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Is the Emerging Nonfarm Market Economy the Route Out of Poverty in Vietnam?

Dominique van de Walle
Dorothyjean Cratty

Abstract

Are the household characteristics that are good for transition to a more diversified market-oriented development process in Vietnam also important for reducing poverty? Or are there tradeoffs? The determinants of both poverty incidence and participation in rural off-farm activities are modeled as functions of household and community characteristics using comprehensive national household surveys for 1993 and 1998. Despite some common causative factors, such as education and region of residence, the processes determining poverty and inhibiting diversification are clearly not the same. Participation in the emerging rural nonfarm market economy will be the route out of poverty for some, but certainly not all, of Vietnam's poor.

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Dominique van de Walle

Development Research Group

World Bank

1818 H St, N.W., Washington, DC 20433

dvandewalle@worldbank.org

Dorothyjean Cratty

Development Research Group

World Bank

dcratty@worldbank.org

1   Introduction

Agriculture has been central to the strong growth and poverty reduction experienced by Vietnam since it adopted a comprehensive reform program of transition from planned to market economy in 1986. The de-collectivization of land, reducing barriers to production and freeing up the agricultural terms of trade directly benefited the bulk of Vietnam's population and its poor whose livelihoods were closely linked to small-scale subsistence agriculture in the rural sector (Green and Vokes 1997, Benjamin and Brandt 2002). However, the gains from correcting previous policy biases, notably from the terms of trade, are one-off gains. There is concern that in the future, agriculture will not be sufficient to sustain a rapidly increasing population. In many parts of what is one of the most densely populated countries in the world, land parcels are small and fragmented. There is further concern about rising landlessness and increased labor saving mechanization in certain regions (Lam 2001, World Bank 1998). Vietnam's agricultural exports, which are behind much of the recent growth in agriculture, are also facing less favorable global conditions (Goletti and Minot 1997). Thus, although opportunities for productivity gains still exist, there is general pessimism about agriculture's employment generation possibilities in the longer term (World Bank 1998). Indeed, it is widely assumed that increased participation in rural off-farm development and a tightening of rural labor markets are going to be critical for the country's growth, raising living standards and reducing poverty.

However, there are two quite different scenarios for how the transition to a more diversified market economy in Vietnam will affect poverty. By one view, the transition will engender dynamic, broad-based, increasingly diversified income and employment growth in which the rural poor will fully participate. An opposing, pessimistic, view is that the poor are badly positioned, locationally and otherwise, to diversify from subsistence farming and partake in peasant entrepreneurship, and will be largely bypassed by the benefits of the transition to a more diversified market economy. Those well placed to take advantage of the new opportunities get richer but the poor gain little. These two scenarios have radically different implications for policy. Clearly, the degree to which diversification from farming and escaping poverty are similarly determined is key to the degree to which supporting rural off-farm diversification and market structures will also resolve the poverty problem.

However, it is difficult to establish a causal link between the emergence of a more diversified market economy and the reduction in poverty. While the literature on the importance of rural off-farm economic activity to development often points to a close association with poverty reduction (Lanjouw and Lanjouw 2001, Ellis 1998), there has been little analytical work on their joint determinants. One strand of the literature has examined living standards as a

function of access to off-farm income sources. Another has looked at income diversification and entrepreneurship as a function of living standards including liquidity constraints. (The literature is reviewed in Ellis, 1998. We discuss the main issues relevant to the present paper as they arise later.) However, the direction of causality probably runs both ways.

In examining whether the poor will directly benefit from the transition to a more diversified rural economy this paper adopts a different approach. Recognizing the simultaneity and difficulties of identification, it tests instead for common causative factors, whereby participation in off-farm income earning activities and poverty are jointly determined by a set of household and community characteristics. By looking at these reduced form relationships one can distinguish variables that share common causation — both increasing rural non-agricultural activities and living standards, as well as their growth over time — from those that imply tradeoffs.

This study examines conditions near the beginning of the reform period, as well as changes since, to try to understand the association between poverty and household participation in the emerging off-farm market sector.1 The paper asks whether the same factors that promote such participation tend to reduce rural poverty in the near term. In doing so, the paper attempts to understand the relative importance of household specific versus geographic constraints on rural development in a transition economy.

The next section introduces the data and examines some simple tabulations and correlations to see what they reveal about poverty and diversification in the cross-section and over time. Section 3 discusses the factors that can be expected to affect participation in off-farm income generating activities both in theory and in the Vietnam setting, and presents the empirical model. Section 4 presents the results. The final section offers some conclusions.

2   Rural poverty and off-farm income diversification in Vietnam

In common with much past work on Vietnam, our analysis is based on data from the 1992/93 and 1997/98 Vietnam Living Standards Surveys (VLSS). These are comparable, nationally representative, high-quality, integrated household-level consumption surveys covering the post-reform period. They collect comprehensive information on consumption and income and their sources. The surveys collected information on individuals in 4800 and 6000 households in 1992/93 and 1997/98 respectively, as well as on the communities in which they reside. In addition, most households from the earlier survey were re-sampled in 1997/98 so that a panel of

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[1] We define off/non-farm to include any gainful activities off the family farm including farm wage labor, manufacturing, agro-processing, trade and services.

4308 households can be formed. In this study, we will focus on the 1992/93 rural sample of 3840 households, make comparisons with the 4382 rural households in the 1997/98 data base, as well as examine changes in outcomes over time using the panel of 3496 rural households.2

The welfare indicator used throughout the analysis is real household consumption expenditures per person.3 As is common in underdeveloped rural settings, prices vary spatially. Expenditures are deflated regionally to allow for spatial cost-of-living differentials and adjusted for monthly variation in prices over the year of the survey. Finally, to facilitate comparison, expenditures are expressed in real January of 1998 national prices.

While still high in Vietnam's rural areas, poverty has decreased significantly over the 1990s. Poverty incidence percentages for 1992/93 and 1997/98 are presented in Tables 1 and 2 by region and by household income source mix — the range of primary and secondary economic activities of all working members.4 The percent of the rural population consuming less than the poverty line dropped from 66 in 1992/93 to 45 in 1997/98. There is wide variation across regions, as can be seen in the bottom rows of the two tables. In 1997/98, the headcount index ranges from 13 percent in the South East (the rural area contiguous to Ho Chi Minh City) to 64 percent in the Northern Uplands.

A classification of all rural individuals according to their household's employment mix reveals that in both periods, farm-only households exhibit the highest overall incidence of poverty nationally (75% in 1992/93 and 52% in 1997/98). They also represent the largest group in 1993 (30% of the rural population) and the second largest in 1998 at 28 percent, just behind the 30 percent who combined farm with wage labor activities. The concentration of the population in farm-only households declines as living standards rise. By far the lowest poverty is among households whose income stems uniquely from off-farm self-employment and wage labor.

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[2] We apply expansion factors to the 1997/98 data but not to the 1992/93 survey which is self-weighted. The last implies that there are no readymade weights for use with the panel households. Separately we tested for panel attrition bias following Fitzgerald et al.(1998). A dummy variable for whether a household dropped out was regressed on household characteristics and each 1992/93 level dependent variable individually. Tests of the coefficients on the latter indicate that the panel can be used without adjustment for bias due to attrition. Details on survey contents, implementation and processing are given in World Bank (1995 and 2000).

[3] This includes the value of consumption from own production and imputed expenditures on housing (World Bank 1995 and 2000).

[4] Poverty incidence figures are based on a poverty line constructed using the 'cost of basic needs' methodology (Ravallion 1994), and detailed in Glewwe et al. (2000). Vietnam is commonly divided into seven regions. The Northern Uplands, Red River Delta, and the North Central Coast form what used to be North Vietnam; the Central Highlands, Central Coast, South East, and Mekong Delta comprise the South.

Indeed, among all households who do at least some farming (around 95% of the rural population in 1992/93 and 94% in 1997/98), 'farm-only' are the poorest followed first by 'farm and wage' and then by 'farm, wage and self-employment outside of agriculture,' and lastly 'farm and self-employment' with the lowest poverty. This is robust to the choice of poverty line over a wide range in both years.5 This pattern generally holds true across regions as well, in that 'farm only' or 'farm and labor' households have the highest poverty rates and, with the exception of the Mekong Delta, non-farming households have some of the lowest poverty rates.

These comparisons suggest a process whereby some of the very poorest cultivating households achieve higher living standards by supplementing farm incomes with casual wage work.6 Adding some off-farm self-employment helps lift living standards further; and eventually, it becomes possible to drop all wage work and focus energies on farm and off-farm self-employment. The data suggest that there are other determinants to poverty, but that a household's income sources have a clear bearing on the standard of living in Vietnam's rural areas.

In summary, farm-only households are still nationally both the poorest and the most common household type in rural Vietnam. This stylized fact has not altered between 1993 and 1998. The cross-sectional data suggest a strong association between poverty and lack of diversification into wage and self-employment activities in both years.7 Taking the argument further, these data might be taken to suggest a process whereby diversification of income sources out of farming is causally associated with a fall in poverty. This could lead to considerable optimism that the rural transition to a more diversified market economy will be a driving force for poverty reduction.

Is such a "model" of how poverty might be reduced valid? While the cross-section correlation is suggestive, the observed relationship between poverty reduction and diversification of income sources may be a spurious one, reflecting latent heterogeneity. For example, there may be some omitted third variable that is correlated with both variables. Obvious candidates include

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5 We tested for first order dominance (FOD) by plotting the cumulative distribution functions (CDF) for each type of household. The only exception to FOD was in 1997/98 when the 'farm only' and 'farm and wage' CDFs overlap at an expenditure level equal to about one and a third times the poverty line.

6 A number of empirical studies find off-farm activities to be most important to the poorest and richest. For example, Hazell and Haggblade (1990) on India. The literature makes a useful distinction between low productivity, off-farm work of last resort, and dynamic, high productivity activities (Lanjouw and Lanjouw 2001, Ellis 1998).

7 The same is found by Vijverberg and Haughton (2002) using the full (rural and urban) VLSS samples.

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entrepreneurial ability or access to credit through social networks. Clearly people with these attributes are both less likely to be poor and more likely to have diversified incomes.

One way to check whether the cross-sectional correlation is spurious is to examine whether that relationship holds over time for the panel. In Table 3 we classify panel households into a four by four matrix according to what happened to their poverty and 'diversification' statuses over time. Note that, here we define a household as being 'diversified' if it engages in at least some nonagricultural self-employment (we discuss this further below). Thus each household is categorized on the one hand as having stayed or become poor, or having stayed or become non-poor, and on the other as having stayed or become un-diversified, or having stayed or become diversified, between 1992/93 and 1997/98.

The first striking thing to note is that although 15 percent of panel households became diversified between 1992/93 and 1997/98, an equal percentage of households became un-diversified during the same period. The panel data indicate no net increase in the percentage of households with nonagricultural self-employment during the transition years framed by the surveys. 45 percent stayed un-diversified in both years.

Turning now to the 30% who escaped poverty, we find that the majority (45%) remained un-diversified, 14% actually became un-diversified and only 18% became diversified. Similarly, of those households who became diversified, the same percentage stayed or became poor as escaped poverty (36%). There is evidence of considerable churning among households. But, it is plain from Table 3 that there is no correlation in the longitudinal data. Diversification into non-farm activities appears to have played no role in the substantial reduction in poverty during this period.

As noted, Table 3 omits wage labor work and focuses on off-farm self-employment. While there are some high paying wage occupations, resorting to casual wage labor is often considered a sign of desperation for farm households, so that including it may obscure the association between diversification and escaping poverty. However, when we redefine being diversified as either participating in "wage labor" only or participating in either wage labor or off-farm self-employment and reconfigure the matrix, the findings are qualitatively the same for both.

The static and longitudinal pictures are not in accordance. The rest of the paper attempts to better understand the factors underlying this finding. It examines which observed characteristics create this association in the static picture, and whether the factors conducive to escaping poverty are also conducive to higher levels of off-farm income diversification in the initial period. It also focuses on what happened over time, and whether the initial conditions that

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influence growth in consumption are the same as those factors that are associated with rising participation in rural non-agricultural self employment over time.

We tackle these questions by examining the household and geographic determinants of living standards and of participation in non-farm income generating activities in the initial period, as well as their subsequent growth. As discussed, engaging in secondary labor activities may not be an ideal measure of the ability to partake in market activities newly presented by the transition. Thus, the analysis below focuses on two measures of diversification: whether or not the household engages in off-farm self-employment activities and the share of hours worked in off-farm self-employment in total hours worked in income-generating activities by the household.

3 Explaining rural poverty and off-farm income diversification

There is a large literature looking at the determinants of off-farm rural diversification and its relationship with poverty. However, concerns about endogeneity of diversification to poverty loom large and are largely un-addressed. For example, one of the central themes of the literature has been whether diversification of income sources is a route out of poverty or a reflection of poverty. As Reardon et al. (1992) note, both theory and empirical evidence are ambiguous about the effects of household land and non-land wealth on income source diversification behavior. Some farm households may be 'pushed' into non-farm activities in their struggle to survive, while others may be 'pulled' into them by their desire to accumulate (Hart 1994). In both the pull and push cases, the extent of diversification is endogenous to living standards. This clouds inferences about causality, with implications for how to test this. One study tests for simultaneity by assuming a recursive system whereby diversification is pre-determined to income generation (Reardon et al. 1992). It tests this using a Seemingly Unrelated Regressions (SUR) system to estimate the correlation between the error terms. However, this is only valid if diversification is exogenous to income generation, since a zero correlation is equivalent to exogeneity in a recursive system. Yet, this is exactly what we wish to test.

Similarly, there is a literature on the determinants of entrepreneurship, emphasizing the role of the lack of wealth as a determinant of access to credit. (For a recent example and references, see Paulson and Townsend 2000). Here too there are endogeneity concerns, given that the observed levels of wealth in the data (as the key determinant of liquidity constraints) are

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endogenous to the composition of economic activity, including prospects of a farm household diversifying into new off-farm activities.[8]

One approach to identifying the structural relationships might be to think of a two-stage model, where stage 1 models the household's choice of whether or not to diversify, and stage 2 determines income conditional on diversification and correcting for sample selectivity bias. Another approach might be a switching regression model. With valid instrumental variables one could identify the structural relationships.

However, the exclusion restrictions required for these approaches are difficult to accept on a priori grounds. One requires a variable that influences a household's economic welfare but does not influence its participation in non-farm activities. Given the pervasive market imperfections in this setting (and consequent non-separabilities between consumption and production decisions) such an exclusion restriction would seem far-fetched.

We take a different approach by looking instead at the reduced form relationships and testing for common causality in the determinants of both the poverty status of rural households and their participation in off-farm self-employment activities. "Common causation" is identified by exogenous explanatory variables having the same sign in regressions for both escaping poverty and diversifying. A trade-off is indicated by opposing signs. This method cannot answer all the questions one might want to ask, but it can address the central question posed here of whether common covariates underlie poverty reduction and diversification into non-farm market activities.

3.1   Factors influencing participation in off-farm self-employment activities

Orientation toward off-farm self-employment is likely to be influenced by historical factors, endowments, and the development of infrastructure and information networks.[9] In contrast to China, pre-reform Vietnam did not encourage rural industrialization. Nor therefore did the institutional structures exist from which rural off-farm enterprises could be nurtured and launched once markets liberalized (O'Connor 1998). Although recent economic reforms have undoubtedly spurred some income source diversification and greater off-farm market participation, state policy post-reform — such as in terms of access to credit — has tended to

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[8] An approach to avoiding this problem is suggested by Mesnard and Ravallion (2000) who study the activity choices of return migrants in Tunisia.

[9] Aspects of the communist legacy that tend to slow down transition to the market include the lack of market skills, unsympathetic institutional setups and a misallocation of productive capacity (Murrell and Wang 1993). Also see de Vylder (1995).

favor SOEs and urban areas (O'Connor 1998, Ronnas 1993 and 1998). Indeed, the VLSSs show that the non-farm sector grew considerably more in urban than in rural areas (Vijverberg and Haughton 2002).

Mobility remains fairly restricted (UNDP 1998).[10] There is temporary migration of individuals seeking employment, but households tend to stay put, fearing the risk of loosing their land and the only safety net available — namely that conferred by the local community (van de Walle 1999).

Other important constraints to off-farm diversification remain. The underdeveloped institutional environment in rural areas continues to cause difficulties. In the words of de Vylder (46:1995) "...the present weaknesses of market-oriented institutions in Vietnam, and of the state as supporter of such institutions, give rise to a series of imperfections which slow down the marketization of the economy." Rural physical infrastructure saw vast improvements during the 1990s but major inadequacies remain that impede labor mobility and information flows (World Bank 1999). Irregular and scarce electricity supplies also present a handicap, though this is becoming less common over the 1990s (Ronnas 1998). The less well-off face compounded constraints — a more pronounced lack of access to credit, capital and skills — which deny them opportunities to supplement meager agricultural incomes by any means other than casual wage work if they can find it. Furthermore, the potential, but invisible, barriers to change raised by the historical and cultural legacy should not be underestimated. Particularly in the North, where the collective farming system and the communist party political apparatus were entrenched for an extended period, it may take time for households to become less dependent on self-subsistence agriculture.

Within these constraints, households make decisions about diversifying into new economic activities based on a calculation of the expected costs and benefits of participation allowing for uninsured risk. The higher the forgone income from competing activities, the transaction and transport costs, and the greater the risks of participation relative to non-participation, the less likely the household will diversify. Conversely, the higher the returns, the more likely diversification will occur.

The outcome is likely to depend on household characteristics. The household's level of education and experience will lower costs and raise the benefits of off-farm self-employment.

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[10] O'Connor (1998) stresses the little urbanization that has occurred since reforms began despite rising urban/rural income disparities, as an indication that obstacles to mobility remain decisive. The Government Statistical Office reports an urban share of 0.20 in 1988 and of 0.21 in 1995. But, unofficial sources using inter-decadal censuses estimate a somewhat higher rate of 0.3 for the late 1990s.

The empirical evidence is unanimous in finding positive effects of education (Ellis 1998). Ethnic minority and female gender status may raise transaction costs. A household's labor endowment will influence the opportunity costs of displacing labor from other essential activities as well as the risks of doing so. More labor units introduces a flexibility into work arrangements that helps raise returns. Household level assets are also key. Some will be labor saving, others labor enhancing with consequent impact on returns. Collateral or capital will ease costs associated with dealing with banks and searching for other forms of credit. Land may be particularly important. The empirical evidence on the direction of the impact of landholdings on off-farm diversification is indefinite, positive in some settings and negative in others.[11] A steady and secure source of income such as remittances will considerably lessen the risks typically associated with increased involvement in non-agricultural self-employment.

Community characteristics could well be equally important to decisions to partake in income diversification off-farm through their effects on the constraints faced. The importance of time and place is emphasized in much of the relevant literature (Ellis 1998). Access to institutional capacity (including information, markets, communications and transport) lowers the costs of acquiring information such as on where wage work is available or on the demand for goods and services. Physical infrastructure lowers transport and transaction costs. Its central role is well-covered in the literature.[12] Both physical and institutional infrastructure may enhance the potential returns for example by allowing demand to come to the village. Environmental factors such as remoteness, susceptibility to natural disasters, or difficult mountain terrain make transport more difficult and elevate the riskiness of investments in off-farm diversification.

Community level market experience and skills can substantially reduce costs for a potential new participant and matter as much or more than the household's own level of skills. Risks are also reduced when one can learn from others and benefit from possible scale economies. Returns are likely to be affected by an activity's prior presence, though the agglomeration effect may bring additional demand or may, on the contrary, result in a saturation effect.

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[11] A negative impact of land is reported for India's semi arid tropics (Walker and Ryan, 1990), Nigeria and Sierra Leone (Liedholm and Kilby, 1989) and Thailand (Rief and Cochrane 1990). A positive impact is found for Burkina Faso by Reardon et al. (1992).

[12] For evidence on the role of rural infrastructure on reducing poverty in neighboring regions of China see Jalan and Ravallion (2002). For empirical discussions on the role of infrastructure in influencing diversification see Rief and Cochrane (1990), Hazell and Roell (1983), Hazell and Haggblade (1990), Ranis et al. (1990) and Nee and Young (1991).

Nee and Young (1991) argue that peasant entrepreneurship in China has been inhibited by state intervention in the form of intense mass mobilization by local party cadres. An analogous situation may apply in Vietnam where fairly recent fiscal decentralization has led to intensive commune-level mobilization of resources for financing local needs. Along with user charges for social services, households are burdened by all sorts of locally administered taxes, fees and contributions (Tran Thi Anh and Nguyen Manh Huan 1995; Government of Vietnam-Donor Working Group 2000). Fear that these will increase even further might well discourage household off-farm diversification. The data do not allow an exploration of these issues, though commune level fixed effects should capture such effects.

3.2 Econometric models of off-farm diversification and poverty

On the basis of the above considerations, it is postulated that the measure of participation in rural off-farm activities (d_i) of the i'th household depends on a vector of household characteristics (x_i^h) and community characteristics (x_i^e) as:

$$d_i = \beta^h x_i^h + \beta^e x_i^e + \eta_i^d \qquad (1)$$

where β^h, β^e are parameters to be estimated and (η_i^d) is an i.i.d. error term. As discussed in Section 2, we shall use two indicators of off-farm income diversification: the probability of participating in any non-farm self-employment activity, and the share of hours worked in off-farm income generating activities in total hours worked by household members.

Appendix Table A1 lists the variables and provides a description and summary statistics. Unfortunately, due to various indicators being unavailable in the data and concerns with their possible endogeneity, it is not possible to include as regressors all the factors identified above as potentially determinant. Explanatory variables aiming to capture the influence of household characteristics include (log) household size and household composition; the head's gender, age, ethnicity, religion, whether Vietnamese is his or her first language, and whether born in the present location; total years of education of the head; years of primary schooling (1 to 5) and of additional years of education (secondary, middle vocational, university) of other household adults (17 and over) and of members aged under 17; "private" and allocated land assets including irrigated and non-irrigated annual crop land, perennial, forest, water surface, swidden and "other" land (bald hills, virgin, and cleared lands);[13] and dummy variables for whether the household receives a government pension or remittances from abroad.

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[13] We include land that is exogenous in that it has not been market-acquired (by bidding from the commune land fund, renting or sharecropping, the only transactions allowed at the time of the survey).

As discussed, the North and South of Vietnam differ in important respects. We tested the regressions separately for the North and South but joint F-tests for the difference in slope coefficients could not reject the null of no difference.[14] To capture differences across communities, rural commune dummy variables for 119 of the 120 communes to which the 1992/93 VLSS-surveyed and panel households belong are included. These will completely capture between-commune variation in physical and institutional infrastructure, prices, geographical and other variables that affect households' diversification and their living standards. Since much decision-making, social and infrastructural services and facilities are decentralized to the commune level in Vietnam, between-commune differentials are likely to be the most important to account for. Using commune dummies, instead of actual community level variables, has the advantage of avoiding omitted variable bias and measurement error in community characteristics.[15] The disadvantage is that the results can throw no light on which community attributes are most critical to the dependent variables. Of course, the commune dummies do not capture within commune heterogeneity.

Are the same variables relevant to living standards? Are policies that are good for developing the diversification of income sources also conducive to poverty reduction or are there tradeoffs? Some variables may matter more — or differently to poverty. For example, education may matter to both, but more so to self-employment activities than to poverty. Equally well, there may be factors that exert opposing effects. Access to land may matter positively to poverty but negatively to participation in off-farm activities. Relatedly, are different measures of welfare affected in the same way? For example, do factors that raise living standards also lower poverty? To address these questions we also estimate a measure of economic welfare or poverty as a function of the same variables. Let that measure be denoted y_i. Thus,

$$y_i = \alpha^h x_i^h + \alpha^e x_i^e + \eta_i^y \qquad (2)$$

'Allocated' land was distributed to households for long-term use at de-collectivization in or around 1988, based on household characteristics that we control for. We include it whether cultivated by the household or not. We also include private land area, comprising inherited residential land and an area of up to 5% of the commune's land distributed to households for their private use during the collective period. Both have been with the household for many years. See Ravallion and van de Walle (2001).

[14] Any difference vanishes once we control for ethnic minority households (found primarily in the North) and commune fixed effects.

[15] The commune level variables, collected in a separate commune survey, appear to have been poorly measured. Attempts at using them as explanatory variables have met with little success.

where α^h, α^e are parameters to be estimated. We use two indicators of welfare: the probability of being non-poor (i.e., consumption per person, y_i, is above the poverty line z) and log per capita expenditures.[16]

The above formulations need to be modified when the indicators of diversification and/or poverty are not continuous but binary variables. We assume that equations (1) and (2) describe the behavior of a latent continuous variable and that η_i^d and η_i^y are normally distributed. Thus, a probit model is estimated for the observed binary variables — the probability of participating in non-agricultural self-employment activities and the probability of being non-poor.

Furthermore, we use a Tobit censored regression model to explain the share of hours worked in off-farm income generating activities in total hours worked since this is zero for some households. The Tobit procedure treats these censored dependent variables as representing a latent value for share of hours which is not above a threshold of zero. The values of the regressors for these observations are included in the estimation of the effects on the share of off-farm hours in total hours worked for the full sample.

We begin by estimating and discussing these regressions on the 1992/93 sample of rural households. We then use the panel data to estimate whether the household and commune characteristics associated with higher levels of welfare and diversity in the initial period are also associated with growth in living standards and off-farm self-employment over time.

4 Results and interpretation

4.1 Initial period determinants

Table 4 summarizes the influences of household characteristics that are statistically significant (at the 5% level) in at least one level regression. A zero indicates that the coefficient is not significant. Full regression results are presented in Appendix Table A2 (excluding the commune dummies for ease of presentation), where to aid interpretation, estimated probit coefficients are transformed into the marginal impact on the probability of each specific factor, evaluated at the mean of the dependent variable and controlling for all other factors. Standard errors in all estimated regressions have been corrected for heteroscedasticity and clustering.

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[16] The interest in estimating the probit is in working out the effects of the variables on the probability of being poor. One could equally well calculate this from the residuals of the log consumption regression, assuming they are normally distributed. The probit is a more direct way of making the same calculation.

Controlling for other household and geographic attributes, there is evidence of lifecycle effects on welfare — indicated by significant coefficients on the household head's age and age squared. The marginal effect of the head being a year older is 0.002 both for log expenditures and the probability of being non-poor. The head's gender has no impact on any measure.

Ethnic minority groups are more likely to be poor than Vietnam's Kinh majority (van de Walle and Gunewardena 2001). Indeed, the results indicate that belonging to one of a number of ethnic minority groups has a significant and considerable negative impact on expenditures, the probability of escaping poverty, the share of hours worked in non-agricultural self-employment, and the probability of partaking in the latter. These are among the strongest effects of any household characteristics. Two or more of these effects are present for the Thai, Muong, Nung, and the category of 'other' minorities. Among these, being from all but the Nung ethnicity has a negative impact on both living standards and diversification. A Christian household head increases both measures of off-farm diversification significantly.

Having a locally born head is found to be significant and positive only with respect to the share of hours worked in off-farm self employment. In the absence of well-developed markets and contractual arrangements, one would expect being born locally to proxy for reputation and personal contacts which would tend to reduce the transaction costs of self-employment. However, there could also be an opposing effect stemming from latent attributes (greater capital or ability) held by recent migrants into an area.

Household size is found to be significant in all cases, with a negative effect on measures of welfare and a positive effect on the measures of participation in off-farm self-employment. Holding other characteristics constant, an additional household member reduces both the likelihood of being non-poor and log per capita expenditures by 0.06 each. It increases the share of self-employment hours (0.02), and the probability of participation in self-employment by 0.04. This tension can perhaps be explained in the following way. Absorbing an extra household member puts pressure on the family's resources while adding to the impetus to find work outside the family farm. Among demographic composition variables, a larger share of adults, male or female, has a positive influence on expenditures and on the probability of escaping poverty. A higher proportion of small children reduces per capita consumption. There is no sign of effects on off-farm income diversification.

Education is of considerable importance to both welfare and diversification into off-farm market activities. An additional year of schooling for the household head, primary and post-primary years of other household adults and post-primary school years of adolescent family members all have substantial positive impacts on welfare and on our measures of diversification.

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Predictably, the receipt of remittances from abroad has a significant positive effect on both welfare indicators. For example, it increases the likelihood of being non-poor by 0.19. Conversely and given severe credit constraints, it is at first surprising that being a recipient of remittances does not influence participation in off-farm income earning activities. However, a number of motives for migrants to remit other than investment have been identified in the literature (de la Brière et al. 2002). These include income support, insurance, and portfolio diversification that would be expected to increase welfare but not to promote diversification. A household with a pension recipient has a reduced probability of self-employment, undoubtedly because these are received primarily by the elderly or handicapped.

Access to land tends to significantly raise both welfare indicators, but has the opposite effect on diversification. Having more annual crop land, both irrigated and non-irrigated, lowers the likelihood of non-agricultural self-employment as well as the hours worked in off-farm self employment. Intuitively, it is easy to see that access to land could be ambiguous in its effect on diversification. It might raise the probability of self-employment through a wealth effect. Yet against this effect, time constraints — due, for example, to the inability to hire labor to work the land — would imply a substitution effect away from non-agricultural activities.[17] The results suggest that the substitution effect dominates.[18] The wealth effect may well be weak in Vietnam since land is not owned and at the time of the survey, land-use titles were generally not well formalized (Green and Vokes 1997, Ravallion and van de Walle 2002).

The commune fixed effects have considerable explanatory power and are highly jointly significant in each regression (test statistics are given in Table 6, bottom row). One way to gauge their explanatory power is by running the regressions without them and comparing the adjusted R^2s (or pseudo R^2s in the case of the probits). (These are given in Table A2.) A substantial decline in explanatory power is evident when the commune dummies are dropped. They account for 63 percent of the explained variance in the probability of engaging in non-agricultural self-employment, 60 percent for the share of hours devoted to self-employment, and 24 and 32 percent respectively for consumption and the probability of escaping poverty. This suggests that a household's location is a key factor in explaining its levels of diversification and welfare.

Does location affect welfare and diversification in a similar way? Significant positive correlation coefficients are found between the commune coefficients in the two sets of

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17 van de Walle (2002) documents the severe constraints on mobility and the relatively underdeveloped nature of labor markets in rural Vietnam in the early 1990s. The paper's results underline the importance of family labor endowments to agricultural production.

18 Interaction effects between land and number of adults and education were tried. None turned out to be significant.

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regressions (Table 6). The correlation is 0.32 between the share of hours in self-employment and log per capita expenditures and 0.27 between the share of hours and the probability of being non-poor. The corresponding correlation coefficients are 0.23 and 0.21 for the probability of engaging in nonagricultural self-employment. This suggests that geographic effects are congruent and is consistent with the view that there are locations where off-farm diversification comes hand in hand with reductions in poverty. It remains that households with certain attributes — such as higher levels of education and belonging to the majority ethnic group — will be better positioned to take on such market activities and raise their living standards at given locations.

The above observations point to some similarities in the factors determining income source diversification and poverty. Both share the positive effects of education. Belonging to an ethnic minority has an adverse effect on one or more indicators of each. Location appears to explain more of the variability in non-agricultural self-employment than it does differences in welfare. However, geographical effects tend to be congruent in their impact on living standards and participation in off-farm income earning activities.

Otherwise welfare and diversification appear to be determined quite differently. A larger household size reduces welfare while enhancing the likelihood of self-employment off-farm. The most striking difference is access to land and particularly, annual crop land, which is found to have a considerable negative impact on the probability of off-farm self-employment activities, but to exhibit a positive influence on welfare. Other household level variables tend to affect either welfare or market participation but to be inconsequential to the other.

Of note is the large idiosyncratic element in all four regressions, with 52 to 77% of the variance left unexplained (Table A2). The unexplained variance is due to omitted household and/or sub-commune community factors. Omitted, idiosyncratic, or micro-commune (lower than the commune level) factors appear to be important, though measurement error in the dependent variable may also account for some.

4.2   *Changes over time*

Next we turn to how these same household and locational characteristics jointly influenced living standards and income diversification over time. We estimate the change between 1993 and 1998 in our two continuous variables — namely the log of per capita consumption and the self-employment share of total hours worked. In addition, we run probits to explain escaping poverty and becoming diversified by 1998 on the 1992/93 sub-samples of those who were poor and un-diversified, respectively, in the initial period. All regressions are estimated on the panel and reported in the Appendix (Table A3).

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Table 5 (analogously to Table 4) presents the marginal effects of household characteristics that are significant at the 5% level. Few initial characteristics have much explanatory power for changes in consumption. An extra household member, a larger share of children aged six and under and having a H'Mong ethnicity head, all have positive effects on consumption growth. In contrast, greater amounts of irrigated and non-irrigated annual land were associated with a lower rate of growth. Commune effects are jointly significant, and a comparison of the R^2s with and without the commune fixed effects shows a drop from 0.21 to 0.08.

Table 5 also gives the significant predictors of the change in self-employment hours in total hours worked by households.[19] We find negative impacts of having a head from the Thai or Dao ethnic groups, and positive impacts of a larger share of male adults and of small children, of primary school years of adults other than the head, and of having more water surface land. Post-primary school years of other adults has a negative impact, as does cultivating swidden land. Thus, the only household characteristic that has a significant impact on both the growth in consumption and the share of hours worked in self-employment is the share of young children. This presumably identifies households who are past the procreation stage of the lifecycle. No other non-geographic variable affected both the growth in consumption and diversification the same way.[20]

The correlation between the commune coefficients in the consumption growth and income diversification regressions is positive in the change regressions (0.20), just as we found in the level regressions. Geographic effects are clearly congruent between household welfare and diversification, both at one date and over time.

Interestingly, every significant effect in the consumption growth regression is of the opposite sign to that found for the corresponding level equation. Households with worse initial characteristics tended to see higher subsequent expenditure growth rates. This pattern also holds for geographic characteristics. We find negative correlations between the coefficients on the geographic dummy variables in the level regression for log consumption and those for growth over time. Controlling for household characteristics, communes with higher initial consumption levels, tend to have lower subsequent growth rates. We find the latter to also hold for off-farm income diversification: geographic effects are convergent over time. By contrast, household

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[19] We use simple OLS. An ordered probit was also run with negative values represented as −1, zero values as 0, and positive changes as 1. This gave similar results.

[20] This is true also if we lower the required significance level to 10%.

characteristics that tended to raise the level of diversification tended also to increase its growth over time, indicating divergence.

While these findings are suggestive of a catching up process for living standards, we cannot discount the possibility that measurement errors might also be playing a role. For example, if for some reason (such as errors in the cost-of-living deflators) one initially over- (under-) estimates real consumptions in a commune then one will tend to under- (over-) estimate consumption growth, assuming that the error is serially uncorrelated.

Finally, we examine the factors that affected the probability that those in the sub-sample of households who were initially poor escaped poverty, and those who had no non-agricultural self-employment in 1992/93, became diversified. We find that a number of initial period household characteristics helped or hindered both. Being headed by someone from the Tay, Thai, Muong, Nung or other ethnic group reduced a household's probability of escaping poverty and becoming diversified by 1998. On the positive side, a larger share of male adults helped both. Geographic effects were also congruent, with a correlation of the coefficients of 0.29. A household was more likely to become diversified if it had a locally born head. Access to more forest land also reduced this probability. An initially poor household was more likely to escape poverty with an older head, more schooling all round, if it received remittances from abroad and had allocated perennial and swidden land. Finally, larger household size reduced the probability of escaping poverty.

Are initial conditions that influence growth in consumption over time the same as the factors associated with rising levels of participation in rural non-agricultural self employment over time? No. With the exception of ethnic minority status which has a negative effect on both and a higher adult male share with a positive effect, the outcomes have different determinants.

5   Discussion and conclusions

The probability of being poor is appreciably lower among Vietnamese households who partake in off-farm self-employment activities. There is a clear <u>association</u> in the cross-section survey between rural diversification and standards of living. The paper has explored the extent to which this reflects common covariates in household characteristics and location.

The results suggest a far more nuanced and complex inter-linkage between rural diversification into non-agricultural market activities and living standards than is often assumed in policy discussions. The strong correlation found in the cross-sectional data vanishes when one uses panel data to track changes over time, suggesting that the cross-sectional association is driven by common correlations with other factors rather than a direct causal link.

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We have looked for variables that jointly influence both indicators of living standards and off-farm income diversification. We find some robust shared determinants. For example, the paper's results indicate the considerable common positive influence of education. Relatedly, ethnic minority status has an important negative impact on both. The commune of residence is also a common factor, influencing both types of indicators in similar ways. However, we find some other factors that have opposite effects, such as household size — negative for welfare, but positive for diversification — and land — positive for welfare, but negative for diversification. Urbanization and lower population growth reduce pressure on the land and hence reduce off-farm diversification in rural areas; but they also reduce poverty.

We can find no observable non-geographic characteristic that jointly affects consumption growth over time and rising diversification in the same way with the exception of the share of young children in household composition. Where one lives emerges as an important and robust determinant of both. These common geographic effects are probably capturing variations in institutional constraints, market development and infrastructure bottlenecks, though further research is needed to understand these effects. Developing appropriate rural infrastructure will no doubt be critical. Passable roads, transport, and permanent markets are all of likely importance. For off-farm income earning activities to thrive, information about and access to markets is going to have to be more widely available. There is a potential public role for providing public infrastructure to help create and support budding rural private enterprises.

The importance of developing and introducing more flexibility in land and labor markets is also suggested by the foregoing analysis. Many households are constrained by under-developed land and labor markets, that limit their ability to reallocate resources and time more efficiently. Markets are highly imperfect, and there is factor immobility between communes. This means that places with low initial capital have a high marginal product of that capital, and hence higher consumption growth. While places with high initial levels of capital exhibited a low marginal product of capital and low consumption growth.

Well defined land property rights and other land policies on which the government has embarked will probably help. The typical rural household has only its plot of land as insurance. Leaving that land may well result in their access right being revoked. Understandably, many are reluctant to take risks that may jeopardize that protection. Even those who diversify incomes tend to maintain their cultivation activities even when less profitable than other endeavors.

These are reasonably clear policy levers along which progress has occurred during the 1990s. However, the paper's results also suggest that such policies can be expected to have diverse impacts—they will undoubtedly help some people, but not others.

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Table 1: 1993 Incidence of rural poverty by household income source mix during last year and by region (%)

	Northern Uplands	Red River	North Central	Central Coast	Central Highlands	South East	Mekong Delta	Total
Farm only	91.5	74.5	80.2	75.3	81.8	42.5	48.3	74.8
Farm & labor only	78.6	76.3	78.7	59.6	78.6	63.8	59.5	69.7
Farm & non-agricultural self-employment only	77.1	69.5	72.9	52.9	33.6	33.3	28.2	58.6
All three	78.6	67.6	73.6	38.5	55.2	52.4	55.6	61.9
Labor &/or non-agricultural self-employment only	--	24.6	--	28.6	--	26.5	62.2	46.4
Total	84.2	71.6	76.9	59.2	70.0	45.8	51.9	66.4

Note: The population is classified by the income source mix of their households. For example, 'farm only' refers to the % of population belonging to households who derived income from farming alone during the last year. Cells are left empty when there are too few observations.
Source: 1992/93 VLSS.

Table 2: 1998 Incidence of rural poverty by household income source mix during last year and by region (%)

	Northern Uplands	Red River	North Central	Central Coast	Central Highlands	South East	Mekong Delta	Total
Farm only	78.3	43.1	53.3	54.5	46.1	6.7	33.6	52.3
Farm & labor only	60.3	43.5	60.1	51.2	68.0	17.1	53.9	50.9
Farm & non-agricultural self-employment only	48.6	32.6	45.7	22.2	32.0	4.1	27.9	35.1
All three	45.1	35.9	51.6	18.1	50.9	17.1	38.4	38.3
Labor &/or non-agricultural self-employment only	9.6	14.0	--	19.1	--	15.0	55.8	34.5
Total	63.6	38.3	52.6	41.9	52.5	13.0	42.0	45.0

Note: The population is classified by the income source mix of their households. For example, 'farm only' refers to the % of population belonging to households who derived income from farming alone during the last year. Cells are left empty when there are too few observations.
Source: 1997/98 VLSS.

Table 3: Percent of rural population by poverty and diversification status in 1993 and 1998.

	Stayed undiversified	Became undiversified	Became diversified	Stayed diversified	Total
Stayed poor	18	5	4	6	34
	54	15	13	18	100
	41	33	30	25	34
	(643)	(173)	(153)	(215)	(1184)
Became poor	2	1	1	1	5
	41	17	18	24	100
	5	6	6	5	5
	(77)	(32)	(33)	(45)	(187)
Became non-poor	13	4	5	7	30
	45	14	18	24	100
	29	27	36	29	30
	(463)	(143)	(183)	(248)	(1037)
Stayed non-poor	12	5	4	10	31
	37	17	13	33	100
	25	34	28	42	31
	(402)	(180)	(144)	(360)	(1086)
Total	45	15	15	25	100
	45	15	15	25	100
	100	100	100	100	100
	(1585)	(528)	(513)	(868)	(3494)

Note: All percents are derived from the household size -weighted panel sample. The number of observations in each cell are given in parentheses. The top figure is the individual cell's percent of the total, the next figure is the column percent within the row, and the third figure is the row percent within the column.
Source: 1992/93 and 1997/98 VLSSs.

Table 4: Marginal effects of household characteristics on measures of welfare and income diversification.

	Welfare		Income diversification	
	Determinants of log per capita expenditures (mean=14.21)	Increase in prob of escaping poverty (evaluated at mean) (mean=0.37)	Determinants of share of non-ag self employm't hours in total hours of h'hold economic activity (mean=0.15)	Increase in prob of non-ag self employm't (evaluated at mean) (mean=0.40)
head is a year older	0.002	0.002	0	0
head is born locally	0	0	0.05	0
Tay ethnicity head	0	0	-0.23	0
Thai ethnicity head	-0.19	0	-0.39	-0.31
Khome ethnicity head	-0.13	0	0	0
Muong ethnicity head	-0.17	-0.19	-0.19	0
Nung ethnicity head	0	0	-0.36	-0.30
H'Mong ethnicity head	-0.45	--	--	--
head is other ethnicity	-0.47	-0.24	-0.28	0
Christian head	0	0	0.15	0.15
extra h'hold member	-0.06	-0.06	0.02	0.04
female adult share up .10	0.02	0.05	0	0
male adult share up .10	0.03	0.06	0	0
share of children ≤ 6 up 10	-0.03	0	0	0
extra year of school for head	0.03	0.03	0.009	0.006
primary school years of other adults	0.02	0.03	0.02	0.03
post-primary school years of other adults	0.03	0.03	0.01	0
post-primary school years of members aged 11-16	0.05	0.07	0.04	0.04
receipt of pension	0	0	-0.09	-0.11
receipt of remittances	0.22	0.19	0	0
+ 1000 m² irrigated land	0.03	0.03	-0.04	-0.04
+ 1000 m² unirrigated land	0.02	0	-0.03	-0.03
+1000 m² water land	0	0.14	0	-0.03
+1000 m² perennial land	0.03	0.04	0	0

Note: When not significantly different from zero (jointly, for squared terms) at the 5% level, the coefficients are replaced by zero. Based on the regressions reported in Table A2.

Table 5: Marginal effects of household characteristics on the growth in welfare and income diversification.

	Welfare		Income diversification	
	Determinants of the change in log per capita expenditures (mean=0.34)	Increase in prob of escaping poverty in 1998 on the sub-sample of poor in 1993 (mean=0.47)	Determinants of the change in share of non-ag self employm't hours in total hours of h'hold economic activity (mean=0.006)	Increase in prob of non-ag self employment in 1998 on the sub-sample w/out non-ag self employm't in 1993 (mean=0.24)
head is a year older	0	0.003	0	0
head was born locally	0	0	0	0.06
Tay ethnicity head	0	-0.19	0	-0.15
Thai ethnicity head	0	-0 40	-0.04	-0 11
Chinese ethnicity head	0	-0 32	0	0
Khome ethnicity head	0	0.20	0	0
Muong ethnicity head	0	-0.27	0	-0 22
Nung ethnicity head	0	-0.17	0	-0.20
H'Mong ethnicity head	0.26	-0 44	0	0
Dao ethnicity head	0	0	-0.06	-0.15
head is other ethnicity	0	-0.38	0	-0.18
extra h'hold member	0.03	-0 03	0	0
male adult share up 10	0	0.04	0.02	0.002
share of children ≤ 6 up .10	0.02	0	0.03	0
extra year of school for head	0	0.03	0	0
primary school years of other adults	0	0.02	0 008	0
post-primary school years of other adults	0	0 02	-0.007	0
receipt of remittances	0	0.19	0	0
+1000 m² irrigated land	-0.01	0	0	0
+1000 m² unirrigated land	-0.01	0	0	0
+1000 m² water land	0	0	0.002	0
+1000 m² perennial land	0	0.03	0	0
+1000 m² forest land	0	0	0	-0.04
+1000 m² swidden land	0	0.02	-0.003	0

Note: When not significantly different from zero (jointly, for squared terms) at the 5% level, the coefficients are replaced by zero. Based on the regressions reported in Table A3.

Table 6: Correlations between commune effects across regressions and Chi²/ F Statistics for tests of the joint significance of the commune dummies

	log per cap expenditures '93	share of non-ag self employm't hours in '93	prob of escaping poverty '93	prob of non-ag self employm't in '93	change in log per cap expenditures 93-98	change in share of non-ag self employm't hours 93-98	poor in '93 becoming nonpoor in '98	no nase in '93 having nase in '98
log real per cap expenditures '93	1.0000							
share of non-ag self employm't hours in '93	0.3169 (0.0010)	1.0000						
prob of escaping poverty '93	0.9270 (0.0000)	0.2652 (0.0063)	1.0000					
prob of non-ag self employm't '93	0.2345 (0.0137)	0.9628 (0.0000)	0.2101 (0.0276)	1.0000				
change in log per cap expenditures 93-98	-0.3366 (0.0003)	-0.1782 (0.0689)	-0.2680 (0.0046)	-0.2119 (0.0262)	1.0000			
change in share of non-ag self employm't hours 93-98	0.1108 (0.2677)	-0.5747 (0.0000)	0.1285 (0.1980)	-0.5420 (0.0000)	0.2008 (0.0430)	1.0000		
poor in '93 becoming nonpoor in '98	0.5117 (0.0000)	0.1073 (0.2759)	0.5244 (0.0000)	0.0087 (0.9300)	0.4603 (0.0000)	0.2213 (0.0269)	1.0000	
no nase in '93 having nase in '98	0.3382 (0.0000)	0.5618 (0.0000)	0.3308 (0.0007)	0.4839 (0.0000)	-0.1560 (0.1175)	0.2878 (0.0037)	0.2878 (0.0037)	1.0000
Chi²/ F	8.91	6.11	460.90	620.44	6.23	2.76	309.94	179.24
prob > chi²/ F	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Source: 1992/93 and 1997/98 VLSSs. Significance levels are given in parentheses. The critical value for significance at the 5% level is 0.196.

Appendix Table A1: Variable definitions and summary data

Variable		Panel Sample		'93 Rural Sample	
		Mean	Std Dev	Mean	Std Dev
pcexp93	Real '93 per capita expenditure (thousands of '98 Dongs per year)	1680.2	999.9	1691 7	1028 3
nonpoor93	Household's '93 per capita expenditure is at or above poverty line	0 36	0 48	0.37	0 48
nase93	Sales from '93 nonagricultural self employment are positive	0.40	0.49	0.40	0 49
nasesh93	Share of non-ag self employment hours to h'hold's total hours worked in income earning activities in '93	0 14	0.24	0.15	0 24
pcexp98	Real '98 per capita expenditure (thousands of '98 Dongs per year)	2359.8	1451 2		
nonpoor98	Household's '98 per capita expenditure is at or above poverty line	0.61	0 49		
nase98	Sales from '98 nonagricultural self employment are positive	0.40	0.49		
nasesh98	Share of non-ag self employment hours to h'hold's total hours worked in income earning activities in '93	0.15	0.26		
north	Household resides in the North dummy			0 58	0.49
gender	Male household head dummy			0.77	0.42
age	Age of household head			44.9	14.8
num06	Share of household members that are 6 years and younger			0.15	0.17
num716	Share of household members that are children between 7 and 16 years			0.21	0 20
fadlt	Share of household members that are female adults (17 +)			0.34	0.19
madlt	Share of household members that are male adults (17 +)			0 28	0.17
hhsize	Household size			4.97	2.12
lang	Head speaks Vietnamese language dummy			0.92	0.27
bornhere	Household head born in current location dummy			0.82	0 38
relig1	Buddhist household head dummy			0.26	0 44
relig2	Christian household head dummy			0 07	0 26
relig3	Animist household head dummy			0.01	0 08
relig4	Other religion household head dummy			0.02	0.14
relig5	No religion household head dummy			0.64	0 48
ethnic1	Kinh household head dummy			0 85	0 35
ethnic2	Tay household head dummy			0.02	0.15
ethnic3	Thai household head dummy			0 01	0.10
ethnic4	Chinese household head dummy			0.004	0 06
ethnic5	Khome household head dummy			0.02	0 14
ethnic6	Muong household head dummy			0.02	0 16
ethnic7	Nung household head dummy			0.02	0 13
ethnic8	H'Mong household head dummy			0 01	0.09
ethnic9	Dao household head dummy			0.002	0 05
ethnic10	Other ethnicity household head dummy			0.03	0 18
hed	Total years of education of household head			5.93	3 97
moaed1	Years (per adult) of primary education of other household adults (17 +)			3.37	1.80
moaed2	Years (per adult) of post-primary education of other h'hold adults (17 +)			1.93	2.24
mted1	Years (per child) of primary education of household children (11-16)			1.91	2 71
mted2	Years (per child) of post-primary education of h'hold children (11-16)			0 44	0 99
pension	Household is recipient of government pension dummy			0 12	0 33
foreign	Household receives foreign remittance dummy			0 03	0 16
irrigated	Private + allocated irrigated annual crop land (m^2)			1874.8	3525 4
nonirrigated	Private + allocated non-irrigated annual crop land (m^2)			1809 2	4220 4
perennial	Private + allocated perennial land (m^2)			405.1	1636.7
forest	Forest land (m^2)			174.8	1333 0
waterland	Private + allocated water surface land (m^2)			55.0	1125.5
otherland	Other land (m^2)			272 0	2222.0
swidden	Swidden land (m^2)			467.0	1997.8

Source: Rural sub-sample of the 1992/93 VLSS and panel sample from 1992/93 and 1997/98 VLSS.

	Welfare				Income diversification			
	Log per capita expenditures		Probability of escaping poverty		Share of non-ag self employm't hours in total economic activity		Probability of non-ag self employment	
	(OLS)		(Probit)		(Tobit)		(Probit)	
Variable	Marginal effect	t-ratio	Marginal effect	z-ratio	Marginal effect	t-ratio	Marginal effect	z-ratio
gender	-0.029	-1 56	-0.037	-1 32	0 019	0.77	0.037	1.31
age	0 008	2 39	0.011	2.42	0.004	0.92	0.007	1 32
age^2	-6 35e-5	-1.93	-9.52e-5	-2.18	-5.31e-5	-1.18	-9 17e-5	-1.71
lang	0 039	0.74	0 014	0.23	0 129	1.83	0.119	1 13
born here	-0.030	-1.34	-0.024	-0.74	0.054	2.07	0.021	0.68
num 06	-0 274	-2.27	-0.165	-0 98	-0.227	-1.62	-0.210	-1.28
num716	0.098	0.86	0.238	1.49	-0 065	-0.46	-0 012	-0.08
fadlt	0 214	1.99	0.491	3.01	0.044	0.31	0.136	0.86
madlt	0.302	2.73	0.562	3.47	-0.183	-1 30	-0.023	-0.14
hhsize(log)	-0.302	-12.09	-0.336	-9 65	0 131	4 84	0 220	5.63
relig1	-0.036	-1.33	-0 032	-0 88	0 049	1 86	0.050	1 71
relig2	0 015	0.40	0.021	0.39	0.154	3.77	0.154	2.47
relig3	0 148	1.07	-0 103	-0.66	-0.109	-0.63	-0.122	-0 99
relig4	0.098	1.35	-0.013	-0.16	-0.055	-0 86	-0.061	-0 90
ethnic2	-0 039	-0.67	0.027	0 27	-0.227	-2.41	-0 170	-1 30
ethnic3	-0.192	-3.47	-0 051	-0.56	-0 391	-3.15	-0 310	-3.44
ethnic4	0.191	1.35	0.293	1.25	0.192	1.68	0 125	0 87
ethnic5	-0.129	-2.60	-0 098	-1.17	0.020	0 22	-0.023	-0.25
ethnic6	-0 166	-3 37	-0.187	-3.00	-0 188	-2 43	-0.142	-0 79
ethnic7	0.008	0 16	-0 013	-0 18	-0 356	-3.02	-0.301	-2.17
ethnic8	-0 445	-4.69	--	--	--	--	--	--
ethnic9	0.032	0.33	0.467	1 75	0.264	1.25	0 245	1.34
ethnic10	-0.475	-3.19	-0.240	-2 24	-0 282	-2 69	-0.214	-1.80
hed	0.036	5 28	0 033	3.37	0.031	4 12	0.021	2 50
hed^2	-7.84e-4	-1.74	-4 24e-4	-0 71	-0 002	-3.49	-0.001	-2.20
moaed1	0.022	3.73	0.026	2.89	0.015	2.35	0.030	4.13
moaed2	0.028	6 60	0.026	4 20	0 011	2.16	0.007	1 33
mted1	-0 006	-1 56	-0.009	-1 58	-0.008	-1.62	-0 010	-1.96
mted2	0 046	5.45	0 072	5.43	0.037	3 35	0 035	2.67
pension	0 025	1.17	0.012	0 38	-0.088	-3 15	-0 112	-3.66
foreign	0 223	4 80	0.187	4.18	0 019	0.40	-0.007	-0.12
irrigated	2.93e-5	5 10	3.07e-5	4 31	-3.94e-5	-8 29	-4.19e-5	-6.33
irrigated^2	-2.72e-10	-2 70	-2 58e-10	-1.35	5.98e-10	5.76	8 03e-10	3.96
nonirrigated	2.16e-5	5 81	1 48e-5	1.61	-3 05e-5	-7 51	-3 40e-4	-4 75
nonirrigated^2	-1.87e-10	-3.34	4.52e-10	1.22	4.48e-10	5.27	7.92e-10	3.46
perennial	3.35e-5	2.76	4.54e-5	2.53	-6.59e-6	-0 66	3 56e-16	0 30
perennial^2	-5.61e-10	-2 15	-1.02e-9	-2.52	-3.80e-11	-0.08	-4.77e-10	-0.85
forest	1.32e-5	1 51	2.64e-5	1 92	-1.24e-5	-0 75	1.61e-6	0 08
forest^2	-1.98e-10	-0.54	-2.71e-10	-0.48	8.52e-10	0.92	2.86e-10	0.25
waterland	-8.74e-6	-1.48	1.37e-4	2.12	-1.50e-5	-1 26	-2 58e-5	-1.67
waterland^2	3.89e-10	5.65	4.79e-9	2 52	-2.62e-10	-0 71	-4 17e-10	-2.91
otherland	2.11e-6	0 33	-7.94e-6	-0.91	-1.31e-5	-1 29	-1 12e-5	-0.66
otherland^2	9 23e-11	0.75	1 38e-10	0.87	1 96e-10	1.09	5.24e-10	0 92
swidden	6.39e-6	0.94	1.36e-6	0.17	-8 85e-6	-1.43	-1 07e-6	-0.15
observations	3824		3792		3802		3792	
log likelihood	--		-1675 76		--		-1973.21	
chi^2/ F	24.20		1644.90		1263.33		1180.44	
prob > chi^2	0.000		0 0000		0 0000		0.0000	
adjusted or pseudo R^2	0.4847		0 3292		0 2555		0.2302	
R^2 (no commune fixed effects)	0 3660		0.2230		0.1022		0 0850	

Note· The marginal effects of each variable on the probabilities are estimated at the mean of the dependent variables Commune fixed effects included. T-ratios are based on standard errors corrected for heteroskedasticity and clustering.

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Appendix Table A3: The determinants of changes in non-agricultural self-employment and welfare from 1993 to 1998

	Welfare				Market participation			
	Change in log per capita expenditures		Probability of poor in '93 escaping poverty in '98		Change in share of nase hours		Probability of nase in '98 for those w/o nase in '93	
Variable	Marginal effect	t-ratio	Marginal effect	z-ratio	Marginal effect	t-ratio	Marginal effect	z-ratio
gender	-0.022	-0 98	-0 028	-0 80	-0 016	-1 27	0.033	0 99
age	-6.00e-4	-0 13	0 016	2.14	-0 001	-0 44	2 57e-4	0 05
age^2	2 39e-5	0.52	-1 52e-4	-2.07	1 43e-5	0 60	-2 61e-5	-0 47
lang	0 029	0.92	0.073	1 20	-0 006	-0 32	0 038	0 72
born here	-0.011	-0.42	0 010	0 20	-0 005	-0.32	0.065	2 01
num 06	0.233	2 03	-0.114	-0.54	0 263	3.10	0 346	1 81
num716	0.174	1 55	0.206	0 98	0 152	1 83	0 060	0 32
fadlt	0 010	0 09	0.384	1.87	0.118	1 37	0.145	0 71
madlt	-0 063	-0 61	0.402	2.06	0.178	2.17	0 144	0.74
hhsize(log)	0 143	5.09	-0.157	-3.21	-0.011	-0.67	0 033	0 99
relig1	0.026	1.14	-0.059	-1.29	-0 014	-0 83	0.048	1 34
relig2	-0 062	-1 71	-0.029	-0 45	-0.041	-1 72	0 020	0 39
relig3	0 138	0 75	0.177	1 13	-0.019	-0.52	-0 053	-0 33
relig4	-0 069	-0 80	-0.159	-1 64	-0 017	-0.45	-0.022	-0 41
ethnic2	-0 058	-0.99	-0 187	-2.45	0.005	0 30	-0 152	-3 18
ethnic3	0.026	0 24	-0 400	-2 09	-0.043	-2 73	-0 114	-4 06
ethnic4	-0 080	-0.57	-0 324	-4.55	-0.071	-1 32	-0 104	-0 68
ethnic5	0 101	1 80	0 197	1.96	-0.053	-0.95	0 055	0 61
ethnic6	-0.052	-0.70	-0.270	-3 20	-0 017	-0.66	-0.216	-4 66
ethnic7	0 024	0.42	-0.170	-2.18	0.001	0 04	-0 200	-4 31
ethnic8	0.256	2 84	-0.437	-4 47	0 012	0 44	--	--
ethnic9	-0 124	-0.89	--	--	-0.062	-2.01	-0.150	-2 02
ethnic10	0.082	1.03	-0.385	-3 86	-0.052	-0 98	-0 178	-1 84
hed	-0 007	-0 85	0 037	2 99	-0.003	-0 67	0 007	0 81
hed^2	6.88e-4	1 40	-9 14e-4	-1 02	2 23e-4	0 75	-5 07e-4	-0 80
moaed1	-0 010	-1 72	0.020	1.95	0 008	2.42	0 0166	2 77
moaed2	-0.004	-0.81	0.018	2 05	-0 007	-2 58	-0 008	-1 25
mted1	0.003	0 89	0 012	1 49	-0.003	-1 11	0 004	0.63
mted2	0 016	1 54	0 025	1 03	-0 004	-0 62	0 004	0 24
pension	-0 005	-0 19	0.068	1 55	-0 015	-1 21	-0.018	-0 51
foreign	0.004	0.07	0.191	1.98	0.050	1 70	0.049	0 73
irrigated	-1 53e-5	-2.58	1.97e-5	1.30	3.81e-7	0 15	5.16e-6	0.76
irrigated^2	1 65e-10	1.51	-4 77e-10	-0 58	-5.64e-11	-1 41	-.3.61e-10	-1.50
nonirrigated	-1 24e-5	-2 77	8.06e-6	0 63	2.78e-6	1.03	-1 69e-7	-0 02
nonirrigated^2	1.70e-10	2 58	2 33e-10	0 33	-2 20e-11	-0 52	6 90e-11	0 21
perennial	-6.48e-7	-0.08	-2.46e-6	-0.06	-7.04e-6	-1 69	2 96e-06	0 29
perennial^2	2 43e-10	1.67	1 80e-8	3.20	1 25e-10	1 47	-1 86e-10	-0 88
forest	-1.54e-5	-1 87	-2 49e-5	-1 51	2 71e-6	1 09	-4 02e-5	-2 38
forest^2	2.74e-10	0 88	1 48e-9	1.82	-6.83e-11	-0 61	1 46e-09	2 18
waterland	7 01e-6	1 47	-6 11e-5	-0 33	1 60e-6	0 93	9 98e-06	0 35
waterland^2	-4 75e-10	-8.88	2 30e-7	1 33	2 15e-10	6 67	-2.44e-11	-0 03
otherland	-2.08e-6	-0.26	-1.33e-5	-0.74	1.67e-6	0.57	4 91e-06	0 31
otherland^2	-1 11e-10	-0.78	1 03e-10	0 41	-8.72e-12	-0 16	-5 45e-11	-0 08
swidden	-1.20e-6	-0.23	2 27e-5	2 65	-3.09e-6	-2.72	865e-6	1.43
observations	3479		2197		3414		2036	
log likelihood	--		-1130.82		--		-966 32	
chi^2 / F	6 97		775.75		2 51		355 00	
prob > chi^2	0.0000		0 0000		0 0000		0 0000	
adjusted or pseudo R^2	0 2068		0.2554		0.1047		0 1552	
R^2 (no commune fixed effects)	0.0776		0 1355		0 0235		0.0699	

Note. The marginal effects of each variable on the probabilities are estimated at the mean of the dependent variables. Commune fixed effects included. T-ratios are based on standard errors corrected for heteroskedasticity and clustering

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