestry land per capita (m <sup>2</sup> )	0.0692	0.0642	0.0049	0.0192
Area of aquaculture water surface per capita (m <sup>2</sup> )	0.3806	0.4509	-0.0703	0.0998
Have road to village	-0.0189	-0.0008	-0.0181	0.0093
Distance to nearest daily market (km)	0.0005	-0.0045	0.0050	0.0007
Time effect (dummy 2004)	0.1315	0.1168	0.0147	0.0016
Constant	8.4796	8.2889	0.1908	0.0344
Test: Ho: difference in coefficients not systematic				
Chi - square statistic	311.3			
P-value	0.000			

Source: Estimation from panel data of VHLSS 2002-2004.

**Table A.6. Hausman tests of fixed-effect and random effect regressions of logarithm of per capita food expenditures (with control variables)**

<i>Explanatory variables</i>	<i>Fixed-effect regression</i>	<i>Random-effect regression</i>	<i>Difference</i>	<i>Std. err. of difference</i>
Receipt of international remittances (dummy variable)	0.0468	0.1094	-0.0626	0.0135
Receipt of internal remittances (dummy variable)	0.0209	0.0183	0.0025	0.0074
Ratio of members younger than 16	-0.2096	-0.3334	0.1238	0.0345
Ratio of members older than 60	-0.1530	-0.1880	0.0350	0.0337
Household size	-0.1292	-0.0982	-0.0309	0.0121
Household size squared	0.0057	0.0035	0.0021	0.0010
Ratio of household members with technical degree	0.2036	0.3593	-0.1557	0.0279
Ratio of household members with post-secondary education	0.3621	0.6062	-0.2441	0.0601
Area of annual crop land per capita (m <sup>2</sup> )	0.2934	0.1816	0.1119	0.0432
Area of perennial crop land per capita (m <sup>2</sup> )	0.0870	0.1708	-0.0838	0.0317
Forestry land per capita (m <sup>2</sup> )	0.0594	0.0723	-0.0129	0.0192
Area of aquaculture water surface per capita (m <sup>2</sup> )	0.1807	0.1739	0.0068	0.0964
Have road to village	-0.0181	-0.0062	-0.0119	0.0093
Distance to nearest daily market (km)	0.0016	-0.0013	0.0029	0.0007
Time effect (dummy 2004)	0.0457	0.0402	0.0055	0.0016
Constant	7.8082	7.7218	0.0863	0.0340
Test: Ho: difference in coefficients not systematic				
Chi – square statistic	104.35			
P-value	0.000			

Source: Estimation from panel data of VHLSS 2002-2004.

Table A.7. Hausman tests of fixed-effect and random effect regressions of logarithm of per capita healthcare expenditures (with control variables)

Explanatory variables	Fixed-effect regression	Random-effect regression	Difference	Std. err. of difference
Receipt of international remittances (dummy variable)	0.1094	0.3405	-0.2311	0.0712
Receipt of internal remittances (dummy variable)	0.1405	0.2405	-0.1000	0.0392
Ratio of members younger than 16	0.0661	-0.3599	0.4260	0.1683
Ratio of members older than 60	0.4538	0.6964	-0.2426	0.1631
Household size	-0.0791	-0.0832	0.0041	0.0596
Household size squared	0.0043	0.0010	0.0033	0.0051
Ratio of household members with technical degree	0.2068	0.5600	-0.3532	0.1442
Ratio of household members with post-secondary education	0.0930	0.7595	-0.6666	0.2949
Area of annual crop land per capita (m <sup>2</sup> )	0.6678	-0.0696	0.7374	0.2134
Area of perennial crop land per capita (m <sup>2</sup> )	0.1766	0.2336	-0.0570	0.1623
Forestry land per capita (m <sup>2</sup> )	0.0920	-0.1467	0.2387	0.1004
Area of aquaculture water surface per capita (m <sup>2</sup> )	1.7710	0.3595	1.4114	0.4784
Have road to village	-0.0309	0.0437	-0.0746	0.0487
Distance to nearest daily market (km)	-0.0020	-0.0124	0.0104	0.0037
Time effect (dummy 2004)	0.3300	0.2943	0.0357	0.0078
Constant	4.3226	4.3093	0.0133	0.1718
Test: Ho: difference in coefficients not systematic				
Chi - square statistic	65.69			
P-value	0.000			

Source: Estimation from panel data of VHLSS 2002-2004.

**Table A.8. Hausman tests of fixed-effect and random effect regressions of logarithm of per capita education expenditures (with control variables)**

<i>Explanatory variables</i>	<i>Fixed-effect regression</i>	<i>Random-effect regression</i>	<i>Difference</i>	<i>Std. err. of difference</i>
Receipt of international remittances (dummy variable)	0.0683	0.2511	-0.1828	0.0684
Receipt of internal remittances (dummy variable)	0.1331	0.2320	-0.0989	0.0371
Ratio of members younger than 16	1.2417	1.6769	-0.4351	0.1800
Ratio of members older than 60	-1.7791	-2.5045	0.7254	0.1763
Household size	1.0030	0.9963	0.0067	0.0631
Household size squared	-0.0669	-0.0697	0.0027	0.0054
Ratio of household members with technical degree	-0.7428	0.2997	-1.0425	0.1425
Ratio of household members with post-secondary education	-1.1572	1.0565	-2.2137	0.3131
Area of annual crop land per capita (m <sup>2</sup> )	0.2737	-0.1508	0.4245	0.2243
Area of perennial crop land per capita (m <sup>2</sup> )	-0.2528	0.1585	-0.4113	0.1622
Forestry land per capita (m <sup>2</sup> )	0.0695	0.1518	-0.0823	0.0975
Area of aquaculture water surface per capita (m <sup>2</sup> )	-0.3779	0.2399	-0.6179	0.4997
Have road to village	-0.0340	0.0737	-0.1077	0.0473
Distance to nearest daily market (km)	0.0030	-0.0211	0.0241	0.0037
Time effect (dummy 2004)	0.3093	0.2911	0.0182	0.0080
Constant	0.3495	0.4339	-0.0844	0.1738
Test: H <sub>0</sub> : difference in coefficients not systematic				
Chi – square statistic	173.1			
P-value	0.000			

Source: Estimation from panel data of VHLSS 2002-2004.

Table A.9. Hausman tests of fixed-effect and random effect regressions of logarithm of per capita other non-food expenditures (with control variables)

Explanatory variables	Fixed-effect regression	Random-effect regression	Difference	Std. err. of difference
Receipt of international remittances (dummy variable)	0.1332	0.2651	-0.1319	0.0227
Receipt of internal remittances (dummy variable)	0.1189	0.1119	0.0071	0.0123
Ratio of members younger than 16	-0.3462	-0.6653	0.3190	0.0598
Ratio of members older than 60	-0.3541	-0.4134	0.0593	0.0586
Household size	-0.1848	-0.0814	-0.1034	0.0210
Household size squared	0.0095	0.0004	0.0091	0.0018
Ratio of household members with technical degree	0.3178	0.8651	-0.5473	0.0473
Ratio of household members with post-secondary education	0.5002	1.5015	-1.0013	0.1040
Area of annual crop land per capita (m <sup>2</sup> )	0.4927	0.3632	0.1295	0.0745
Area of perennial crop land per capita (m <sup>2</sup> )	0.0818	0.2847	-0.2029	0.0538
Forestry land per capita (m <sup>2</sup> )	0.0719	0.0538	0.0181	0.0323
Area of aquaculture water surface per capita (m <sup>2</sup> )	0.5879	0.7971	-0.2092	0.1659
Have road to village	-0.0013	0.0230	-0.0243	0.0157
Distance to nearest daily market (km)	-0.0011	-0.0102	0.0091	0.0012
Time effect (dummy 2004)	0.2079	0.1860	0.0219	0.0027
Constant	7.4926	7.1211	0.3715	0.0577
Test: Ho: difference in coefficients not systematic				
Chi - square statistic	289.23			
P-value	0.000			

Source: Estimation from panel data of VHLSS 2002-2004.



Table A.10. Fixed-effect regressions of household welfare with interactions between remittances and urbanity (with sampling weights and cluster correlation)

Explanatory variables	Logarithm of per capita income	Logarithm of per capita expenditure	Logarithm of per capita food expenditure	Logarithm of per capita healthcare expenditure	Logarithm of per capita education expenditure	Logarithm of per capita other non-food expenditure
Receipt of international remittances (dummy variable)	0.2246*** [0.0452]	0.0964*** [0.0329]	0.0575* [0.0302]	0.0816 [0.1193]	0.0563 [0.1568]	0.1241** [0.0515]
Receipt of international remittances (dummy variable)	0.0345 [0.0243]	0.0532*** [0.0176]	0.0123 [0.0172]	0.1477** [0.0739]	0.1590** [0.0797]	0.0944*** [0.0267]
Interaction: international remittances*urban	-0.0823 [0.0796]	-0.0145 [0.0621]	-0.0522 [0.0526]	0.0499 [0.2154]	0.0324 [0.3040]	-0.0105 [0.0873]
Interaction: internal remittances*urban	0.0892* [0.0474]	0.0524 [0.0335]	0.0336 [0.0347]	-0.0841 [0.1579]	0.0763 [0.2013]	0.0713 [0.0483]
Ratio of members younger than 16	-0.3608*** [0.0798]	-0.2911*** [0.0544]	-0.2137*** [0.0459]	0.1389 [0.2020]	1.2705*** [0.2690]	-0.3253*** [0.0874]
Ratio of members older than 60	-0.2913*** [0.0699]	-0.2309*** [0.0546]	-0.1331*** [0.0446]	0.5366*** [0.2031]	-1.7987*** [0.2873]	-0.3609*** [0.1115]
Household size	-0.1055*** [0.0260]	-0.1362*** [0.0191]	-0.1273*** [0.0162]	-0.0838 [0.0751]	1.0419*** [0.1206]	-0.1898*** [0.0311]
Household size squared	0.0035* [0.0020]	0.0062*** [0.0017]	0.0057*** [0.0014]	0.0047 [0.0062]	-0.0697*** [0.0105]	0.0096*** [0.0026]
Ratio of household members with technical degree	0.2990*** [0.0643]	0.2682*** [0.0559]	0.2142*** [0.0462]	0.1925 [0.2268]	-0.6557** [0.2679]	0.3157*** [0.1004]
Ratio of household members with post-secondary education	0.3712*** [0.1060]	0.3099*** [0.1142]	0.3771*** [0.0852]	0.0866 [0.3887]	-0.9522 [0.6687]	0.4618*** [0.1656]
Area of annual crop land per capita (m <sup>2</sup> )	0.4903*** [0.1549]	0.3273*** [0.0719]	0.2873*** [0.0608]	0.5582* [0.3107]	0.3078 [0.3350]	0.4316*** [0.1061]
Area of perennial crop land per capita (m <sup>2</sup> )	0.2152 [0.1453]	0.1180* [0.0656]	0.1031 [0.0746]	0.1476 [0.1716]	-0.2928 [0.2205]	0.0919 [0.0976]

Table A.10. (continued)

Explanatory variables	Logarithm of per capita income	Logarithm of per capita expenditure	Logarithm of per capita food expenditure	Logarithm of per capita healthcare expenditure	Logarithm of per capita education expenditure	Logarithm of per capita other non-food expenditure
Forestry land per capita (m <sup>2</sup> )	0.1800** [0.0712]	0.1027** [0.0486]	0.0897** [0.0408]	0.1096 [0.1698]	0.0129 [0.1335]	0.1395 [0.1060]
Area of aquaculture water surface per capita (m <sup>2</sup> )	0.6952** [0.2817]	0.3379** [0.1620]	0.1518 [0.1553]	1.5822** [0.7620]	-0.5354 [0.7635]	0.5909** [0.2659]
Have road to village	-0.021 [0.0244]	-0.0197 [0.0183]	-0.0106 [0.0201]	-0.0339 [0.0779]	-0.0346 [0.0708]	-0.0063 [0.0281]
Distance to nearest daily market (km)	0.002 [0.0014]	0.0003 [0.0011]	0.0012 [0.0012]	-0.0005 [0.0055]	0.0037 [0.0048]	-0.0011 [0.0020]
Time effect (dummy 2004)	0.1645*** [0.0103]	0.1324*** [0.0079]	0.0468*** [0.0080]	0.3496*** [0.0326]	0.2916*** [0.0357]	0.2053*** [0.0116]
Constant	8.6380*** [0.0821]	8.5155*** [0.0567]	7.8112*** [0.0504]	4.3590*** [0.2374]	0.2558 [0.3563]	7.5642*** [0.0894]
Observations	8016	8016	8016	8016	8016	8016
Number of i	4008	4008	4008	4008	4008	4008
R-squared	0.20	0.22	0.20	0.05	0.22	0.17

Source: Estimation from panel data VHLSS 2002-2004.

Notes: Standard errors in brackets.

\* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%.