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The Impact of International Remittances on Income, Work Efforts, Poverty and Inequality: Evidence from Vietnam Household Living Standard Surveys

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ABSTRACT

This study provides new empirical evidence on the impact of international remittances. Using data from the two most recent Vietnam Household and Living Standard Surveys, the paper estimates the effect of remittances on per capita income, per capita expenditure, work efforts, poverty and inequality. The estimates suggest that a rise in international remittances in Vietnam increases household income and expenditure. Yet, the study also finds evidence that international remittances may create a moral hazard problem by inducing disincentives to work. Moreover, the study suggests that international remittances, at the least in the short run, do not reduce poverty. They may even lead to an increase in inequality. Overall, the study casts doubts on the view that international remittances may play a crucial role in reducing poverty in developing countries.

JEL Classification: F24, D63, I32.

Key words: Remittances, poverty, expenditure, income, household survey, Vietnam.

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I. Introduction

During the last decade, the development impact of international remittance flows has increasingly become subject of policy discussions, because these flows represent a substantial part of financial resources, especially from developed to developing countries (Chami et al, 2003). Foreign direct investment is still the largest flow of external funding for the entire group of developing countries, but international remittances represent the second most important external capital flow (Adams, 2006). The average inflow of remittances even surpasses official development flows in middle-income countries, and foreign direct investment in low-income countries. In 2005, the total flow of international remittances amounted to US\$ 250 billion, and constituted 5-10% of total GDP in developing countries (World Bank, 2005a). The amount of international remittances to developing countries was in 2005 even 50 percent larger than the level of development aid (World Bank, 2008). The rising trend of international remittances is unlikely to reverse in the medium to long term. It is even to be expected that remittance flows keep growing at a 7-8 percent annual rate (World Bank 2005b:92-3).

The significance of remittances for developing countries also becomes clear by the high proportion of households for which remittances are an important source of income. For instance, Rodriguez (1996) shows that 17% of Philippines poor households receive international remittances, Cox, Eser and Jimenez (1998) estimate that about 25% of Peruvian households receive remittances, and Cox Edwards and Ureta (2003) find that about 14 percent of the households in El Salvador receive considerable amounts of international remittances.

International remittances are also attracting increasing attention since they are supposed to play a crucial role in improving economic growth and reducing poverty in developing countries. It is even argued that facilitating international remittances may be very important in achieving the Millennium Development goals. Yet, the existing empirical evidence shows that many key questions regarding the impact of international remittances on developing countries remain unanswered. The literature points at

beneficial but also detrimental effects of international remittances on the economy of the migrant-sending countries. Several studies conclude that on average remittances positively affect economic growth in developing countries (see e.g. the survey paper by Rapoport and Docquier, 2005, p.75). The channel by which this occurs is still unclear, though. Some authors argue that remittance inflows directly augment income, and increase capital availability for consumption in receiving countries. Remittance inflows can also create multiplier effects in local economies on GDP, job creation, consumption, income and investment (Stahl and Arnold, 1986, De Vasconcelos, 2005, and Ratha and Shaw, 2007). Remittances may provide finance for investment, notably for small-scale projects, and hence may stimulate production (Solimano, 2003). Some studies, however, argue that remittances are used unproductively and mostly spent on consumption (see Rapoport and Docquier, 2005, p. 74). Other studies suggest that remittances are used productively. Estimates show that around 10 percent of remittance receipts are being saved, invested, and used for entrepreneurial activity (Orozco and Fedewa, 2005:4). Similarly, Adams (2006) based on a survey of the literature, concludes that international remittances have a more substantial effect on households investments, like education and housing, than on consumption. A large inflow of international remittances can also lower the chance of a financial crisis since it helps to reduce current account reversals (Bugamelli and Paternò, 2005). However, a large inflow of remittances may also have negative effects on growth, since it may reduce export competitiveness in the remittance-receiving country on account of a sharp currency appreciation (World Bank 2005c:104 and Cordova and Olmedo, 2006). Moreover, remittances may promote idleness on the part of the recipients, and consequently may have a negative effect on work efforts of recipients (Chami, Fullenkamp and Jahjah, 2005).

One of the most contentious issues regarding the impact of remittances concerns the effect of remittances on poverty reduction and income inequality. Indeed, the impact on poverty reduction and inequality is central in any attempt to examine the overall effect of international remittances in developing countries. It is argued that international remittances may help to reduce poverty in the developing world without increasing debt or administrative burden since remittances are a person-to-person flow of money without government intervention. Yet, it is still far from clear whether and how international

remittances reduce poverty and income inequality. Several authors find evidence that the inflow of international remittances reduce poverty. For instance, Adams and Page (2005) found the strongly positive correlation between international remittances and poverty reduction in developing countries. Anyanwu and Erhijakpor (ud) in a cross-country study for 33 African countries show that international remittances have a significant poverty reducing effect. In addition, Adams (2006) finds that international remittances reduce poverty in Guatemala and Mexico, e.g. since in these countries international migrants come from the poorest group of households, and remittances are sent to relatively poor households. Moreover, Adams, Cuecuecha, and Page (2008) show that international remittances have a poverty reducing effect in Ghana. In contrast, Cattaneo (2005), in a cross-country study, does not find any effect of international remittances on poverty. Stahl (1982) even argues that international remittances may eventually even lead to an increase in poverty since poor households would not benefit from the inflow of international remittances. The empirical evidence on the impact of international remittances on income inequality even seems to be more pessimistic. Acosta (2007) suggests that the effect of remittances on inequality is mixed. He finds that for some countries remittances increase inequality, whereas for other countries inequality reduces. However, Adams, Cuecuecha, and Page (2008) find that international remittances in Ghana increase income inequality. A similar outcome is found by Azam and Gubert (2006). Based on surveys performed in Mali and Senegal, they argue that migrants mainly come from rich families, and that especially the rich families receive most remittances. Hence, the existing studies show a wide diversity of empirical results, which calls for more empirical studies to better understand the economic effects of international remittances.

The aim of this study is to provide new empirical evidence on the impact of international remittances. This study has several special features. First, we concentrate on one country, Vietnam. For several reasons, Vietnam is an interesting case to look at. International remittances to Vietnam are increasing in size and importance. However, there are few recent empirical analyses on the impact of international remittances on welfare in Vietnam available. Niimi, Pham and Reilly (2008) investigate the determinants of remittances in Vietnam, but they concentrate on internal remittances. Since, as is e.g.

argued by Adams, Cuecuecha, and Page (2008), it is highly likely that international and internal remittances will have differing effects on poverty and inequality, the study by Niimi, Pham and Reilly (2008) can not provide any evidence on the impact of international remittances. Phuong et al. (2008) study the effects of migration. They also deal with remittances, but only indirectly. Nguyen (2008) uses VHLSSs in 2002 and 2004 to measure the impact of international remittances on poverty and inequality. However, his discussions on remittances as well as the impact of remittances are rather short and simple. Vietnam is also interesting to look at since over the past decade Vietnam has achieved a remarkable result in the fight against poverty. The incidence of poverty, according to the international poverty line, declined from 58 percent to 20 percent between 1993 and 2004 (Vietnamese Academy of Social Sciences, 2007). The impact of international remittances on household welfare in Vietnam remains an open question, though. Our study aims to provide new evidence on this important issue. Second, this study is the first study that uses data from the two most recent Vietnam Household and Living Standard Surveys (VHLSS) of 2004 and 2006 to estimate the impact of remittances. The use of two years of data allows us to use panel techniques. This enormously improves the estimation strategy since by using panel data biases that arise due to omitted variables, endogeneity and selection can be addressed. Third, we estimate the impact of international remittances on a series of indicators, so that our study provides new evidence for the most important direct effects of remittances. More specifically, we focus on the effect of remittances on per capita income, per capita expenditure (consumption), work efforts, poverty and inequality. We will show that a rise in international remittances increases household income and expenditure. However, we will also show that international remittances decrease work efforts, have no impact on poverty reduction, and lead to a minor increase in inequality. Although the empirical analysis deals with Vietnam, we expect our results to be important for a wider group of emerging and developing economies. At the least, our study shows that international remittances are not a panacea for poverty reduction, which may have important policy implications.

The remainder of this paper is organised as follows. Section 2 introduces data sources used in this study. Section 3 presents data on international remittances and

poverty in Vietnam. Section 4 describes the methodology. Section 5 presents regression results and Section 6 concludes.

II. Data Set

Since the year 2002, Vietnam Household Living Standard Surveys (VHLSS) are conducted by the General Statistical Office of Vietnam (GSO) every two years. At the time of writing this paper, the most recent VHLSSs are the 2004 and 2006 ones. With technical supports from the World Bank, these surveys are designed in a similar way of Living Standards Measurement Surveys of the World Bank. The sample size of the 2004 VHLSS and the 2006 VHLSS is 9,188 and 9,189 households, respectively. The number of individuals covered in the 2004 VHLSS and the 2006 VHLSS is 40,437 and 39,071, respectively. These samples are representative for the national, rural and urban, and regional levels.

It is interesting that the 2004 and 2006 VHLSSs result in a panel of 4216 households, for which data is available for both years. The number of urban and rural households is 1012 and 3204, respectively.²

The sample selection of VHLSSs 2004 and 2006 follows a method of stratified random cluster sampling. GSO selected households in all rural and urban provinces of Vietnam, i.e. rural and urban areas of all provinces are strata. Among each stratum, communes were selected randomly as a primary sampling unit. The number of communes per stratum is proportionate to the population proportion of the strata over the total population. The number of selected communes in each VHLSS is 3063. In each commune, about 3 households were selected randomly.

The surveys collected data by means of household and community level questionnaires. Data on households includes basic demography, employment and labor

² There are earlier versions of the survey available. However, due to changes in the households interviewed it is not possible to match the 2006 survey with earlier surveys than the one of 2004.

force participation, education, health, income, expenditure, housing, fixed assets and durable goods, and participation of households in poverty alleviation programs. It also contains information on the amount of international remittances that households had received during the 12 months before the interview.

Expenditure and income per capita are collected using detailed questions. Expenditure includes food and non-food expenditure. Food expenditure includes purchased food and foodstuff and self-produced products of households. Non-food expenditure comprises expenditure on education, healthcare expenditure, expenditure on houses and commodities, and expenditure on power, water supply and garbage. Regarding income, household income can come from any source. Income includes income from agricultural and non-agricultural production, salary, wage, pensions, scholarship, income from loan interest and house rental, remittances and social transfers. Income from agricultural production comprises crop income, livestock income, aquaculture income, and income from other agriculture-related activities.

A household is classified as poor if their per capita expenditure is less the poverty line developed by the World Bank and GSO. The poverty line is equivalent to the expenditure level that allows for nutritional needs, and some essential non-food consumption such as clothing, housing and durables. The poverty lines for 2004 and 2006 are 1160 and 2560 thousands VND, respectively.³

III. Poverty and Remittances in Vietnam

Poverty rates declined continuously over the period 1993-2006 (Figure 1). The proportion of poor dropped dramatically from 58 percent in 1993 to 37 percent in 1998, and continued to decrease to 20 and 16 percent in 2004 and 2006, respectively. In rural areas, however, poverty was more prevalent than the country-average, with a poverty rate of 20 percent in 2006. The reduction of poverty was associated with a moderate increase in

³ 1 USD is equivalent to 15,777 and 16,054 VND in 2004 and 2006, respectively.

inequality. The Gini index based on expenditure per capita increased from 0.33 in 1993 to 0.36 in 2006.

<<INSERT FIGURE 1>>

Recently, international remittances have become an increasing source of external funding for Vietnam. Figure 2 shows that international remittances increased from 26.5 to 57.9 thousand billion VND, in prices of 2001, during the period 2001-2007. Table 1 presents the distribution of international remittances over the poor and non-poor in 2004 and 2006. It shows that international remittances are not pro-poor. In 2004 and 2006, the percentage of the poor receiving remittances was only 1.3 and 1.8 percent, respectively. Moreover, the bulk of international remittances went to the non-poor. Some 97% of the remittances receiving households are non-poor. In terms of amount, even more than 99% of the international remittances inflow is distributed to non-poor households. The average value of remittances of the non-poor is even more than 5 times as high as the average value of remittances to the poor. Also in terms of percentages of household income and expenditure, remittances to the non-poor are much higher than remittances to the poor.

<<INSERT FIGURE 2>>

<<INSERT TABLE 1>>

Table 2 shows that urban households are more likely to receive remittances than rural households. In 2006, the proportion of households receiving remittances was 11.6 percent and 5.1 percent in the urban and rural areas, respectively. The average size of international remittances inflows was also larger in urban areas.

<<INSERT TABLE 2>>

Table 3 presents changes in welfare and poverty for different household groups over the 2004-2006 period. It appears that households receiving international remittances in both years have higher income and expenditure per capita, and lower poverty than households never receiving remittances. The impact of changes in remittance status is, however, unclear. On the one hand, the strongest decline in the poverty rate is experienced by households receiving remittances neither in 2004, nor in 2006. On the

other hand, it appears that households who do receive remittances in 2004, but not in 2006 experience an increase in poverty, whereas the opposite holds for households who receive remittances in 2006, but not in 2004.

<<INSERT TABLE 3>>

If anything, this section suggests that an increase in international remittances will increase income. However, it also suggests that the effects on poverty reduction are probably minor since international remittances primarily go to the non-poor. It may even be the case that an increase in international remittances increases inequality. The remainder of this paper analysis these issues in detail.

IV. Methodology

Impact of remittances on per capita income, per capita expenditure, and work efforts

We assume a similar specification for estimating the effect of international remittances on per capita income, per capita expenditure and work efforts⁴:

$$Y_{ijt} = \beta_0 + G_t\beta_1 + X_{ijt}\beta_2 + D_{ijt}\beta_3 + C_{jt}\beta_4 + u_{ij} + v_j + \varepsilon_{ijt}, \quad t = 1,2 \quad (1)$$

where Y is a vector including income per capita, expenditure per capita, and different proxies for work efforts (see section 5.2). The subscripts i, j and t refer to household i in commune j at time t , respectively. Note that “per capita” refers to the average per household member at period t . For instance, per capita income is calculated as total household income at period t over the amount of household members at period t . G_t is a year dummy, with a one for 2006; This dummy is included to allow the intercept to differ between the two periods. This variable enables to control for common macroeconomic

⁴ It should be noted that we treat international remittances as an exogenous transfer of income by migrants. We do not control for home earnings of migrants had those migrants stayed and worked at home as has been done by e.g. Adams, Cucuecha, and Page (2008). We ignore home earnings of migrants had they not migrated since this induces severe methodological difficulties. Probably our methodology implies that the results overestimate the possible positive effects of international remittances.

effects. X is a vector of household level control variables. D is per capita remittances (i.e. average remittances per household member at period t). C is a vector of control variables with community characteristics.; u_{ij} and v_j are unobserved time-invariant household and commune characteristics, respectively. ε_{ijt} is an error term. β_0 is a constant. As will be explained below, we use a fixed effects and a random effects estimator to estimate equation (1). If the random effects estimator is used β_0 is assumed to be the same for all households. In the fixed effects estimator, however, the constant is allowed to differ per household, i.e. $\beta_0 = \beta_{0ij}$. If the fixed effects estimator is used, the time invariant household and commune characteristics are perfectly correlated with the fixed effects. In that case, $u_{ij} + v_j$ will drop out of the model.

The marginal impact of remittances is measured by β_3 . We will also measure the impact of remittances by calculating the Average Treatment Effect on the Treated (ATT) (Heckman, et al., 1999). ATT is the expected impact of remittances on remittances recipients (with $D > 0$):

$$ATT_t = E(Y_{ijt} | D_{ijt} > 0) - E(Y_{ijt(D=0)} | D_{ijt} > 0), \quad (2)$$

Where $E(Y_{ijt(D=0)} | D_{ijt} > 0)$ is the expected value of the outcome variable of the remittance recipients, i.e. income per capita, expenditure per capita, or work efforts, had they not received remittances. This is not observed and has to be estimated.

Using equation (1), we get

$$ATT_t = E(Y_{ijt} | D_{ijt} > 0) - E(Y_{ijt(D=0)} | D_{ijt} > 0) = (\beta_0 + G_t \beta_1 + X_{ijt} \beta_2 + D_{ijt} \beta_3 + C_{jt} \beta_4) - (\beta_0 + G_t \beta_1 + X_{ijt} \beta_2 + C_{jt} \beta_4) = D_{ijt} \beta_3. \quad (3)$$

The ATT at time t is thus estimated by:

$$A\hat{T}T_t = \frac{1}{n_t} \sum_{i=1}^{n_t} D_{ijt} \hat{\beta}_3, \quad (4)$$

where n_t is the number of the remittance recipients at the time t .

We estimate the standard error of the ATT estimates by using a non-parametric bootstrap technique. This bootstrap is implemented by repeatedly drawing samples from the original sample of the VHLSS panel data. Since the VHLSSs sample selection follows stratified random cluster sampling, communes instead of households are bootstrapped in each stratum (Deaton, 1997). In other words, the bootstrap is made of communes (i.e., clusters) within strata. The number of replications is 500.⁵

The impact of remittances on poverty and inequality

We calculate poverty by three Foster-Greer-Thorbecke poverty indexes, which can all be calculated using the following formula (Foster, Greer and Thorbecke, 1984):

$$P_\alpha = \frac{1}{n} \sum_{i=1}^q \left[\frac{z - Y_i}{z} \right]^\alpha, \quad (5)$$

where Y_i is a welfare indicator for person i . We use consumption expenditure per capita as the welfare indicator, since, as is well known, consumption is a better proxy for well-being than income. z is the expenditure poverty line, n is the number of people in the sample population, q is the number of poor people, and α can be interpreted as a measure of inequality aversion.

When $\alpha = 0$, we have the headcount index H , which measures the proportion of people below the poverty line. When $\alpha = 1$ and $\alpha = 2$, we obtain the poverty gap PG , which measures the depth of poverty, and the squared poverty gap P_2 which measures the severity of poverty, respectively.

To measure inequality, we use three common measures of inequality: the Gini coefficient, Theil's L index of inequality, and Theil's T index of inequality. The Gini index can be calculated from the individual expenditure in the population:

$$G = \frac{1}{n(n-1)\bar{Y}} \sum_{i=1}^n \sum_{j=1}^n |Y_i - Y_j| \quad (6)$$

where \bar{Y} is the average per capita expenditure.

The value of the Gini coefficient varies from 0 to 1. The closer the Gini coefficient is to one, the more unequal is the expenditure distribution.

The Theil L index of inequality is calculated as follows:

$$Theil_L = \frac{1}{n} \sum_{i=1}^n \ln\left(\frac{\bar{Y}}{Y_i}\right), \quad (7)$$

The Theil L index ranges from 0 to infinity. A higher value of Theil L indicates more inequality.

The Theil T index of inequality is calculated as:

$$Theil_T = \frac{1}{n} \sum_{i=1}^n \frac{Y_i}{\bar{Y}} \ln\left(\frac{Y_i}{\bar{Y}}\right) \quad (8)$$

The Theil T index ranges from 0 (lowest inequality) to $\ln(N)$ (highest inequality).

The impact of remittances on the poverty indices of remittances receivers in period t is calculated as follows:

$$\Delta P = P(D_t > 0, Y_t) - P(D_t > 0, Y_{t(D=0)}), \quad (9)$$

where the first term on the right-hand side of (9) is the poverty measure of the remittances receiving households given their remittances. This term is observed and can be computed directly from the sample data. However, the second term on the right-hand side of (9) is the counterfactual measure of poverty, *i.e.*, poverty indexes of the receiving households had they not received remittances. This term is not observed directly, and is estimated by using equation (1), and substituting these estimates of expenditure into equation (5).

We also measure the impact of remittances on total poverty:

⁵ In order to examine the robustness of our bootstrap technique, we also tried to bootstrap households

$$\Delta P = P(Y_t) - P(Y_{t(D=0)}), \quad (10)$$

where $P(Y_t)$ is the observed poverty index of the entire population and $P(Y_{t(D=0)})$ is the poverty index of the entire population if the recipients had not received the remittances. The difference between equations (10) and (9) is that the latter only looks at the effect on remittances receivers, while the former considers the effect on the entire population.

Regarding inequality, we only measure the impact of remittances on inequality of the entire population. The impact on the inequality index is given by:

$$\Delta I = I(Y_t) - I(Y_{t(D=0)}), \quad (11)$$

where $I(Y_t)$ is observed inequality, which is calculated using the observed expenditure data. $I(Y_{t(D=0)})$ is an inequality index in the absence of the remittances, which is estimated using the predicted counterfactual expenditure without remittances, using equation (1). The standard errors of the estimates of impacts on poverty and inequality are estimated using the same bootstrap technique as for ATT.

V. Impact Estimation Results

This section presents the estimation results regarding the effects of international remittances on per capita income, per capita expenditure, work efforts, and on aggregate poverty and inequality. We use panel data from VHLSS 2004-2006 to regress income per capita, expenditure per capita, and different proxies for work effort, on remittances per capita and other control variables. We use fixed and random effects regression. The advantage of these techniques is that they controls for time invariant unobserved variables which are correlated with both income (expenditure) and remittances.

Control variables include household composition, education of household members, land and housing, villages, urbanity, and regional variables. It should be noted that we use two village level variables, distance to the nearest market, and a dummy

variable indicating whether the village has a road. The VHLSS data sets only provide information on these variables for the rural area. Since our sample includes the urban and rural area, we had to come up with estimates for the urban areas. We assumed that for urban areas, the variables “distance to market” and “have a road” are equal to 0 and 1, respectively. This is a reasonable assumption given the fact that in all cities there is a market and at least one road.⁶

The complete list of the variables and summary statistics are presented in Table A.1 in the Appendix. In order to control for inflation, we have deflated all variables in terms of 2004 prices.

Impact on per capita expenditure and income

Tables A.2 and A.3 present the regression results with respect to the impact of remittances on per capita income and per capita expenditure, respectively. We present both random effects and fixed effects estimates, without and with sampling weight and cluster correlation. Since the Hausman tests strongly favor the fixed effects estimates we focus the discussion on the fixed effects estimates.

International remittances had a significant positive effect on per capita income and per capita expenditure. For all regressions presented, the coefficient for international remittances is highly significant. An increase in remittances had, however, a much smaller impact on consumption than on income. An increase of 1 VND in per capita remittances resulted in an increase of 0.85 VND in per capita income and of only 0.08 VND in per capita expenditure. This suggests that households made only limited use of remittances for daily consumption. Improvement and construction of houses appear to be an important alternative use: these expenses, which are not included in the total expenditure measure used in the remainder in the paper, increased by 0.3 for each VND of remittances. This accounts for about 40 percent of the difference between income and

⁶ We tested whether international remittances have a different impact in rural and urban areas by including interaction terms for international remittances and a dummy for living in an urban area. These estimates indicate that the effects of remittances do not differ between urban and rural areas. We, therefore, only present the estimates for the entire sample.

expenditures. We did not find a significant direct effect of remittances on the purchase of physical assets (tools, implements, etc), but these may require more long-term saving.⁷

Table 4 presents the ATT for the effect of remittances on per capita income and per capita expenditure. The advantage of ATT over the regression coefficient is that it gives a better estimate of the total increase in per capita income and expenditure caused by remittances. Since ATT depends on the size of remittances, it differs for 2004 and 2006. The table shows that remittances on average increase per capita income of recipients by 3148 and 3602 thousand VND in 2004 and 2006, respectively. In other words, remittances help increase per capita income of the recipient by around 40 and 47 percent in 2004 and 2006, respectively. The effect of international remittances on per capita expenditure, however, is much smaller: only 285 and 326 thousand VND in 2004 and 2006, respectively.

<<INSERT TABLE 4>>

Impact on per work efforts

Table A2 indicates that some crowding out of remittances takes place since there is not a one to one increase in income if remittances increase. This may *e.g.* be caused by a decrease in work efforts. We try to present some evidence for this by presenting regression results on the impact of remittances on different proxies for working time. More specifically, we estimate the effect of remittances on the percentage of household members that work (for persons older than 14), the number of working household members, the total annual working hours per capita, and total working hours per working household member.⁸ These regression results are reported in Tables A.4 and A.5 in the Appendix. The tables show that remittances lead to a significant reduction in the percentage of household members that work, and in per capita annual working hours.

⁷ Estimates available from the authors on request

⁸ The government of Vietnam does not allow the use of labourers under 15 years old.

In order to better understand the effect of remittances on working time, we also calculate the ATT for these variables.⁹ The results are presented in Table 5. The table shows that remittances reduce the ratio of working people above 14 year olds by around 3 percentage points. As a result, working hours per capita of the receiving households reduced by 45 and 59 hours in 2004 and 2006, respectively. However, the effect of remittances on the number of annual working hours per working person is small and not statistically significant.

<<INSERT TABLE 5>>

Impact on poverty and inequality

Table 6 presents the impact of international remittances on poverty and inequality. The table suggests that an increase in international remittances does not reduce poverty: not one of the three poverty indices is significantly reduced. The table also shows that international remittances have a significant but very small effect on inequality: inequality increased slightly due to an increase in remittances. Both effects do not come as a surprise given that most remittances go to the non-poor and that, although remittances substantially increase income, they have a limited effect on expenditures (see section 3).

<<INSERT TABLE 6>>

VI. Conclusions

This paper estimates the impact of international remittances on per capita income, per capita expenditure (consumption), work efforts, and poverty and inequality in Vietnam, using the two most recent Vietnam Household Living Standard Surveys for 2004 and 2006. We show that an increase in international remittances leads to a significant increase

⁹ We used Hausman specification tests to test the differences in coefficients between the random and fixed-effect regressions. The test statistics strongly reject the null hypothesis that the differences in coefficients between two regressions are not systematic. Thus we use the fixed-effect regressions.

in income. Yet, we do not find evidence that international remittances reduce poverty. Our analysis even suggests that in the short run international remittances may increase inequality. These effects on poverty and inequality seem unfortunate. However, they are not unexpected given the fact that in Vietnam mainly the non-poor are remittances receivers. Moreover, it appears that the direct impact of international remittances on per capita consumption is small since a substantial part of international remittances is being saved and invested.

It should be noted that our estimates only show direct effects. The estimates do not allow for spill-over effects. Especially if international remittances are used productively, indirect effects on the poor may be substantial. On the other hand, we do not control for home earnings had the migrant stayed at home, which may imply that our estimates are too positive. Estimating the indirect effects of international remittances, allowing for spill-over effects, and controlling for home earnings had the migrant stayed at home is beyond the scope of the paper, but certainly important for future research.

Overall, our analysis suggests that international remittances neither play an important role in reducing poverty, nor in improving equality. International remittances may play an important role in enhancing production and investment, and hence in reducing poverty in the long run. However, to reduce poverty and inequality in the short run, the government of Vietnam could probably better rely on income distribution and poverty reduction programs which are targeted at the poor more directly. Also for other developing countries the role that international remittances may play in terms of poverty reduction should not be exaggerated. Especially for some Asian developing countries, such as the Philippines, Indonesia, Lao, and Cambodia, with a similar economic structure as Vietnam there is no reason to expect that international remittances will have a profound poverty reducing effect. Our study clearly casts doubts on the hypothesis of many academics and politicians who argue that international remittances may play a crucial role in reducing poverty in developing countries. International remittances may have positive economic effects, especially in the longer run, but are certainly not a panacea for poverty reduction in the short run.

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Tables and Figures

Table 1: International remittances by the poor and non-poor

Indicators	2004			2006		
	Poor	Non Poor	All	Poor	Non Poor	All
% of households receiving remittances	1.3 [0.3]	8.3 [0.4]	7.1 [0.3]	1.8 [0.4]	7.7 [0.4]	6.9 [0.3]
Remittances per capita (thousand VND)*	851.8 [299.1]	4744.1 [390.1]	4626.6 [379.9]	912.0 [228.5]	4919.2 [482.8]	4781.3 [467.7]
Distribution of receiving households	3.0 [0.7]	97.0 [0.7]	100	3.4 [0.8]	96.6 [0.8]	100
Distribution of remittance amount	0.9 [0.4]	99.1 [0.4]	100	0.9 [0.3]	99.1 [0.3]	100
% of remittances in household expenditure	50.5 [17.5]	52.9 [4.0]	52.8 [4.0]	54.7 [13.8]	60.6 [5.9]	60.6 [5.9]
% of remittances in household income	27.6 [7.8]	38.2 [2.1]	38.1 [2.1]	24.8 [5.9]	39.8 [2.7]	39.6 [2.7]
Number of observations	1769	7419	9188	1427	7762	9189

Note: * in 2004 prices
Standard errors in parentheses (corrected for sampling weights and cluster correlation).
Source: calculated from VHLSSs 2004 and 2006.

Table 2: International remittances received by urban and rural households

Indicators	2004			2006		
	Urban	Rural	All	Urban	Rural	All
% of households receiving remittances	13.8 [0.9]	4.7 [0.3]	7.1 [0.3]	11.6 [0.9]	5.1 [0.3]	6.9 [0.3]
Remittances per capita (thousand VND)*	5352.5 [633.1]	3861.9 [392.5]	4626.6 [379.9]	5320.4 [828.9]	4319.0 [497.5]	4781.3 [467.7]
Distribution of receiving households	51.3 [2.7]	48.7 [2.7]	100	46.2 [2.7]	53.8 [2.7]	100
Distribution of remittance amount	56.7 [4.6]	43.3 [4.6]	100	50.0 [5.8]	50.0 [5.8]	100
% of remittances in household expenditure	44.9 [4.8]	71.2 [6.9]	52.8 [4.0]	51.3 [7.8]	74.8 [8.5]	60.6 [5.9]
% of remittances in household income	35.2 [2.9]	43.5 [2.8]	38.1 [2.1]	37.9 [4.2]	41.7 [3.0]	39.6 [2.7]
Number of observations	2250	6938	9188	2307	6882	9189

Note: * in 2004 prices.
Standard errors in parentheses (corrected for sampling weight and cluster correlation).
Source: Estimation from VHLSSs 2004 and 2006.

Table 3: Per capita expenditure and income (thousand VND), and the poverty indexes of households over the period 2004-2006

	Not receiving remittances in both 2004 and 2006			Receiving remittances in 2004, but not in 2006			Receiving remittances in 2006, but not in 2004			Receiving remittances in both 2004 and 2006		
	2004	2006	Change	2004	2006	Change	2004	2006	Change	2004	2006	Change
Per capita expenditure*	4221.8	4913.4	691.6	8189.7	8427.4	237.7	5488.1	6724.7	1236.6	9437.8	9468.2	30.3
	[70.5]	[94.9]	[68.5]	[673.9]	[753.4]	[487.8]	[352.0]	[382.5]	[272.1]	[843.5]	[830.9]	[688.5]
Per capita income*	5542.0	6740.7	1198.7	11015.3	10340.5	-674.7	6869.0	11767.4	4898.4	13665.1	14633.4	968.4
	[111.3]	[121.3]	[90.4]	[874.3]	[827.1]	[675.9]	[513.0]	[1182.9]	[1230.3]	[1668.0]	[1422.1]	[1106.3]
Poverty rate (%)	19.01	14.35	-4.67	5.10	5.17	0.07	8.31	5.80	-2.51	1.80	1.70	-0.10
	[0.81]	[0.73]	[0.63]	[2.07]	[2.04]	[2.22]	[2.07]	[1.93]	[2.57]	[1.26]	[1.21]	[1.00]
Poverty gap index	0.0460	0.0338	-0.0122	0.0118	0.0116	-0.0002	0.0169	0.0100	-0.0069	0.0014	0.0045	0.0030
	[0.0026]	[0.0022]	[0.0016]	[0.0055]	[0.0048]	[0.0051]	[0.0049]	[0.0039]	[0.0051]	[0.0011]	[0.0036]	[0.0026]
Poverty severity index	0.0167	0.0119	-0.0048	0.0040	0.0031	-0.0009	0.0046	0.0027	-0.0019	0.0001	0.0013	0.0012
	[0.0012]	[0.0010]	[0.0008]	[0.0021]	[0.0014]	[0.0016]	[0.0017]	[0.0013]	[0.0017]	[0.0001]	[0.0012]	[0.0011]
Number of observations	3800			127			170			119		

Note: * in 2004 prices.

Standard errors in parentheses (corrected for sampling weight and cluster correlation).

The poverty indexes are calculated using per capita expenditure and the expenditure poverty line of WB-GSO. The formulas of the poverty indexes are presented in section 4.

Source: Estimation from panel data of VHLSSs 2004-2006.

Table 4: Impact of international remittances measured by ATT

	2004			2006		
	Y ₁	Y ₀	ATT (Y ₁ - Y ₀)	Y ₁	Y ₀	ATT (Y ₁ - Y ₀)
Income per capita	11052.6*** [500.1]	7905.0*** [432.5]	3147.5*** [317.8]	11281.8*** [507.9]	7679.9*** [364.8]	3601.9*** [432.1]
Expenditure per capita	7984.8*** [331.2]	7700.2*** [349.7]	284.7** [132.3]	7445.4*** [289.4]	7119.7*** [314.3]	325.8** [158.9]
Difference in ATT between income and expenditure			2862.9*** [309.7]			3276.1*** [413.9]

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

Figures in parentheses are standard errors.

Standard errors are corrected for sampling weights and estimated using bootstrap (non-parametric) with 500 replications.

Source: Estimation from VHLSSs 2004 and 2006

Table 5: Impact of remittances on annual working hours (ATT)

	2004			2006		
	Y ₁	Y ₀	ATT (Y ₁ - Y ₀)	Y ₁	Y ₀	ATT (Y ₁ - Y ₀)
Ratio of members engaged in productive activities to the total household members older than 14	65.2*** [1.3]	68.0*** [1.4]	-2.7*** [0.8]	65.4*** [1.2]	68.8*** [1.5]	-3.4*** [0.9]
Annual working hours per working household member	1985.7*** [47.6]	1998.2*** [52.7]	-12.5 [25.4]	1978.1*** [43.6]	1994.6*** [55.4]	-16.5 [33.6]
Annual working hours per capita	993.0*** [30.1]	1038.2*** [34.9]	-45.2** [19.5]	1014.6*** [31.2]	1074.0*** [40.7]	-59.4** [25.0]

Note: working people are those who are above 14 year olds and working, and working hours are calculated for working people.

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

Figures in parentheses are standard errors.

Standard errors are corrected for sampling weights and estimated using bootstrap (non-parametric) with 500 replications.

Source: Estimation from VHLSSs 2004 and 2006

Table 6: Impact of international remittances on poverty and inequality

	2004			2006		
	With remittances	Without remittances	Impact	With remittances	Without remittances	Impact
Poverty of remittance recipients						
P0	0.0412*** [0.0098]	0.0591*** [0.0162]	-0.0179 [0.0129]	0.0406*** [0.0098]	0.0593*** [0.0153]	-0.0188 [0.0122]
P1	0.0081*** [0.0026]	0.0111*** [0.0054]	-0.0029 [0.0048]	0.0105*** [0.0033]	0.0193*** [0.0137]	-0.0088 [0.0135]
P2	0.0027*** [0.0010]	0.0035*** [0.0068]	-0.0008 [0.0068]	0.0038*** [0.0015]	0.0097*** [0.0473]	-0.0059 [0.0474]
All poverty						
P0	0.1949*** [0.0058]	0.1962*** [0.0058]	-0.0013 [0.0009]	0.1597*** [0.0059]	0.1610*** [0.0060]	-0.0013 [0.0009]
P1	0.0472*** [0.0019]	0.0474*** [0.0019]	-0.0002 [0.0003]	0.0383*** [0.0019]	0.0389*** [0.0021]	-0.0006 [0.0009]
P2	0.0170*** [0.0009]	0.0170*** [0.0011]	-0.0001 [0.0005]	0.0137*** [0.0009]	0.0141*** [0.0035]	-0.0004 [0.0034]
All inequality						
Gini	0.3698*** [0.0050]	0.3687*** [0.0050]	0.0012*** [0.0004]	0.3580*** [0.0046]	0.3577*** [0.0046]	0.0003 [0.0005]
Theil L	0.2235*** [0.0062]	0.2221*** [0.0062]	0.0014** [0.0006]	0.2117*** [0.0056]	0.2110*** [0.0055]	0.0008 [0.0006]
Theil T	0.2407*** [0.0077]	0.2389*** [0.0077]	0.0018** [0.0007]	0.2268*** [0.0074]	0.2265*** [0.0074]	0.0003 [0.0007]

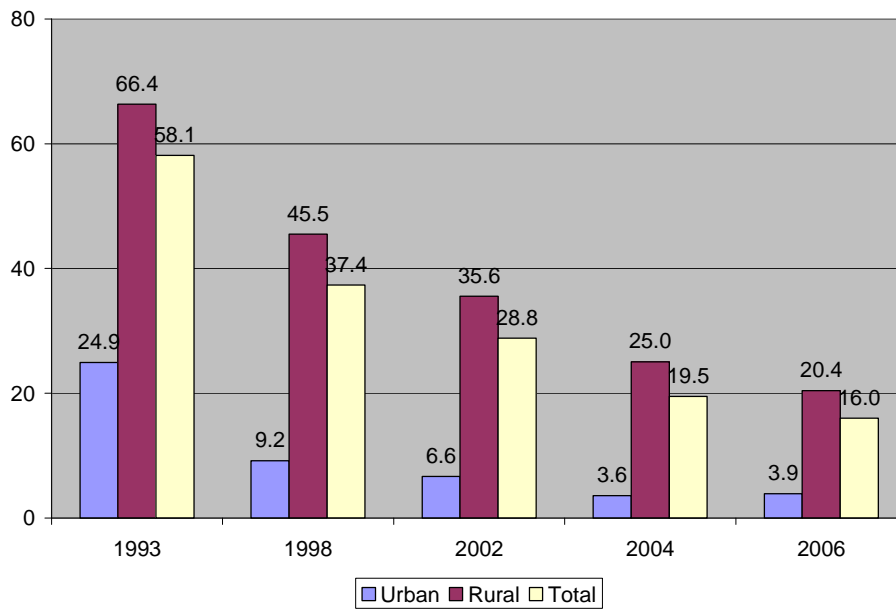
* significant at 10%; ** significant at 5%; *** significant at 1%

Figures in parentheses are standard errors.

Standard errors are corrected for sampling weights and estimated using bootstrap (non-parametric) with 500 replications.

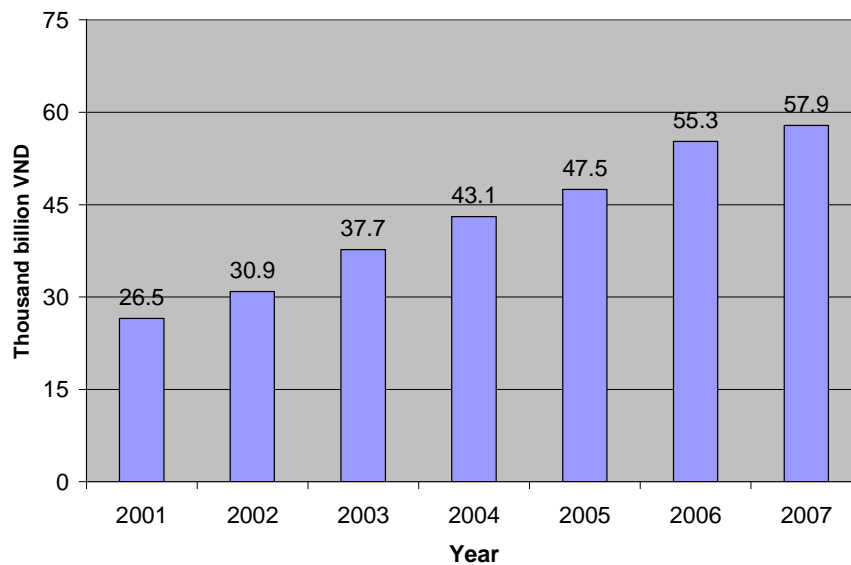
Source: Estimation from VHLSSs 2004 and 2006

Figure 1: Poverty rate over the period 1993-2006 (in percent)



Source: Authors calculations using VHLSS in 1993, 1998, 2002, 2004, and 2006.

Figure 2: International remittances in Vietnam over time (in 2001 prices)



Note: 1 USD = 15084 VND in 2001

Source: Vietnam Economy Newspapers (www.vneconomy.com.vn)

Appendix: Regressions and impact estimation results

Table A.1: Descriptive statistics for households with and without international remittances

Variables	Type	2004		2006	
		Households with remittances	Households without remittances	Households with remittances	Households without remittances
<u>Outcome and program variables</u>					
Income per capita (thousand VND)	Continuous	11052.6 [500.1]	5325.7 [107.6]	11281.8 [507.9]	6509.8 [125.4]
Expenditure per capita (thousand VND)	Continuous	7984.8 [331.2]	4057.2 [71.4]	7445.4 [289.4]	4666.7 [81.1]
Expenditure per capita on fixed-assets (thousand VND)	Continuous	240.1 [89.4]	312.5 [37.2]	465.7 [158.7]	269.7 [24.8]
Expenditure per capita on housing and land (thousand VND)	Continuous	1477.6 [265.2]	774.1 [71.2]	1581.9 [315.4]	878.5 [87.7]
International remittances per capita (thousand VND)	Continuous	4042.1 [594.6]		4691.7 [818.6]	
<u>Labor variables</u>					
Members engaged in productive activities/total household members older than 14	Continuous	0.652 [0.013]	0.804 [0.006]	0.654 [0.012]	0.784 [0.004]
Number of household members engaged in productive activities	Discrete	2.457 [0.096]	2.692 [0.030]	2.611 [0.098]	2.774 [0.032]
Annual working hours per capita	Continuous	993.0 [30.1]	1013.0 [9.7]	1014.6 [31.2]	1049.8 [10.4]
Annual working hours per household member engaged in productive activities	Continuous	1985.7 [47.6]	1830.7 [17.8]	1978.1 [43.6]	1829.1 [14.3]
<u>Control variables</u>					
<u>Household variables</u>					
Ratio of members younger than 16 to total household members	Continuous	0.2390 [0.0136]	0.2683 [0.0041]	0.1969 [0.0121]	0.2409 [0.0039]
Ratio of members older than 60 to total household members	Continuous	0.1107 [0.0109]	0.0937 [0.0030]	0.1223 [0.0110]	0.0973 [0.0028]
Household size	Discrete	5.0762 [0.1659]	4.8768 [0.0406]	4.8805 [0.1142]	4.9183 [0.0466]
Household size squared	Discrete	29.7 [2.2]	26.9 [0.6]	26.5 [1.3]	27.6 [0.7]
Ratio of members with technical degree to total household members	Continuous	0.0885 [0.0112]	0.0573 [0.0029]	0.0838 [0.0118]	0.0651 [0.0028]
Ratio of members with post secondary to total household members	Continuous	0.0624 [0.0103]	0.0258 [0.0022]	0.0546 [0.0101]	0.0310 [0.0024]
Area of annual crop land per capita (m2)	Continuous	510.8 [72.2]	709.6 [28.1]	437.4 [58.6]	763.6 [33.2]
Area of perennial crop land per capita (m2)	Continuous	290.1 [141.5]	208.2 [17.9]	169.7 [35.8]	243.4 [19.7]
Forestry land per capita (m2)	Continuous	37.6 [26.2]	224.0 [39.9]	108.9 [45.1]	279.3 [51.0]
Aquaculture water surface per capita (m2)	Continuous	32.7 [15.9]	56.8 [9.3]	75.4 [39.5]	65.4 [12.2]
<u>Commune variables</u>					
Road to village (yes = 1)	Continuous	0.9456 [0.0145]	0.8509 [0.0099]	0.9131 [0.0211]	0.9049 [0.0079]
Distance to nearest daily market (km)	Continuous	0.9565 [0.1818]	2.2521 [0.1380]	1.0502 [0.1773]	2.4313 [0.1723]
<u>Regional variables</u>					
Household in Red River Delta	Binary	0.1786 [0.0281]	0.2116 [0.0114]	0.1405 [0.0244]	0.2149 [0.0115]
Household in North East	Binary	0.0323 [0.0102]	0.1239 [0.0085]	0.0862 [0.0177]	0.1201 [0.0084]
Household in North West	Binary	0.0063 [0.0045]	0.0345 [0.0046]	0.0091 [0.0057]	0.0345 [0.0046]

Variables	Type	2004		2006	
		Households with remittances	Households without remittances	Households with remittances	Households without remittances
Household in North Central Coast	Binary	0.1479 [0.0280]	0.1383 [0.0108]	0.1310 [0.0257]	0.1397 [0.0110]
Household in South Central Coast	Binary	0.0701 [0.0164]	0.0880 [0.0075]	0.1034 [0.0226]	0.0854 [0.0074]
Household in Central Highlands	Binary	0.0408 [0.0162]	0.0645 [0.0072]	0.0293 [0.0120]	0.0656 [0.0074]
Household in North East South	Binary	0.3192 [0.0415]	0.1374 [0.0108]	0.2658 [0.0395]	0.1406 [0.0111]
Household in Mekong River Delta	Binary	0.2048 [0.0302]	0.2017 [0.0110]	0.2347 [0.0289]	0.1993 [0.0109]
Household in Living in urban areas	Binary	0.4646 [0.0403]	0.2370 [0.0121]	0.4171 [0.0378]	0.2395 [0.0124]
Observations		563	8625	584	8605

Standard errors in parentheses.
Source: Estimation from VHLSSs 2004-2006.

Table A.2: Impact of remittances on per capita income

Explanatory variables	Random effect (no sampling weights)	Fixed-effect (no sampling weights)	Fixed-effect (sampling weights and cluster correlation)	Random effect (no sampling weights)	Fixed-effect (no sampling weights)	Fixed-effect (sampling weights and cluster correlation)
International remittances (thousand VND)	0.917*** [0.021]	0.853*** [0.024]	0.849*** [0.041]	0.896*** [0.019]	0.848*** [0.023]	0.848*** [0.043]
Members younger than 16/ total household members				-1849.669*** [317.177]	-744.764 [592.755]	-448.3 [712.882]
Members older than 60/ total household members				-2020.407*** [275.009]	-1446.877** [644.009]	-1604.552* [927.439]
Household size				-687.284*** [115.694]	-1140.166*** [197.594]	-1312.333*** [220.586]
Household size squared				30.233*** [10.292]	64.304*** [17.162]	79.102*** [18.724]
Members with technical degree/ total members				5398.712*** [351.413]	2377.630*** [510.939]	2749.986*** [740.022]
Members with post secondary degree/ total members				11452.856*** [518.597]	2970.618*** [942.386]	3091.188* [1655.836]
Area of annual crop land per capita (m2)				0.579*** [0.035]	0.589*** [0.059]	0.622*** [0.144]
Area of perennial crop land per capita (m2)				0.420*** [0.043]	-0.069 [0.063]	-0.131 [0.192]
Forestry land per capita (m2)				0.036 [0.024]	0.033 [0.034]	0.033 [0.062]
Area of aquaculture water surface per capita (m2)				0.639*** [0.088]	0.320*** [0.118]	0.310** [0.126]
Road to village (yes = 1)				357.211** [157.162]	393.357** [200.113]	552.909** [234.068]
Distance to nearest daily market (km)				-29.269*** [8.982]	-7.937 [11.123]	-8.394 [5.629]
Red River Delta	Base-omitted					
North East				-554.983** [225.195]		
North West				-1817.819*** [349.823]		
North Central Coast				-987.195*** [238.329]		
South Central Coast				-284.653 [255.609]		
Central Highlands				-821.533*** [311.587]		
North East South				1373.413*** [240.520]		
Mekong River Delta				294.476 [210.262]		
Urban				2401.531*** [210.365]		
Time effect (2006 variable)	1272.601*** [74.338]	1276.351*** [74.227]	1240.674*** [84.223]	1041.546*** [74.567]	1127.202*** [75.390]	1086.619*** [81.476]
Constant	5469.512*** [86.716]	5485.500*** [52.821]	5756.272*** [44.378]	6670.533*** [373.428]	8511.186*** [576.197]	9023.166*** [651.007]
Observations	8432	8432	8432	8432	8432	8432
Number of i	4216	4216	4216	4216	4216	4216
R-squared	0.17	0.17	0.17	0.39	0.25	0.24
Hausman test χ^2 (prob)	30.0 (0.000)			194.5(0.00)		

Standard errors in parentheses.

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

Source: Estimation from panel data VHLSSs 2004-2006.

Table A.3: Impact of remittances on per capita expenditure

Explanatory variables	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
International remittances (thousand VND)	0.161*** [0.012]	0.084*** [0.013]	0.077** [0.031]	0.166*** [0.011]	0.080*** [0.013]	0.077*** [0.029]
Members younger than 16/ total household members				-1751.376*** [176.039]	-653.115** [323.282]	-587.531* [346.572]
Members older than 60 / total household members				-917.851*** [152.759]	-892.519** [351.235]	-832.818 [651.192]
Household size				-596.769*** [64.184]	-973.662*** [107.765]	-1139.451*** [167.845]
Household size squared				27.810*** [5.709]	51.371*** [9.360]	65.656*** [15.224]
Members with technical degree /total members				3234.433*** [194.720]	903.029*** [278.660]	923.699** [420.860]
Members with post secondary degree/ total members				8450.103*** [287.800]	1480.861*** [513.966]	1,447.67 [1054.883]
Area of annual crop land per capita (m2)				0.107*** [0.020]	0.102*** [0.032]	0.094*** [0.025]
Area of perennial crop land per capita (m2)				0.151*** [0.024]	0.110*** [0.034]	0.112*** [0.035]
Forestry land per capita (m2)				-0.008 [0.013]	-0.026 [0.019]	-0.033*** [0.010]
Area of aquaculture water surface per capita (m2)				0.139*** [0.049]	0.011 [0.064]	0.013 [0.065]
Road to village (yes = 1)				25.578 [86.985]	-3.501 [109.139]	73.475 [132.414]
Distance to nearest daily market (km)				-11.793** [4.970]	-2.211 [6.066]	-3.582 [3.269]
Red River Delta	Base-omitted					
North East				-710.320*** [125.288]		
North West				-1176.680*** [194.597]		
North Central Coast				-683.058*** [132.610]		
South Central Coast				-124.728 [142.225]		
Central Highlands				-580.157*** [173.332]		
North East South				1154.754*** [133.819]		
Mekong River Delta				107.106 [116.963]		
Urban				2193.406*** [116.780]		
Time effect (2006 variable)	616.732*** [40.860]	621.270*** [40.475]	615.082*** [53.511]	467.003*** [41.131]	533.584*** [41.117]	519.708*** [57.590]
Constant	4276.946*** [53.202]	4296.294*** [28.803]	4548.855*** [24.810]	5860.681*** [207.203]	7511.981*** [314.251]	8091.677*** [450.432]
Observations	8432	8432	8432	8432	8432	8432
Number of i	4216	4216	4216	4216	4216	4216
R-squared	0.05	0.04	0.04	0.43	0.16	0.15
Hausman test χ^2 (prob)		159.9 (0.000)		443.4 (0.000)		

Standard errors in parentheses.

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

Source: Estimation from panel data VHLSSs 2004-2006.

Table A.4: Regressions of the ratio of working members and the number of working members

Explanatory variables	working members/total members			working members		
	Random effect (no sampling weight)	Fixed-effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation	Fixed-effect Poisson (no sampling weight)	Random effect (no sampling weight)	Fixed-effect with sampling weight and cluster correlation
International remittances (thousand VND)	-0.000006*** [0.000001]	-0.000006*** [0.000001]	-0.000007*** [0.000002]	-0.000014*** [0.000003]	-0.000013*** [0.000004]	-0.000017*** [0.000005]
Members younger than 16/ total household members	0.392005*** [0.014255]	0.540145*** [0.027693]	0.567058*** [0.032548]	-2.353461*** [0.048023]	-1.708024*** [0.093696]	-1.567524*** [0.110482]
Members older than 60/ total household members	-0.255982*** [0.012320]	-0.257242*** [0.030087]	-0.262890*** [0.047100]	-0.730356*** [0.041473]	-0.572812*** [0.101798]	-0.560986*** [0.108241]
Household size	-0.078676*** [0.005209]	-0.098372*** [0.009231]	-0.102891*** [0.012423]	0.541307*** [0.017555]	0.531192*** [0.031233]	0.475342*** [0.063409]
Household size squared	0.004704*** [0.000464]	0.006061*** [0.000802]	0.006380*** [0.001073]	-0.001434 [0.001563]	0.001198 [0.002713]	0.006005 [0.006576]
Members with technical degree/total members	0.044635*** [0.015900]	0.096389*** [0.023870]	0.102978*** [0.027643]	0.140401*** [0.053645]	0.332328*** [0.080763]	0.350237*** [0.091373]
Members with post secondary/total members	0.017463 [0.023317]	0.260835*** [0.044027]	0.260499*** [0.053764]	0.103101 [0.078559]	0.854753*** [0.148962]	0.836195*** [0.170325]
Area of annual crop land per capita (m2)	0.000007*** [0.000002]	0.000004 [0.000003]	0.000006* [0.000003]	0.000010* [0.000005]	0.00000 [0.000009]	0.000003 [0.000010]
Area of perennial crop land per capita (m2)	0.000003 [0.000002]	0.000003 [0.000003]	0.000005* [0.000003]	0.000004 [0.000007]	0.000003 [0.000010]	0.000009 [0.000008]
Forestry land per capita (m2)	0.000001 [0.000001]	0.000001 [0.000002]	0.000001 [0.000001]	0.000007* [0.000004]	0.000007 [0.000005]	0.000007 [0.000007]
Area of aquaculture water surface per capita (m2)	0.000004 [0.000004]	0.000008 [0.000006]	0.000005 [0.000008]	0.00001 [0.000014]	0.000022 [0.000019]	0.000013 [0.000026]
Road to village (yes = 1)	0.000026 [0.007144]	0.002227 [0.009349]	0.001892 [0.010078]	0.002863 [0.024130]	-0.001004 [0.031632]	0.013625 [0.034266]
Distance to nearest daily market (km)	0.000098 [0.000409]	-0.001141** [0.000520]	-0.001336*** [0.000423]	-0.001812 [0.001381]	-0.005351*** [0.001758]	-0.006548*** [0.001896]
North East	0.032107*** [0.010025]			0.126874*** [0.033700]		
North West	0.031512** [0.015582]			0.091586* [0.052389]		
North Central Coast	-0.022212** [0.010604]			-0.121797*** [0.035645]		
South Central Coast	-0.003892 [0.011373]			-0.039766 [0.038228]		
Central Highlands	0.01318 [0.013877]			-0.052701 [0.046656]		
North East South	-0.033159*** [0.010705]			-0.132133*** [0.035987]		
Mekong River Delta	-0.012134 [0.009366]			-0.006609 [0.031489]		
Urban	-0.081426*** [0.009449]			-0.263615*** [0.031831]		
Time effect (2006 dummy)	-0.016156*** [0.003439]	-0.013672*** [0.003522]	-0.011090*** [0.003882]	-0.044927*** [0.011654]	-0.028738** [0.011917]	-0.022221* [0.012944]
Constant	0.999363*** [0.016803]	0.990560*** [0.026919]	0.988902*** [0.033991]	0.889214*** [0.056623]	0.603264*** [0.091079]	0.677731*** [0.145530]
Observations	8432	8432	8432	7998	8432	8432
Number of i	4216	4216	4216	3999	4216	4216
R-squared	0.22	0.13	0.14	0.62	0.57	0.39
Hausman test χ^2 (prob)		72.7 (0.000)		272.8 (0.000)		

Standard errors in parentheses.

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

Source: Estimation from panel data VHLSSs 2004-2006.

Table A.5: Regressions of annual working hours

Explanatory variables	Annual working hours per working member			Annual working hours per capita		
	Random effect (no sampling weights)	Fixed-effect (no sampling weights)	Fixed-effect (sampling weights and cluster correlation)	Random effect (no sampling weight)	Fixed-effect (no sampling weights)	Fixed-effect (sampling weights and cluster correlation)
International remittances (thousand VND)	-0.0115*** [0.0019]	-0.0109*** [0.0024]	-0.0110** [0.0045]	-0.0068** [0.0027]	-0.0055 [0.0035]	-0.0023 [0.0065]
Members younger than 16/ total household members	-840.5761*** [30.9290]	-637.4136*** [60.8238]	-612.3838*** [62.2531]	126.7249*** [42.7032]	17.7247 [89.1169]	-16.5051 [92.7447]
Members older than 60/ total household members	-692.9007*** [26.6990]	-615.2529*** [66.0831]	-643.0128*** [115.9812]	-722.4424*** [36.6304]	-591.9096*** [96.8226]	-668.4195*** [148.3619]
Household size	-64.3343*** [11.3086]	-77.4442*** [20.2755]	-82.7503*** [27.8351]	134.2960*** [15.6676]	128.6281*** [29.7070]	145.3145*** [33.4032]
Household size squared	2.9546*** [1.0067]	3.9353** [1.7610]	4.6391** [2.3511]	-11.2184*** [1.3961]	-10.0354*** [2.5802]	-10.9687*** [2.7208]
Members with technical degree/total members	106.1335*** [34.5807]	186.4422*** [52.4285]	195.8052*** [58.8290]	68.2896 [48.3976]	77.6263 [76.8164]	63.1636 [74.3786]
Members with post secondary/total members	144.966*** [50.5980]	621.331*** [96.7001]	587.845*** [118.6326]	111.616 [69.9148]	366.885*** [141.6816]	269.328 [166.6653]
Area of annual crop land per capita (m2)	-0.0037 [0.0035]	-0.0013 [0.0061]	0.0001 [0.0074]	-0.0148*** [0.0048]	0.0009 [0.0089]	0.003 [0.0096]
Area of perennial crop land per capita (m2)	-0.0041 [0.0043]	0.0041 [0.0065]	0.0068 [0.0061]	-0.0062 [0.0060]	0.0067 [0.0095]	0.0088 [0.0094]
Forestry land per capita (m2)	-0.0006 [0.0023]	0.0019 [0.0035]	0.004 [0.0040]	-0.0058* [0.0033]	-0.003 [0.0051]	0.0003 [0.0084]
Area of aquaculture water surface per capita (m2)	0.0037 [0.0087]	0.0256** [0.0121]	0.0207 [0.0187]	0.0008 [0.0123]	0.0468*** [0.0177]	0.0397** [0.0199]
Road to village (yes = 1)	32.2659** [15.5647]	27.4813 [20.5340]	30.0836 [21.2196]	63.0966*** [21.9999]	56.6440* [30.0857]	55.3039* [31.6430]
Distance to nearest daily market (km)	-1.0156 [0.8911]	-1.2624 [1.1414]	-1.0739 [1.4364]	-1.554 [1.2630]	1.1297 [1.6723]	1.7424 [2.0353]
North East	71.1442*** [21.6774]			47.1721 [29.3908]		
North West	0.0205 [33.7013]			-41.2948 [45.7492]		
North Central Coast	-34.4369 [22.9265]			-1.3202 [31.0523]		
South Central Coast	-7.6895 [24.5881]			18.1579 [33.3017]		
Central Highlands	-6.9438 [30.0125]			-20.608 [40.7286]		
North East South	72.9059*** [23.1476]			187.3539*** [31.3731]		
Mekong River Delta	-74.4765*** [20.2564]			-128.4896*** [27.4979]		
Urban	120.5362*** [20.4997]			414.8475*** [28.3175]		
Time effect (2006 variable)	8.8296 [7.5328]	10.4994 [7.7359]	11.2493 [9.3207]	33.5535*** [11.0055]	25.9731** [11.3344]	21.4611 [13.7098]
Constant	1485.59*** [36.4743]	1469.28*** [59.1247]	1472.23*** [81.8643]	1343.03*** [50.5076]	1425.39*** [86.6274]	1407.75*** [98.4460]
Observations	8432	8432	8432	8432	8432	8432
Number of i	4216	4216	4216	4216	4216	4216
R-squared	0.21	0.17	0.17	0.16	0.08	0.08
Hausman test χ^2 (prob)		48.8(0.000)		89.3(0.000)		

Standard errors in parentheses.

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

Source: Estimation from panel data VHLSSs 2004-2006.