Impacts of International and Internal Remittances on Household Welfare: Evidence from Viet Nam

Nguyen Viet, Cuong

22 June 2008

Impacts of International and Internal Remittances on Household Welfare: Evidence from Viet Nam

Nguyen Viet Cuong[1]

ABSTRACT

This paper measures the impact of international and internal remittances on household welfare of remittances-receiving households using data from Viet Nam Household Living Standard Surveys 2002 and 2004. It is found that the receiving of international and internal remittances increased both income and consumption expenditures of the recipients. The impact of remittances on non-food expenditures tended to be higher than the impact on food expenditures. For international remittances, the impact on income was much higher than the impact on consumption expenditures. It means that a large proportion of international remittances were used for saving and investment. For the receipt of internal remittances, the impact on income was just slightly larger than the impact on consumption expenditures. In other words, most of the internal remittances were used for consumption expenditures.

JEL Classification: O15, I32, F24

Key words: International remittances, internal remittances, household welfare, income, expenditures, Viet Nam.

[1] Lecturer of National Economic University, Hanoi, Vietnam. Email: c_nguyenviet@yahoo.com

I. INTRODUCTION

It is often argued that remittances are an important source of income for households, which can help households increase investments and cope with socioeconomic shocks. Yet, there has been little quantitative research on impacts of remittances on household welfare. One reason might be that some researchers believe positive correlation between remittances and household welfare. However, the causal effect of remittances on household welfare should deserve studied at least for two reasons. Firstly, 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 received remittances. For example, impact of remittances on income would be small if remittances reduce the working incentive of recipients. 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 consumption, education and healthcare. If remittances have strong impact on saving and investment, impact on consumption and related 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 the strongly 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 Adam (1991), Adam (1994), Adam (2004), Lopez (2005), Taylor and others (2005), Esquivel and Huerta-Pineda (2006), Adam (2006), and Acosta and others (2007).

However, there are only a few studies on impact of migration and remittances on household welfare such as education, healthcare, consumption and saving. In addition, impacts of migration and remittances on household welfare are not always found positive in these empirical studies. For example, Hildebbrandt and Mckenzie (2005) found that children in migrant households had lower ratios of infant mortality and higher birth-weights, but also had lower preventative healthcare than children in non-migrant households. Mckenzie and Rapoport (2006) found negative impact of migration on schooling ratio of children in Mexico. In contrast, Adams (2005) showed that the both international and internal helped increase healthcare and educational expenditures of receiving households. Regarding to the impact on investment, Adams (1991) found positive impact of international remittances on housing 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.

One problem in most studies on impact assessment of remittances is that the problem of endogeineity of remittances is not solved sometimes. Most studies agree that international migration are 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, the estimation of remittance impacts on household welfare is no longer unbiased.

In Viet Nam, remittances, especially international remittances have been increasing overtime. It is often argued that remittances have contributed to economic development and welfare improvement. Although there are a large numbers of studies on impacts of migration (e.g., Guest, 1998; Djamba, 1999; Dang et al., 1997; Dang, 2001; Dang et al., 2003; Brauw

and Harigaya, 2007), there are only a few ones on impacts of remittances in Viet Nam. Two exceptions are Nguyen (2008) and Nguyen et al. (2008), which measures impacts of international remittances on poverty and inequality. The objective of the paper is to measure to which extent remittances international (foreign) and internal (domestic) can affect welfare of receiving households in Viet Nam. By doing so, the paper is expected to contribute empirical findings to debate on relationship between remittances and household welfare improvement in developing countries.

Compared to other previous studies on remittances in Vietnam, this study has two special features. Firstly, it focuses on direct welfare indicators including income, consumption expenditures, expenditures on food, nonfood, education and healthcare. It does not estimate impacts of remittances on poverty and inequality, which are addressed by Nguyen (2008) and Nguyen et al. (2008). Secondly, it compares the effects of both international and internal remittances, while other studies focus on one type of remittances, international or internal.

The paper is structured into 6 sections. The second section introduces the data set used in this 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 concludes.

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 (WB) in the years 2002 and 2004. The 2002 and 2004 VHLSSs covered 29530 and 9188 households, respectively. The samples are representative for the national, rural and urban, and regional levels. The 2002 and 2004 VHLSSs set up a panel of 4008 households, which are representative for the whole country, and for the urban and rural population.

The surveys collected information through household and community level questionnaires. Information on households includes basic demography, employment and labor force participation, education, health, income, expenditures, housing, fixed assets and durable goods, participation of households in poverty alleviation programs, 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 remittances that are defined in VHLSSs include all moneys and kinds that households receive from anyone. Remittances can be given to households by not only their relatives but also their friends, neighbors, etc. Thus, international and internal remittances have broad definition in this paper. They can be regarded as international and internal private transfers to households.

In VHLSSs, 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 foodstuff and self-produced products of households. Non-food expenditures comprise expenditures on education, healthcare, houses and commodities, and expenditures on power, water supply and garbage.

Information on commune characteristics was collected from 2960 and 2181 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 programs, 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 for household income, consumption and investments. In recent years, international remittances have become an increasing source of external fund for Viet Nam. International remittances increased from 26100 to 75200 billion VND during the period 2001-2006.[2] Its share in GDP increased from 5.5 to 7.7 per cent during this period.[3] The access to remittances at the household level has been little known. Using VHLSSs 2002 and 2004, we can examine the receiving of international and internal remittances of households over the period 2002-2004. 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. Per capita international remittances of the recipients increased by around 34 per cent from 4005 to 5367 thousand VND during the period 2002-2004.[4] In 2004, the ratio of remittances to household income and consumption expenditures was 38.1 and 52.8 per cent, respectively. Tables 1 also shows that urban households are more likely to receive international remittances than rural households.[5] In 2004, the proportion of households receiving international remittances was 13.8 per cent and 7.1 per cent in the urban and rural areas, respectively. Per capita international remittances of the recipients were also higher than in the urban areas.

Table 1. International remittances of households in 2002-2004

	2002*			2004		
	Urban	Rural	Total	Urban	Rural	Total
Percentage of receiving households	11.3	4.2	5.9	13.8	4.7	7.1
	[0.8]	[0.2]	[0.3]	[0.9]	[0.3]	[0.3]
Per capita remittances of receiving households (thousand VND)	4 477.9	3 599.2	4 005.4	5 352.5	3 861.9	4 626.6
	[677.3]	[747.9]	[513.2]	[633.1]	[392.5]	[379.9]
Ratio of remittances to	46.6	88.8	60.5	44.9	71.2	52.8

[2] 1 USD ≈ 16000 VND in January 2007.
[3] Source: Vietnam Economy (http://www.vneconomy.com.vn)
[4] Per capita remittances are equal to the total remittances divided by the number of household members.
[5] The classification of urban areas in Vietnam is regulated in Government (2001). Urban areas include towns and wards. Each town/ward should have more than 4000 people, and more than 65 per cent of labors have non-farm employment.

	2002*			2004		
	Urban	Rural	Total	Urban	Rural	Total
household expenditures (per cent)	[6.5]	[17.4]	[7.3]	[4.8]	[6.9]	[4.0]
Ratio of remittances to household income (per cent)	35.7	49.4	41.2	35.4	42.3	37.9
	[3.7]	[5.4]	[3.3]	[3.0]	[2.8]	[2.1]

Source: Estimation from VHLSSs 2002 and 2004.
Notes: * in the price of 2004.
Standard errors in brackets (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 the average internal remittances were smaller than the average international remittances, they experienced a very high growth rate during the period 2002-2004. Per capita internal remittances increased by around 57 per cent from 530 thousand VND in 2002 to 831 thousand VND 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 the rural areas than the urban areas. However, the average size of the internal remittances in the urban areas was much higher than that in the rural areas.

Table 2. Internal remittances of households in 2002-2004

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

Source: Estimation from VHLSSs 2002 and 2004.
Notes: * in the price of 2004.
Standard errors in brackets (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 to food expenditures, healthcare and education expenditures, and other non-food expenditures. In this paper, the non-food expenditures do not include healthcare and education expenditures. Table 3 shows that households without international remittances have much lower consumption expenditures on food, healthcare, 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.

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

Table 3. Welfare of recipients and non-recipients of international remittances

Household indicators	2002*						2004					
	Urban		Rural		Total		Urban		Rural		Total	
	Recipient	Non-recipient	Recipient	Non-recipient	Recipient	Non-recipient	Recipient	Non-recipient	Recipient	Non-recipient	Recipient	Non-recipient
Per capita income	11 592.2	7 703.1	6 282.6	3 673.2	8 679.3	4 553.6	13 916.7	8 725.6	8 172.7	4 530.1	11 088.9	5 531.5
	[817.7]	[272.6]	[458.3]	[40.3]	[500.6]	[81.8]	[888.9]	[663.8]	[416.9]	[63.3]	[435.3]	[153.2]
Per capita consumption expenditures	8 899.4	6 372.7	3 745.6	2 787.9	6 072.0	3 571.1	10 893.5	7 017.2	4 985.2	3 295.2	7 984.8	4 183.6
	[362.3]	[194.5]	[118.1]	[24.6]	[262.2]	[61.5]	[554.3]	[616.1]	[233.3]	[28.8]	[339.5]	[117.7]
Per capita food consumption expenditures	3 103.3	2 458.4	1 645.9	1 445.6	2 303.7	1 666.9	3 604.9	2 576.6	1 930.8	1 564.0	2 780.8	1 805.7
	[116.9]	[67.1]	[41.1]	[10.3]	[80.1]	[20.7]	[217.1]	[215.9]	[68.4]	[9.4]	[98.5]	[28.0]
Per capita healthcare expenditures	455.5	263.0	276.6	162.2	357.4	184.2	737.1	410.9	569.1	237.5	654.4	278.9
	[47.0]	[12.9]	[31.9]	[3.7]	[27.9]	[4.2]	[106.5]	[32.9]	[94.8]	[8.4]	[61.8]	[11.6]
Per capita educational expenditures	599.8	404.6	216.2	143.5	389.4	200.5	782.3	472.4	257.4	191.6	523.9	258.6
	[42.9]	[15.4]	[17.4]	[3.1]	[24.9]	[4.9]	[121.9]	[38.6]	[18.9]	[5.2]	[60.6]	[10.6]
Per capita other non-food consumption expenditures	4 740.8	3 246.7	1 606.9	1 036.6	3 021.5	1 519.5	5 769.2	3 557.4	2 227.9	1 302.1	4 025.8	1 840.4
	[262.2]	[121.4]	[68.3]	[13.5]	[173.3]	[37.4]	[266.0]	[338.9]	[131.7]	[18.6]	[198.6]	[73.6]

Source: Estimation from VHLSSs 2002 and 2004.
Notes: * in the price of 2004. Standard errors in brackets (standard errors are corrected for sampling weights and cluster correlation).

Table 4. Welfare of recipients and non-recipients of internal remittances

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

Source: Estimation from VHLSSs 2002 and 2004.
Notes: * in the price of 2004. Standard errors in brackets (standard errors are corrected for sampling weights and cluster correlation).

IV. IMPACT EVALUATION METHOD

Parameter of interest

The main objective of impact evaluation of the remittance receipt in this paper is to assess the extent to which the receipt of remittances has changed outcomes of the recipients.[1] Denote the receipt of remittances, international or internal, that a household receives by *D*. *D* is a dummy variable, which is equal to one for the receiving households, and zero otherwise. Let *Y* denote the observed value of outcome, i.e., household income and expenditures in this paper. Further, let Y_1 and Y_0 denote potential outcomes in state of remittances and no-remittances, respectively. Then the impact of receiving remittances (international or internal) on a household *i* can be defined as:

$$\Delta_i = Y_{i1} - Y_{i0}, \qquad (1)$$

The most popular parameter of the impact evaluation literature is Average Treatment Effect on the Treated (ATT) (Heckman, et al., 1999), which is equal to: [2]

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

where the term $E(Y_{i0} | D_i = 1)$ is not observed and has to be estimated. This is called counterfactual outcome, which is 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 semi-log functional form as follows:

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

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 household; D_{it} are the dummy variables indicating receipts of international and internal remittances; u_i and ε_{it} are unobserved time-invariant and variant variables, respectively. In equation (3), the variable G_t is included to allow the intercept shift between the time t1 and t2. 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:

[1] In literature of impact evaluation, a broader term "treatment" instead of program/project is sometimes used to refer an intervention whose impact is evaluated.
[2] In some formulas, the subscript i is dropped for simplicity.

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

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

$$\begin{aligned}\hat{ATT}_t &= \hat{E}(Y_{it1} \mid D_{it} = 1) - \hat{E}(\hat{Y}_{it0} \mid D_{it} = 1) \\ &= \frac{1}{n_t}\sum_{i=1}^{n_t} Y_{it} - \frac{1}{n_t}\sum_{i=1}^{n_t} Y_{it}\exp\left(-\hat{\beta}_3\right) \\ &= \frac{1}{n_t}\left[1 - \exp\left(-\hat{\beta}_3\right)\right]\sum_{i=1}^{n_t} Y_{it},\end{aligned} \tag{5}$$

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 the Delta method or bootstrap technique.

It should be noted that if the equation (3) is linear instead of semi-log, ATT will be equal to the coefficient of *D*, i.e. β_3, which is constant overtime.

The main problem in estimating equation (3) is the endogeneity of the receiving of remittances. Unobserved characteristics of recipients can be different from those of non-recipients. For example, households with international remittances can have more favorable conditions or more information on 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 oversea migration to rich areas. Failure to control for such unobserved factors leads to biased estimates of remittance impact. In this paper, we rely on the fixed-effect regressions using panel data to avoid endogeneity bias. A main identification assumption of the fixed-effect regression is that only unobserved time-invariant variables, u_i, in the outcome equation are correlated with the receiving 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 overtime, the fixed-effect regressions can remove the unobserved time-invariant variables to obtain unbiased estimates of coefficients in the outcome equation.

However, the impact evaluation approach of this paper can have a main drawback that it does not allow for the indirect or spillover effects. Households can use remittances for investment and lending, which can have indirect effects on the economy and other households. Estimation of the indirect effects is beyond the cope of the paper, since the paper relies on the micro data in analyzing remittances.

V. EMPIRICAL RESULTS

This section presents empirical findings on impacts of the receipts 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 expenditures, and per capita expenditures on foods, healthcare, 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 receipts of international and internal remittances.

The explanatory variables and regression results are presented in tables A.1 to A.3 in Appendix. Most of the explanatory variables have 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 A9 in Appendix, and all the P-values of the tests are smaller than 0.01). Thus, we incline to use the fixed-effect regressions (with sampling weights and cluster correlation) to estimate ATT of remittances.

We also test whether there is difference in the impact of remittance receipts on household welfare between urban and rural households. We include interactions between the receipts of remittances (international and internal) and the urban dummy variables. The regression results are presented in table A.10 in 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 receiving of international remittances increased per capita income of the recipients by 1425 and 1820 thousand VND in 2002 and 2006, respectively.[3] The increases in

[3] The estimators of ATT are based on the sample means of outcome. Thus, their asymptotic distribution is assumed to follow the normal distribution. To test whether the ATT estimates are statistically different from zero (the null hypothesis), we can compute the test statistics by dividing the ATT estimates by their standard errors. Then we compare these test statistics with the critical value of the standard normal distribution at different significant levels to see whether we can reject the null hypothesis at the significant levels.

income are less than the remittances received by households. It 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 and 478 thousand VND in 2002 and 2004, respectively. In other words, it helped the recipients increase per capita expenditures by around 9 and 7 per cent in 2002 and 2004, respectively. The receiving 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, healthcare and education were not statistically significant. The reason for small impacts of international remittances 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 saving or production investment.

Table 5. Impact estimates of international remittances

Household indicators	2002			2004		
	Y1	Y0	Impact: $(Y_1 - Y_0)$	Y1	Y0	Impact: $(Y_1 - Y_0)$
Per capita income (thousand VND)	8 679.3***	7 254.7***	1 424.6***	11 088.9***	9 268.8***	1 820.1***
	[500.6]	[668.2]	[286.4]	[435.3]	[514.7]	[352.1]
Per capita consumption expenditures (thousand VND)	6 072.0***	5 556.0***	516.0***	7 984.8***	7 507.2***	477.6***
	[262.2]	[283.3]	[132.5]	[339.5]	[359.1]	[183.6]
Per capita food consumption expenditures (thousand VND)	2 303.7***	2 164.0***	139.7**	2 780.8***	2 712.2***	68.6
	[80.1]	[89.4]	[53.5]	[98.5]	[112.5]	[69.2]
Per capita healthcare expenditures (thousand VND)	357.4***	350.3***	7.1	654.4***	588.1***	66.3
	[27.9]	[58.1]	[32.6]	[61.8]	[114.2]	[67.9]
Per capita education expenditures (thousand VND)	389.4***	336.7***	52.7	523.9***	485.8***	38.1
	[24.9]	[59.8]	[51.5]	[60.6]	[67.4]	[51.3]
Per capita non-food consumption expenditures (thousand VND)	3 021.5***	2 746.2***	275.3***	4 025.8***	3 759.4***	266.4***
	[173.3]	[164.7]	[87.9]	[198.6]	[243.7]	[114.1]

Source: Estimation from VHLSS 2002-2004.
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.

Impact estimates 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 internal remittances were lower than international remittances. The receiving of internal remittances increased per capita income of the recipients by nearly 6 per cent, or equivalent to 243 and 305 thousand VND in 2002 and 2004, respectively.

Table 6. Impact estimates of internal remittances

Household indicators	2002			2004		
	Y1	Y0	Impact: (Y_1–Y_0)	Y1	Y0	Impact: (Y_1–Y_0)
Per capita income (thousand VND)	4 667.7***	4 424.0***	243.7***	5 847.9***	5 542.7***	305.2***
	[90.5]	[153.1]	[91.0]	[154.3]	[136.5]	[115.7]
Per capita consumption expenditures (thousand VND)	3 678.1***	3 465.1***	213.0***	4 458.0***	4 199.8***	258.2***
	[65.1]	[76.7]	[55.3]	[127.8]	[75.7]	[67.4]
Per capita food consumption expenditures (thousand VND)	1 689.9***	1 652.0***	37.9	1 870.8***	1 829.0***	41.8*
	[22.2]	[41.3]	[27.6]	[30.8]	[32.6]	[28.1]
Per capita healthcare expenditures (thousand VND)	201.5***	173.2***	28.3**	310.3***	266.8***	43.5***
	[4.8]	[11.9]	[14.0]	[12.2]	[19.3]	[16.7]
Per capita education expenditures (thousand VND)	210.4***	183.3***	27.1*	273.2***	238.0***	35.2**
	[5.2]	[18.1]	[14.1]	[11.7]	[19.8]	[17.3]
Per capita non-food consumption expenditures (thousand VND)	1 576.4***	1 430.4***	146.0***	2 003.7***	1 818.2***	185.5***
	[39.4]	[49.2]	[35.8]	[81.3]	[51.5]	[41.1]

Source: Estimation from VHLSS 2002-2004.
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 expenditures of the recipients is lightly smaller than the effect on income. It means that most of internal remittances were used for consumption rather than investments or saving. The effect estimate of the internal remittance receipt on the recipients' expenditure was 213 and 258 thousand VND in 2002 and 2004, respectively. It is interesting that impact estimates on food consumption expenditure, and other expenditures on healthcare, education and other non-foods are positive and statistically significant in 2004 (at least at 10 per cent level – table 6). Compared to international remittances, internal remittances are spent in more consumption items.

VI. CONCLUSION

Remittances especially international remittances have been increasing overtime in Viet Nam. Although it is consent that remittances are important resources for increasing income and smoothing consumption, the question on their causal effects on household welfare in Viet Nam remain unanswered so far. Using panel data from VHLSSs 2002 and 2004, the paper investigates the access of households to international and internal remittances and measures to which extent the receipts of remittances can affect income and consumption expenditures of the recipients.

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

It is found that international remittances are still luxuries for the people. Around 5.9 and 7.1 per cent of households received international remittances in 2002 and 2004,

respectively. On the contrary, 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.

Regarding to impacts, the receiving of international remittances increased per capita expenditures of the recipients. International remittances also had positive and statistically significant impacts on expenditures on nonfood consumption (excluding healthcare and education spending). However, the effects of the receipts of international remittances on per capita expenditures on food, education and healthcare were not statistically significant. The impact of international remittances on income was much higher than the impact on expenditures. It indicates that international remittances helped the recipients increase saving and production investment.

The receipt of internal remittances also increased households' income and expenditure. 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 other per capita expenditures on healthcare, education and other non-food consumptions.

To short, international remittances covered a small proportion of population, and they were often received by high-income households. As a result, international remittances had an important role in increasing income, saving and assets of the receiving households. On the contrary, internal remittances covered a large proportion of population. Households receiving internal remittances had smaller income than other households. Internal remittances helped the recipients increase consumption expenditure rather than saving or assets.

REFERENCES

Acosta, P., C. Calderon, P. Fajnzylber, and H. Lopez (2007). "What is the impact of international remittances on poverty and inequality in Latin America?", *World Development*, vol. 36, No. 1, p. 89-114.

Adams, H. R. (1991). "The Economic uses and impact of international remittances in rural Egypt", *Economic Development and Cultural Change*, vol. 39, No. 4, p. 695-722.

Adams, H. R. (1998). "Remittances, investment, and rural asset accumulation in Pakistan", *Economic Development and Cultural Change*, vol. 47, No.1, p. 155-173.

Adams, H. R. (2004). "Remittances and poverty in Guatemala", Policy Research Working Paper 3418 (World Bank, Washington, DC).

Adams, H. R. (2005). "Remittances, household expenditures and investment in Guatemala", World Bank Policy Research Working Paper 3532 (World Bank, Washington, DC).

Adams, H. R. (2006). "Remittances and poverty in Ghana", World Bank Policy Research Working Paper 3838 (World Bank, Washington, DC).

Adams, H. R., and John Page (2005). "Do international migration and remittances reduce poverty in developing countries?", *World Development*, vol. 33, No. 10, p. 1645-1669.

Brauw, A. and Harigaya T. (2007). "Seasonal migration and improving living standards in Vietnam", *American Journal of Agricultural Economics*, vol. 89, No. 2, p. 430-447.

Dang, A., Goldstein, S. and McNally, J.W. (1997). 'Internal migration and development in Vietnam.' *International Migration Review*, vol. 31, No. 2, p. 312–337.

Dang, N. A. (2001). "Rural labor out-migration in Vietnam: a multi-level analysis." In *Migration in Vietnam-Theoretical Approaches and Evidence From a Survey*. Transport Communication Publishing House.

Dang, N. A., C. Tackle and X. T. Hoang (2003). "Migration in Vietnam: a review of information on current trends and patterns, and their policy implications", Paper presented at the Regional Conference on Migration, Development and Pro-Poor Policy Choices in Asia, on 22-24 June 2003 in Dhaka, Bangladesh.

David McKenziea and Hillel Rapoportb (2006). "Can migration reduce educational attainment? Evidence from Mexico", World Bank Policy Research Working Paper 3952 (World Bank, Washington, DC).

Deshingkar Priya (2006). "Internal migration, poverty and development in Asia", Institute of Development Studies and Overseas Development Institute.

Djamba, Y., S. Goldstein, and A. Goldstein (1999). "Permanent and temporary migration in Vietnam during a period of economic change", *Asia-Pacific Migration Journal*, vol. 14, No. 3, p. 25-28.

Esquivel Gerardo and Alejandra Huerta-Pineda (2007). "Remittances and poverty in Mexico: A propensity score matching approach", Unpublished manuscript.

Foster, James., J. Greer, E. Thorbecke (1984). "A class of decomposable poverty measures" *Econometrica*, vol. 52, No. 3, p. 761-765.

Glewwe, P. (1991). “Investigating the determinants of household welfare in Cote d’Ivoire”, *Journal of Development Economics*, Vol. 35, p. 307-337.

Guest, P. (1998). “The dynamics of internal migration in Vietnam.” UNDP Discussion Paper (UNDP, Hanoi, Vietnam).

Government (2001). “The decision No. 72/2002/ND-CP of Vietnamese Government on the classification of urban areas” dated on May 10, 2001.

Heckman, James; Robert Lalonde; and Jeffrey Smith (1999). "The economics and econometrics of active labor market programs" *Handbook of Labor Economics* 3, Ashenfelter, A. and D. Card, eds., Amsterdam: Elsevier Science.

Lopez Cordova, E. 2005. “Globalization, migration and development: the role of Mexican migrant remittances”, *Economia,* vol. 6, p. 217-256.

McKenzie David and Hillel Rapoport (2006). “Can Migration Reduce Educational Attainment? Evidence from Mexico”, World Bank Policy Research Working Paper 3952 (World Bank, Washington, DC).

Nguyen, V. C. (2008). “Do Foreign Remittances Matter to Poverty and Inequality? Evidence from Vietnam”, *Economics Bulletin, v*ol. 15, No. 1, p. 1-11.

Nguyen, V. C., Van den Berg M., and Lensink R. (2008). “International Remittances and Poverty Reduction: New Evidence for Vietnam”, Unpublished Manuscript.

Nicole Hildebrandt and David J. McKenzie (2005). “The Effects of Migration on Child Health in Mexico”, World Bank Policy Research Working Paper 3573 (World Bank, Washington, DC).

Taylor, J. E., J. Mora, R. Adams, and A. Lopez-Feldman (2005). “Remittances, Inequality, and Poverty: Evidence from Rural Mexico”, Unpublished manuscript, University of California.

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***	0.1955***	0.1916***	0.1942***	0.1008***	0.0897***
	[0.0260]	[0.0328]	[0.0374]	[0.0197]	[0.0234]	[0.0282]
Receipt of internal remittances (dummy variable)	0.0465***	0.0631***	0.0557***	0.0707***	0.0681***	0.0656***
	[0.0154]	[0.0189]	[0.0213]	[0.0116]	[0.0135]	[0.0153]
Ratio of members younger than 16	-0.5319***	-0.3534***	-0.3615***	-0.5014***	-0.2988***	-0.2920***
	[0.0352]	[0.0627]	[0.0801]	[0.0280]	[0.0447]	[0.0544]
Ratio of members who older than 60	-0.3521***	-0.2849***	-0.2920***	-0.2626***	-0.2460***	-0.2304***
	[0.0318]	[0.0598]	[0.0697]	[0.0255]	[0.0427]	[0.0545]
Household size	-0.0638***	-0.1022***	-0.1074***	-0.0825***	-0.1341***	-0.1368***
	[0.0131]	[0.0225]	[0.0259]	[0.0104]	[0.0160]	[0.0189]
Household size squared	-0.0001	0.0033*	0.0036*	0.0016*	0.0061***	0.0063***
	[0.0012]	[0.0019]	[0.0020]	[0.0009]	[0.0014]	[0.0017]
Ratio of household member with technical degree	0.7169***	0.3021***	0.2991***	0.5819***	0.2610***	0.2687***
	[0.0467]	[0.0625]	[0.0641]	[0.0358]	[0.0446]	[0.0557]
Ratio of household member with post secondary	1.1421***	0.4167***	0.3662***	1.0080***	0.3286***	0.3058***
	[0.0644]	[0.1110]	[0.1061]	[0.0511]	[0.0792]	[0.1139]
Area of annual crop land per capita (m2)	0.4375***	0.5112***	0.4945***	0.2309***	0.3617***	0.3295***
	[0.0495]	[0.0816]	[0.1550]	[0.0391]	[0.0582]	[0.0720]
Area of perennial crop land per capita (m2)	0.3974***	0.1970***	0.2132	0.2128***	0.1113**	0.1165*
	[0.0494]	[0.0684]	[0.1456]	[0.0381]	[0.0488]	[0.0653]
Forestry land per capita (m2)	0.1281***	0.1321***	0.1811**	0.0642**	0.0692**	0.1035**
	[0.0356]	[0.0456]	[0.0719]	[0.0271]	[0.0325]	[0.0491]
Area of aquaculture water surface per capita (m2)	0.7394***	0.6758***	0.7010**	0.4509***	0.3806***	0.3417**
	[0.1142]	[0.1844]	[0.2820]	[0.0901]	[0.1316]	[0.1646]
Have road to village	0.013	-0.0123	-0.0225	-0.0008	-0.0189	-0.0207
	[0.0171]	[0.0220]	[0.0245]	[0.0131]	[0.0157]	[0.0184]
Distance to nearest daily market (km)	-0.0055***	0.0014	0.0019	-0.0045***	0.0005	0.0003
	[0.0012]	[0.0016]	[0.0014]	[0.0009]	[0.0011]	[0.0011]
Red River Delta	Base					
	-					
North East	-0.0858***			-0.1050***		
	[0.0261]			[0.0219]		
North West	-0.2648***			-0.3385***		
	[0.0408]			[0.0342]		
North Central Coast	-0.2140***			-0.1266***		
	[0.0277]			[0.0233]		
South Central Coast	-0.0394			-0.0071		
	[0.0286]			[0.0241]		
Central Highlands	-0.0883**			-0.1902***		
	[0.0347]			[0.0291]		
North East South	0.2895***			0.2370***		
	[0.0276]			[0.0232]		
Mekong River Delta	0.1154***			0.0514***		
	[0.0237]			[0.0198]		
Urban	0.3737***			0.4775***		
	[0.0236]			[0.0191]		

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
Time effect (dummy 2004)	0.1509***	0.1657***	0.1637***	0.1168***	0.1315***	0.1321***
	[0.0090]	[0.0092]	[0.0103]	[0.0065]	[0.0066]	[0.0079]
Constant	8.4356***	8.5858***	8.6436***	8.2889***	8.4796***	8.5174***
	[0.0447]	[0.0678]	[0.0819]	[0.0355]	[0.0484]	[0.0564]
Observations	8016	8016	8016	8016	8016	8016
Number of households	4008	4008	4008	4008	4008	4008
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 healthcare expenditures

Explanatory variables	Logarithm of per capita food expenditures			Logarithm of per capita healthcare 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***	0.0468**	0.0371	0.3405***	0.1094	0.1023
	[0.0170]	[0.0215]	[0.0248]	[0.0688]	[0.0986]	[0.1008]
Receipt of internal remittances (dummy variable)	0.0183*	0.0209*	0.0203	0.2405***	0.1405**	0.1278*
	[0.0101]	[0.0124]	[0.0152]	[0.0413]	[0.0567]	[0.0657]
Ratio of members younger than 16	-0.3334***	-0.2096***	-0.2137***	-0.3599***	0.0661	0.14
	[0.0230]	[0.0412]	[0.0459]	[0.0867]	[0.1886]	[0.2025]
Ratio of members who older than 60	-0.1880***	-0.1530***	-0.1340***	0.6964***	0.4538**	0.5366***
	[0.0208]	[0.0393]	[0.0445]	[0.0777]	[0.1800]	[0.2034]
Household size	-0.0982***	-0.1292***	-0.1283***	-0.0832**	-0.0791	-0.0825
	[0.0086]	[0.0148]	[0.0162]	[0.0325]	[0.0676]	[0.0750]
Household size squared	0.0035***	0.0057***	0.0058***	0.001	0.0043	0.0046
	[0.0008]	[0.0013]	[0.0014]	[0.0029]	[0.0058]	[0.0062]
Ratio of household member with technical degree	0.3593***	0.2036***	0.2140***	0.5600***	0.2068	0.192
	[0.0305]	[0.0411]	[0.0458]	[0.1220]	[0.1881]	[0.2271]
Ratio of household member with post secondary	0.6062***	0.3621***	0.3759***	0.7595***	0.093	0.0923
	[0.0421]	[0.0730]	[0.0856]	[0.1594]	[0.3339]	[0.3910]
Area of annual crop land per capita (m2)	0.1816***	0.2934***	0.2891***	-0.0696	0.6678***	0.5545*
	[0.0323]	[0.0536]	[0.0608]	[0.1234]	[0.2455]	[0.3109]
Area of perennial crop land per capita (m2)	0.1708***	0.0870*	0.1026	0.2336*	0.1766	0.1498
	[0.0322]	[0.0449]	[0.0747]	[0.1277]	[0.2056]	[0.1716]
Forestry land per capita (m2)	0.0723***	0.0594**	0.0901**	-0.1467	0.092	0.1085
	[0.0233]	[0.0300]	[0.0411]	[0.0943]	[0.1372]	[0.1697]
Area of aquaculture water surface per capita (m2)	0.1739**	0.1807	0.1538	0.3595	1.7710***	1.5764**
	[0.0747]	[0.1212]	[0.1555]	[0.2853]	[0.5548]	[0.7589]
Have road to village	-0.0062	-0.0181	-0.0111	0.0437	-0.0309	-0.0323
	[0.0112]	[0.0145]	[0.0201]	[0.0452]	[0.0662]	[0.0778]
Distance to nearest daily market (km)	-0.0013*	0.0016	0.0012	-0.0124***	-0.002	-0.0005
	[0.0008]	[0.0011]	[0.0012]	[0.0031]	[0.0048]	[0.0055]
Red River Delta	Base					
North East	-0.017			-0.4659***		

Explanatory variables	Logarithm of per capita food expenditures			Logarithm of per capita healthcare 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
	[0.0171]			[0.0606]		
North West	-0.2324***			-0.2659***		
	[0.0267]			[0.0948]		
North Central Coast	-0.1733***			-0.1590**		
	[0.0181]			[0.0639]		
South Central Coast	-0.0924***			0.1717***		
	[0.0188]			[0.0660]		
Central Highlands	-0.2016***			0.1497*		
	[0.0227]			[0.0805]		
North East South	0.1067***			0.3319***		
	[0.0180]			[0.0636]		
Mekong River Delta	0.0265*			0.3941***		
	[0.0155]			[0.0549]		
Urban	0.2718***			0.2805***		
	[0.0154]			[0.0577]		
Time effect (dummy 2004)	0.0402***	0.0457***	0.0464***	0.2943***	0.3300***	0.3503***
	[0.0059]	[0.0060]	[0.0081]	[0.0267]	[0.0277]	[0.0325]
Constant	7.7218***	7.8082***	7.8142***	4.3093***	4.3226***	4.3548***
	[0.0292]	[0.0445]	[0.0502]	[0.1112]	[0.2038]	[0.2370]
Observations	8016	8016	8016	8016	8016	8016
Number of i	4008	4008	4008	4008	4008	4008
R-squared	0.36	0.20	0.20	0.15	0.05	0.05

Source: Estimation from panel data VHLSSs 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 nonfood 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***	0.0683	0.0666	0.2651***	0.1332***	0.1184***
	[0.0947]	[0.1156]	[0.1381]	[0.0316]	[0.0381]	[0.0414]
Receipt of internal remittances (dummy variable)	0.2320***	0.1331**	0.1769**	0.1119***	0.1189***	0.1112***
	[0.0560]	[0.0665]	[0.0750]	[0.0187]	[0.0219]	[0.0228]
Ratio of members younger than 16	1.6769***	1.2417***	1.2686***	-0.6653***	-0.3462***	-0.3266***
	[0.1323]	[0.2210]	[0.2685]	[0.0442]	[0.0728]	[0.0873]
Ratio of members who older than 60	-2.5045***	-1.7791***	-1.7965***	-0.4134***	-0.3541***	-0.3600***
	[0.1199]	[0.2109]	[0.2869]	[0.0401]	[0.0695]	[0.1113]
Household size	0.9963***	1.0030***	1.0419***	-0.0814***	-0.1848***	-0.1904***
	[0.0492]	[0.0792]	[0.1205]	[0.0165]	[0.0261]	[0.0310]
Household size squared	-0.0697***	-0.0669***	-0.0697***	0.0004	0.0095***	0.0097***
	[0.0043]	[0.0068]	[0.0104]	[0.0014]	[0.0022]	[0.0026]
Ratio of household member with technical degree	0.2997*	-0.7428***	-0.6542**	0.8651***	0.3178***	0.3166***
	[0.1712]	[0.2204]	[0.2682]	[0.0571]	[0.0726]	[0.1003]

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
Ratio of household member with post secondary	1.0565***	-1.1572***	-0.9601	1.5015***	0.5002***	0.4559***
	[0.2416]	[0.3913]	[0.6684]	[0.0807]	[0.1289]	[0.1653]
Area of annual crop land per capita (m2)	-0.1508	0.2737	0.3104	0.3632***	0.4927***	0.4345***
	[0.1851]	[0.2877]	[0.3353]	[0.0618]	[0.0948]	[0.1064]
Area of perennial crop land per capita (m2)	0.1585	-0.2528	-0.2955	0.2847***	0.0818	0.0898
	[0.1817]	[0.2410]	[0.2207]	[0.0606]	[0.0794]	[0.0967]
Forestry land per capita (m2)	0.1518	0.0695	0.0142	0.0538	0.0719	0.1406
	[0.1300]	[0.1608]	[0.1328]	[0.0434]	[0.0530]	[0.1066]
Area of aquaculture water surface per capita (m2)	0.2399	-0.3779	-0.5293	0.7971***	0.5879***	0.5962**
	[0.4267]	[0.6503]	[0.7639]	[0.1425]	[0.2142]	[0.2694]
Have road to village	0.0737	-0.034	-0.0362	0.023	-0.0013	-0.0076
	[0.0626]	[0.0776]	[0.0705]	[0.0209]	[0.0256]	[0.0282]
Distance to nearest daily market (km)	-0.0211***	0.003	0.0037	-0.0102***	-0.0011	-0.0012
	[0.0043]	[0.0056]	[0.0048]	[0.0014]	[0.0019]	[0.0020]
Red River Delta	Base					
	-					
North East	-0.4414***			-0.1912***		
	[0.1015]			[0.0340]		
North West	-0.9670***			-0.5341***		
	[0.1582]			[0.0530]		
North Central Coast	-0.0146			-0.1038***		
	[0.1077]			[0.0361]		
South Central Coast	-0.2661**			0.1156***		
	[0.1114]			[0.0373]		
Central Highlands	-0.5384***			-0.2576***		
	[0.1347]			[0.0451]		
North East South	-0.3227***			0.3976***		
	[0.1071]			[0.0359]		
Mekong River Delta	-0.8614***			0.1400***		
	[0.0917]			[0.0307]		
Urban	0.8345***			0.7240***		
	[0.0896]			[0.0300]		
Time effect (dummy 2004)	0.2911***	0.3093***	0.2913***	0.1860***	0.2079***	0.2048***
	[0.0318]	[0.0324]	[0.0357]	[0.0106]	[0.0107]	[0.0116]
Constant	0.4339***	0.3495	0.2563	7.1211***	7.4926***	7.5664***
	[0.1675]	[0.2389]	[0.3564]	[0.0560]	[0.0787]	[0.0891]
Observations	8016	8016	8016	8016	8016	8016
Number of i	4008	4008	4008	4008	4008	4008
R-squared	0.32	0.22	0.22	0.45	0.18	0.18

Source: Estimation from panel data VHLSSs 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 who 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 member with technical degree	0.3021	0.7169	-0.4149	0.0429
Ratio of household member with post secondary	0.4167	1.1421	-0.7254	0.0924
Area of annual crop land per capita (m2)	0.5112	0.4375	0.0737	0.0664
Area of perennial crop land per capita (m2)	0.1970	0.3974	-0.2004	0.0487
Forestry land per capita (m2)	0.1321	0.1281	0.0040	0.0295
Area of aquaculture water surface per capita (m2)	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				
Chi2 – statistic	220.5			
P-value	0.000			
Source: Estimation from panel data of VHLSSs 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 who 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 member with technical degree	0.2610	0.5819	-0.3208	0.0282
Ratio of household member with post secondary	0.3286	1.0080	-0.6794	0.0627
Area of annual crop land per capita (m2)	0.3617	0.2309	0.1308	0.0448
Area of perennial crop land per capita (m2)	0.1113	0.2128	-0.1015	0.0322
Forestry land per capita (m2)	0.0692	0.0642	0.0049	0.0192
Area of aquaculture water surface per capita (m2)	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				
Chi2 – statistic	311.3			
P-value	0.000			
Source: Estimation from panel data of VHLSSs 2002-2004				

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

Explanatory variables	Fixed-effect regression	Random-effect regression	Difference	Std. err. of difference
Receipt of international remittances (dummy variable)	0.0468	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 who 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 member with technical degree	0.2036	0.3593	-0.1557	0.0279
Ratio of household member with post secondary	0.3621	0.6062	-0.2441	0.0601
Area of annual crop land per capita (m2)	0.2934	0.1816	0.1119	0.0432
Area of perennial crop land per capita (m2)	0.0870	0.1708	-0.0838	0.0317
Forestry land per capita (m2)	0.0594	0.0723	-0.0129	0.0192
Area of aquaculture water surface per capita (m2)	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				
Chi2 – statistic	104.35			
P-value	0.000			
Source: Estimation from panel data of VHLSSs 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 who 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 member with technical degree	0.2068	0.5600	-0.3532	0.1442
Ratio of household member with post secondary	0.0930	0.7595	-0.6666	0.2949
Area of annual crop land per capita (m2)	0.6678	-0.0696	0.7374	0.2134
Area of perennial crop land per capita (m2)	0.1766	0.2336	-0.0570	0.1623
Forestry land per capita (m2)	0.0920	-0.1467	0.2387	0.1004
Area of aquaculture water surface per capita (m2)	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				
Chi2 – statistic	65.69			
P-value	0.000			
Source: Estimation from panel data of VHLSSs 2002-2004				

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

Explanatory variables	Fixed-effect regression	Random-effect regression	Difference	Std. err. of difference
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 who 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 member with technical degree	-0.7428	0.2997	-1.0425	0.1425
Ratio of household member with post secondary	-1.1572	1.0565	-2.2137	0.3131
Area of annual crop land per capita (m2)	0.2737	-0.1508	0.4245	0.2243
Area of perennial crop land per capita (m2)	-0.2528	0.1585	-0.4113	0.1622
Forestry land per capita (m2)	0.0695	0.1518	-0.0823	0.0975
Area of aquaculture water surface per capita (m2)	-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: Ho: difference in coefficients not systematic				
Chi2 – statistic	173.1			
P-value	0.000			
Source: Estimation from panel data of VHLSSs 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 who 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 member with technical degree	0.3178	0.8651	-0.5473	0.0473
Ratio of household member with post secondary	0.5002	1.5015	-1.0013	0.1040
Area of annual crop land per capita (m2)	0.4927	0.3632	0.1295	0.0745
Area of perennial crop land per capita (m2)	0.0818	0.2847	-0.2029	0.0538
Forestry land per capita (m2)	0.0719	0.0538	0.0181	0.0323
Area of aquaculture water surface per capita (m2)	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				
Chi2 – statistic	289.23			
P-value	0.000			
Source: Estimation from panel data of VHLSSs 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 nonfood expenditure
Receipt of international remittances (dummy variable)	0.2246***	0.0964***	0.0575*	0.0816	0.0563	0.1241**
	[0.0452]	[0.0329]	[0.0302]	[0.1193]	[0.1568]	[0.0515]
Receipt of international remittances (dummy variable)	0.0345	0.0532***	0.0123	0.1477**	0.1590**	0.0944***
	[0.0243]	[0.0176]	[0.0172]	[0.0739]	[0.0797]	[0.0267]
Interaction: international remittances*urban	-0.0823	-0.0145	-0.0522	0.0499	0.0324	-0.0105
	[0.0796]	[0.0621]	[0.0526]	[0.2154]	[0.3040]	[0.0873]
Interaction: internal remittances*urban	0.0892*	0.0524	0.0336	-0.0841	0.0763	0.0713
	[0.0474]	[0.0335]	[0.0347]	[0.1579]	[0.2013]	[0.0483]
Ratio of members younger than 16	-0.3608***	-0.2911***	-0.2137***	0.1389	1.2705***	-0.3253***
	[0.0798]	[0.0544]	[0.0459]	[0.2020]	[0.2690]	[0.0874]
Ratio of members who older than 60	-0.2913***	-0.2309***	-0.1331***	0.5366***	-1.7987***	-0.3609***
	[0.0699]	[0.0546]	[0.0446]	[0.2031]	[0.2873]	[0.1115]
Household size	-0.1055***	-0.1362***	-0.1273***	-0.0838	1.0419***	-0.1898***
	[0.0260]	[0.0191]	[0.0162]	[0.0751]	[0.1206]	[0.0311]
Household size squared	0.0035*	0.0062***	0.0057***	0.0047	-0.0697***	0.0096***
	[0.0020]	[0.0017]	[0.0014]	[0.0062]	[0.0105]	[0.0026]
Ratio of household member with technical degree	0.2990***	0.2682***	0.2142***	0.1925	-0.6557**	0.3157***
	[0.0643]	[0.0559]	[0.0462]	[0.2268]	[0.2679]	[0.1004]
Ratio of household member with post secondary	0.3712***	0.3099***	0.3771***	0.0866	-0.9522	0.4618***
	[0.1060]	[0.1142]	[0.0852]	[0.3887]	[0.6687]	[0.1656]
Area of annual crop land per capita (m2)	0.4903***	0.3273***	0.2873***	0.5582*	0.3078	0.4316***
	[0.1549]	[0.0719]	[0.0608]	[0.3107]	[0.3350]	[0.1061]
Area of perennial crop land per capita (m2)	0.2152	0.1180*	0.1031	0.1476	-0.2928	0.0919
	[0.1453]	[0.0656]	[0.0746]	[0.1716]	[0.2205]	[0.0976]
Forestry land per capita (m2)	0.1800**	0.1027**	0.0897**	0.1096	0.0129	0.1395
	[0.0712]	[0.0486]	[0.0408]	[0.1698]	[0.1335]	[0.1060]
Area of aquaculture water surface per capita (m2)	0.6952**	0.3379**	0.1518	1.5822**	-0.5354	0.5909**
	[0.2817]	[0.1620]	[0.1553]	[0.7620]	[0.7635]	[0.2659]
Have road to village	-0.021	-0.0197	-0.0106	-0.0339	-0.0346	-0.0063
	[0.0244]	[0.0183]	[0.0201]	[0.0779]	[0.0708]	[0.0281]
Distance to nearest daily market (km)	0.002	0.0003	0.0012	-0.0005	0.0037	-0.0011
	[0.0014]	[0.0011]	[0.0012]	[0.0055]	[0.0048]	[0.0020]
Time effect (dummy 2004)	0.1645***	0.1324***	0.0468***	0.3496***	0.2916***	0.2053***
	[0.0103]	[0.0079]	[0.0080]	[0.0326]	[0.0357]	[0.0116]
Constant	8.6380***	8.5155***	7.8112***	4.3590***	0.2558	7.5642***
	[0.0821]	[0.0567]	[0.0504]	[0.2374]	[0.3563]	[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 VHLSSs 2002-2004.
Notes: Standard errors in brackets.
* significant at 10%; ** significant at 5%; *** significant at 1%.