Income Diversification and Poverty in the Northern Uplands of Vietnam

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Abbreviations

CH	Central Highlands
DARD	Department of Agriculture and Rural Development
DOLISA	Department of Labor, Invalids, and Social Affairs
GDLA	General Department for Land Administration
GDP	Gross domestic product
GIS	Geographic Information Systems
GSO	General Statistics Office
IFPRI	International Food Policy Research Institute
JBIC	Japan Bank for International Cooperation
MARD	Ministry of Agriculture and Rural Development
MOLISA	Ministry of Labor, Invalids, and Social Affairs
MRD	Mekong River Delta
NCC	North Central Coast
NIAPP	National Institute for Agricultural Planning and Projection
NU	Northern Uplands (including the Northeast and Northwest)
QSAID	Qualitative Social Assessment of Income Diversification
RRD	Red River Delta
SAM	Social Accounting Matrix
SCC	South Central Coast
SDC	Swiss Agency for Development and Cooperation
SE	Southeast (also called the Northeast South)
SID	Simpson Index of Diversity
SIDA	Swedish International Development Agency
SW	Shannon–Weaver Index of Diversity
UNDP	United Nations Development Programme
VHLSS	Vietnam Household Living Standards Survey
VLSS	Vietnam Living Standards Survey
VND	Vietnamese dong

Foreword

Urbanization and income growth within developing countries have created large markets for meat, milk, fish, fruits, and vegetables, while trade liberalization and foreign investment have connected farmers in developing countries with high-income consumers in other countries. In the first half of the 1990s, the International Food Policy Research Institute (IFPRI) carried out a series of studies on the impact of agricultural commercialization on farm income and nutrition, finding that the effects were generally positive. More recently, IFPRI research explored the "livestock revolution" and its effect on small farmers, as well as the dramatic growth in international trade in fish and seafood, in which developing countries play an increasingly important role.

This report continues IFPRI's research into high-value agriculture, examining income diversification and its contribution to poverty reduction in the Northern Uplands of Vietnam, the poorest region of the country. Three aspects of the approach used in this study merit attention. First, unlike many studies of income diversification that use cross-sectional data, this study looks at household-level changes in income sources over a period of rapid economic growth. Second, this study makes use of both qualitative and quantitative data, combining information from three nationally representative household surveys, secondary data, and surveys of farmers and local officials to better understand their perceptions of the relationship between income growth, diversification, and poverty reduction. Third, the report presents a new method for measuring the contribution of diversification into higher-value crops to income growth for different types of households.

The results indicate that rural households in the Northern Uplands have participated fully in the economic growth of Vietnam, though poverty remains high. Income growth among rural households has occurred through proportional increases in crops, livestock, and nonfarm income. Surprisingly, poor rural households have benefited largely from crop income growth. Furthermore, yield increases account for the largest share of crop income growth, particularly among the poor. Crop diversification played a relatively small role in rural income growth in the Northern Uplands, though it accounted for more than 25 percent of the crop income growth in other, more commercialized, regions. Local authorities manage a range of programs aimed at promoting new crops. Marketing problems with these new crops are common, however, suggesting the need for greater attention to marketing and profitability.

IFPRI continues to carry out research on the potential for high-value agriculture to reduce poverty in developing countries. In particular, IFPRI is examining institutional mechanisms to link farmers, processors, and buyers with the aim of helping the poor participate as producers, laborers, and consumers in rapidly growing markets for high-value agricultural commodities.

Joachim von Braun
Director General, IFPRI

Summary

Since the mid-1990s, Vietnam has sustained high rates of economic growth, reducing poverty from 58 percent in 1993 to 37 percent in 1998. Despite these gains, Vietnam is among the 30 poorest countries in the world. In the poorest region, the Northern Uplands, provincial poverty rates range from 55 to 78 percent. In recent years, government efforts to reduce rural poverty and raise rural incomes have focused on income diversification, especially into high-value crops.

In general, the Northern Upland region is hilly to mountainous, infrastructure is poor, and the population density is low. The region is less urbanized and more dependent on agriculture than any other region. A large share of the population consists of ethnic minorities. Rice is an important source of income, accounting for 46 percent of the net value of crop production, but it is less important than in the lowland regions of Vietnam.

This study addresses a number of questions about income diversification in the Northern Uplands and its contribution to poverty reduction: How much diversification is occurring, and which households are participating? How much does diversification contribute to income growth? How do farmers perceive government efforts to encourage crop diversification?

The authors analyze three types of data to gather information relevant to income diversification: (1) secondary data from the General Statistics Office of Vietnam provide evidence of the broad economic trends and differences from province to province; (2) data from three nationally representative household surveys carried out in 1992–93, 1997–98, and 2002 allow analysis of changing income patterns for different types of households; and (3) interviews with farmers and local government officials in the region, conducted in 2002 as part of a survey called the Qualitative Social Assessment of Income Diversification (QSAID), provide insights on their perceptions of diversification.

The study uses regression analysis to examine the characteristics that best explain variation in five measures of income diversification. In addition, the study decomposes income growth to assess the relative importance of yield growth, area expansion, price changes, diversification into higher-value crops, and diversification into nonfarm activities.

Regression analysis using the household survey data suggests that livelihood decisions are strongly affected by family land and labor endowments. Households with many members but small farms are more likely to have multiple income sources, a large share of nonfarm income, a higher crop value per hectare, but a smaller share of output that is marketed. Good market access facilitates larger marketed surplus and more specialization. Electrification appears to enable households to diversify into nonfarm activities. Although ethnic minorities are sometimes viewed as "traditional" and less market-oriented in Vietnam, the analysis suggests that ethnic minorities are no different from others in their livelihood choices, after taking farm size, education, market access, and other factors into account.

Comparing the 1992–93 and 1997–98 surveys, all sources of income grew roughly proportionally, on average, but the patterns differed across income groups. For example, crop income growth accounted for 45 percent of income growth across all rural households but 69 percent among the poorest households. Poor farmers earned more by increasing their yields,

while richer households expanded the area cultivated. Farmers in the Northern Uplands have diversified into high-value crops, gradually shifting from rice and cassava cultivation to fruits and tea production. The analysis indicates, however, that diversification into higher-value crops accounted for just 6 percent of the crop income growth. In other regions of Vietnam, such as the coffee-growing Central Highlands and the highly commercialized Southeast, crop diversification accounted for more than one-quarter of crop income growth.

In the interviews, farmers confirmed that their standard of living had risen. Eighty percent attributed improvements to higher crop yields, 62 percent to livestock income, and 47 percent to new, more profitable crops. More than four-fifths of the farmers said they had tried at least one new crop. Farmers complained, however, that the new crops promoted by extension agents were not always profitable—sometimes the market became flooded and the price fell. More than 50 percent said that rice was still their most important source of income.

Local authorities noted that the pace of diversification is greater where market access is better. For example, in provinces close to Hanoi and the delta, farmers tend to diversify into fruit crops, such as litchi, while farmers who are farther from markets diversify into tea, sugarcane, and tobacco. And in the most remote provinces they diversify into maize or cattle. Local governments are deeply involved in promoting adoption of new varieties and use various policy tools to encourage diversification, including input subsidies, transportation subsidies, technical assistance, and low-interest loans. Traders, however, do not seem to play an active role in promoting new crops.

The strong growth in household income in the Northern Uplands—almost 6 percent a year—confirms the positive impact of the economic reforms of the past 15 years. The main criticism is that these reforms may have widened the gap between the rich and the poor. But this study finds that inequality in rural areas increased only slightly and that poverty, although high, has declined.

Since crop production is the most important source of income growth, particularly among the poor, rural development strategy should focus on ways to increase labor and land productivity of crop production, especially for the poor. Nonfarm income is concentrated among the high-income households in the Northern Uplands, so that assistance to existing small enterprises would have only minimal impact in reducing poverty.

The gradual shift from staple food crops to higher-value crops means that the share of land allocated to rice has decreased. Because of higher yields and greater cropping intensity, however, per capita rice availability has actually increased. Thus, in Vietnam, rice intensification and crop diversification may be complementary.

All three of the analyses carried out for this study indicate that yield increases are the most important source of income growth in the Northern Uplands, especially for the poor. This result highlights the pro-poor impact of yield-increasing investments in agricultural research and extension. Some subsidies to encourage innovation may be justified to help farmers overcome risk associated with new crops, but fertilizer subsidies for rice cultivation are difficult to justify and are unlikely to be targeted to the poor.

Although farmers appreciated the help of the extension service, less than half of them had had contact with an extension agent in the past year. Increasing the number of agents in some areas and evaluating the results could be worthwhile. Given the marketing problems in the promotion of some crops, however, greater attention must be paid to marketing research and assessments of the profitability of new crops before they are promoted.

CHAPTER 1

Introduction

In many ways, Vietnam is in an enviable position among developing countries. Since the mid-1990s, it has enjoyed macroeconomic stability and sustained high rates of economic growth. According to the Vietnam Living Standards Surveys, the incidence of poverty fell from 58 percent in 1993 to 37 percent in 1998 (Joint Working Group 2000). Vietnam has benefited from trade liberalization and the rapid growth of the region, but was able to avoid the worst effects of the 1997–98 Asian financial crisis. From a situation of chronic rice shortages in the 1980s, it has transformed itself into one of the three largest rice exporters in the world. It has also dramatically expanded exports of coffee, seafood, and fruits and vegetables.

At the same time, Vietnam faces serious development challenges. In spite of the rapid pace of economic growth, Vietnam remains among the 30 poorest countries in the world.[1] Further, there is concern that the process of market liberalization, while unleashing the economic potential of the country, may also have exacerbated the disparities between urban and rural areas, between north and south, and between delta and upland regions.

Poverty and underemployment are particularly serious problems in the rural Northern Upland region. According to a recent study, the 10 poorest provinces of Vietnam are in this region, with poverty rates ranging from 55 to 78 percent (Minot and Baulch 2002). In addition to the high incidence of poverty, the region is characterized by:

- Rugged upland terrain;
- Poor infrastructure;
- A large ethnic minority population;
- Low population density and low levels of urbanization; and
- Importance of the agricultural sector.

Although economic growth will not necessarily solve all the problems of the Northern Uplands, there is little doubt that sustained and widespread growth in household incomes is a necessary component of any successful development strategy for the region.

Income growth in an agricultural economy can come from various sources. First, we can distinguish between growth in crop income, noncrop agricultural income (livestock, fisheries, and forestry), and nonagricultural income. Given that semisubsistence farmers often focus on the production of staple food crops, the switch to noncrop activities is often referred to as

[1]This is based on per capita gross national product using market exchange rates. If the exchange rates are adjusted to reflect purchasing power parity, Vietnam's relative position improves, but it is still ranked 164 out of 210 countries (World Bank 2000, 231).

income diversification. The growth in crop income can be further broken down into five components:

- Area expansion. Sometimes referred to as crop extensification, expansion may be the result of clearing new lands, rehabilitating degraded land, or reducing fallow periods.
- Increasing cropping intensity. The number of harvests per year can be increased by adopting varieties or crops with shorter growing cycles or by improving water control on the off-season. This is one form of crop intensification.
- Yield increases. Higher yields, defined as the output per sown area, are another form of crop intensification. They are associated with improved seed, greater or more effective use of modern inputs, improved water control, and better cultivation methods. This is another form of crop intensification.
- Higher agricultural prices. Higher prices may be the result of market liberalization, improved transport infrastructure, or better coordination between farmers and buyers.
- Crop diversification. Even if prices, cropping yields, intensity, and area remain constant, farmers can increase their income by reallocating land from low-value crops (typically staple food crops) to higher-value crops (typically commercial crops).

All of these factors play some role in the growth of rural income, but the relative importance of each factor varies across households depending on agroecological conditions, market access, and household characteristics. The importance of each factor may vary over time as well. For example, rising population density is limiting the opportunities for farmers to increase income through area expansion, forcing them to rely more on yield increases and higher-value activities to maintain income growth. In addition, rising incomes are leading to changes in domestic food demand, such as rapidly growing demand for animal products, beverages, and processed foods. These domestic trends and the expansion in international trade contribute to diversification away from food production toward commercial agricultural production. Rising income among consumers and several highly visible food scares are also leading to increased concern for quality and food safety. The growth of supermarket chains, particularly in middle- and high-income countries, is helping to transmit these shifts in demand back to farmers (Reardon, Timmer, and Berdegue 2003).[2]

How are these growth patterns relevant to agricultural policy issues that the government faces? In theory, public investment and spending decisions should be based on the size of the *marginal* contribution to output or growth that is expected from alternative investments of equal size. However, since this information is generally not available, a reasonable approximation is to allocate investment among growth strategies according to the *average* contribution to economic growth, assuming that growth patterns in the recent past will continue in the medium-term future. Thus, if most rural income growth comes primarily from technological change that increases crop yields, then investments in agricultural research deserve priority. If income growth derives largely from crop diversification, then research into the constraints that prevent some farmers from diversifying deserves greater attention. And if income growth is mainly due to the switch from farm to nonfarm activities, then helping rural households make that transition should be a priority.

Furthermore, the most important factor in raising rural incomes may be different

[2]As discussed later, this factor is less important in Vietnam, where supermarkets represent a very small share of retail food stores.

from the most important factor in reducing rural poverty. In other words, income growth among low-income households may follow a different pattern than income growth among higher-income households. Government efforts to lift rural households out of poverty should probably focus on the strategies that have been successful in raising the income of other poor (or formerly poor) rural households.

Finally, it is possible that the importance of each factor will vary depending on other household characteristics and location. For example, crop diversification may be important to households near roads and market infrastructure, and diversification into nonfarm activities may be most important in urban and peri-urban areas.

Although information on the factors contributing to rural income growth is important, it is only part of the information policymakers need. Policies and programs to promote rural income growth and poverty reduction are not being designed from scratch; they evolve out of the experience of previous rural development strategies. Since the implementation of rural development policies and programs is largely carried out by provincial, district, and commune authorities, it is useful to assess previous programs to promote rural development, particularly diversification programs, based on the perceptions and experiences of rural households themselves and local government officials.

Objectives

In light of this background, this study examines income diversification in the Northern Upland region of Vietnam, its contribution to poverty reduction, and the constraints to further diversification. More specifically, the study addresses the following questions:

- What are the trends in poverty and living standards in the Northern Uplands?
- What are the patterns and trends in income diversification in the region?
- How much have different income-generating activities contributed to the growth in rural income in recent years?
- How much has crop diversification into higher-valued crops contributed to crop income growth, compared to yield increases, area expansion, and higher prices?
- How do the patterns of diversification vary across households depending on their income level, degree of market access, ethnicity, and so on?
- What are the perceptions of farmers and local government officials regarding the process of income diversification and the constraints that farmers face in diversifying into high-value commodities and nonfarm activities?
- What are the implications of these results for Vietnamese agricultural policy and programs?

In terms of research methods, the study also aims to clarify the often-contradictory definitions of income diversification and propose methods for measuring its impact on rural income growth.

Data and Methods

This study uses three approaches to gathering information about diversification and poverty in the Northern Uplands of Vietnam:

- Analysis of economic and agricultural trends at the provincial level using secondary data from the General Statistics Office (GSO) of Vietnam.
- Analysis and comparison of three nationally representative household surveys: the 1992–93 Vietnam Living Standards Survey, the 1997–98 Vietnam Living Standards Survey, and the 2002 Vietnam Household Living Standards Survey.
- Analysis of data from a survey of farmers and local government officials carried out in 2002. The survey, called the Qualitative Social Assessment of Income Diversification (QSAID), was

designed to gather information on the perceptions of farmers and local officials regarding the constraints to income diversification in selected communes of the Northern Upland region.

Although addressing the same issues, these three approaches complement each other. Examining GSO statistics allows us to better understand broad trends in the economy and highlights the diversity across provinces within the Northern Uplands. Analysis of the three household surveys provides information on the historical patterns of income diversification and poverty reduction, but does not explain the constraints to diversification or describe the macroeconomic context. The QSAID sheds light on the constraints to diversification and the perceptions of farmers and local officials, but does not generate statistically representative results. The data sources and the analytical methods are described in more detail in Chapter 3.

Organization of the Report

Chapter 2 reviews previous studies of income diversification in developing countries. Among the topics discussed are alternative definitions of income diversification, some of the drivers of income diversification, and a review of the impact of diversification in different countries. Chapter 3 describes the three data sources used in this study and the methods employed to analyze the data. Chapter 4 provides some background on the Northern Uplands of Vietnam to serve as a context for interpreting the results in subsequent chapters.

Chapter 5 describes the patterns and trends in poverty and income diversification in the Northern Uplands. Data from three surveys are used to describe the sources of household income for different types of households, to measure the contribution of income from each sector to overall income growth, and to estimate the contribution of crop diversification to growth in crop income.

Chapter 6 uses the results from the Qualitative Social Assessment of Income Diversification to explore the experiences and perceptions of farmers in the Northern Uplands with regard to the process of income diversification. This chapter covers changes in income patterns since 1994, successful and unsuccessful attempts to introduce new crops, the catalysts that convinced farmers to try new crops, the role of government in the process of diversification, and opinions regarding the most useful government interventions to assist poor rural households.

Chapter 7 continues to examine the results of the QSAID, focusing on interviews with local government officials that collected information on the patterns of diversification by local farmers, the initiatives by local government to promote new crops, and their perceptions regarding the role of traders, processors, and state enterprises.

Chapter 8 summarizes the results obtained from the various components of the project, draws conclusions about the process of diversification, and identifies some implications for public investment and agricultural policy to facilitate the process of diversification and allow small farmers to participate in the process.

CHAPTER 2

Previous Research on Income Diversification

In the analysis of household income, the term "income diversification" has been used to describe four distinct but related concepts. This chapter identifies these definitions, and for each we describe the economic rationale and summarize previous research on patterns and determinants of this type of diversification in developing countries. Finally, we discuss diversification in Vietnam, focusing on its growing importance in agricultural policy and emerging patterns as identified by recent research. The chapter provides some context that will assist in the interpretation of the results that will be presented in subsequent chapters.

Definitions of Diversification

One definition of income diversification, perhaps closest to the original meaning of the word, refers to an increase in the number of sources of income or the balance among the different sources. Thus, a household with two sources of income would be more diversified than a household with just one source, and a household with two income sources, each contributing half of the total, would be more diversified than a household with two sources, one that accounts for 90 percent of the total (see Joshi et al. 2002; Ersado 2003).

A second definition of diversification concerns the switch from subsistence food production to the commercial agriculture. For example, Delgado and Siamwalla (1997, 13) argue that "'farm diversification' as an objective in African smallholder agriculture should refer primarily to the part of farm household output undertaken specifically for cash generation." A less ambiguous term for this type of diversification is agricultural commercialization. It does not necessarily involve an increase in the number or balance of income sources. For example, a farmer may move from producing various grains, tubers, and vegetables for own consumption to specializing in one or a few cash crops.

Third, income diversification is often used to describe expansion in the importance of noncrop or nonfarm income. Nonfarm income includes both off-farm wage labor and nonfarm self-employment (see Reardon 1997; Escobal 2001). Diversification into nonfarm activities usually implies more diversity in income sources (the first definition), but this is not always the case. For example, if a household increases the share of income from nonfarm sources from 30 percent to 75 percent, this represents diversification into nonfarm activities but not income diversification in terms of the number and balance of income sources. The share of income coming from nonfarm activities often correlates with total income, both across households and across countries. This definition of income diversification is linked to the concept of structural transformation at the national level, defined as the long-term decline in the

percentage contribution of agriculture sector to gross domestic product (GDP) and employment in growing economies.

Finally, income diversification can be defined as the process of switching from low-value crop production to higher-value crops, livestock, and nonfarm activities. "High-value crops" are often defined in terms of the value per unit of weight, but it is probably more useful to define them as crops that generate high economic returns per unit of labor or land. This definition focuses on diversification as a source of income growth and a potential means for poverty reduction. Again, diversification from staple crop production into high-value activities often implies greater diversity in crops and income sources, but this is not always the case. For example, if a mixed grain-and-poultry farmer decides to specialize in poultry production, this would represent diversification into a high-value activity, but not diversification in the sense of multiple activities.

International Patterns in Income Diversification

Because income diversification refers to several distinct concepts, the patterns of diversification vary depending on the definition used. Here, we briefly describe some of the determinants of each type of diversification and review studies of income diversification.

Income Diversification as Diversity in Income Sources

Determinants of Diversity in Income Sources. Rising income, lower domestic marketing costs, and international trade liberalization all create new opportunities for rural households, thus contributing to more diverse sources of income in rural areas. But this does not imply income diversity at the household level; in fact, it could lead to household-level specialization. To understand the economic rationale for an individual household to have multiple income-generating activities, we need to look at household-level factors. Here we identify four.

Risk reduction: If each source of income fluctuates from year to year as a result of weather or other factors and the correlations in variations in income are not perfectly positively across sources, then a household with multiple income sources will experience less variability in total income than a specialized household. Risk management helps explain diversification away from crop production toward nonfarm activities such as wage labor and nonfarm enterprises that are less likely to be affected by weather. Quiroz and Valdez (1995) argued that *crop* diversification is unlikely to reduce income risk because the yields of different crops are closely correlated, but if drought-resistant crops such as cassava are included in the crop mix, weather-related risks may be reduced. When diversification is motivated by risk management, the household generally has to sacrifice in terms of average income. Diversification into cattle raising and nonfarm activities can also reduce smooth consumption in the face of weather shocks (see Reardon, Matlon, and Delgado 1988; Dercon 1998). Thus, we expect diversification to occur when income sources are highly variable and when households are particularly risk averse. This is consistent with empirical research that shows that poor rural households practicing rain-fed agriculture in low-potential areas are more likely to have diverse income sources than richer households in areas with greater agro-ecological potential (see Barrett, Bezuneh, and Aboud 2001; Block and Webb 2001; Joshi et al. 2002).

Meeting consumption needs: Diverse economic activities may be motivated by the combination of diverse consumption needs and high transaction costs in purchasing consumer goods. In economic terms, high transaction costs imply that production and consumption decisions are not separable, so that consumption needs affect production decisions. For example, if a household lives far from roads and markets, the cost of buy-

ing and selling goods will be high, forcing it to diversify in order to satisfy its own demand for different types of food and nonfood goods (see Singh, Squire, and Strauss 1986; Omamo, 1998).

Economies of scope: Carrying out two activities on the same farm may reduce costs or increase output if they are linked in some way. Often there are positive externalities between activities, in that the production of one good reduces the unit cost of producing another good, a phenomenon also called economies of scope. For example, a household that raises livestock can often reduce the cost of feed by growing its own grain and fodder. At the same time, raising livestock near crops reduces the cost of producing crops by providing an inexpensive source of organic fertilizer. Another example is on-farm processing of crop output, which can reduce transportation costs if (as is often the case) the product loses volume or weight in processing. A third example is beekeeping, which can improve pollination and thus yields in fruit orchards. Like the consumption needs motive, the externality motive may also be considered a result of the transaction costs (including transportation) associated with buying or renting the input instead of producing it on the farm. This implies that households in remote areas far from markets are more likely to have diverse production patterns, both to supply their own consumption needs and to produce inputs for other productive activities.

Diminishing marginal returns to labor: Even if the activities are not linked, it may be worth it for a household to have multiple income-generating activities if the activities exhibit diminishing marginal returns to labor input. For example, if a household has a plot of land that is too small to fully occupy the family labor, then the marginal return to farm labor is close to zero and household income could be increased by devoting some labor to off-farm activities, including wage labor. Labor productivity in one activity may be highly seasonal, creating an incentive to engage in a different activity when productivity in the first is low. In areas with rainfed farming and only one rainy season, the offseason is typically used for wage labor and other nonfarm activities. Similarly, during the harvest season of a major cash crop, agricultural labor becomes remunerative, leading to seasonal participation in agricultural labor markets. In addition, heterogeneity in the skills or employment opportunities of household members can motivate the household to diversify. Even if individual members are specialized in their economic activities, the household may be diversified.

Studies of Diversity in Income Sources. Delgado and Siamwalla (1997) examined broad patterns of income diversification in Asia and Africa. They noted that African farmers often have highly diversified crop mixes as a strategy to reduce risks associated with weather. In contrast, crop diversity in Asia is associated with farmers diversifying away from rice into higher-value crops and activities, such as horticulture, livestock, and aquaculture.

In a study of Zimbabwe, Ersado (2003) examined the relationship between income diversification and household welfare. Using household surveys carried out in 1990–91 and 1995–96, the study measured income diversification by the number of income sources, the share of nonfarm income, and the Simpson index of diversity (see Chapter 3, section on Indicators of Diversification). The study found that in rural areas, richer households had more diversified income sources, while in urban areas the reverse was true. Ersado (2003) also found that households living in rural areas with highly variable rainfall were more likely to have a large number of income sources, which is consistent with the idea of income diversity as a risk management strategy.

Using area and production statistics, Joshi et al. (2002) examined the trends in diversification in South Asia over recent decades. They showed that the diversity of crop production has increased since 1980 in most South Asian countries. In India, the

southern and western regions are diversifying away from grains toward pulses, oil seeds, fruits, and vegetables. In the northern region, farmers are turning from coarse grains to commercial production of rice, wheat, and (to a lesser degree) non-grain crops. The eastern region is poorer and less developed. Agriculture is dominated by rice, but the non-rice areas are quite diverse. Carrying out state-level time-series econometric analysis, they showed that income diversity is associated with road density, urbanization, average farm size, and per capita income. Rainfall is also a significant factor: low-rainfall areas have more diverse cropping patterns than high-rainfall areas. They concluded that diversification from coarse grains to high-yielding rice and wheat has had positive effects on food security, while diversification toward cash crops has boosted employment per hectare and agricultural exports.

Reardon, Matlon, and Delgado (1988) found that rural households in an arid village in Burkina Faso have very diverse income sources, relying on crop income, livestock income, local nonfarm activities, and migrant labor in roughly equal proportions. In contrast, another village with better agroclimatic conditions earned about half of their income from crop production, but were actually more vulnerable to droughts than households in the drier zone. Studies that focus on diversification in terms of the number and balance of income sources are relatively rare compared to studies using other definitions, particularly diversification into nonfarm activities. These studies are discussed in the next three sections.

Diversification into Commercial Production

Given the gains from trade, it is relatively easy to understand the motive for diversifying into commercial crops and other market-oriented activities. More relevant are the factors that cause many farmers in developing countries to avoid commercialization, producing food and other goods for their own consumption. One possible explanation is the risk associated with producing for the market. If a farmer allocates a large share of labor and land to production of commercial crops, the household becomes dependent on purchased food, which may be risky if the prices of the commercial crop and the prices of food are highly variable.[3] Based on this motive, we expect households with large farms to sell a larger share of their output because they can do so while meeting staple food needs for own consumption. In addition, households that have more assets should be less risk averse and more willing to participate in market production. Another explanation for subsistence production is the desire to avoid high transaction costs in selling crops and buying food. Transaction costs reduce the selling price of food crops and raise the buying price of food products. If the opportunity cost of food production for a household lies within the band defined by these two prices, then production for own consumption is worthwhile but food purchases and food sales are not. The greater the transaction costs (including the cost of transportation to or from the market), the wider the band and the more likely that rural households will be subsistence farmers. Thus, commercial production is likely to be greater for rural households with good market access, while subsistence production is more likely in remote, sparsely populated areas (see Minot 1999).

Following the pioneering work on "missing markets" by de Janvry, Fafchamps, and Sadoulet (1991), the effect of transaction costs on the decision of farmers to produce for own consumption rather than for sale has

[3]The variability of food purchasing power is a function not just of the variance of food prices and cash crop prices, but also the covariance between them.

been the subject of various studies. Jayne (1994) demonstrated that high food marketing costs (due to regulated grain markets) encourage household self-sufficiency and limit cash crop production in Zimbabwe. Omamo (1998) showed that farmers in Kenya who live in more remote areas rely more on own food production and less on commercial production. Key, Sadoulet, and de Janvry (2000) used household data from Mexico to show how fixed and variable transaction costs affect the maize supply response of rural households. And Minot (1999) used a household model to show that high transaction costs reduce the aggregate supply response of food crops, at least within a certain range of prices. Pingali and Rosegrant (1995) discuss a range of issues related to agricultural commercialization, including a number of concerns about the impact of commercialization. One of the more common critiques is that switching from food production to cash crop production may adversely affect food security and nutrition. This view is disputed by von Braun (1994), who summarizes a series of studies based on household surveys that compare income, food intake, and nutritional status of farm households. These studies found that farmers involved in cash crop production are generally better off on various dimensions than similar households that are more subsistence oriented. On the other hand, commercialization combined with inappropriate policies or institutional failures can result in adverse effects for poor households. Probably more common is the case in which poor farmers are disadvantaged by *not* being able to participate in cash crop production. Liquidity constraints are often an important factor in the ability of households to diversify into commercial production. In Côte d'Ivoire, the 1994 currency devaluation increased the incentives to grow cocoa, cotton, and other export crops, but richer households were better able to take advantage of these opportunities, presumably as a result of greater liquidity (Barrett, Bezuneh, and Aboud 2001).

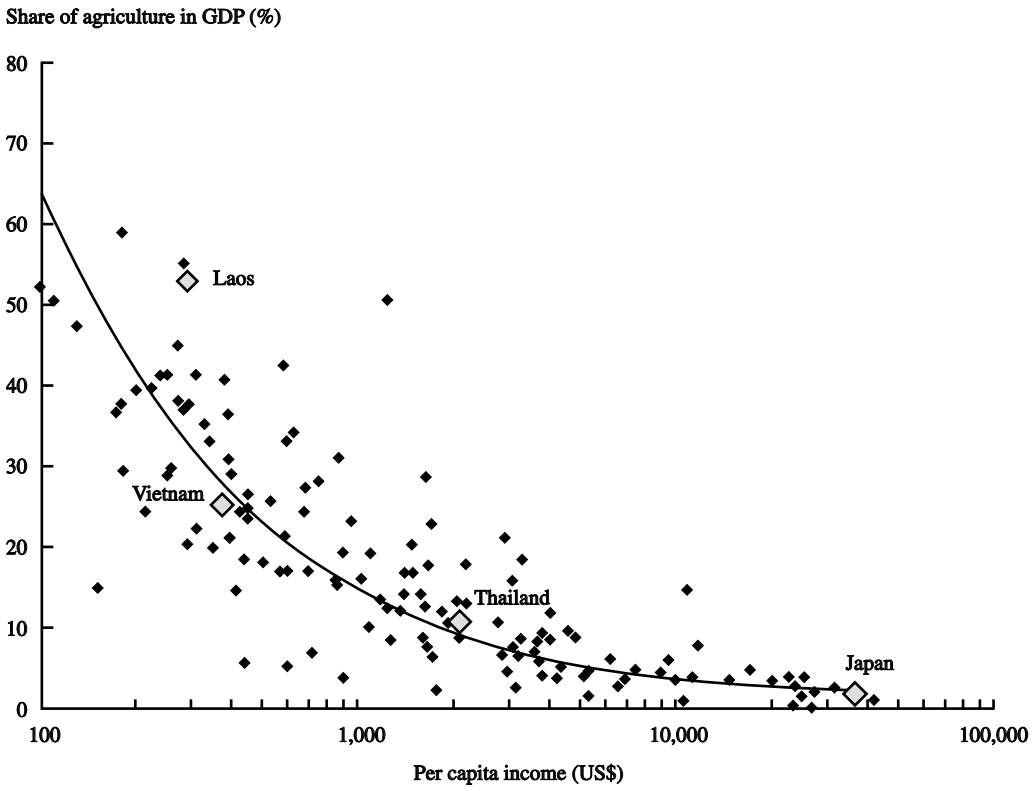
Diversification into Nonfarm Activities

Engel's Law states that as household income rises, the share allocated to food declines. At the national level, this trend is manifested as the process of structural transformation, in which the contribution of the nonagricultural sector to gross domestic product (GDP) tends to increase as per capita GDP rises. Figure 2.1 illustrates the process of structural transformation with cross-sectional data. The growth in the share of nonagricultural GDP is linked to (1) the growth of nonfarm income within rural areas, (2) seasonal or temporary migration of rural inhabitants to urban areas to work in nonfarm activities, and (3) permanent migration from rural to urban areas.

Based on a review of more than 20 studies carried out in the 1960s and 1970s, Haggblade, Hazell, and Brown (1989) found that nonfarm income accounts for 25 to 30 percent of rural income in Sub-Saharan Africa, somewhat less than the norm in Asia. A more recent study of global patterns suggests that nonfarm activities account for 30 to 45 percent of rural income (FAO 1998).

There is conflicting evidence on whether rich or poor rural households earn a higher share of their income from nonfarm activities. Haggblade, Hazell, and Brown (1989), in a review of more than 20 studies from Sub-Saharan Africa, found that the share of nonfarm income is usually greater among higher-income rural households in Africa. A more recent review by Reardon (1997), based on 27 studies of rural nonfarm employment in Sub-Saharan Africa, confirms that the share of income from nonfarm activities is greater among higher-income rural households, presumably as a result of the capital and skill requirements of many types of nonfarm occupations. However, studies from Asia and Latin America often show a relationship between nonfarm income share and total income that is U-shaped, with poor households relying on agricultural labor income and relatively high-income households

Figure 2.1 Structural transformation across countries



Source: World Bank (2003).

having formal-sector wage jobs and off-farm self-employment (see FAO 1998; Lanjouw and Lanjouw 2001). This pattern may be more common in countries with a large rural landless population.

Rural infrastructure has an important effect on rural nonfarm income activities. Nonfarm income share is often greater in households and villages with electricity, because this reduces the cost of many types of nonfarm activities (see Reardon 1997; Escobal 2001; Lanjouw and Lanjouw 2001). The development of the road network, however, has mixed effects. Road improvements reduce the local cost of imported goods and goods made in urban areas, thus threatening some nonfarm enterprises such as basket weaving, roof thatching, and traditional brewing (Haggblade, Hazell, and Reardon 2002). On the other hand, road improvements make it easier to purchase inputs from and sell products to urban markets and overseas. On net, the latter effect is probably larger, since nonfarm income activity is often positively related to road density and proximity to urban markets (see Reardon 1997; Escobal 2001; Lanjouw and Lanjouw 2001).

Similarly, the existence of credit markets may have a mixed effect on nonfarm activities. On the one hand, credit constraints may prevent many rural households from starting some types of nonfarm enterprises. On the other hand, nonfarm activities may serve as a substitute source of cash when rural credit markets are not effective (FAO 1998).

In Peru, nonfarm activities make up roughly half of all rural income, though the percentage varies widely across regions and households. The share of income from nonfarm enterprises correlates positively with education, electrification, proximity to mar-

ket, and the value of crop output per hectare (Escobal 2001).

In a study of rural households in Ethiopia, Block and Webb (2001) found that diversification out of crop production is associated with higher-income households, a higher dependency ratio, male-headed households, and location in the highlands (a region with good soils and higher rainfall). One of the motivations for diversifying out of crops, often into livestock activities, is to provide insurance against drought. According to a survey, farmers believe that households with large herds are less vulnerable to drought. These results are difficult to interpret, however, because if insurance against drought were the main motive for diversification, then it should be more common in the marginal lands with low rainfall.

Another study compared diversification in Rwanda, Kenya, and Côte d'Ivoire. Diversification away from crop production is greatest in areas with low rainfall and poor soils. Although unskilled labor income is associated with poor households, most other forms of nonfarm income correlate positively with income. The fact that income diversity is greater among higher-income households contradicts the idea that diversification is a risk management strategy (since we would expect the poor to be more risk averse). On the other hand, it suggests that nonfarm activities involve some barriers to entry, such as education or capital, that make it difficult for poor households to participate (Barrett et al. 2000).

Diversification into High-Value Activities

If we define diversification as the process of switching from low-value crops to higher-value crops and activities (including nonfarm employment), then an obvious question is why a household would choose to grow low-value crops. The explanation is that various barriers to entry keep some households from diversifying into the high-value crops and activities. Indeed, these barriers to entry probably contribute to the higher returns from these activities. Diversification into high-value crops and activities may be inhibited by:

- Lack of liquidity and lack of access to credit. This constraint is particularly applicable in the case of fruit and other tree crops that require several years to mature. It is also a barrier to entry into some nonfarm enterprise sectors that require equipment, such as grain milling.
- Lack of information about production methods and markets. This constraint is particularly relevant for new and specialty crops, aquaculture, fruits and vegetables, and other perishable commodities. It is also more relevant for products supplied to supermarkets and export markets, which often have strict standards for quality (color, size, shape, and consistency) and food safety (pesticide residues and biological contamination).
- Lack of education or language skills necessary to acquire needed information. This issue affects ethnic minorities in many countries and female-headed households in areas where the gender differences in education are large.
- Poor transportation infrastructure. High transportation costs reduce the farm-gate price of crops and raises the farm-gate cost of purchased inputs. This constraint is more binding for households in remote locations and for perishable products.
- Insufficient land or labor. Poor farmers are understandably reluctant to depend on the market for their food, so they often prefer to supplement food production with high-value crops and other activities rather than reallocate a large portion of land to high-value crop production. This constraint affects areas where the population density is high relative to the agroecological potential of the land.
- Lack of social capital. Social capital refers to the network of friends and

business associates with whom a person shares some level of mutual trust. In the agricultural sector, social capital is particularly important for traders who assemble crops, those trading in perishable commodities, and those engaged in long-distance trade.

One way to address some of these constraints is through cooperatives or other farmer organizations. In some situations, they can reduce the cost of disseminating technical and marketing information, distributing inputs, and marketing output. Alternatively, farmer organizations may coordinate the marketing of highly perishable commodities such as milk. At the same time, organizing is not costless, so it makes sense only when there are economies of scale in some phase of production or marketing. In addition to farmer organizations, the public sector may play a role in lifting these barriers. This intervention may be justified on efficiency grounds, if there are market failures, or on equity grounds, if it facilitates the participation of poor households in high-value activities.

Of course, if such efforts are successful, they will expand the supply and may depress the market price. Stories of development projects that flood the market with cabbage or apricots, pushing down the price to the point where it is not worth harvesting the crop, are common in many developing countries. But this situation is avoidable if careful market research can confirm that the commodity is tradable, that domestic demand is elastic, or that the project area has some advantages over other production zones.

In many Asian countries, crop diversification is associated with reducing the importance of rice and moving toward fruits, vegetables, and livestock activities. This type of diversification raises income but exposes farmers to market risks, particularly when the commodity is perishable. Delgado and Siamwalla (1997) argue that governments can play a constructive role in facilitating institutions, such as cooperatives and contract farming, that facilitate diversification into high-value commodities, thus raising rural income.

As discussed in Chapter 1, the main driver of the shift toward high-value agricultural activities is rising income, which leads consumers to diversify their diets away from staples grains and tubers toward fruits, vegetables, fish, meat, and milk. This trend is particularly prominent in Asia because of rapid economic growth during the past decade. In addition, trade liberalization, foreign direct investment in developing countries, and technological advances have made it easier to produce high-value commodities in one country for export to high-income consumers in other countries (Gulati et al. 2005). Rising income has also resulted in increasing demand for quality and food safety, particularly in perishable commodities. The growth of supermarket chains in both developed and developing countries has facilitated the process of transmitting demand for these attributes back to farmers. Supermarket chains are increasingly taking an active role in setting and enforcing production and marketing standards (Reardon, Timmer, and Berdegue 2003).

In spite of the growing importance of high-value agriculture, few studies have attempted to measure their contribution to income growth. One such study looked at long-term trends in agricultural production in West Punjab (India) (Kurosaki 2003). This study found that area increase accounted for 71 percent of the growth in an index of agricultural output[4] over 1903–1952, but in the period 1952–1992 the most important contributors were yield increases (53 percent) and diversification (7 percent), where diver-

[4]Because price data were not available throughout the 89-year period of the study, the author constructed an index that combines production data on 12 major crops using fixed 1960 prices.

sification was defined as the reallocation of land toward higher-yielding crops. In the first period, rice yield growth was due to concentration of rice production in the districts with higher and growing yields, while in the second period, it was due to higher yields in each district. Finally, analysis across districts indicates that road density is associated with diversification in the first period and with specialization in the second period.

Income Diversification in Vietnam

With the reunification of North and South Vietnam in 1975, the government faced the challenges of rebuilding from the war and extending the system of agricultural collectives and state management to the south. In spite of high expectations, none of the 15 production targets in the first 5-year plan (1976–80) was achieved. Food production actually fell in per capita terms, making it necessary to import rice to meet domestic needs (Kim 1996). Farmers in the south resisted collectivization and those in the north were becoming increasingly aware of the erosion of incentives under the collective system. In 1981, the government promulgated Directive 100, under which collectives would contract individual households to produce a given amount on their own plots, but surpluses could be sold on the partially liberalized markets (Xuan 1995). Initially, farmers produced more, but when quotas were adjusted upward, it undercut the incentives. Vietnam continued to face chronic rice shortages, forcing the government to import rice. During this period, the focus of agricultural policy was on self-sufficiency in rice production, with little attention to income diversification.

In 1986, the government announced its intention to move toward a market-oriented economy, a policy known as *doi moi* (renovation). One of the first concrete results of this new approach was Resolution 10 of 1988, which called for the allocation of collective land to farm households, giving them responsibility for production decisions. By 1989, the system of quotas was abandoned and rice markets were deregulated. Combined with reforms in the nonagricultural sector, particularly exchange rate adjustments, the agricultural sector responded strongly. By 1990, Vietnam had become the third largest rice exporter in the world. The issue that dominated agricultural policy in the early 1990s was how to balance the need for foreign currency earning from rice exports with the need to ensure food security (Minot and Goletti 2000).

In the late 1990s, the world price of rice and coffee dropped sharply, affecting both foreign currency earnings and farmer income. This stimulated interest in the topic of diversification away from rice, and, more generally, gave support to those in government who argued that food security is best ensured by raising farm income rather than expanding rice production. The increased interest in agricultural diversification resulted in the relaxation of land-use regulations that prevented farmers from converting rice land into other crops, as well as production campaigns to promote new crops in specific areas. In principle, rural households have been given responsibility for farm management decisions, and most farmers own land-use certificates that entitle them to use land for at least 20 years. In practice, the government plays an active role in cropping decisions, attempting to direct agricultural transformation with crop-specific land-use plans and provincial production targets. These goals are pursued by a range of policies including land-use regulations, credit, provision of free or subsidized credit, and technical assistance (see Chapter 9 for more information).

As in many other developing countries, the food retail sector in Vietnam is characterized by the growth of modern supermarketing chains, including the arrival of foreign-invested firms. There are currently about 160 supermarkets in Vietnam. Foreign-invested retailers account for a small percentage of the stores but about half of the

supermarket sales. Metro Cash and Carry, the German retailer, has five outlets and plans three more. Parkson Corporation from Malaysia and Dairy Farm Corporation from Hong Kong plan to enter the Vietnamese market soon. Press reports suggest that consumers appreciate the cleanliness and convenience of supermarkets, even if the prices are a little higher. As in other countries, the supermarkets must develop and maintain close relationships with their suppliers to ensure a steady supply of high-quality produce (*VOV News* 2004; Kim Phuong 2005).

In spite of this growth, it should be recognized that supermarkets account for a minuscule share of retail food sales. One estimate is that by 2007 supermarkets and hypermarkets in Vietnam will reach sales of US$143 million, less than 3 percent of projected retail food sales (BMI 2004). Assuming no growth in retail food sales and 10 percent annual growth in the sales of supermarkets and hypermarkets, by 2020 their share of retail food sales would be 12 percent. Clearly, it will take some time for them to become a major factor in the retail food sector in Vietnam.

A number of recent studies have examined the patterns and process of agricultural diversification in Vietnam. Pederson and Annou (1999) examined the patterns of diversification using the 1992–93 Vietnam Living Standards Survey. They found that agricultural diversification (defined as the share of non-rice output in agricultural output) is associated with small farms, small irrigated areas, and higher levels of education. In addition, they found that households whose crop production is relatively specialized in rice tend to have more nonfarm income diversification. This may suggest that households prefer some form of diversification, either in non-rice production or in nonfarm activities.

Henin (2002) described diversification patterns in the Northern Uplands, focusing on Lang Son province. He argued that *doi moi* policies have increased income and stimulated income diversification. Farmers in the study area have adopted modern rice varieties and fertilizer (though they continue to use local varieties as well) and have expanded production of cash crops such as sugarcane, peanuts, soybeans, tobacco, cinnamon, tea, and anis. Nonagricultural activities are limited by the lack of rural industries, but some households earn income from porter work, collecting firewood, bicycle and motorbike repair, and so on. Farmers identify a number of constraints to diversification and poverty reduction: lack of capital, shortage of paddy land, poor access to markets, poor irrigation infrastructure, and low-quality education. Borrowing from the formal sector, even from the concessionary Hunger Alleviation and Poverty Reduction Fund, is not popular owing to the high interest rates, short maturity of the loans, and complex procedures. Many farmers borrow informally from members of their kin network. Although the reforms have increased income, they have also increased inequality, social differentiation, and a deterioration in some social services.

A recent book contains a number of detailed studies of changes in land use and income sources in Bac Kan province in the Northern Uplands (Castella and Dang Dinh Quang 2002). Most of the studies provide long-term perspectives, describing changes in land-use patterns as a result of various changes in policy and technology: collectivization in the late 1950s, the introduction of high-yielding rice varieties in the late 1960s, the contract system under Decree 100 in 1981, decollectivization of land in the years following Resolution 10 of 1988, and the Land Law of 1993, which began the process of allocating land-use certificates. The studies use satellite imagery to document the progressive loss of forest cover, particularly during the 1980s. One study in Cho Moi District (Bac Kan province) argues that the allocation of collective land to individual households under *doi moi* has been successful in stimulating intensification of lowland rice production, diversification in the uplands (particularly in fruit), and preser-

vation of forestland. Intensification of lowland production is not an alternative to upland diversification; in fact, intensification has produced the liquidity and food security needed to allow households to diversify on their upland plots (Fatoux et al. 2002).

A study of Ba Be District (Bac Kan province) highlights the importance of accessibility in determining income opportunities. In remote villages, farmers rely on subsistence crop and livestock production. They have fewer opportunities to sell their output, speak with extension agents, benefit from government programs, or obtain nonfarm employment. As a result, they tend to be poorer than villages on main roads close to urban centers, even if they have irrigated land (Alther et al. 2002). A study in Cho Don District (Bac Kan province) found that ethnicity is becoming less useful as a predictor of livelihood strategies. Historically, the Tay were sedentary lowland rice farmers, while the Dao were nomadic and practiced shifting cultivation in upland areas. As a result of land allocations, land purchases, and other factors, the distinction between Tay and Dao livelihood strategies is weak. Both Tay and Dao farmers who have access to lowland paddy land are sedentary and grow irrigated rice, while those without (both Tay and Dao) are forced to practice shifting cultivation (Castella et al. 2000).

Summary

Diversification has been defined in various ways. Some studies define it as an increase in the number of income-generating activities or the balance among them. Others focus on the transition from subsistence farming to commercial agriculture. A third definition concentrates on diversification away from farming into nonfarm activities, and a fourth emphasizes the reallocation of resources from crops with low returns (typically staple food crops) to crops and activities with higher returns.

Rural households adopt multiple income-generating activities to manage risk, to meet household consumption needs in the face of high transaction costs, to take advantage of positive externalities among activities, and to respond to diseconomies of scale. Diseconomies of scale can, in turn, be caused by land constraints, seasonal variation in agricultural labor productivity, and heterogeneous skills in the household. Diversification into high-value activities is often inhibited by barriers to entry, including lack of liquidity for investment, lack of information about production and marketing, lack of education or language skills, lack of social capital, and poor infrastructure. Empirical research indicates that, in some cases, income diversity is a risk-management strategy of poor households in response to unpredictable weather and low agricultural potential. In other cases, income diversity is associated with higher-income farmers switching into high-value crops and nonfarm activities.

Diversification into commercial production is motivated by the gains from trade. The main constraints to commercial production are (1) the risk associated with market participations and (2) high transaction costs that make food purchases more expensive and reduce the farm-gate price of commercial crops. The transaction cost rationale helps explain empirical studies showing that subsistence production tends to be more important in remote areas far from markets. Although there is concern that commercialization may adversely affect food security, most studies show that cash-crop farmers are better off than otherwise similar subsistence farmers.

Diversification into nonfarm activities is associated with the growth in demand for non-food products as income rises. The share of nonfarm income among rural households tends to be greater among households with higher education, electricity, good market access, and relatively high income. In some cases, nonfarm income is also important to the rural poor, particularly if there is a large landless population that relies on unskilled labor wage income (e.g., India).

Diversification into high-value crops and activities is constrained by lack of access to credit, lack of production and marketing information, risk aversion, and poor infrastructure. This type of diversification is associated with access to high-income markets and the level of education. Some of these constraints can be relieved via institutions that facilitate vertical coordination, such as contract farming, farmer associations, market information systems, and so on.

Interest in income and crop diversification was modest in the 1970s and 1980s when Vietnam was struggling to achieve rice self-sufficiency. The Vietnamese government became particularly interested in diversification in the late 1990s in response to falling world prices for rice and coffee. Studies of diversification in Vietnam indicate that market reforms have stimulated both intensification of rice production in the lowlands and diversification into higher-value commercial crops (such as fruit and tea) in the uplands.

CHAPTER 3

Data and Methods

In this chapter, we describe the three sources of data used in this study and the methods of analysis used in each one. The first source is secondary data from the General Statistics Office (GSO) of Vietnam, which provides economic and agricultural indicators at the provincial level. The second source is a set of three nationally representative household surveys carried out in 1992–93, 1997–98, and 2002, which allow an analysis of the changes in income sources and the contribution of different factors to income growth. The third source is a survey of households and local officials carried out in 2002 called the Qualitative Social Assessment of Income Diversification (QSAID). The QSAID focuses on the perceptions of and experiences with income diversification.

The methods of analysis described in this chapter include the calculation of income, indicators of diversification, measuring the contribution of income diversification to income growth, and calculating an index of standard of living from the QSAID data.

Data Sources

Secondary Statistics on the Economy and Agriculture

The General Statistics Office (GSO) of Vietnam collects a wide range of economic and agricultural statistics, many of which are presented at the provincial level for the years 1995 through 2000 in a recent publication (GSO 2001). The statistics included data on population, urbanization, gross domestic product (GDP), the composition of GDP, land use, and the area and yield of major crops. To facilitate analysis, we prepared a spreadsheet with about 150 variables for each of the 14 provinces in the Northern Uplands for 1995 and 2000. These variables allow the calculation of several measures of income diversification including the share of GDP from nonagricultural sources, changes in the allocation of crop land among crops, and changes in the value of agricultural output per hectare. The analysis of the GSO data is mainly descriptive because there are only 14 provinces and 2 years. On the other hand, unlike the household survey data discussed below, the GSO statistics are available at the provincial level, allowing an assessment of spatial differences in diversification patterns within the Northern Uplands.

Another secondary source of data is the 1999 Population and Housing Census, which is used here in two ways. First, we present commune-level maps of some basic demographic data from the census, such as population density and ethnicity. In addition, we present estimates of district-level poverty that were calculated by combining the census data with the 1998 Vietnam Living Standards Survey (VLSS) using small-area estimation methods. This analysis involves econometrically estimating per capita expenditure as a function of various

household characteristics with the VLSS data and then applying the estimated equation to the census data on the same household characteristics. Small-area estimation methods are described in Elbers, Lanjouw, and Lanjouw (2003) and Hentschel et al. (2000). The Vietnam analysis can be found in Minot, Baulch, and Epprecht (2003). Here, we limit ourselves to presenting and interpreting the results for the Northern Uplands.

Nationally Representative Household Surveys

This study uses three national household surveys to examine the patterns and trends in income diversification. The first VLSS was carried out in 1992–93 by the State Planning Committee and the General Statistical Office (GSO), with technical assistance from the World Bank. The design is similar to other Living Standards Measurement Surveys. A 110-page questionnaire covered a range of topics including household size and composition, health, anthropometric measures of nutrition, education, housing characteristics, migration, employment, nonfarm enterprises, agriculture, other income, expenditure and food consumption, ownership of consumer durables, and savings and credit. The sample of 4,800 households was selected using a three-stage stratified random sample (for more information, see SPC/GSO 1994). The sample was designed to be representative at the level of the seven geographic regions of Vietnam. The survey was implemented between October 1992 and October 1993. Because the bulk of the data collection took place in 1993, we refer to it as the 1993 VLSS.

The second VLSS was conducted in 1997–98 by the GSO, with technical assistance from the World Bank. The household questionnaire covers the same topics as the 1993 VLSS, with only slight changes in the questions and format. The household sample includes most of the households from the 1993 VLSS, as well as additional households to provide better coverage of urban areas and the Central Highlands.[5] The sample contains 6,000 households and is representative for each of 10 strata, the rural areas of the 7 geographic regions, and 3 urban strata (Hanoi and Ho Chi Minh City, other cities, and towns). The data collection began in December 1997 and was completed in December 1998. We refer to this survey as the 1998 VLSS.

The Vietnam Household Living Standards Survey (VHLSS) was carried out in 2002 by the GSO. The VHLSS has two versions: a small questionnaire (36 pages) administered to about 45,000 households and a larger questionnaire (43 pages) administered to a smaller sample of about 30,000. The larger questionnaire has an expenditure module, allowing calculation of more reliable expenditure-based estimates of living standards. In this analysis, we use the data from the first two rounds of the smaller-sample version because we need expenditure data for comparability with the two VLSS surveys. The larger VHLSS questionnaire is similar to the VLSS questionnaire except that some modules are not included (anthropometrics, migration, and savings and credit) and most of the other modules are simplified. For example, the VHLSS does not collect crop-level information on seed, fertilizer, and other input costs, so it is not possible to calculate net income from each crop. In addition, the VHLSS uses just one page to collect information on revenue and costs of nonfarm enterprises, while the VLSS uses six pages to collect this information. Simi-

[5]Because the 1993 VLSS sample was designed to be proportional to the population, the sample for the sparsely populated Central Highlands was just 128 households. In the 1998 VLSS, two clusters from the 1993 VLSS sample in the Red River Delta were dropped and 1,290 households were added, mostly in urban areas and in the Central Highlands.

Table 3.1 Characteristics of the household surveys

Name	Period of data collection	Sample size	Length of the household questionnaire	Lowest level of representativeness	Types of data collected
1993 Vietnam Living Standards Survey (VLSS)	1992–93	4,800	110 pages	Seven regions	Household member characteristics, education, health, employment, migration, housing, fertility, agriculture, nonfarm self-employment, expenditure, assets, other income, and savings and credit
1998 VLSS	1997–98	5,999	110 pages	Ten strata (seven rural regions and three types of urban areas)	Almost identical content and structure as the 1992–93 VLSS
2002 Vietnam Household Living Standards Survey (VHLSS)	2002	30,000	43 pages	Urban and rural areas of eight regions	Similar to VLSS but no migration, anthropometrics, savings, or credit modules. Other modules simplified
		45,000	36 pages	61 provinces	Similar to small-sample VHLSS but no expenditure module

larly, the VHLSS modules to collect information on wage and other income is more limited than the corresponding module in the VLSS. Table 3.1 summarizes some of the key differences across the three surveys.

Qualitative Social Assessment of Income Diversification

The Qualitative Social Assessment of Income Diversification (QSAID) is a small survey carried out in 2002 using semi-structured interviews with about 300 farm households and 90 local officials in the Northern Uplands. Although the samples are relatively small and were not selected randomly, the QSAID provides more in-depth information on the perceptions, experiences, and constraints to diversification. In addition, when the information overlaps with that available from the national household surveys, it serves as a useful check.

QSAID Questionnaire for Rural Households. The questionnaire used in the QSAID Household Survey was 10 pages long, including the cover sheet. It contains a mix of quantitative questions such as size of farm and qualitative questions such as whether the standard of living of the household has improved or deteriorated. Somewhat more than half the questions were closed, meaning that the enumerator records a number or classifies the answer using predetermined codes. Other questions, such as "why" questions were left open and the responses were recorded in notes. The questionnaire had five sections:

- Section A covered the characteristics and living conditions of the household, including access to land, housing characteristics, ownership of selected consumer goods, perceived standard of living relative to others in the village, and perceived changes in standard of living over time.
- Section B focused on the income sources of the household, including which sources have become more or less important over time and perceptions of the important income sources of others in the village.
- Section C examined the perceptions and experience regarding income diversification, concentrating on attempts to grow new crops or launch new income-generating activities.

- Section D explored the role of traders and processors, evaluating the degree of competition in agricultural markets and the relationship between farmers and buyers.
- Section E asked about the role of the government in promoting new crops and new activities, including questions about the types of assistance offered, the usefulness of the assistance, and how the government could best contribute to income diversification and poverty reduction.

Many of the questions ask about changes in livelihoods over time. After discussions with our Vietnamese colleagues and field testing the questionnaire, it was decided to use 1994 as the base year. The recall period (8 years) is long enough to capture structural changes in the agricultural economy, but short enough to ensure that respondents can recall their main sources of income. We also wanted to include younger households that may not have been formed before 1994. More than 90 percent of the heads of household in our sample are at least 28 years old, implying that they would have been a head of household in 1994 or at least aware of household income sources.[6]

QSAID Questionnaires for Local Government Officials. The interview guidelines for the provincial and district officials consisted of 24 questions and one table to complete. The questions covered topics related to the patterns of crop and income diversification in the province or district, the factors that catalyze the introduction of new crops, the role and policies of the local authorities in promoting new crops, the role of private traders in promoting new crops, and the role of state-owned enterprises in stimulating diversification. The table requested a simple high–medium–low classification of the degree of market access and the standard of living of the administrative units within the province or district, along with a brief summary of the main crops or activities that have expanded since 1994 and the main obstacles to development. These questions were designed to be the starting point for open-ended discussion of the process of income diversification in the province/district and the role of the government in promoting it.

The interview guidelines for the commune authorities followed the format of the household questionnaire. As such, it involved somewhat longer and less open-ended interviews. Further, it focused more closely on the experience of farmers within the commune with new crops and new activities.

QSAID Sampling and Data Collection. For the purpose of this study, the Northern Upland region is defined as the 14 provinces in the Northeast and the Northwest regions.[7] The QSAID household survey used a five-stage stratified cluster sample using purposive sampling. In the first stage, eight provinces were selected to represent the diversity of the region in terms of market access (proximity to Hanoi), topography (lowland vs. upland), and geography (east vs. west). In the second stage, we selected two districts from each of the eight provinces. Generally speaking, one of the districts chosen was close to the main roads or a major city while the other was more remote. The selection also took into account the ethnic composition of the districts to ensure that the districts were representative of the province. In the third stage, one commune was selected randomly in each of the 16 selected districts (see Table 3.2 and Figure 3.1).

[6]In some cases, the respondents may be comparing the income patterns of their own household now with that of their parents in 1994.

[7]One of these provinces, Lai Chau, has since been divided into two provinces, Lai Chau and Dien Bien provinces, making a total of 15 provinces in the Northeast and Northwest.

Table 3.2 Provinces, districts, and communes selected for Qualitative Social Assessment of Income Diversification (QSAID)

Province code	Province	District/ commune code	District	Commune	Hardship factor
1	Yen Bai	1	Tram Tau	Xa Ho	0.7
1	Yen Bai	2	Tran Yen	Luong Thinh	0.3
2	Ha Giang	1	Dong Van	Van Chai	0.7
2	Ha Giang	2	Vi Xuyen	Viet Lam	0.5
3	Lang Son	1	Dinh Lap	Cuong Loi	0.4
3	Lang Son	2	Van Quan	Trang Phat	0.3
4	Bac Giang	1	Luc Ngan	Bien Son	0.1
4	Bac Giang	2	Luc Nam	Nghia Phuong	0.1
5	Thai Nguyen	1	Phu Luong	Phan Me	0.1
5	Thai Nguyen	2	Vo Nhai	Dan Tien	0.4
6	Bac Kan	1	Ngan Son	Thuong Quan	0.7
6	Bac Kan	2	Choi Moi	Nong Ha	0.3
7	Son La	1	Yen Chau	Phieng Khoai	0.5
7	Son La	2	Thuan Chau	Muong Khieng	0.5
8	Lai Chau	1	Muang Lay	Cha To	0.5
8	Lai Chau	2	Dien Bien Dong	Keo Lom	0.7

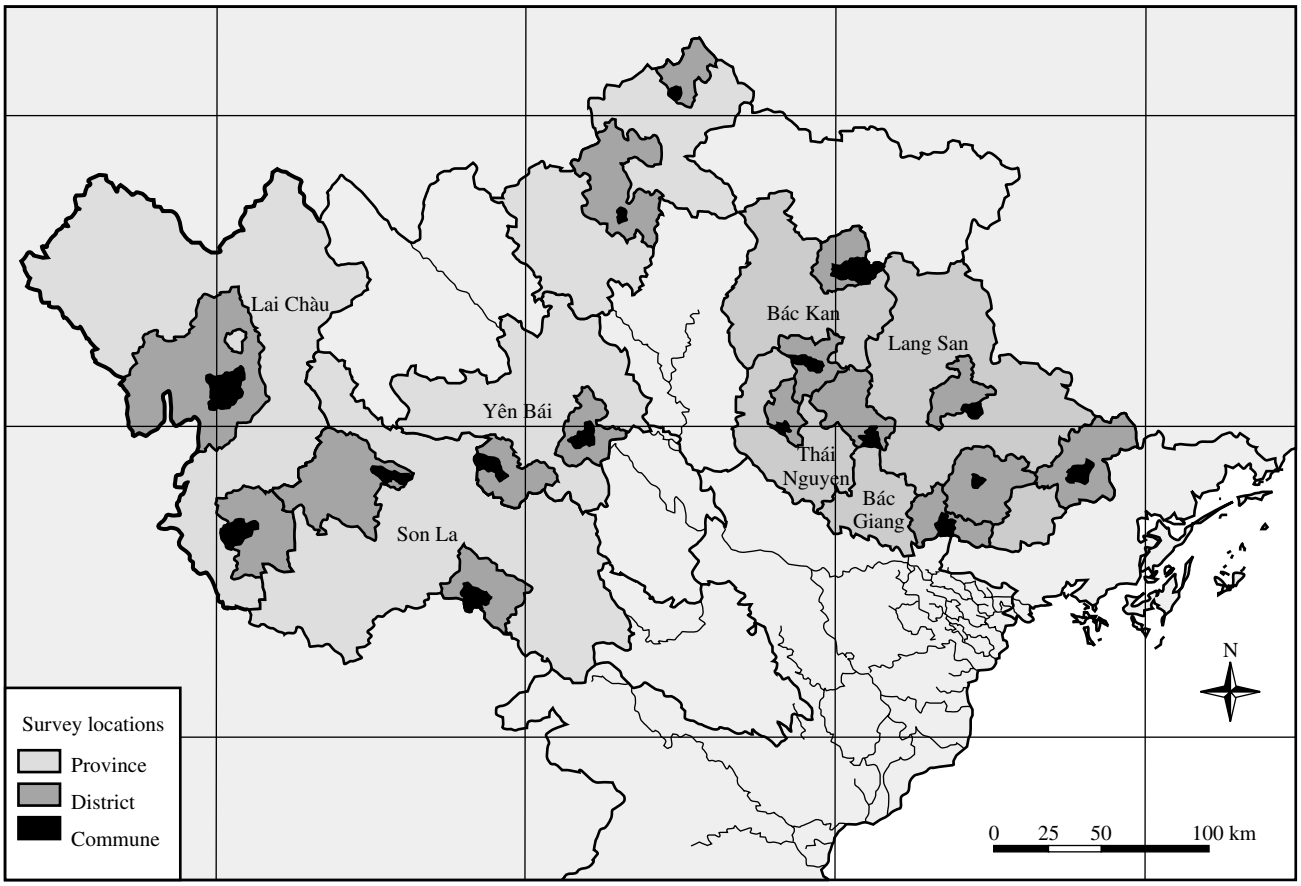
Note: The "hardship factors" are calculated by the Vietnamese government for each commune to determine the hardship allowance paid to government staff posted to rural areas. The hardship factor is based on climate, altitude, accessibility by road, and availability of public services.

While the province, district, and commune selections were made by the survey management before the data collection was launched, the selection of villages and households was carried out by the field teams. Two teams, each consisting of one supervisor and two researchers, carried out the data collection. The teams selected two villages in each of the 16 selected communes for a total of 32 villages. The teams were instructed to select villages that were representative of the commune in terms of income, ethnicity, and level of accessibility. In particular, they were asked to avoid the tendency to visit "model" villages or easily accessed villages.

In the fifth and last stage of the sample, the survey teams selected between 5 and 10 households to interview. The number of households was left open, depending on resource and time constraints, but in practice, the teams were able to interview 10 households in most of the villages. The teams used village leaders to help select households, but they were instructed that the households should be representative of the village in terms of income, ethnicity, and level of accessibility. In particular, the teams were asked to avoid the tendency to oversample households that are richer, more accessible, or Kinh. Overall, 307 households were interviewed. The QSAID survey of local officials used the same provinces, districts, and communes as the household survey. In each province, district, and commune selected, one or two local officials were interviewed. Usually, they were from the Department of Agriculture and Rural Development (DARD) or the Department of Labor, Invalids, and Social Affairs (DOLISA), which are the local offices of the ministries of the same names. Some 90 local officials were interviewed as part of this survey.

The responses to the household survey and the survey of commune leaders were computerized using a data entry program written in MS Access. The program was designed to replicate the layout of the questionnaire and included range checks to minimize data-entry error. The data files were

Figure 3.1 Location of provinces, districts, and communes included in QSAID



Source: Spatial analysis of GIS data from the Center for Remote Sensig & Geomatics.

then converted to Stata for processing and analysis. Because of the relatively small number of provincial and district officials interviewed, their responses were entered into a spreadsheet for more qualitative analysis.

Methods of Analysis

Calculation of Income from the VLSS and VHLSS

Income is calculated from both the VLSS and the VHLSS as the sum of net revenues from the following sources: crop production, agricultural by-products, livestock production, aquaculture, forestry, agricultural processing, nonfarm enterprises, wages, transfers, and other income. The value of crop sales is collected directly from the questionnaire. The value of crop production that is consumed at home is imputed using the reported quantities and the regional average sale price for the commodity in question. Crop production costs, including seed, fertilizer, pesticides, land rental, hired labor, storage, and marketing, are deducted.

Net income from each crop is calculated as the value of production minus the cost of production. The VLSS questionnaire does not allocate some costs (hired labor, equipment rental, and storage), so it was necessary to distribute these costs among the crops in proportion to the value of production of each crop in each household. In the VHLSS crop input costs are collected at the crop category level (e.g., food grains), but

not at the crop level, so we can calculate net income from crops, but not the net income from each crop.

Livestock revenue includes the value of animal sales and home consumption of meat from animals minus the value of animal purchases, plus the sales and home consumption of animal products such as milk and eggs. The home consumption of animal products is calculated from the expenditure section of the questionnaire. In the VLSS questionnaire, the expenses associated with livestock and aquaculture production are combined. To calculate net revenue from livestock and aquaculture production separately, it was necessary to allocate the costs in proportion to the gross value of production of livestock and aquaculture. In this case, the VHLSS is more detailed, collecting livestock and aquaculture expenses separately.

Aquaculture sales, net of the purchase of breeding stock, were collected directly. A small number of households in the 1998 VLSS reported production and aquaculture area, but not the value of sales. For these households, the sales value was imputed using the national average sales per square meter of aquaculture area. The home consumption of fish and seafood, as measured by the expenditure section of the questionnaire, was also included. As described in the preceding text, the VLSS expenses for livestock and aquaculture production were allocated between the two sectors according to the household level gross values. The value of fish caught and sold is apparently not collected in the two VLSS questionnaires (although home consumption of such fish is presumably included in the expenditure section). The VHLSS is more complete in collecting information on income from both aquaculture and capture fisheries.

Net revenue from self-employment by household members in nonfarm enterprises can be calculated in two ways. The VLSS includes detailed questions regarding the gross cash revenue, consumption of enterprise goods and raw materials by household members, and costs associated with the three most important enterprises, as well as simplified questions regarding any other enterprises. From these data, the net enterprise revenue can be calculated. Alternatively, the VLSS also includes a question on the amount of money that the household retains from enterprise earnings after paying for hired labor and other business expenses. This figure can be added to consumption of enterprise goods and raw materials by household members to obtain a different estimate of net enterprise revenue. The average values of these two measures are similar, but the latter measure had fewer extreme values. For this reason, we adopt the second measure in the analysis of the VLSS analysis.[8] In the VHLSS, there is only one way to calculate enterprise income, which is in between the two VLSS methods in terms of complexity.

Wage income is calculated from the VLSS as the sum of annual earnings in wages and bonuses from the main job over the previous 7 days, secondary jobs over the previous 7 days, and (when they are different) the main job over the previous 12 months and secondary jobs over the previous 12 months. The questionnaire collects information on the number of weeks worked, the number of days per week, and the number of hours per day in order to capture seasonal and part-time wage work. The VHLSS employment module is simpler, collecting information on the income from the main job over the past 12 months and the total income from all other wage employment.

Transfers include both private transfers (gifts and remittances) and public transfers (payments from various government programs) over the past 12 months. Other

[8]This method of calculating the net revenue from nonfarm enterprise was used by the General Statistics Office in its analysis of the 1998 VLSS (GSO 2000a, 296).

income includes pensions, lottery winnings, and rental income. The VLSS and VHLSS questionnaires are similar in this area. Revenue from the sale of assets such as buildings, vehicles, gold, or jewelry is not included in our definition of income.

Indicators of Diversification

There are several ways of measuring income diversification using the income data from the VLSS and the VHLSS. In this study, we focus on four distinct but related definitions of income diversification: diversification as multiple sources of income, diversification as commercialization, and diversification into high-value activities. Below, we discuss several indicators of each definition.

Diversification as Multiple Sources of Income. One definition of income diversification relates to the diversity of income sources. The simplest measure is the number of income sources that a household has. Other measures take into account both the number of sources and the balance among them. The Simpson index of diversity is widely used to measure the biodiversity of an ecosystem. The Simpson index of diversity is defined as:

$$SID = 1 - \sum_i P_i^2$$

where P_i is the proportion of organisms that are classified in species *i*. The Simpson index of diversity can also be interpreted as the probability that two randomly selected organisms will be from the same species.[9] Joshi et al. (2003) adapt the Simpson index to compare crop diversification in several South Asian countries. Here, we use it to measure income diversity, interpreting P_i as the proportion of income coming from source *i*. The value of SID always falls between 0 and 1. If there is just one source of income, $P_i = 1$, so SID = 0. As the number of sources increases, the shares (P_i) decline, as does the sum of the squared shares, so that SID approaches 1. If there are *k* sources of income, then SID falls between zero and $1 - 1/k$.

Another index used in studies of biodiversity is the Shannon-Weaver index, defined as:

$$SW = -\sum_i P_i \ln(P_i)$$

where P_i is defined as previously. The Shannon-Weaver index is less sensitive than the Simpson index to the degree of dominance of the largest categories.

Diversification as Commercialization. Diversification is sometimes defined as the process of switching from subsistence production of staple crops to commercial production of a wider range of agricultural commodities and to nonfarm activities. We can identify three measures of commercial diversification. The first measure, crop commercialization, is the proportion of the value of crop production that is sold or bartered. The second, agricultural commercialization, is defined as the share of agricultural output (including crops, livestock, fisheries, and forestry) that is sold or bartered. The third measure is "income commercialization," defined as the proportion of gross income that is in the form of cash income. Subsistence production is dominated by food, so income commercialization is roughly equal to the marketed share of agricultural production multiplied by the share of agriculture in total net income.[10]

[9]The Simpson Index is closely related to the Hirschman–Hirfendal index of concentration. Specifically, SID = 1 – HH/10,000. The Simpson Index is also related to the family of generalized entropy indices. When the generalized entropy index parameter $\beta = 1$, it is equivalent to 1 – SID.

[10]The VLSS surveys collect information on the home consumption of goods or raw materials from a household nonfarm enterprise. The average value of this nonagricultural home consumption is small, however, relative to agricultural home consumption.

Diversification into Nonfarm Activities. Another definition of diversification refers to the process of switching from farming toward nonfarm activities, such as nonfarm enterprises and wage income. The obvious measure of this type of diversification is the share of income from nonagricultural activities.

Diversification into High-Value Activities. Finally, diversification is often used to refer to the process by which farmers switch from low-value crops and activities to higher-value crops and activities. Three measures of diversification into high-value activities are the share of area or income from high-value crops and the percentage of income from noncrop agricultural activities (including livestock, fisheries, and forestry).

Measuring the Contribution of Diversification to Income Growth

The measures of diversification discussed above are static measures in that they quantify the degree of income diversification at one point in time. We are also interested in measuring the *process* of diversification over time. In particular, we would like to measure the contribution of diversification to income growth. If we simply calculate the average value of crop production per hectare at two points in time, we are including the effect of price changes and yield changes to income growth. Thus, to assess the contribution of diversification, it is necessary to develop a way of decomposing income growth into various components, one of which is diversification.

We can measure the contribution of income diversification to income growth by decomposing growth into increases in crop income and increases in other income, then separating crop income growth into four components: changes in yield, changes in real prices, changes in total area sown, and crop diversification, where crop diversification is the effect of reallocating land among crops on income, holding prices, yields, and total area constant.

We start with an expression for total net revenue in terms of crop income and noncrop income. Crop income can be rewritten as the product of the area planted, the average yield, and the average value per kilogram. Area, in turn, can be divided up into total area and the shares allocated to each crop:

$$R = \sum_i A_i Y_i P_i + NCY$$
$$= \left(\sum_i a_i Y_i P_i\right)\sum_i A_i + NCY$$

where

R = crop revenue expressed in Vietnamese dong per year per household
Y_i = yield of crop i expressed in kilograms per sown hectare
P_i = real net income from crop i per unit of output expressed in Vietnamese dong per kilogram
A_i = sown area of crop i expressed in hectares (double-cropped land is counted twice)
a = share of crop area allocated to crop i
NCY = noncrop income expressed in Vietnamese dong per year per household

Next, we take the total derivative of both sides:

$$dR \cong \left(\sum_i a_i Y_i P_i\right) d\left(\sum_i A_i\right)$$
$$+ \left(\sum_i A_i\right) d\left(\sum_i a_i Y_i P_i\right) + dNCY$$

The second term on the right-hand side can be changed from the change in a sum to the sum of changes:

$$dR \cong \left(\sum_i a_i Y_i P_i\right) d\left(\sum_i A_i\right)$$
$$+ \sum_i A_i \sum_i d(a_i Y_i P_i) + dNCY$$

$$dR \cong \left(\sum_i a_i Y_i P_i\right) d\left(\sum_i A_i\right)$$
$$+ \sum_i A_i \sum_i a_i Y_i dP_i + \sum_i A_i \sum_i a_i P_i dY_i$$
$$+ \sum_i A_i \sum_i Y_i P_i da_i + dNCY$$

The five terms on the right-hand side of the equation can be described as follows:

- The first term on the right side represents the change in crop revenue due to the change in total area allocated to crops. The expression $\Sigma_i a_i Y_i P_i$ is the weighted average revenue per hectare, where the weights are the proportion of total area allocated to each crop (a_i).
- The second term on the right side is the change in gross crop revenue attributable to the change in real prices of the crops. The first summation is the total area, while the second represents the change in average gross revenue per hectare due to price changes.
- The third term is the change in gross crop revenue due to changes in yields. The first summation is the total area, while the second is the change in average gross revenue per hectare due to yield increases.
- The fourth term on the right side represents the change in agricultural revenue due to crop diversification, that is, the shift in the allocation of land among crops. Again, the first summation is the total area, while the second is the change in average gross revenue due to shifts in the allocation of land among the crops. This fourth term will be zero if there is no reallocation of land among crops ($da_i = 0$ for all crops). It will also be zero if the revenue per hectare is the same for all crops, since $\Sigma da_i = 0$.
- The fifth term is simply the change in noncrop income. Noncrop activities can be further disaggregated into livestock activities, fishery activities (including aquaculture), forestry, wages, nonfarm enterprise activities, transfers, and other income. These different terms have been combined to simplify the exposition.

Thus, the contribution of crop diversification to overall growth in crop income is measured by calculating the income change that would occur if cropland were reallocated among crops the way it actually was between 1993 and 1998, but yield, prices, and total area remained constant. Dividing both sides of the equation by the overall change in income (dR) will give the proportional contribution of each component to overall growth. Naturally, this decomposition can be carried out for any region, income group, or any other category of households. Unfortunately, this analysis cannot be carried out to explain growth in rural income between 1998 and 2002 because the 2002 VHLSS does not provide information on input use for each crop.[11] Thus, it is not possible to calculate net income for each crop (P_i), which is necessary for the analysis.

In interpreting the results, there are three qualifications that should be kept in mind. First, the decomposition is only approximate because there is an interaction term that reflects, for example, the effect of higher yields on the additional area planted. As a result, the sum of the percentage changes will generally be somewhat less than or somewhat greater than 100 percent. In some cases, when one of the factors changes by a large percentage, the discrepancy can be large.

Second, as mentioned previously, the VLSS questionnaire does not link some inputs (hired labor, equipment rental, and storage costs) to a specific crop, so these costs are allocated in proportion to the value of output. Further, the VLSS does not provide information on the cost of planting tree crops unless they were planted in the year of the survey. Third, for fruit trees and industrial tree crops, the VLSS gives respondents the choice of expressing the total area and the productive area in hectares or in the number of trees. Since the decomposition of crop income relies on area estimates in hectares,

[11]The VHLSS does collect information on the value of each type of input used for each crop category, such as grains and industrial crops, but not for each crop, such as rice or tea.

we need to impute the area of tree crops for households that gave only the number of trees. This was done by estimating the average yield (output per hectare of productive land) based on the responses of those who gave area figures in hectares. For farms that gave only the number of trees, the productive area in hectares was calculated by dividing household output by the average yield for that crop and that region (or using a national average yield if necessary). With information on the productive area and the productive number of trees, the unproductive area was imputed from the number of unproductive trees, assuming that the tree density was the same for productive and unproductive areas.

Measures of Income and Accessibility for the QSAID

The focus of the study is on the role of income diversification in reducing poverty, so we are interested in how the experience of the rural poor differs from that of other rural households. In the QSAID, we did not attempt to collect all the information necessary to estimate income or expenditure directly. Rather, we construct an index of household standard of living based on the characteristics of the education, ethnicity, and sex of the head of household; household size and composition; housing characteristics; and ownership of selected consumer goods. Econometric analysis of the 1998 VLSS is used to generate an equation that predicts per capita expenditure for QSAID household based on these household characteristics (see Appendix for more information).

We use this index of household standard of living to divide the sample into terciles. Although these groups actually represent terciles of estimated per capita consumption expenditure based on household characteristics, we refer to them as "income terciles" or "income groups" for convenience. It should be kept in mind that even the households in the "high-income" tercile are poor by international standards and even compared to other households in Vietnam. Their incomes are "high" only relative to those of other rural households in the Northern Upland region.

Another key variable is accessibility. Access to markets, infrastructure, and urban centers has a large bearing on the opportunities for nonfarm employment, the cost of marketing crops, the cost of obtaining inputs, and the availability of information needed to make economic decisions. In this analysis we use a "hardship factors" calculated by the Vietnamese government to determine the hardship allowance paid to government staff posted to rural areas. The hardship factor is calculated for each commune in the country and is based on "natural factors" such as climate and altitude, as well as on accessibility by road, and availability of services such as schools, health stations, and so on (see Table 3.3).

Table 3.3 Definitions and measures of diversification

Definition of diversification	Measures of diversification
Multiple sources of income	Number of sources of income
	Simpson index of diversity
	Shannon-Weaver index
Commercial orientation	Share of crop output that is sold
	Share of agricultural output that is sold
	Share of net income that is in monetary form
Diversification into nonfarm activities	Share of income from nonfarm activities
High-value activities	Share of households with income from nonstaple crops
	Share of crop area allocated to nonstaple crops
	Share of income from nonstaple crop activities

In the 16 communes where the QSAID Household Survey was carried out, the hardship factor takes five values: 0.1, 0.3, 0.4, 0.5, and 0.7. To create categories with at least 50 households each, we combine the third and fourth hardship categories to create the accessibility variable used in the analysis. More specifically, the accessibility category is 1 (low) if the hardship factor is 0.7, 2 if the hardship factor is 0.5, 3 if it is 0.3 or 0.4, and 4 (high) if the hardship factor is 0.1.

CHAPTER 4

Background on the Northern Uplands

This chapter provides a descriptive background of the Northern Uplands region. The goal is to provide some context that will assist in the interpretation of the results of this study that are presented in subsequent chapters. For the purpose of this report, we define the Northern Uplands to include the provinces in the Northeast and Northwest regions.[12] This region is characterized by:

- Rugged upland terrain. Much of the Northern Uplands consists of hills and low mountains between 500 and 1,000 meters above sea level, but there are mountainous areas above 1,000 meters (Nguyen Trong Dieu 1995).
- Poor infrastructure. According to the 1994 Traffic Survey, the length of asphalted roads in the Northern Upland region was 3,271 kilometers, giving it a road density of 0.032 km/km^2. By comparison, the national average is 0.045 km/km^2 (GSO 1998, 779).
- Low population density. The population density in the Northern Uplands is 111 people/km^2, which is low compared to the national figure of 231 people/km^2.
- A large ethnic minority population. According to the data from the 1998 Vietnam Living Standards Survey (VLSS), 47 percent of the heads of household in the rural areas of the Northern Uplands belong to an ethnic minority. In contrast, the figure for Vietnam as a whole is just 12 percent.
- Low levels of urbanization. According to General Statistics Office (GSO) estimates for 2000, 16 percent of the Northern Upland population lives in urban areas, compared to 23 percent nationally (GSO 2001).
- Importance of the agricultural sector. Agriculture, forestry, and fishing account for about 42 percent of the gross domestic product (GDP) of the Northern Uplands region. For Vietnam as a whole, this sector accounts for just 24 percent of GDP (GSO 2001).
- Widespread poverty. According to the 1998 VLSS, the incidence of poverty was 59 percent in the Northern Uplands, higher than in any other region. The rate for Vietnam as a whole was 37 percent (Joint Working Group 2000).

[12] The number of provinces in the Northern Uplands increased from 13 in 1995 (when it was called the North Mountain and Midlands) to 16 in 1999 (when it was divided into two regions: the Northeast and Northwest). In 2000, two provinces (Vinh Phuc and Bac Ninh) were reclassified as part of the Red River Delta, leaving 14 provinces: 11 in the Northeast (Ha Giang, Cao Bang, Lao Cai, Bac Kan, Lang Son, Tuyen Quang, Yen Bai, Thai Nguyen, Phu Tho, Bac Giang, and Quang Ninh) and 3 in the Northwest (Lai Chau, Son La, and Hoa Binh). In 2004, Lai Chau was split into two provinces (Lai Chau and Dien Bien), but in this report we continue to use the 2003 provincial names.

Behind these generalizations, however, a considerable amount of diversity exists within the region. For example, across provinces, the population density varies from 36 to 395 people/km^2, the per capita GDP varies from less than VND 1.4 million to VND 3.7 million, and the share of agriculture in GDP ranges from less than 10 percent to over 60 percent. Another important point is that, although much of the region is poor, rural, and geographically isolated, this does not imply that the rural economy is stagnant or that the region is being "left behind." In fact, the Northern Uplands is undergoing the same transformations (economic growth, urbanization, commercialization, poverty reduction, etc.) that are occurring elsewhere in Vietnam. Thus, it is important to understand both the diversity within the region and the trends over time. This chapter uses data from various sources to describe the geographic, demographic, and economic diversity of the region. When possible, we present statistics for 1995 and 2000 to demonstrate the changes occurring in the region.

Geography

The Northern Uplands covers about 102,000 square kilometers, representing a little less than one third of the area of Vietnam. It is bordered by China on the north and the Lao P.D.R. to the west and south. The region is bisected diagonally by the Red River (*Song Hong*), which runs from the northwest to the southeast. Running parallel south of the Red River is the Black River (*Song Da*).

Much of the Northern Uplands consists of hills and low mountains with elevations between 500 and 1,000 meters above sea level. The three provinces of the Northern Uplands to the west of the Red River have large areas more than 1,000 meters, particularly in the Hoang Lien Son, a range that runs between the Red River and the Black River. In fact, Fan Si Pan, the highest peak in Vietnam at 3,143 meters above sea level, is in the province of Lao Cai in this range. In the Northeast, the elevations are not as high, but some areas are greater than 1,000 meters. In Figure 4.1, the Red River valley can be seen as a thin line entering Vietnam from the northwest, passing through Lai Chau, Yen Bai, and Phu Tho. The rugged Hoan Lien Son mountain range is visible running parallel to the Red River to the south.

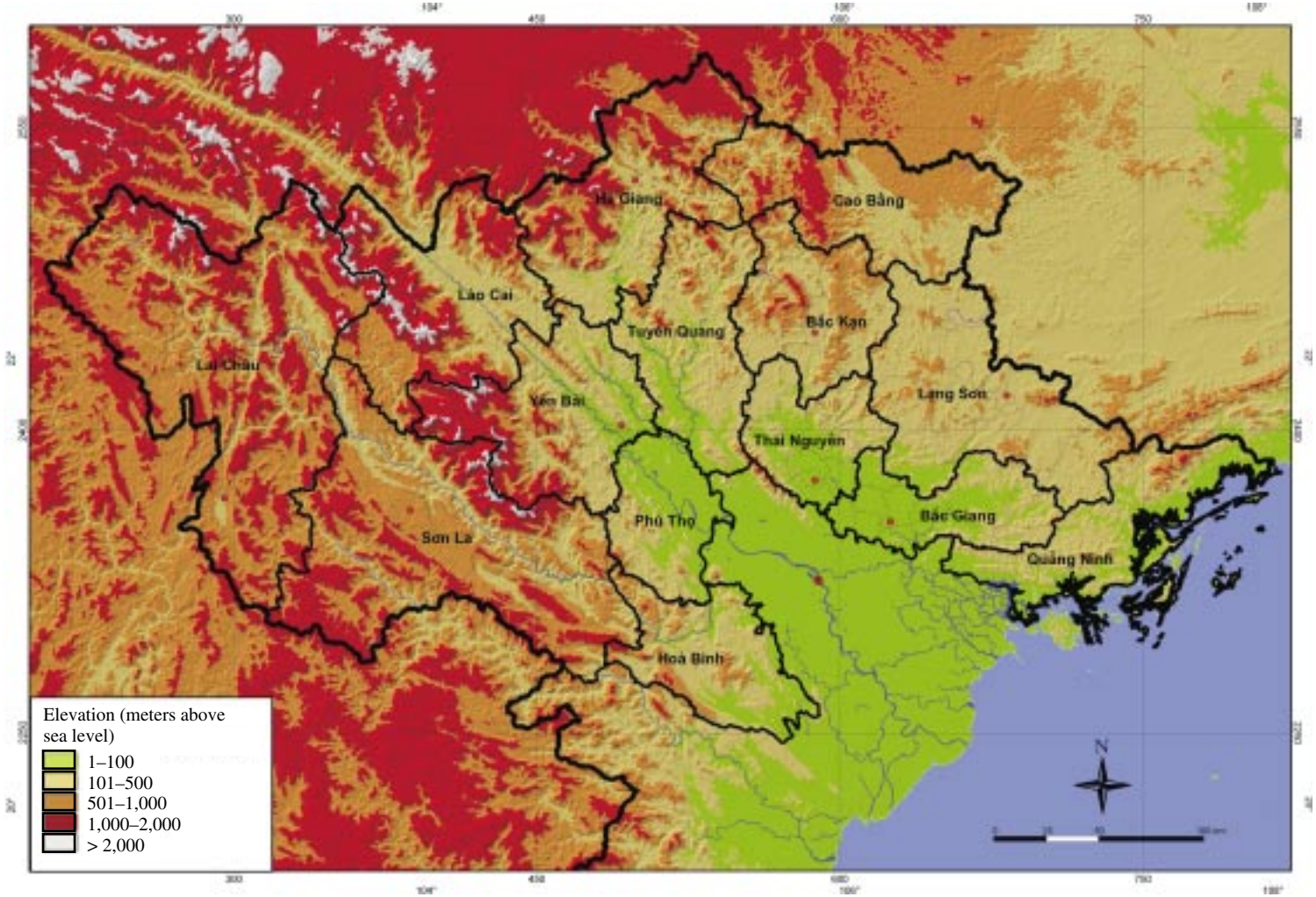
Figure 4.2 maps an index of accessibility based on the time it takes to get to the district capital. The travel time is calculated using assumed fastest possible travel speed, taking into account land cover, road quality, river navigability, the presence of bridges or ferries at the river crossings, and slope. The red and purple zones represent areas with less access (greater travel time to the district headquarters). It is clear that Lai Chau is one of the least accessible provinces in the Northern Uplands, followed by Son La and Lao Cai. Provinces in the Northeast generally have better accessibility.

Population

The region is home to 11.2 million people,[13] giving it a population density of 111 people per square kilometer. As mentioned above, however, there is considerable variation. Four provinces have more than 1 million inhabitants: Bac Giang, Phu Tho, Thai Nguyen, and Quang Ninh. These four are also the most densely populated provinces in the region with 173–395 people per square kilometer. Three of the four are located on the edges of the Red River Delta, with significant lowland areas and relatively good proximity to Hanoi. Quang Ninh is a special case among these provinces because it is on the coast, allowing it to benefit from

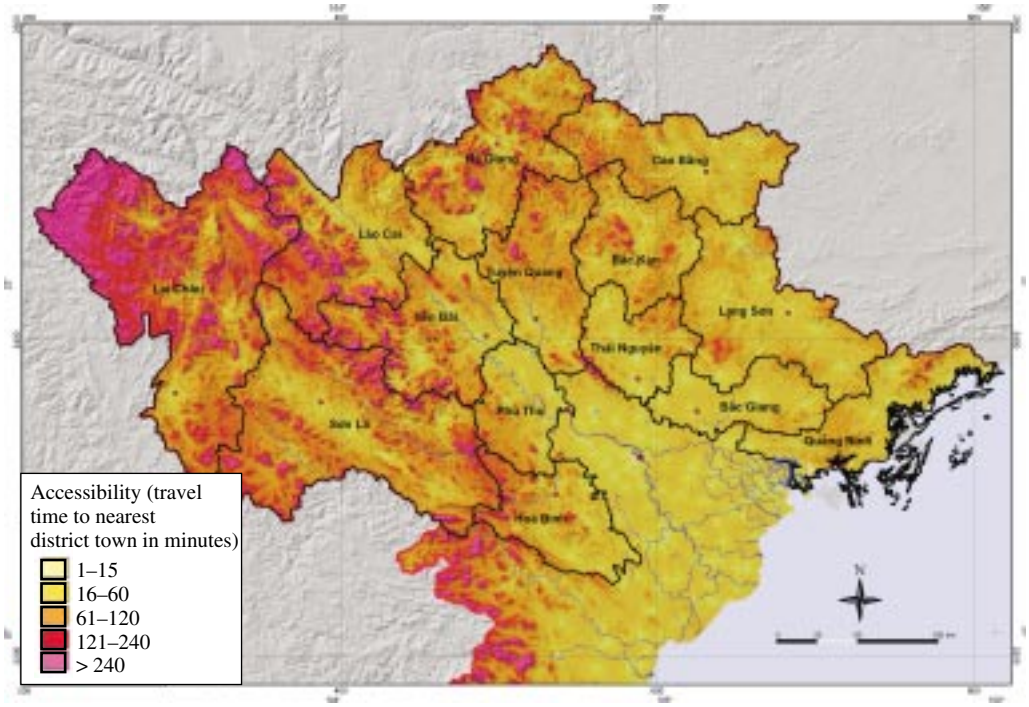
[13] The figures given here are GSO estimates for the year 2000. The estimates are slightly higher than the results of the 1999 Census, which counted 11.1 million people in the 16 provinces considered here.

Figure 4.1 Elevation of the Northern Uplands



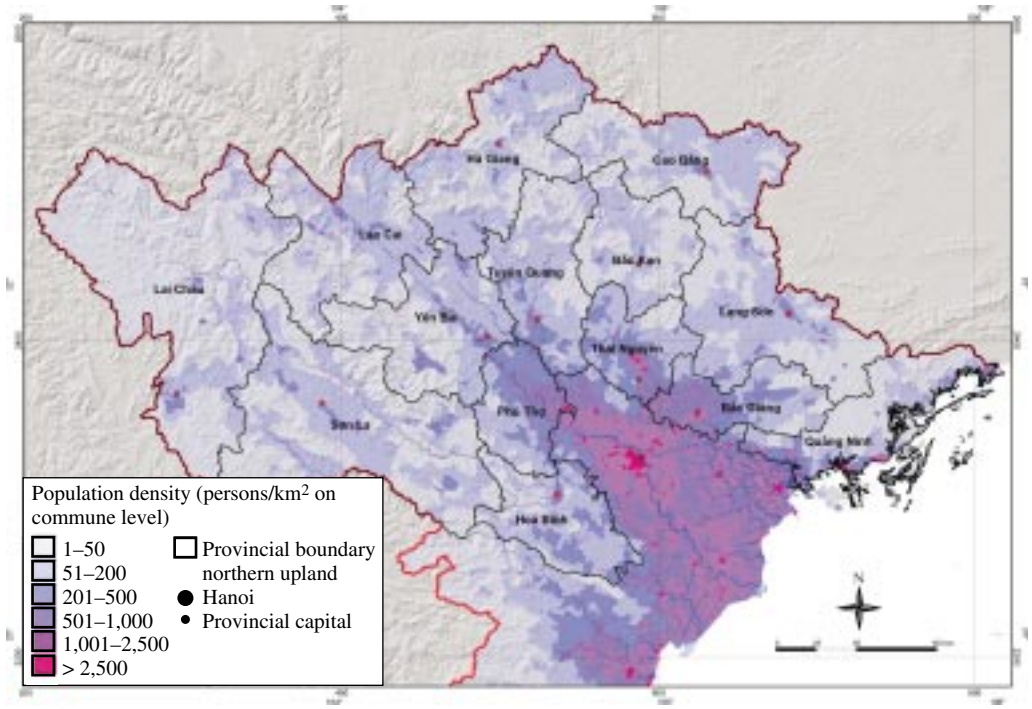
Source: Elevation data from USGS GTOPO30 (2003).

Figure 4.2 Index of accessibility in the Northern Uplands



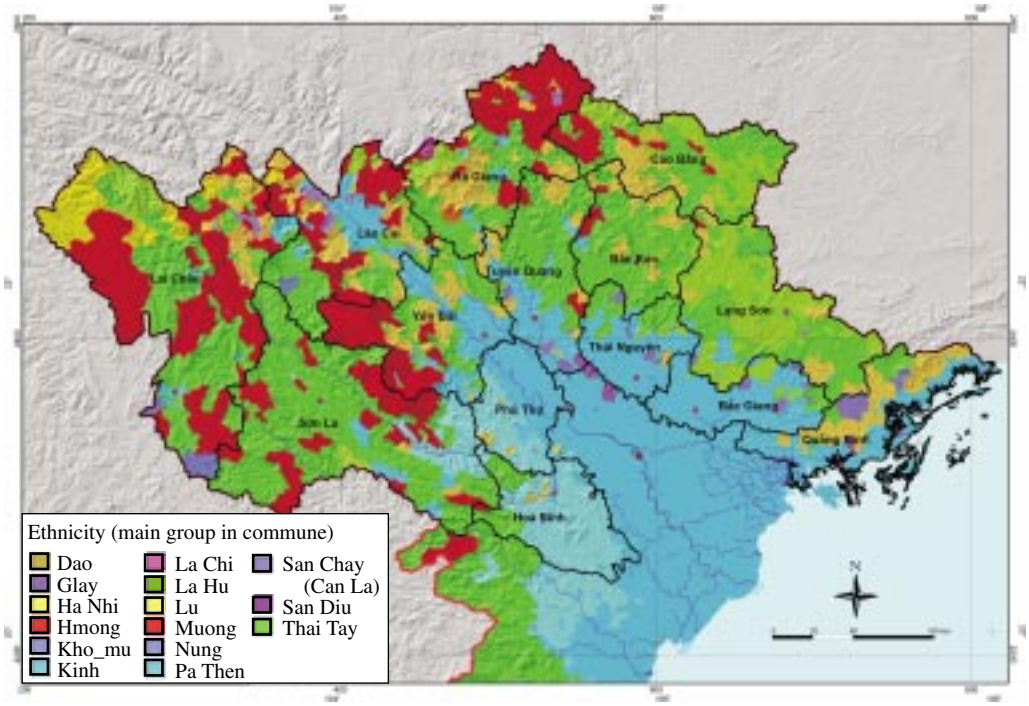
Source: Spatial analysis of GIS data from the Center for Remote Sensing & Geomatics.

Figure 4.3 Population density in the Northern Uplands



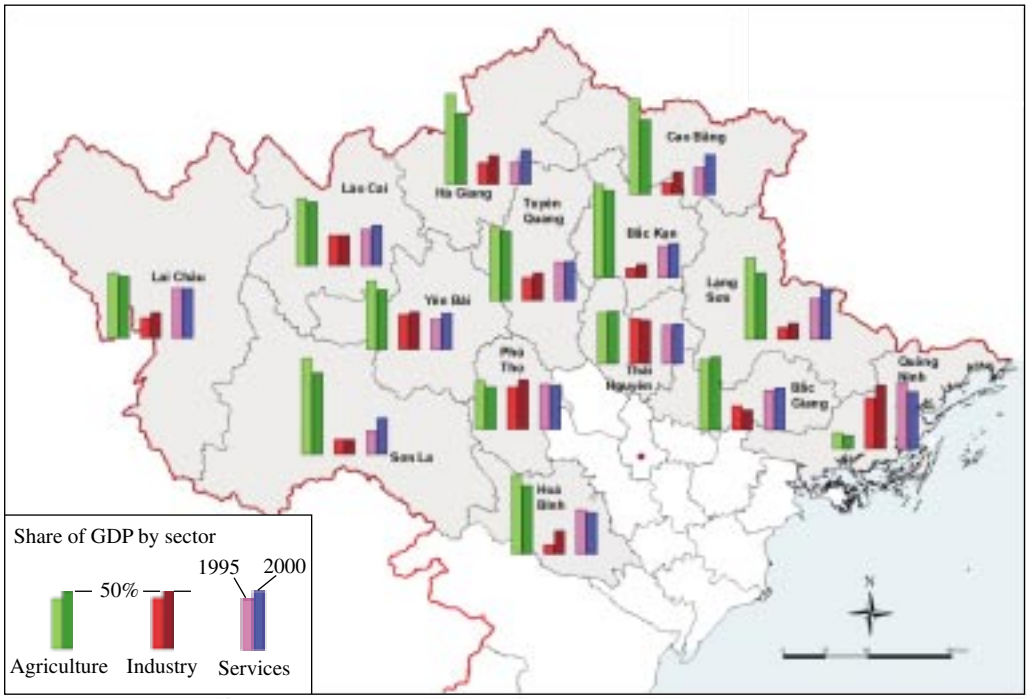
Source: Analysis of data from the 1999 Population and Housing Census.

Figure 4.4 Main ethnic group in each commune of the Northern Uplands



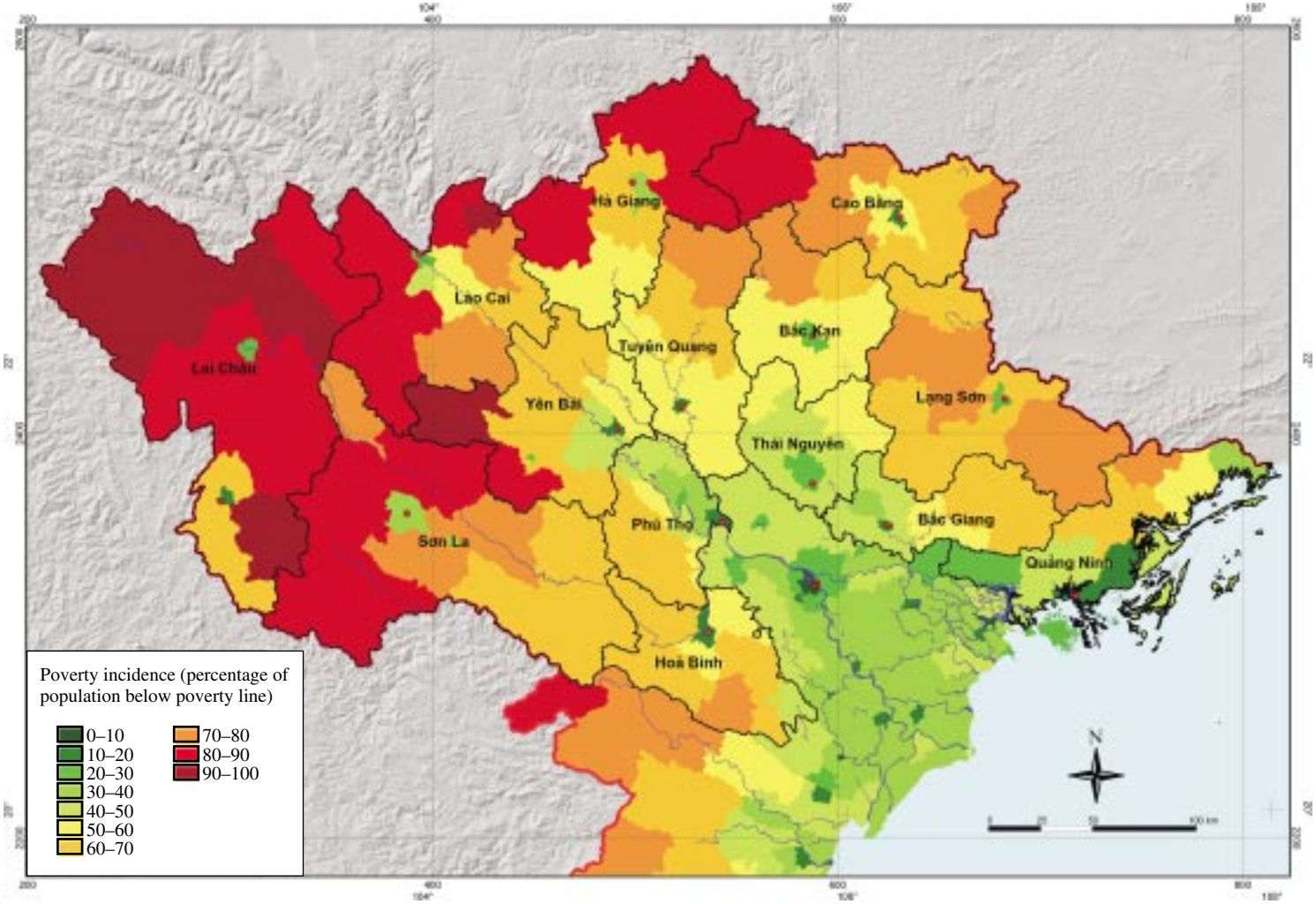
Source: Main ethnic group in each commune of the Northern Uplands.

Figure 4.5 Composition of gross domestic product (GDP) by province in 1995 and 2000



Source: Calculations based on data from GSO (2001).

Figure 4.6 Estimates of the incidence of poverty at the district level



Source: Analysis of the 1999 Population and Housing Census and the 1998 VLSS.

Table 4.1 General indicators for the Northern Uplands by province in 1995 and 2000

Province	Year	Population	Population growth rate	Population density	Agricultural population density	Urban population	GDP per capita	Growth rate in GDP per capita
		(1,000 persons)	(%)	(population km^2)	(rural population/ hectare of crop land)	(%)	(1,000 1994 VND/person)	(%)
Ha Giang	1995	550.3		70	5.00	9	945	
	2000	618.4	2.4	78	4.67	11	1,374	8
Cao Bang	1995	489.2		73	4.99	10	1,202	
	2000	497.4	0.3	74	5.27	13	2,171	13
Lao Cai	1995	550.1		68	6.32	17	1,366	
	2000	613.6	2.2	76	5.85	17	1,556	3
Bac Kan	1995	254.2		52	8.16	13	1,068	
	2000	280.7	2.0	58	6.43	15	1,461	6
Lang Son	1995	679.2		82	7.22	17	1,645	
	2000	710.7	0.9	86	5.32	19	2,436	8
Tuyen Quang	1995	638.8		109	7.21	11	1,379	
	2000	685.5	1.4	117	6.85	9	1,957	7
Yen Bai	1995	647.7		94	7.24	19	1,382	
	2000	691.6	1.3	100	6.22	20	1,938	7
Thai Nguyen	1995	1,005.3		284	7.92	20	1,662	
	2000	1,054.1	1.0	298	6.22	21	1,984	4
Phu Tho	1995	1,211.7		344	8.96	10	1,533	
	2000	1,273.5	1.0	362	7.87	14	2,184	7
Bac Giang	1995	1431		374	6.67	6	1,326	
	2000	1,509.3	1.1	395	6.66	7	1,771	6
Quang Ninh	1995	941.7		160	7.50	43	2,439	
	2000	1,017.7	1.6	173	6.89	44	3,708	9
Lai Chau	1995	535.5		32	4.99	12	1,440	
	2000	613.3	2.8	36	5.12	12	1,614	2
Son La	1995	811.7		58	6.15	13	884	
	2000	906.8	2.2	65	5.05	11	1,369	9
Hoa Binh	1995	718.5		154	6.31	14	1,255	
	2000	767.6	1.3	165	5.77	14	2,033	10
Total Northern	1995	10,464.6		104	6.73	15	1,446	
Uplands	2000	11,240.1	1.4	111	6.06	16	2,030	7
Annual growth		1.4%		1.4%	–2.1%	1.4%	7.0%	

Source: Calculations based on data from GSO (2001).

large fishing, coal mining, and tourism sectors. At the other extreme, Bac Kan has the smallest population (281,000) and Lai Chau, located in the far northwest bordering the Lao People's Democratic Republic and the People's Republic of China, has the lowest population density: 36 people per square kilometer (see Table 4.1). The wide variation in population density is shown graphically in Figure 4.3. In much of the Red River Delta, the density is more than 1,000 people per square kilometer. Outside the delta, the population density falls off quickly to fewer than 200 people per square kilometer.

The agricultural population density, defined as the rural population per hectare of crop land, varies much less. Most provinces have between 5.0 and 7.0 rural inhabitants per hectare of crop land. In addition, while population density of the Northern Uplands has increased, the agricultural population density has fallen owing to the expansion of land under cultivation. Over 1995–2000, the population growth rate for the region as

a whole is estimated at 1.4 percent per year, though it differs widely across provinces. In general, the least densely populated provinces experience the highest growth rates and vice versa. Lai Chau, the most sparsely populated province, has the highest rate of population growth: 2.8 percent per year. Son La, Lao Cai, and Ha Giang, also with low densities, also have growth rates of more than 2 percent. In contrast, the more densely populated provinces bordering the Red River Delta have growth rates in the range of 1–1.5 percent (see Table 4.1).

Overall, 16 percent of the people in the region lived in urban areas in 2000, up slightly from 15 percent in 1995. The degree of urbanization tends to range between 10 and 20 percent across provinces. Quang Ninh is again an exception, with the urban areas accounting for 44 percent of the population. Bac Giang and Tuyen Quang have urbanization rates somewhat below 10 percent (see Table 4.1).

Figure 4.4 shows the main ethnic group in each commune in northern Vietnam. Note that the map indicates the most common ethnic group, but this group does not necessarily constitute a majority of the population in that commune. The map shows that the Kinh (ethnic Vietnamese) are the main group in the Red River Delta region, as well parts of Northern Upland provinces that border the Delta (Bac Giang, Thai Nguyen, Phu Tho, and Hoa Binh). The Tay, the most numerous of the ethnic minorities, live among the Nung in the valleys and plains of Bac Kan, northern Tuyen Quang, and parts of other provinces in the Northeast. The Tay are more similar culturally and economically to the Kinh than many minority groups. The Nung, the second most numerous minority, are concentrated in Lang Son and Cao Bang. The Thai are the main ethnic group in much of Son La province and parts of Lai Chau. The Muong are found in Hoa Binh and parts of Phu Tho and Son La. The Hmong (Meo) are more spread out, living in Son La, Lai Chau, Yen Bai, and northern Ha Giang, often at higher altitudes (above 1,500 meters). The Dao live at middle altitudes (700–1000 meters) and are similarly scattered (Nguyen Trong Dieu 1995).

Economic Structure

As mentioned earlier, the economy of the Northern Uplands relies heavily on the agricultural sector. Agriculture (defined broadly to include crops, livestock, fishing, and forestry) accounts for 24 percent of national GDP, but 42 percent of the GDP in the Northern Uplands. As shown in Table 4.2 and Figure 4.5, agriculture plays a particularly important role in the poorer, more remote border provinces such as Ha Giang, Cao Bang, and Son La, where it represents more than half of GDP. Agriculture plays a smaller role in the higher-income interior provinces close to Hanoi such as Thai Nguyen and Phu Tho, where it accounts for 30–40 percent of GDP. Quang Ninh is the most industrial and the highest-income province in the region. Agriculture in Quang Ninh province accounts for just 9 percent of GDP, while industry and construction (including mining) represents almost half of GDP.

Agriculture

Agricultural Land Use

The figures presented in Table 4.3 indicate that only 15 percent of the land area in the region is under cultivation. Almost half (47 percent) of the total land area is classified as "unused land," which includes large tracts of land that are unusable either because the topography is too rugged, because it is too remote, or because it has been degraded (so-called "barren land"). Another 37 percent of the area is classified as forest land, although this category includes actual forests and areas that are designated to be reclaimed as forest. The share of total land used for cultivation is lowest in Lai Chau (6 percent) and ranges from 11 to 15 percent in the other border provinces. The interior province of Bac Giang is the only province in the region

Table 4.2 Structure of gross domestic product (GDP) in the Northern Uplands by province in 1995 and 2000

Province	Year	Agriculture, forestry, and fishing (%)	Industry and construction (%)	Services (%)	Total (%)
Ha Giang	1995	69	15	16	100
	2000	54	21	25	100
Cao Bang	1995	73	7	19	100
	2000	56	16	29	100
Lao Cai	1995	51	22	27	100
	2000	48	22	30	100
Bac Kan	1995	71	6	23	100
	2000	66	9	25	100
Lang Son	1995	62	8	30	100
	2000	50	11	38	100
Tuyen Quang	1995	56	16	28	100
	2000	52	20	29	100
Yen Bai	1995	52	26	22	100
	2000	45	28	27	100
Thai Nguyen	1995	38	33	28	100
	2000	39	32	29	100
Phu Tho	1995	36	31	33	100
	2000	31	37	32	100
Bac Giang	1995	53	17	29	100
	2000	55	14	31	100
Quang Ninh	1995	11	38	50	100
	2000	9	48	43	100
Lai Chau	1995	49	14	37	100
	2000	46	18	37	100
Son La	1995	73	10	17	100
	2000	62	10	27	100
Hoa Binh	1995	60	6	33	100
	2000	52	17	31	100
Total Northern Uplands	1995	47	22	31	100
	2000	42	26	33	100
Change (percentage points)		–5	+4	+2	

Source: Calculations based on data from GSO (2001).

in which more than 50 percent of the total area is devoted to crop production. In Thai Nguyen and Phu Tho, two other provinces with lowland areas, good access, and a high population density, more than 35 percent of the land area is dedicated to crops.

Agricultural data from the GSO suggest that rice remains the dominant crop in the Northern Uplands, but that the share of crop land allocated to rice is declining. As shown in Table 4.4, from 1995 to 2000, sown rice area[14] declined from 50 percent of the total to 44 percent. Further, this decline can be observed in every province except one (Bac Giang). In Bac Kan and Son La, the percentage of cropland planted with rice declined dramatically, falling by more than 10 percentage points over the five-year period.

[14] "Sown area" adds the areas planted in different seasons, so that one hectare of double-cropped rice is counted as two hectares.

Table 4.3 Land use in the Northern Uplands by province in 1995 and 2000

Province	Year	Total land area	Total cropped area	Cropped area as percentage of total
		(1,000 ha)	(1,000 ha)	
Ha Giang	1995	788	100.2	13
	2000	788	117.9	15
Cao Bang	1995	669	88.2	13
	2000	669	82.1	12
Lao Cai	1995	806	72.3	9
	2000	806	87.1	11
Bac Kan	1995	486	27.1	6
	2000	486	37.1	8
Lang Son	1995	830	78.1	9
	2000	830	108.3	13
Tuyen Quang	1995	587	78.8	13
	2000	587	91.1	16
Yen Bai	1995	688	72.5	11
	2000	688	88.9	13
Thai Nguyen	1995	354	101.5	29
	2000	354	133.8	38
Phu Tho	1995	352	121.7	35
	2000	352	139.2	40
Bac Giang	1995	382	201.6	53
	2000	382	210.9	55
Quang Ninh	1995	590	71.6	12
	2000	590	82.7	14
Lai Chau	1995	1,692	94.5	6
	2000	1,692	105.4	6
Son La	1995	1,405	114.9	8
	2000	1,405	159.7	11
Hoa Binh	1995	466	98	21
	2000	466	114.4	25
Total Northern Uplands	1995	10,096	1,321.0	13
	2000	10,096	1,558.6	15
Annual growth		0.0%	3.4%	

Source: Calculations based on data from GSO (2001).

Other food crops (maize, cassava, and sweet potatoes) show no net change for the region as a whole, but this masks some variation across provinces. Most provinces experienced a small decrease in the share of area allocated to non-rice food crops, but this was offset by large increases in Son La and Bac Kan. In Son La, maize production has grown strongly in recent years to supply the feed industry, which in turn has been stimulated by the growth of urban demand for poultry and pork. The share of cropland allocated to vegetables and beans increased slightly, as did the share of area devoted to tea and coffee (of which tea represents 93 percent), while the share allocated to annual industrial crops fell slightly. But the most noteworthy trend is the growth in the share of cropland devoted to "other crops," which has increased from 6 percent in 1995 to 11 percent in 2000. The largest increase is in the province of Lang Son, along the border with China in the north. The category "other crops" presumably includes fruit trees, other tree crops, and agroforestry plantations. The growth in litchi and longan production for domestic consumption and for export to China probably accounts for the main part of this increase. It should be noted, however, that we have calculated "other crops"

Table 4.4 Allocation of cropped area in the Northern Uplands by province in 1995 and 2000

Province	Year	Rice	Other food crops	Vegetables and beans	Annual industrial crops	Coffee and tea	Other crops	Total
					(% of cropped areas)			
Ha Giang	1995	29	44	8	6	7	6	100
	2000	26	39	9	8	8	9	100
Cao Bang	1995	38	43	3	12	0	4	100
	2000	35	43	5	14	0	4	100
Lao Cai	1995	46	35	8	8	2	1	100
	2000	42	34	4	9	2	9	100
Bac Kan	1995	66	19	4	7	1	3	100
	2000	50	34	4	6	1	6	100
Lang Son	1995	58	21	6	9	1	5	100
	2000	43	18	5	6	1	27	100
Tuyen Quang	1995	51	23	4	13	5	3	100
	2000	49	22	5	14	4	7	100
Yen Bai	1995	53	21	6	4	10	7	100
	2000	45	24	6	4	12	10	100
Thai Nguyen	1995	58	18	7	9	8	0	100
	2000	51	20	6	8	9	6	100
Phu Tho	1995	58	19	7	6	6	4	100
	2000	51	21	7	7	6	8	100
Bac Giang	1995	54	18	6	8	0	13	100
	2000	55	14	8	6	0	17	100
Quang Ninh	1995	63	18	9	8	0	3	100
	2000	59	16	9	5	0	11	100
Lai Chau	1995	50	38	2	6	1	3	100
	2000	49	38	3	6	2	2	100
Son La	1995	38	34	2	12	3	11	100
	2000	26	43	3	10	4	14	100
Hoa Binh	1995	44	28	3	13	3	9	100
	2000	38	32	5	11	2	12	100
Total Northern Uplands	1995	50	27	5	9	3	6	100
	2000	44	27	6	8	4	11	100
Change (percentage points)		–6	0	+1	–1	+1	+5	

Source: Calculations based on data from GSO (2001).

as a residual of total crop area after subtracting the other crop categories.

Grain Production

The falling share of crop land allocated to rice cultivation raises questions about the impact of crop diversification on food security. Are farmers in the Northern Uplands sacrificing food security in pursuit of higher profits from vegetables, tea, and fruit? The question is particularly relevant in light of the fact that the rural Northern Uplands is the poorest region of Vietnam, so food security is clearly an important issue. Table 4.5 shows that the amount of rice land in the Northern Uplands has remained virtually unchanged over the period 1995–2000. Further, a crude measure[15] of rice cropping

[15]Rice cropping intensity is calculated as the sum of sown rice area divided by the area planted with rice in any season. In the absence of data on the latter, we approximate rice intensity as the sum of spring and winter area divided by the larger of the two figures. This represents an upper limit on the true rice cropping intensity.

Table 4.5 Cereal production in the Northern Uplands by province in 1995 and 2000

Province	Year	Rice land	Rice area sown	Rice cropping intensity	Paddy yield	Paddy output	Rice output per capita	Maize output	Maize output per capita
		(1,000 ha)	(1,000 ha)	(ratio)	(tons/ha)	(1,000 tons)	(kg/person)	(1,000 tons)	(kg/person)
Ha Giang	1995	23.5	29.3	1.25	2.80	81.9	98	45.4	83
	2000	23.7	31.2	1.32	3.88	121.0	129	71.3	115
Cao Bang	1995	30.1	33.4	1.11	2.77	92.4	125	55.3	113
	2000	25.2	28.6	1.13	3.10	88.8	118	75.8	152
Lao Cai	1995	26.4	33.1	1.25	2.49	82.5	99	27.7	50
	2000	27.7	36.4	1.31	3.07	111.7	120	38.3	62
Bac Kan	1995	14.4	18.0	1.25	2.81	50.5	131	5.1	20
	2000	13.3	18.6	1.40	3.67	68.3	161	20.3	72
Lang Son	1995	34.6	45.4	1.31	2.83	128.5	125	21.6	32
	2000	33.9	46.9	1.38	3.09	145.0	135	42.8	60
Tuyen Quang	1995	26.4	40.3	1.53	3.32	133.7	138	24.8	39
	2000	26.6	44.5	1.67	4.47	198.9	192	36.6	53
Yen Bai	1995	24.3	38.5	1.58	3.14	120.7	123	9.4	15
	2000	24.8	39.9	1.61	3.77	150.5	144	19.5	28
Thai Nguyen	1995	37.6	59.2	1.57	3.03	179.4	118	10.1	10
	2000	42.7	68.6	1.61	3.89	267.1	167	30.6	29
Phu Tho	1995	35.9	70.2	1.96	2.62	183.6	100	23.9	20
	2000	36.3	71.6	1.97	4.04	289.1	150	42.2	33
Bac Giang	1995	60.4	109.8	1.82	2.62	287.7	133	13.9	10
	2000	64.3	115.0	1.79	4.14	475.6	208	28.9	19
Quang Ninh	1995	28.0	45.1	1.61	2.59	116.7	82	6.0	6
	2000	30.1	48.4	1.61	3.64	176.0	114	12.9	13
Lai Chau	1995	41.9	47.4	1.13	2.13	100.8	124	30.1	56
	2000	45.2	51.9	1.15	2.52	130.7	141	41.0	67
Son La	1995	37.7	43.6	1.16	2.28	99.4	81	45.6	56
	2000	34.8	41.5	1.19	2.49	103.3	75	122.1	135
Hoa Binh	1995	27.1	43.5	1.61	2.96	128.7	118	20.6	29
	2000	26.9	43.4	1.61	3.73	161.9	139	48.7	63
Total Northern Uplands	1995	446.7	656.8	1.47	2.72	1,786.5	113	339.5	32
	2000	454.5	686.5	1.51	3.62	2,487.9	146	631.0	56
Annual growth (%)		0.3	0.9	0.5	5.9	6.8	5.3	13.2	11.6

Source: Calculations based on data from GSO (2001).

intensity suggests that it has increased only slightly, rising from 1.47 to 1.51 over the five-year period.

Combining the changes in rice land and cropping intensity, the sown area of rice increased less than 1 percent per year over the period 1995–2000. Paddy yields, however, have increased from 2.7 tons per hectare in 1995 to 3.6 tons per hectare in 2000, equivalent to an annual growth rate of almost 6 percent. The combined effect of the small increase in sown area and the large increase in yield is that rice production in the Northern Uplands has grown 6.8 percent per year. Per capita rice production has grown from 113 kilogram per person in 1995 to 146 kilogram per person in 2000, an annual growth rate of more than 5 percent. Thus, farmers are not sacrificing rice production to diversify into higher-value crops. Instead, they are moving toward rice self-sufficiency on the basis of higher yields, while allocating any new land to higher-value crops such as vegetables, fruit, and tea.

Maize output has grown even more rapidly, rising 13 percent annually. Son La maize production has increased more than 160 percent over the five-year period, making it the main maize producer in the region. As mentioned earlier, the growing demand for animal feed by poultry and pig producers is driving the demand for maize.

Income and Poverty

According to the GSO, the per capita GDP of the Northern Uplands in 2000 was US$225. The per capita GDP ranged from about US$150 in the border provinces of Ha Giang and Son La to US$410 in Quang Ninh. Except for Quang Ninh, no other province has a per capita GDP higher than US$280. By comparison, the per capita GDP for Vietnam as a whole was US$390 in 2000.

Although the Northern Upland region is significantly poorer than the national average, it has experienced rapid economic growth. Between 1995 and 2000, per capita GDP in the region grew 7.0 percent per year. This growth rate is greater than that of Vietnam as a whole, whose per capita real GDP grew at 5.3 percent over 1995–2000. The slowest growing provinces over this period were Lao Cai and Lai Chau, whose economies grew at 2–3 percent per year in per capita terms. Since these are some of the most remote regions, one might assume that there is a relationship between proximity to Hanoi and the growth rate. In fact, the relationship is not very clear. The fastest growing province in the region is Cao Bang, along the border with China in the north and other border-provinces, such as Ha Giang and Son La, registered growth rates above the regional average (see Figure 4.5).

This economic growth has been reflected in falling poverty rates. According to the 1993 VLSS, 79 percent of the Northern Upland population lived below the poverty line. Five years later, the 1998 VLSS, using an almost identical questionnaire and sampling method, found the incidence of poverty in the Northern Uplands had fallen to 59 percent. For the country as a whole, the incidence of poverty is estimated to have fallen from 58 percent in 1993 to 37 percent in 1998 (Joint Working Group 2000).

District-level poverty rates were estimated by combining data from the 1998 VLSS and the 1999 Population and Housing Census using a method called small-area estimation (see Elbers, Lanjouw, and Lanjouw 2003). The VLSS data were used to estimate econometrically the relationship between per capita expenditure and various household characteristics including size and composition of the household, housing characteristics, ownership of consumer durables, type of water source, type of toilet, and region. This relationship is then applied to the same household characteristics taken from the 1999 census (see Minot, Baulch, and Epprecht 2003 for more details). The results indicate that poverty is more widespread in the more remote districts, particularly those along the Lao and Chinese border. Closer to Hanoi and to the Red River Delta, the incidence of poverty is lower (see Figure 4.6).

As shown in Table 4.6, the highest incidences of poverty were found in the border provinces of Lai Chau, Ha Giang, Son La, Lao Cai, and Cao Bang, where more than two thirds of the population lives below the poverty line. According to this analysis, these five provinces are not just the poorest in the Northern Uplands, but the poorest in the country.[16] The least poor province in the Northern Uplands is Quang Ninh, whose poverty rate is just 35 percent. Quang Ninh is the only coastal province in the Northern Uplands and has large mining, fishing, and tourism sectors. Thai Nguyen, Phu Tho, and Bac Giang also have poverty rates below

[16] The 95 percent confidence interval of these estimates is ± 6–8 percent, so we cannot say with confidence that, for example, Lai Chau is poorer than Son La.

Table 4.6 Gross domestic product (GDP) per capita and estimated poverty

Province	GDP per capita 1995	GDP per capita 2000	Annual growth rate in GDP per capita 1995–2000	Estimated incidence of poverty 1999
	(2002 US$/person)		(%)	(%)
Ha Giang	105	152	8	75
Cao Bang	133	240	13	67
Lao Cai	151	172	3	70
Bac Kan	118	162	6	60
Lang Son	182	270	8	62
Tuyen Quang	153	217	7	57
Yen Bai	153	214	7	57
Thai Nguyen	184	220	4	43
Phu Tho	170	242	7	45
Bac Giang	147	196	6	46
Quang Ninh	270	410	9	35
Lai Chau	159	179	2	80
Son La	98	151	9	73
Hoa Binh	139	225	10	59
Total Northern Uplands	160	225	7.0	60

Source: GDP expressed in 1994 Vietnamese dong from GSO (2001). Converted to 1994 dollars using the official exchange rate of 10,966 VND/US$ and to 2002 dollars using the U.S. CPI ratio of 1.21 (World Bank 2004). Poverty estimates from Minot, Baulch, and Epprecht (2003).

50 percent, presumably as a result of their proximity to Hanoi and the large percentage of the area in the lowlands (see Table 4.6).

Summary

The topography of the Northern Uplands is hilly to mountainous, with altitudes typically between 500 and 1,000 meters but with some mountainous areas with peaks above 3,000 meters. The infrastructure is poor, leading to communities being relatively isolated from the rest of the economy. Approximately 11 million people live in the region, resulting in a low population density (111 people per square kilometer) compared to the country as a whole (231 people per square kilometer). Approximately half the population is a member of an ethnic minority, compared to just 12 percent nationally. The region is less urbanized and more dependent on the agricultural sector than other regions of Vietnam. The incidence of poverty is probably highest in the Northern Uplands, though some studies rank the North Central Coast and the Central Highlands as equally poor.

Nonetheless, there is considerable diversity across the Northern Uplands. The topography is highest and most rugged in Lai Chau, Lao Cai, and Son La, while provinces adjacent to the Red River Delta have significant lowland areas. The infrastructure is better and the population density is much higher in the provinces near the delta such as Thai Nguyen, Bac Giang, and Phu Tho. Although ethnic minorities dominate in most of the Northern Uplands, Kinh are the main ethnic group in large areas of Thai Nguyen, Bac Giang, Phu Tho, and Quang Ninh. The level of urbanization varies from 7 percent in Bac Giang to 44 percent in Quang Ninh. Similarly, the incidence of poverty varies widely, being greatest in the border provinces such as Lai Chau, Ha Giang, and Son La and lowest in Quang Ninh and provinces adjacent to the Delta.

Some general trends in the Northern Uplands can be identified by comparing statis-

tics for 1995 and 2000. Although the agricultural sector is growing rapidly (6 percent per year), the agricultural share of GDP has fallen from 47 percent to 42 percent during this period. The area allocated to rice has been almost unchanged over this period, but rice production per capita has grown significantly as a result of rising yields and, to a lesser extent, cropping intensification. The data suggest that the Northern Uplands is poorer than the rest of the country, both in terms of per capita GDP and the incidence of poverty. Among the Northern Upland provinces, poverty is greatest in the remote provinces along the Chinese and Lao border and lowest in the provinces bordering the Red River Delta. In spite of the high level of poverty, the region has grown rapidly: real GDP grew 7 percent per year over 1995–2000, exceeding the growth rate for the country as a whole.

CHAPTER 5

Patterns and Trends in Diversification

This chapter examines the patterns in income diversification across regions and different types of households and the trends in income diversification over the last decade. The analysis relies mainly on the results of three nationally representative household surveys: the 1993 Vietnam Living Standards Survey (VLSS), the 1998 VLSS, and the 2002 Vietnam Household Living Standards Survey (VHLSS), although where possible we also refer to secondary data from the General Statistics Office (GSO) of Vietnam.

As described in Chapter 2, diversification has been defined in at least four ways: income diversity, diversification into commercial activities, diversification into nonfarm activities, and diversification into high-value activities. This chapter is divided into four sections, each of which describes the patterns and trends in one definition of diversification.

Diversification as Multiple Sources of Income

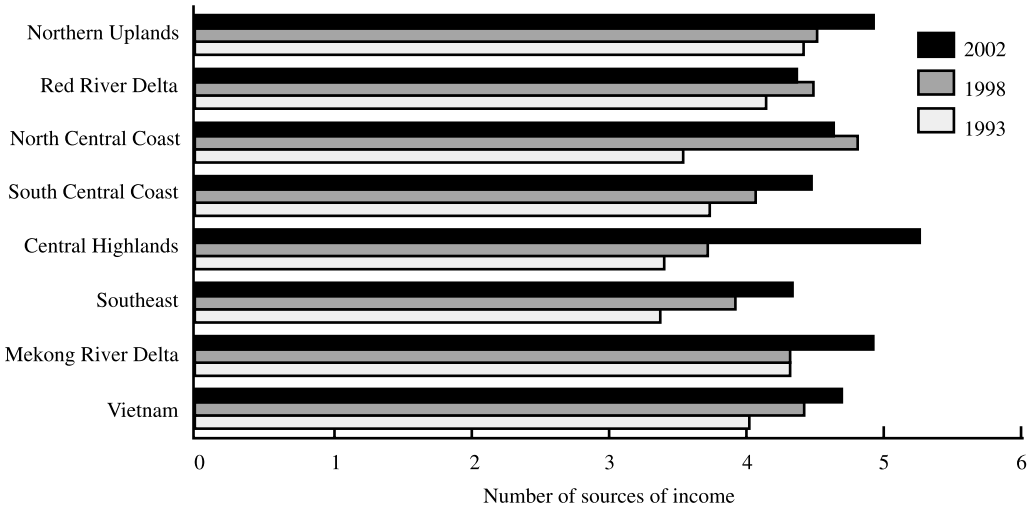
How diverse are the income sources of rural households in the Northern Uplands and is this diversity increasing over time? In this section, we consider both the diversity in broad income categories and diversity in crop production.

Diversity in Sources of Income

To examine the diversity of income sources, household income is divided into eight categories: crop income, livestock income, fisheries income, forestry income, nonfarm enterprise income, wages, transfers, and other income. The simplest measure of income diversity is the average number of income sources (of the eight listed here) that households have. According to the VLSS, rural households in the Northern Uplands had an average of 4.43 sources of income in 1993, 4.53 sources in 1998, and 4.97 in 2002. These represent small but statistically significant increases. The Simpson Index of Diversity and the Shannon–Weaver index take into account both the number of activities and the balance among them (see Chapter 3 for definitions). These two indices are roughly constant in 1993 and 1998, but increase markedly in 2002. In other words, rural households in the Northern Uplands show a tendency to increase the number of sources of income and the balance of income among sources. As shown later, this is largely due to the declining dominance of crop income. The three indicators tend to increase over time in the other regions of Vietnam (see Figure 5.1).

Comparing the indicators across regions, it is interesting to note that, according to most indicators in most years, the income sources of households in the Northern Uplands are more diverse than in any other region. The least diverse livelihood patterns are found in the Southeast (see Table 5.1). Given that the Northern Uplands is the poorest region in Vietnam and the Southeast is the most urbanized and the least poor, these results are consistent with the idea that diverse rural incomes are associated with poor households that diversify to reduce risks

Figure 5.1 Trends in the number of income sources by region



Source: Analysis of data from 1993 VLSS, 1998 VLSS, 1998 VLSS, and 2002 VHLSS.

associated with fluctuations in income from any given source. Being more isolated from the market, households in the Northern Uplands may have a larger number of activities to meet the diverse consumption needs of the family. Finally, since irrigation is less common in the Northern Uplands, households there are more likely to have an off-season when nonagricultural activities can be used to supplement their income.

Given the regional patterns, we might expect greater income diversity among lower-income than among higher-income households. In fact, the pattern is more complex. In 1993 and 1998, diversity showed an inverted U-shape when plotted against income,[17] while in 2002 diversity is relatively constant over the lower quintiles, but drops in the richest quintile. It should be kept in mind, however, that the differences are modest, with the number of income sources ranging from 3.8 to 4.7 across all categories of households (see Table 5.2).

Finally, urban households have much less diverse livelihoods than rural households. For example, in 1998, rural households had an average of 4.4 activities while urban households had just 2.9 activities. Similar patterns can be observed in the 1993 and 2002 data and for the other two indicators of income diversity (see Table 5.3). Part of the explanation is that rural households tend to be larger than urban households, so the greater heterogeneity in skills will contribute to more diverse income sources. It should be noted, however, that this may also be partly a result of the way we classified income sources. Agricultural income is divided into four categories (crops, livestock, fisheries, and forestry), while activities that are common in urban areas are grouped in two categories (nonfarm enterprise income and wage income).

Diversity in Crop Production

Within the agricultural sector, we can measure diversity in terms of the number of different crops grown. We calculated the number of crops grown by different types of rural farm households out of the 45 crops

[17] The "income" categories are actually quintiles of per capita consumption expenditure. The quintiles are defined separately for each year, so that the first quintile has the poorest 20 percent of the households for that year.

Table 5.1 Measures of diversity in income sources in rural areas by region in 1993, 1998, and 2002

Year and region	Number of income sources	Simpson Index of Diversity	Shannon–Weaver Index
1993			
Northern Uplands	4.43	0.49	0.89
Red River Delta	4.16	0.48	0.85
North Central Coast	3.57	0.45	0.77
South Central Coast	3.74	0.40	0.69
Central Highlands	3.41	0.31	0.54
Southeast	3.36	0.37	0.63
Mekong River Delta	4.31	0.43	0.76
Total	4.02	0.44	0.78
1998			
Northern Uplands	4.53	0.49	0.88
Red River Delta	4.50	0.49	0.88
North Central Coast	4.82	0.52	0.96
South Central Coast	4.08	0.47	0.84
Central Highlands	3.72	0.36	0.63
Southeast	3.92	0.39	0.68
Mekong River Delta	4.30	0.40	0.73
Total	4.41	0.46	0.83
2002			
Northern Uplands	4.97	0.59	1.14
Red River Delta	4.37	0.56	1.02
North Central Coast	4.65	0.59	1.11
South Central Coast	4.49	0.54	1.01
Central Highlands	5.21	0.53	1.02
Southeast	4.36	0.48	0.89
Mekong River Delta	4.91	0.52	0.99
Total	4.67	0.55	1.04

Source: Analysis of the 1993 and 1998 VLSS and the 2002 VHLSS.

for which the three surveys provide information (households without crop production were excluded from these calculations). Among crop-producing households in the rural Northern Uplands, the average number of crops grown is more than eight. In contrast, the rural average is five or six crops. The average number of crops grown is smallest (indicating crop specialization) among rural households in the Southeast and Mekong River Delta. For example, in the Mekong Delta in 2002, the average farm household produced just 2.6 crops (see Table 5.4). This is similar to the regional patterns observed in the diversity of income sources. There is no clear trend over time, with crop diversity increasing over 1993–1998 and decreasing over 1998–2002.

Looking at cropping patterns across income groups, it is apparent that the number of crops declines among high-income farm households. For example, in 2002 the poorest quintile grows an average of 5.7 crops, while the richest grows 3.8 crops. Presumably, poor farmers grow a wide variety of crops to meet household needs and reduce production risk while higher-income farmers are somewhat more likely to specialize (see Table 5.5).

Diversification as Commercialization

Diversification is sometimes defined as the process of moving from food crops for own consumption to producing goods and ser-

Table 5.2 Measures of diversity in income sources in rural areas by expenditure category in 1993, 1998, and 2002

Year and expenditure category	Number of income sources	Simpson Index of Diversity	Shannon–Weaver Index
1993			
Poorest	3.82	0.43	0.74
2	3.92	0.44	0.77
3	4.20	0.46	0.81
4	4.17	0.47	0.82
Richest	4.05	0.42	0.76
Total	4.02	0.44	0.78
1998			
Poorest	4.26	0.45	0.81
2	4.51	0.47	0.85
3	4.56	0.48	0.86
4	4.47	0.47	0.84
Richest	4.09	0.43	0.78
Total	4.41	0.46	0.83
2002			
Poorest	4.69	0.58	1.08
2	4.65	0.57	1.07
3	4.71	0.56	1.04
4	4.69	0.53	1.00
Richest	4.57	0.50	0.93
Total	4.67	0.55	1.04

Source: Analysis of the 1993 and 1998 VLSS and the 2002 VHLSS.

vices for sale. In this section, we examine patterns and trends in commercialization using three indicators:

- Crop commercialization is defined as the value of crop sales divided by the gross value of crop production.
- Agricultural commercialization is defined as the sales of crops, animal

Table 5.3 Measures of diversity in income sources in rural and urban areas in 1993, 1998, and 2002

Year and residence	Number of income sources	Simpson Index of Diversity	Shannon–Weaver Index
1993			
Rural	4.02	0.44	0.78
Urban	2.90	0.35	0.58
Total	3.79	0.42	0.74
1998			
Rural	4.41	0.46	0.83
Urban	2.91	0.33	0.55
Total	4.05	0.43	0.77
2002			
Rural	4.67	0.55	1.04
Urban	4.34	0.49	0.90
Total	4.65	0.55	1.03

Source: Analysis of the 1993 and 1998 VLSS and the 2002 VHLSS.

Table 5.4 Measures of diversity in crop production by region in 1993, 1998, and 2002

Year and region	Number of crops grown	Simpson Index of Diversity	Shannon–Weaver Index
1993			
Northern Uplands	8.02	0.50	1.06
Red River Delta	6.00	0.33	0.71
North Central Coast	5.77	0.45	0.92
South Central Coast	3.98	0.46	0.65
Central Highlands	5.15	0.45	0.83
Southeast	3.29	0.30	0.50
Mekong River Delta	4.27	0.34	0.60
Total	5.55	0.39	0.76
1998			
Northern Uplands	8.44	0.56	1.19
Red River Delta	6.22	0.37	0.77
North Central Coast	7.77	0.53	1.13
South Central Coast	4.23	0.40	0.74
Central Highlands	4.71	0.37	0.68
Southeast	4.10	0.36	0.62
Mekong River Delta	3.29	0.28	0.43
Total	6.00	0.42	0.84
2002			
Northern Uplands	8.17	0.53	1.13
Red River Delta	4.70	0.28	0.59
North Central Coast	6.60	0.45	0.96
South Central Coast	3.56	0.30	0.58
Central Highlands	6.50	0.42	0.84
Southeast	3.04	0.30	0.51
Mekong River Delta	2.58	0.18	0.30
Total	5.06	0.34	0.69

Source: Analysis of the 1993 VLSS, the 1998 VLSS, and the 2002 VHLSS.

products, fish, and forest products divided by the gross value of production of crops, livestock, fisheries, and forest products.

- Income commercialization is defined as the value of sales of farm and nonfarm products services divided by the gross value of farm and nonfarm production.

In each case, the numerator refers only to monetary income, while the denominator includes both monetary income and the value of non-cash income.

Table 5.6 shows the three measures of commercialization by region for 1993, 1998, and 2002. Rural households in the Northern Uplands sell a relatively small portion of their crop output, just 34 percent in value terms based on the 2002 VHLSS. The commercial share of crop production in the Northern Uplands is similar to the share in the Red River Delta and the North Central Coast. In contrast, the marketed share of crop production is over 70 percent in the Central Highlands, the Southeast, and the Mekong Delta.[18]

[18] These percentages are calculated as the sum of sales divided by the sum of output, giving greater weight to households with greater output. If the percentage is calculated as the average of the household-level percentages, the marketed share is smaller. For example, the marketed share of crop production in Vietnam in 2002 would be 43 percent using this method of calculation, rather than 61 percent as reported in the table.

Table 5.5 Measures of diversity in crop production by expenditure category in 1993, 1998, and 2002

Year and expenditures	Number of crops grown	Simpson Index of Diversity	Shannon–Weaver Index
1993			
Poorest	5.35	0.39	0.76
2	5.96	0.41	0.80
3	5.92	0.40	0.78
4	5.32	0.38	0.73
Richest	4.91	0.38	0.71
Total	5.55	0.39	0.76
1998			
Poorest	6.38	0.48	0.97
2	6.34	0.43	0.87
3	5.85	0.40	0.80
4	5.66	0.39	0.75
Richest	5.52	0.40	0.77
Total	6.00	0.42	0.84
2002			
Poorest	5.73	0.41	0.84
2	5.44	0.36	0.74
3	5.00	0.32	0.65
4	4.47	0.29	0.58
Richest	3.80	0.27	0.52
Total	5.06	0.34	0.69

Source: Analysis of the 1993 VLSS, the 1998 VLSS, and the 2002 VHLSS.

About half the agricultural output of the rural Northern Uplands is marketed and more than two thirds of total income is in the form of cash, according to the 2002 VHLSS. The southern regions tend to be even more commercially oriented. About 85 percent of the agricultural output of the Southeast and Mekong Delta is marketed, as is 90 percent of the income in these regions.

In general, rural households are becoming more commercialized over time. For example, the marketed share of crop production in the rural Northern Uplands has increased from 22 percent in 1993 to 34 percent in 2002 (though most of this increase occurred in the 1993–98 period). For the country as a whole, the share rose from 40 percent in 1993 to 61 percent in 2002. The fact that the marketed share of crop output in the Central Highlands fell between 1998 and 2002 may reflect the drop in the world prices of coffee, reducing the value of sales relative to subsistence food crop production (see Figure 5.2 and Table 5.6).

Looking at the patterns of commercialization across income categories, it is evident that commercialization is higher among higher income rural households. For example, the share of crop production that is commercialized rises from 40 percent among the poorest rural households to 79 percent among the highest income category, according to the 2002 VHLSS.

The rise in commercialization over time appears to occur at all income levels. Even the poorest rural households have experienced an increased degree of crop commercialization between 1993 and 2002. In fact, the proportional increase in crop commercialization is similar between the poorest quintile and the richest quintile. While it is true that the poor participate less in the market economy, their degree of commercialization is rising as much as that of their higher income neighbors (Table 5.7).

Table 5.6 Measures of commercialization by region in 1993, 1998, and 2002

	Share of output that is sold (%)		
Year and region	**Crop output**	**Agricultural output**	**Total income**
1993			
Northern Uplands	22	36	68
Red River Delta	23	39	81
North Central Coast	22	37	74
South Central Coast	23	39	85
Central Highlands	78	77	92
Southeast	65	69	93
Mekong River Delta	56	59	88
Total	40	48	84
1998			
Northern Uplands	33	44	75
Red River Delta	29	45	88
North Central Coast	30	44	80
South Central Coast	46	55	86
Central Highlands	78	78	88
Southeast	77	79	95
Mekong River Delta	74	74	91
Total	54	59	87
2002			
Northern Uplands	34	52	71
Red River Delta	34	61	83
North Central Coast	38	63	82
South Central Coast	53	73	91
Central Highlands	74	74	80
Southeast	88	84	89
Mekong River Delta	84	85	91
Total	61	70	84

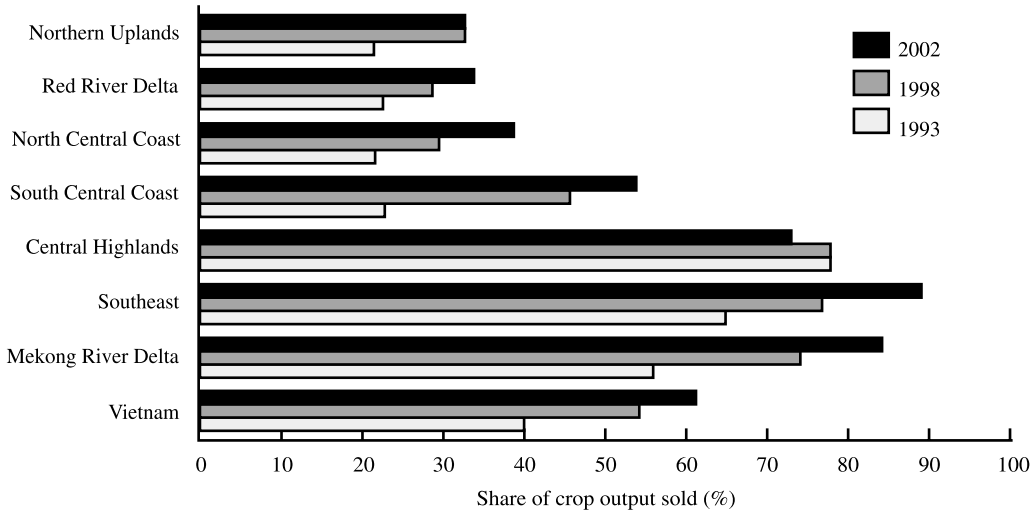
Source: Analysis of the 1993 and 1998 VLSS and the 2002 VHLSS.

Diversification into Nonagricultural Activities

The term "income diversification" is sometimes used to refer to the transition from relying almost entirely on agriculture to having significant nonagricultural income. Unlike the previous indicators of diversification, this process can be measured using both aggregate statistics from the GSO and household survey data. GSO statistics give us information on the share of gross domestic product (GDP) generated outside the agricultural sector, defined broadly to include crops, livestock, fishing, and forestry. Overall, the nonagricultural share of GDP has increased from 53 to 58 percent in the Northern Uplands over 1995–2000. This increase occurred in 12 of the 14 provinces in the region (see Table 5.8). Figure 5.3 plots the changes in the contribution of agriculture to GDP against changes in GDP per capita. Provinces with higher income tend to have a smaller agricultural component, but almost all provinces show both economic growth and declining share of agriculture, consistent with gradual structural transformation of the economy.

Although the share of agriculture in GDP has declined in the Northern Uplands, the household surveys do not show any decline in the importance of agriculture to rural households over 1993–2002. The share of

Figure 5.2 Share of crop output sold by region and by year



Source: Analysis of the 1993 and 1998 VLSS and the 2002 VHLSS.

Table 5.7 Measures of commercialization by expenditure quintile in 1993, 1998, and 2002

Year and expenditure category	Share of output that is sold (%)		
	Crop output	Agricultural output	Total income
1993			
Poorest	29	38	72
2	31	42	74
3	39	48	82
4	44	52	86
Richest	56	61	92
Total	40	48	84
1998			
Poorest	37	44	69
2	47	54	79
3	52	57	84
4	62	67	89
Richest	72	74	96
Total	54	59	87
2002			
Poorest	40	54	70
2	52	64	78
3	62	71	83
4	70	77	89
Richest	79	84	93
Total	61	70	84

Source: Analysis of the 1993 and 1998 VLSS and the 2002 VHLSS.

Table 5.8 Measures of income diversification in the Northern Uplands by province in 1995 and 2000

Province	Year	Nonagricultural GDP as percentage of total	Non-rice area as percentage of crop area	Nonfood area as percentage of crop area
Ha Giang	1995	31	71	27
	2000	46	74	34
Cao Bang	1995	27	62	19
	2000	44	65	22
Lao Cai	1995	49	54	20
	2000	52	58	24
Bac Kan	1995	29	34	15
	2000	34	50	16
Lang Son	1995	38	42	21
	2000	50	57	39
Tuyen Quang	1995	44	49	25
	2000	48	51	29
Yen Bai	1995	48	47	26
	2000	55	55	31
Thai Nguyen	1995	62	42	24
	2000	61	49	29
Phu Tho	1995	64	42	23
	2000	69	49	27
Bac Giang	1995	47	46	27
	2000	45	45	32
Quang Ninh	1995	89	37	19
	2000	91	41	26
Lai Chau	1995	51	50	12
	2000	54	51	12
Son La	1995	27	62	28
	2000	38	74	31
Hoa Binh	1995	40	56	27
	2000	48	62	30
Northern Uplands	1995	53	50	23
	2000	58	56	28
Change		+5	+6	+5

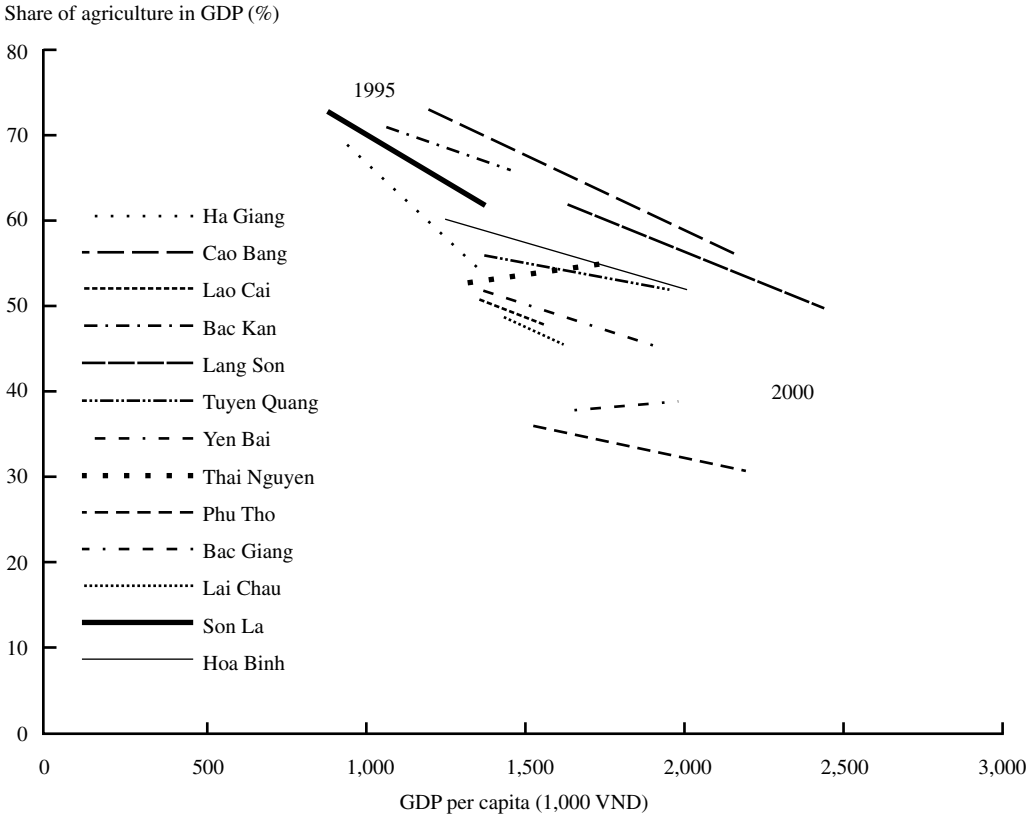
Source: Calculations based on data from GSO (2001).

agriculture (including crops, livestock, fisheries, and forestry) in rural household income has remained relatively constant at 61–62 percent across the 1993, 1998, and 2002 surveys. It is possible that the growing importance of the nonagricultural sector in the GDP estimates is due to the growing importance of the urban sector in GDP rather than the shift toward nonfarm activities within the rural sector.

Diversification as a Shift to High-Value Activities

Diversification is sometimes defined as the process of shifting from low-value activities, such as production of staple food crops, to higher-value activities, including production of higher-value crops, animal products, fishery products, or nonfarm employment. High-value crops are often defined in terms of the value of the commodity per kilogram.

Figure 5.3 Changes in the share of agriculture in gross domestic product (GDP) and per capita GDP by province, 1995–2000



Source: Calculated from data in GSO (2001).

For example, the producer prices of cassava averaged 500 Vietnamese dong (VND) per kilogram and rice, maize, and sweet potatoes averaged 1,350–1,460 VND/kg, according to farm sales recorded in the 1998 VLSS.[19] By contrast, the average producer price for soybeans, peanuts, tobacco, and coffee was more than 4,000 VND/kg.

However, there are two problems with defining "high-value" crops by the value per kilogram. First, many crops that are often considered "high-value" do not actually have unit values that are greater than those of rice or maize. For example, fruit and vegetables are generally considered "high-value" agricultural commodities, but the prices for most of the 18 fruit and vegetable categories are below 2,000 VND/kg. Second, the value per kilogram is not a good measure of the potential of the crop to contribute to household income. Yields, labor requirements, growing period, and input costs all vary from crop to crop and affect profitability. Even if two crops have the same price, one may be more profitable to the grower if it has a higher yield, a shorter growing cycle (allowing more crop cycles per year), lower labor requirements, or lower input requirements.

Thus, a better indicator of a "high-value" crop is the net revenue per hectare or per day

[19] The sales transactions were recorded over a 12-month period, but they have been adjusted using the consumer price index to be expressed in January 1998 prices.

of labor. Since data on labor input are difficult to collect and are not available at the crop level from the VLSS, we focus on the net revenue per hectare per year. For our purposes, net revenue is defined as the value of crop production (including sales and home consumption) minus the value of retained seed and crops given to laborers as wages-in-kind, the cost of fertilizer and other inputs, spending on hired agricultural labor, and the costs of storage and marketing.[20]

With regard to noncrop activities, the appropriate measure would be the net revenue per day of labor or perhaps per unit of investment, but the VLSS data do not provide sufficient detail on labor and capital inputs to carry out this analysis. Thus, we examine the process of diversification from crop production to livestock, fisheries, and nonfarm employment and from food crop production to nonfood crop production, reflecting the widespread view that these activities generate higher returns per day of labor.

Participation in High-Value Activities

One measure of the importance of high-value activities among rural households in the Northern Uplands is the percentage of households that participate in those activities. According to the 2002 VHLSS, virtually all rural households in the Northern Uplands grow crops and almost all (97 percent) raise livestock, defined broadly to include not only raising buffalo, cattle, pigs, and poultry, but also activities such as beekeeping, silk worm production, and raising snakes and frogs. More than one third (38 percent) participate in some form of fishery activity, including both aquaculture and capture fisheries. About 84 percent have some forestry income, which includes both agroforestry and harvesting firewood. Thirty-two percent earn money from nonfarm enterprises, the most common activities being food processing and retail sales. About 45 percent have wage income, and three quarters receive some kind of transfer, either from family members or from government programs (see Table 5.9).

Looking at changes over time in the Northern Uplands, the proportion of households growing crops and raising livestock does not appear to have changed much. Fishery activities were fairly widespread in the 1993 and 1998 VLSS, but dropped to 38 percent in the 2002 VHLSS. This pattern (which reflects a national trend) may indicate a shift from self-provision to relying on purchases from a smaller number of specialized fishing households.[21]

The proportion of households in the Northern Uplands with forestry income appears to have increased from 27 percent in 1993 to 84 percent in 2002. A similar pattern is observed in most other regions as well. This expansion may be a reflection of the allocation of upland land-use certificates, although these figures should be interpreted with caution given differences in the surveys and the difficulties in measuring firewood collection (see Table 5.9).

Similarly, the proportion of rural households in the Northern Uplands with enterprise income (nonfarm self-employment) has fallen from 63 percent in 1993 to 40 percent in 1998 and to 35 percent in 2002. This decline is found at the national level as well. Nonfarm enterprises may be undergoing a consolidation, in which enterprises such as retail shops and food processors are becoming fewer in number but larger on average. This is consistent with international trends

[20]As described in Chapter 3, section on methods of analysis, the VLSS questionnaire does not allocate hired labor or storage and marketing costs among crops, so it was necessary to allocate these costs in proportion to the value of crop production within each household.

[21]Alternatively, it may be related to a change in the design of the fishery/aquaculture module in the VHLSS.

Table 5.9 Percentage of rural households participating in different activities by region in 1993, 1998, and 2002

Year and source	Region							
	NU	RRD	NCC	SCC	CH	SE	MRD	Total
1993								
Crops	98	97	97	90	97	81	84	92
Livestock	97	94	95	85	77	63	79	87
Fisheries	56	57	32	7	3	13	58	43
Forestry	27	13	11	18	7	29	51	25
Enterprise	63	40	38	35	24	48	46	45
Wages	35	44	36	46	48	52	61	46
Transfers	65	65	46	90	77	46	44	59
Other	2	6	4	3	8	6	8	5
1998								
Crops	97	98	96	97	98	75	82	92
Livestock	97	95	97	87	85	63	64	86
Fisheries	59	67	51	6	29	21	69	53
Forestry	50	19	54	42	0	35	38	37
Enterprise	40	42	48	29	26	44	40	41
Wages	29	43	43	54	44	58	52	44
Transfers	78	79	87	89	88	86	81	82
Other	4	8	6	3	2	9	4	5
2002								
Crops	100	100	100	100	99	99	99	100
Livestock	97	86	94	80	86	64	57	81
Fisheries	38	39	25	10	42	16	64	37
Forestry	84	10	57	52	92	59	71	53
Enterprise	35	40	34	41	33	24	31	35
Wages	45	56	45	59	62	69	59	55
Transfers	75	84	90	73	80	78	78	81
Other	22	19	19	32	27	25	29	24

Source: Analysis of the 1993 and 1998 VLSS and the 2002 VHLSS.

Note: NU = Northern Uplands; RRD = Red River Delta; NCC = North Central Coast; SCC = South Central Coast; CH = Central Highlands; SE = Southeast; MRD = Mekong River Delta.

toward consolidation in the food retail sector, including the growth of supermarket chains (Reardon, Timmer, and Berdegue 2003). An alternative hypothesis is that market liberalization (including import liberalization) and/or rising income has led to consumers switching from locally made goods to factory-made goods produced in other regions or imported goods. This could well apply to processed food and wood products, though it would not affect retail trade. The prevalence of wage income in the Northern Uplands does not show a consistent pattern over time, nor does it at the national level (see Table 5.9).

Participation in High-Value Crop Production

Another type of high-value diversification is the shift toward high-value crops. Diversification toward high-value crops usually implies greater commercialization but this is not always the case. For example, a farmer may shift land from maize for sale to fruit for sale, increasing household income without necessarily increasing the degree of commercialization. Comparing the 1993 and 1998 VLSS surveys, there is some evidence of crop diversification among rural households in the Northern Uplands. The proportion of farmers growing rice, sweet

Table 5.10 Percentage of rural households in the Northern Uplands growing different crops in 1993, 1998, and 2002

	Year		
Crop	**1993**	**1998**	**2002**
Rice	95	94	91
Maize	56	61	64
Sweet potatoes	49	40	30
Potatoes	13	16	6
Cassava	49	51	49
Other staple crops	8	5	5
Kohlrabi, cabbage, cauliflower	53	45	47
Other leafy greens	47	44	67
Tomatoes	12	8	5
Water morning glory	59	54	57
Fresh legumes	20	20	36
Dried legumes	48	30	–
Herbs and spices	11	27	–
Other vegetables	42	50	63
Soybeans	28	28	38
Peanuts	41	40	24
Sugarcane	13	17	8
Tobacco	11	7	2
Other annual crops	6	4	5
Tea	20	19	21
Other industrial tree crops	3	2	1
Citrus	12	21	21
Pineapple	10	8	6
Bananas	44	53	46
Mango	5	4	6
Apple	5	9	3
Plum	12	16	10
Papaya	16	21	16
Litchi, longan, and rambuttan	12	23	16
Custard apple	7	12	9
Jackfruit, durian	23	25	12
Other fruit trees	6	7	7

Source: Analysis of the 1993 and 1998 VLSS and the 2002 VHLSS.

potatoes, and "other staple crops" decreased slightly, though they remain the most widespread crops in the region. The percentage of rural households growing fresh legumes, soybeans, and citrus increased. Some crops increased between 1993 and 1998, only to decline between 1998 and 2002. Examples are litchi and longan,[22] sugarcane, and custard apple. In the case of litchi and longan, the rise and fall may be connected to fluctuations in the access to Chinese markets. In recent years, import controls in China have been tightened. The proportion growing herbs and spices increased sharply between 1993 and 1998, but this crop category was not included in the 2002 VHLSS (see Table 5.10).

If we group the crops into six categories, the broader trends are easier to see. The proportion of rural households in the Northern

[22]Although rambuttan is included in this crop category, only longan and litchi are grown in the north.

Table 5.11 Percentage of rural households in the Northern Uplands growing each crop category

	Year		
Crop	**1993**	**1998**	**2002**
Rice	95	94	91
Other food	90	88	84
Vegetables	85	80	92
Fruit	62	78	67
Annual industrial crops	68	73	64
Perennial industrial crops	22	20	24

Source: Analysis of the 1993 and 1998 VLSS and the 2002 VHLSS.

Uplands that grow rice and other food has declined, while the proportion growing fruit and annual industrial crops increased over 1993–98 but declined in 1998–2002. For example, the share of farms growing fruit increased from 62 percent to 78 percent, but then fell to 67 percent in 2002. This pattern might be explained by the proliferation of fruit promotion campaigns and experimentation by farmers, followed by a consolidation of production in zones with a comparative advantage. The proportion growing vegetables and perennial tree crops (mainly tea) does not show a consistent trend in either direction (see Table 5.11).

Even without changing the crop mix, farmers may diversify toward high-value crops by reallocating land toward high-value crops. For this reason, it is useful to look at the share of agricultural land planted with different crops as shown in Table 5.12. These figures come from the three household surveys and refer to sown area, so that, for example, the area under double cropped rice is counted twice.

Even in the Northern Uplands, where rice plays a less dominant role than in the lowlands, rice accounts for almost half the sown crop area. This percentage has declined from 53 percent in 1993 to 49 percent in 1998 and to 44 percent in 2002. These results are consistent with the official agricultural statistics from GSO reported in Table 5.4 in which the share of agricultural land allocated to rice fell from 50 percent in 1995 to 44 percent in 2002.

According to Table 5.12, the proportion of sown area allocated to maize doubled from 12.6 percent in 1998 to 25.7 percent in 2002. This increase may be somewhat exaggerated, but the rapid growth in maize production in the Northern Uplands is well documented in agricultural statistics, as discussed later. According to the surveys, the area allocated to sweet potatoes has declined from 3.1 percent in 1993 to 1.6 percent in 2002. The share of crop land planted with tea and litchi/longan has increased, while the share allocated to citrus, sugarcane, soybeans, and peanuts increased over 1993–98 and then decreased over 1998–2002.

Examining the share of the sown area allocated to the six crop categories, it is clear that farmers in the Northern Uplands have shifted cropland away from rice but the surveys are not consistent in telling us which crops have gained. Comparing the 1993 and 1998 surveys, the shift has been mainly to fruit and annual industrial crops, but comparing the 1993 and 2002 surveys suggests that the expansion has been in maize and tea (see Table 5.12).

Agricultural statistics from the GSO confirm the growing share of crops other than rice. Overall, the share of non-rice crops has increased from 50 percent of crop land in 1995 to 56 percent in 2000. The share of non-rice crops expanded in every province except one (Bac Giang), with the largest shifts occurring in Bac Kan, Lang Son, and Son La (see Table 5.13).

The GSO agricultural statistics also confirm diversification in terms of a growing share of cropland allocated to nonfood crops.[23] Under this definition, unlike the previous one, a shift from rice to maize would

[23] Food crops are defined as rice, maize, sweet potatoes, and cassava.

Table 5.12 Percentage of crop area allocated to each crop in the rural Northern Uplands in 1993, 1998, and 2002

	Year		
Crop	**1993**	**1998**	**2002**
Rice	53.2	49.0	44.3
Maize	16.8	12.6	25.7
Sweet potatoes	3.1	2.0	1.6
Potatoes	0.2	0.4	0.3
Cassava	6.4	6.4	8.8
Other staple crops	0.2	0.3	0.0
Kohlrabi, cabbage, cauliflower	0.8	0.8	0.8
Other leafy greens	0.5	0.5	0.9
Tomatoes	0.3	0.2	0.1
Water morning glory	0.4	0.3	0.4
Fresh legumes	0.1	0.1	0.5
Other vegetables	0.5	0.9	0.0
Soybeans	2.2	3.6	2.3
Peanuts	2.4	2.3	1.2
Sugarcane	2.1	5.9	1.2
Tobacco	1.2	0.7	0.1
Other annual crops	1.0	1.3	0.4
Tea	1.0	0.9	7.1
Other industrial tree crops	0.1	0.7	0.0
Cashew	0.0	0.0	0.0
Citrus	0.3	0.7	0.2
Pineapple	0.2	0.2	0.1
Bananas	0.7	1.1	1.0
Mango	0.1	0.4	0.0
Apple	0.4	0.1	0.0
Plum	0.3	0.3	0.1
Papaya	0.0	0.0	0.1
Litchi, longan, and rambuttan	1.0	1.9	2.5
Custard apple	0.2	0.4	0.1
Jackfruit, durian	3.3	4.4	0.1
Other fruit trees	1.0	1.6	0.0
Total	100.0	100.0	100.0

Source: Analysis of the 1993 and 1998 VLSS and the 2002 VHLSS.

not be considered crop diversification. Overall, the share of cropland planted with nonfood crops grew from 23 percent to 28 percent. The largest increase was found in Lang Son, where it increased from 21 percent to 39 percent, presumably in response to trade with China (see Figure 5.3 and Table 5.13).

Summary

The patterns and trends in income diversification in the Northern Uplands depend on which definition of the term is used. One definition of diversification is based on the number of income sources and balance among them. Among rural households in the Northern Uplands, there is evidence of increased diversity in broad income categories, but little change in crop diversity. Income diversity is higher among rural households than urban households, and crop diversity is higher among poor rural households than better-off rural households. Farmers in the Northern Uplands have the

Table 5.13 Percentage of crop area allocated to each crop category in the rural Northern Uplands in 1993, 1998, and 2002

	Year		
Crop	**1993**	**1998**	**2002**
Rice	53.2	49.0	44.4
Other food	26.7	21.6	36.4
Vegetables	2.6	2.7	2.7
Fruit	7.5	11.1	4.2
Annual industrial	9.0	13.9	5.2
Perennial industrial	1.1	1.6	7.1
Total	100.0	100.0	100.0

Source: Analysis of the 1993 and 1998 VLSS and the 2002 VHLSS.

most diverse cropping systems in Vietnam, growing more than eight crops on average.

If we define diversification in terms of the shift toward commercial production, the trend is unambiguous: households in the rural Northern Uplands, as well as other rural areas, have shifted noticeably from subsistence production to commercial production. The share of crop production that is marketed rose from 22 percent to 34 percent in the Northern Uplands and from 40 to 61 percent in rural areas as a whole. Although poor households are less market oriented, they also shifted toward commercial production over this period.

If diversification is defined as the shift from agricultural activities to nonagricultural activities, it appears that the overall economies in the Northern Uplands are diversifying, but rural households are not. Apparently, the growth in the share of nonagricultural GDP is due to growth in income and population in urban areas rather than shifting incomes among rural households.

If we define diversification in terms of the shift toward high-value crops, livestock, fisheries, and nonfarm income sources, several conclusions emerge. There is evidence of crop diversification, with farmers reducing the area planted with rice and increasing the area planted to either sugarcane and fruit (according to the 1998 VLSS) or maize and tea (according to the 2002 VHLSS). Almost all rural households in the Northern Uplands already raise livestock, but we do not see a consistent increase in the share of income from livestock production. The importance of fisheries has fallen somewhat in terms of the percentage of households participating and its contribution to total income, while that of forestry has increased. The importance of both activities, however, remains modest. Nonfarm income is important in the livelihoods of rural households, but its importance grew only slowly over the period 1993–2002. The importance of self-employment in family-owned enterprises has fallen, perhaps because of consolidation, while that of wage labor has increased.

CHAPTER 6

Determinants of Rural Income Diversification

Chapter 5 examined the patterns in diversification across different types of households, but it is difficult to identify causal factors looking at one variable at a time. For example, rural households in the Mekong Delta sell a much larger share of their crop output than those in the Northern Uplands. Is this because they have more land or because they have smaller families or for some other reason? In this chapter, econometric analysis is used to identify the impact of each household characteristics holding other factors constant. After a description of the data and methods, we propose a number of hypotheses and then test these hypotheses using regression analysis to estimate different indicators of income diversification among rural households.

Data and Methods

The analysis in this chapter is carried out with household-level data from the 1998 Vietnam Living Standards Survey (VLSS). Although there are 5,999 households in the full sample, the analysis focuses on rural households, which total 4,269. Some of the analysis examines only rural households who grow crops, of which there are 3,912.

Regression analysis is used to estimate models of five measures of income diversification as a function of various household characteristics. The dependent variables correspond to the four types of diversification discussed in Chapter 2, section on definitions, with two indicators for the diversity of income sources:

- The number of income sources from a list of eight (crops, livestock, fisheries, forestry, wages, nonfarm enterprises, transfers, and other);
- The number of crops grown from a list of 45;
- The share of crop production (in value terms) that is marketed;
- The share of income from nonfarm activities (i.e., wage income and nonfarm enterprise income); and
- The net crop income per hectare, a measure of diversification toward high-value crops.

There are 21 explanatory variables including characteristics of the head of household (age, sex, education, and ethnicity), the size and composition of the household, access to electricity, farm size, proportion of the farm that is irrigated, three measures of market access, and region. Descriptive statistics for the dependent and independent variables are shown in Table 6.1.

In carrying out the regression analysis, it is important to take into account the survey sampling design. The sampling weights (the inverse of the probability of selection) vary across clusters of households, so, for the estimated equation to represent the relationship as it exists

Table 6.1 Descriptive statistics for dependent and independent variables

Variable	Description	Number of observations	Mean	Standard deviation	Minimum	Maximum
Dependent variables	Number of income sources	4,269	4.406	1.225	1.000	8.000
	Number of crops grown	3,912	6.914	4.300	1.000	24.000
	Share of crops sold	3,870	0.386	0.289	0.000	1.000
	Share of income from nonfarm activities	4,253	0.320	0.580	0.000	43.071
	Crop income per hectare (1,000 VND/ha)	3,658	13,065.670	12,102.370	5.549	236,558.600
	Log of crop income per hectare	3,658	9.180	0.833	1.714	12.374
Independent variables	Age of head of household (years)	4,269	47.177	13.871	16.000	95.000
	Age squared	4,269	2,418.034	1,421.321	256.000	9,025.000
	Education of head (years)	4,269	6.646	4.065	0.000	18.000
	Ethnicity minority (1 = minority)	4,269	0.159	0.366	0.000	1.000
	Female head (1 = female)	4,269	0.215	0.411	0.000	1.000
	Size of household (people)	4,269	4.800	1.896	1.000	16.000
	Proportion of members younger than 10 years	4,269	30.861	22.741	0.000	83.333
	Proportion of members older than 60 years	4,269	12.992	25.343	0.000	100.000
	Electricity in household (1 = yes)	4,269	0.723	0.448	0.000	1.000
	Farm size (hectares)	4,269	0.521	0.823	0.000	18.010
	Farm size squared	4,269	0.948	6.846	0.000	324.360
	Share of farm irrigated	3,746	0.693	0.383	0.000	1.000
	Distance to a daily market (km)	4,205	3.709	8.284	0.000	71.000
	Distance to a road (km)	4,269	1.146	3.170	0.000	22.000
	Period that road is impassible (months)	4,269	0.421	1.177	0.000	7.000
	Lives in Northern Uplands	4,269	0.191	0.393	0.000	1.000
	Lives in North Central Coast	4,269	0.168	0.374	0.000	1.000
	Lives in South Central Coast	4,269	0.095	0.294	0.000	1.000
	Lives in Central Highlands	4,269	0.040	0.196	0.000	1.000
	Lives in Southeast	4,269	0.073	0.261	0.000	1.000
	Lives in Mekong River Delta	4,269	0.210	0.407	0.000	1.000

in the population, greater weight needs to be given to observations that have larger sampling weights. More importantly, the clustering of households in the sample increases the standard error of the estimated coefficients relative to a pure random sample. Thus, if clustering is not taken into account in the analysis, the standard errors will be underestimated and the *t*-statistics will be overestimated. Finally, the stratification of the sample, if done well, can increase the precision of the estimates for a given sample size by sampling more intensively households where there is more variability in the variables of interest. In other words, the failure to take into account the stratification in the sample may result in overestimation of standard errors (StataCorp 2003).

To implement the regression analysis, we use the "svy" class of estimation commands in the statistical package Stata. The command generates Huber/White/sandwich estimates of the standard errors that take into account the design of the sample. These estimates are robust to heteroskedasticity (nonstandard variance) and non-normal error terms. We use the command "svyregress" for continuous dependent variables, such as the number of income sources, the number of crops grown, and the per hectare crop income. For censored dependent variables, such as the share of nonfarm income and the share of crop output sold, we use "svyintreg," which is designed for interval data but can be used for two-limit censored data (StataCorp 2003).

Table 6.2 Hypotheses regarding impact of household characteristics on measures of diversification

Independent variable	Diversity in income sources	Diversity in crops	Marketed share of crop output	Share of nonfarm income	Crop income per hectare
Age	?	?	?	?	+
Education	?	?	+	+	+
Ethnic minority	–	?	–	–	–
Female head	?	?	–	?	–
Household size	+	?	–	+	+
Proportion of children	–	?	+	–	–
Proportion of elderly	–	?	+	–	–
Electricity	+	0	0	+	0
Farm size	–	+	+	–	–
Share of land irrigated	–	–	?	–	+
Distance to market	–	+	–	–	–
Distance to road	–	+	–	–	–
Months that road is impassible	–	+	–	–	–
Region	?	?	?	?	?

Expected Sign of Determinants of Diversification

Given the five measures of diversification and the household characteristics listed in the preceding text, what are the hypothesized relationships among them? In this section, we describe how each household characteristic (the independent variables) is expected to affect the five measures of diversification (the dependent variables). The hypotheses are summarized in Table 6.2.

It is difficult to anticipate how the age of the head of household will affect the different indicators of diversification. Since older heads will be more experienced farmers, we might expect the value of crop income per hectare to be higher, conditional on growing crops. The effect on income diversity, however, is ambiguous. On the one hand, age may be associated with the accumulation of skills in one activity, leading to greater specialization and fewer income sources and crops. On the other hand, more experience and accumulation of assets may allow these households to diversify into more remunerative nonfarm activities while maintaining food production for own consumption, leading to greater income and crop diversity. Similarly, there is no obvious connection between the age of the head of household and the share of crop output that is marketed.

As the number of years of education of the head of household increases, so does his range of work-related skills and his ability to acquire new skills. Thus, we expect higher education to be associated with a higher-value crop production, more commercially oriented agriculture, and greater participation in nonfarm activities. It is less clear whether education would translate into a wider range of crops (since the head may be more likely to experiment with new crops) or fewer crops (since the skills might be devoted to crop specialization).

Ethnic minority households face linguistic and cultural barriers to participating in the wider cash economy and tend to be poorer than other rural households. Thus, we expect that these households would be less involved in nonfarm activities and less commercially oriented in their crop production. The lack of commercial orientation may lead to greater crop diversity, either to satisfy diverse demands for food consumption or to reduce weather-related risks. Female-headed households may face some of the same cul-

tural barriers in dealing with the cash economy. Other studies have found female-headed households to use fewer purchased inputs in agricultural production and to sell a smaller share of their crop production (see Baden 1998; Morris and Dossa 2001). On the other hand, women in Vietnam (as elsewhere) play an important role in small-scale agricultural trade, implying that female-headed households may have nonfarm activities.

A large household with a high proportion of working-age adults implies more labor for income-generating activities. If this labor is allocated to crop production, the higher labor intensity will probably be reflected in higher yields and greater per hectare crop income. At the same time, we expect a larger number of working-age adults to be associated with nonfarm activities for two reasons. First, more adults implies a wider range of skills and greater likelihood that some would have the skills needed for nonfarm activities. Second, holding farm size constant, applying more labor to crop production would reduce the marginal product of labor, making it more likely that nonfarm activities would be more attractive. For the same reasons, we expect a large number of adults to be associated with more diverse income sources. It is not clear how household size and composition would affect crop diversity. Finally, a large household also means more mouths to feed, so that, for a given farm size, large households should produce a smaller marketed surplus.

Electrification makes it possible for household members to participate in some forms of self-employment. Thus, we expect that households with electricity have more diverse income sources and a larger share of income from nonfarm activities, particularly nonfarm enterprise income. We do not expect electricity to have a noticeable effect on crop production or marketed surplus.

Farm size (measured by the area of annual crop land and perennial crop land) is a measure of the availability of land for agricultural production. Since land rental and land sales are legal but still fairly uncommon in Vietnam, land ownership is a good measure of land availability. We expect households with more land to have a larger number of crops and more marketed surplus, with less income diversity and less nonfarm income. We expect the relationship between farm size and the per hectare value of crop production to be negative for two reasons. First, since household size and composition are held constant, a larger farm means less labor intensity in crop production, which results in lower yields. In addition, there is often an inverse relationship between land quality and farm size as a result of historical patterns of migration and population growth. In Vietnam, this process is accentuated by the fact that collective land was often allocated to households with the goal of maintaining equity in productive capacity.

Irrigation affects the crop mix, favoring water-intensive crops such as rice and vegetables, increasing yields, and increasing the demand for agricultural labor. Thus, we expect a higher proportion of land under irrigation to decrease the share of income from nonfarm activities and reduce the number of income sources, but to increase per hectare crop income. The effect on marketed surplus is ambiguous, since it may increase the yield and output of commercial crops or shift the crop mix toward rice, which, for net buyers of rice, would increase rice self-sufficiency but have little effect on marketed surplus.

Households with poor access to roads and markets face higher transaction costs in buying from or selling to the national economy. Since wage labor and nonfarm enterprises are almost all market oriented, while crop production can be for home consumption or for sale, we might expect households that have poor market access to be more specialized in crop production, have fewer nonfarm activities, and fewer income sources. Since transaction costs reduce the returns from market sales, we expect the remote households to sell a smaller share of their crop production. We also expect them

to have lower per hectare crop income, both because their market opportunities are limited and because their demand for purchased inputs is dampened by the higher transaction cost of acquiring them. Finally, we expect remote households to have more diverse cropping patterns to meet diverse needs of household consumption. We have three measures of market access, but it is difficult to anticipate how the impact might vary among them.

Finally, it is likely that the different types of diversification will vary across regions. Many of the key differences among regions, such as extent of irrigation and market access, are already included in the regression, but there are undoubtedly other variables that follow spatial patterns and influence diversification patterns. For example, the three market access variables in our model do not include distance to a major city. Thus, we might expect the Southeast region (near Ho Chi Minh City) to have more nonfarm income and higher levels of crop commercialization. Similarly, we do not include agroclimatic variables that make an area suitable for growing a particular cash crop. The Central Highlands, for example, has good conditions for growing coffee, which should increase market orientation and the per hectare crop income.

Determinants of Income Diversity

The first definition of diversification concerns the diversity in income sources. Here, income diversity is measured by the number of income sources that a household has, based on a classification with eight categories: crop income, livestock income, fisheries income, forestry income, nonfarm enterprise income, wages, transfers, and other income. As described in Table 5.3, the national average for rural households in 1998 is 4.41 income sources and the average for rural households in the Northern Uplands is 4.53 sources.

As shown in Table 6.3, the education of the head of household is significantly[24] and positively related to the number of income sources, confirming our expectation that education may open the door to a number of different economic activities, either because of formal requirements for wage-earning positions or because education (particularly literacy and numeracy) facilitate learning about new self-employment opportunities and managing them efficiently. On the other hand, there is no evidence that the age, sex, and ethnicity of the head of household have any effect on the level of income diversity.

The results also reveal that, as expected, large households with a small proportion of children and a small proportion of elderly people tend to have a larger number of income sources. As discussed previously, controlling for farm size, the marginal product of additional family labor in crop production declines as the household size increases, making it more likely that alternative sources of income would be attractive. Furthermore, with a large number of working-age adults, it is more likely that the household will have a range of skills and inclinations that allows income diversity at the household level, even if household members are specialized individually. As expected, households with more land have fewer income sources, being more specialized in crop production.[25] The share of farm land that is irrigated is negatively related to the number of income sources, presumably because irrigated farm land implies more intensive cultivation, making

[24] Unless otherwise noted, all relationships described in this section are statistically significant at the 5 percent level ($p < .05$).

[25] The coefficients on farm size and farm size squared suggest that the number of income sources declines, reaching a minimum at about 8 hectares. Since 99 percent of all farms in the sample have fewer than 8 hectares, the relationship is declining throughout almost the entire range of farm sizes.

Table 6.3 Determinants of income diversity (number of sources)

pweight: wgt	Number of observations	=	3,682
Strata: urban	Number of strata	=	1
PSU: cluster	Number of PSUs	=	133
	Population size	=	10,668,260
	$F(21, 112)$	=	12.24
Dependent variable:	Prob F	=	0.0000
Number of sources of income	R^2	=	0.1422

Variable	Coefficient	Std error	*t*
Age of head	–0.00746	0.01284	–0.58
Age squared	0.00010	0.00013	0.79
Education of head (yrs)	0.02492	0.00807	3.09***
Ethnic minority	0.10369	0.13716	0.76
Female head	–0.11055	0.05287	–2.09**
Household size	0.13344	0.01553	8.59***
Proportion children	–0.00639	0.00126	–5.08***
Proportion older	–0.00607	0.00105	–5.77***
Electricity	0.11855	0.10319	1.15
Farm size	–0.16860	0.06166	–2.73***
Farm size squared	0.00980	0.00449	2.18**
Share of land irrigated	–0.42972	0.11386	–3.77***
Distance to market	–0.00254	0.00737	–0.34
Distance to road	0.03831	0.01755	2.18**
Months road impassible	0.03418	0.04554	0.75
Northern Uplands	–0.14807	0.19705	–0.75
North Central Coast	0.19565	0.15867	1.23
South Central Coast	–0.47573	0.18027	–2.64***
Central Highlands	–0.90216	0.17383	–5.19***
Southeast	–0.34056	0.16285	–2.09**
Mekong River Delta	0.04976	0.17110	0.29
Constant	4.47729	0.33893	13.21***

Source: Analysis of the 1998 Vietnam Living Standards Survey.
Note: *** Indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

less labor available for noncrop activities (see Table 6.3).

Among the three market access variables, only the distance to a road was statistically significant. Contrary to expectations, households farther from a road tend to have *more* sources of income. Perhaps the greater opportunities for fishing, livestock, and forestry activities in remote areas more than offsets the more limited opportunities for wage employment. This is partially confirmed by separate regressions (not shown here) showing that the share of income from fishing and forestry is significantly higher among households further from the road, while share of income from wages declines. The share of income from livestock and nonfarm enterprises does not vary significantly with distance to road.

Finally, the regional dummy variables suggest that, even after controlling for farm size, irrigation, and market access, rural households in the south tend to be more specialized than those in the Red River Delta (the reference region). The exception is the Mekong Delta, which is no different from the Red River Delta in this respect. Somewhat surprisingly, there is no statistically significant difference between the intensively cultivated Red River Delta and the

more subsistence-oriented Northern Uplands, after controlling for other variables (see Table 6.3).

It should be kept in mind that, although these variables are statistically significant, they explain only 14 percent of the variation in the number of income sources. There are a large number of idiosyncratic features of households not captured here that influence income diversity.

Determinants of Crop Diversity

This model examines factors associated with the number of *crops* grown from a list of 45 crops for which information was available in the 1998 VLSS. The national average is 6.9 crops, among those households that grow crops. The model explains 36 percent of the variation in the number of crops grown.

Holding other variables constant, the number of crops grown rises with the age of the head of household, but the increase slows and crop diversity reaches a maximum at 68 years. This seems to indicate that farmers try new crops as they gain more experience over time. The education level of the head of household is also strongly and positively associated with the number of crops grown, highlighting the importance of knowledge and ability to absorb new information through extension services or other sources. Furthermore, even after controlling for other variables, ethnic minority households grow 1.4 more crops than other households (see Table 6.4).

Large households grow a significantly larger number of crops, with weak evidence ($p < .10$) that the proportion of children and elderly reduces the number. This indicates that more family labor is needed to cultivate a larger number of crops, perhaps reflecting some fixed costs in planting each new crop.

As expected, there is a weakly positive relationship between farm size and the number of crops.[26] Also, as expected, the share of irrigated land is negatively related to the number of crops. A fully irrigated farm has, on average, 2.5 fewer crops than an unirrigated farm of the same size, as irrigated farmers concentrate their labor on rice or other irrigated crops (see Table 6.4).

Even after controlling for market access, irrigation, farm size, and other characteristics, farms in the southern regions (South Central Coast, Central Highlands, Southeast, and Mekong Delta) are more specialized in the number of crops grown, as well as in the number of income sources.

Determinants of the Share of Crop Production that Is Marketed

In this section, we examine the household characteristics associated with the share of crop production that is marketed in value terms. The sample includes 3,651 rural households that grow crops, including about 270 households that have no crop sales. It is interesting to note that 93 percent of all crop-producing households have at least some crop sales, suggesting that pure subsistence production is rare. Across crop-growing households, the average share of crops marketed is 39 percent, according to the 1998 VLSS. In econometric terms, the fact that the dependent variable is censored at zero and one implies the need to apply a limited dependent variable model. Here, we use the two-limit tobit model with adjustments for the complex survey design. This analysis was implemented with the "svyintreg" command in Stata (StataCorp 2003).

As shown in Table 6.5, the characteristics of the head of household (age, sex, education, and ethnicity) are not significantly related to the share of crops marketed. This

[26] An *F*-test of the hypothesis that both the farm size and farm size squared coefficients are zero is rejected at the 10 percent level of confidence.

Table 6.4 Determinants of crop diversity (number of crops)

pweight: wgt	Number of observations	=	3,679
Strata: urban	Number of strata	=	1
PSU: cluster	Number of PSUs	=	133
	Population size	=	10,658,998
	$F(21, 112)$	=	16.69
Dependent variable:	Prob F	=	0.0000
Number of crops grown	R^2	=	0.3545

Variable	Coefficient	Std error	*t*
Age of head	.1226933	.039188	3.13***
Age squared	–.0009008	.0003734	–2.41**
Education of head	.1563918	.0273202	5.72***
Ethnic minority	1.432969	.4441109	3.23***
Female head	–.1888308	.2125542	–0.89
Household size	.1765235	.0477832	3.69***
Proportion children	–.0082547	.0042113	–1.96*
Proportion older	–.0076253	.0045271	–1.68*
Electricity	.5809754	.4313514	1.35
Farm size	.3362395	.2142934	1.57
Farm size squared	–.0111187	.0239122	–0.46
Share of land irrigated	–2.525977	.4630407	–5.46***
Distance to market	–.0082886	.0414006	–0.20
Distance to road	–.0076048	.0902021	–0.08
Months road impassible	.1241284	.1561122	0.80
Northern Uplands	1.172246	.8914611	1.31
North Central Coast	1.250738	.7671226	1.63
South Central Coast	–2.64555	.6364453	–4.16***
Central Highlands	–2.939687	.7935269	–3.70***
Southeast	–3.348079	.702958	–4.76***
Mekong River Delta	–3.083585	.6979138	–4.42***
Constant	3.419373	1.16259	2.94***

Source: Analysis of the 1998 Vietnam Living Standards Survey.
Note: *** Indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

is somewhat surprising in light of the general view in Vietnam that ethnic minorities are culturally less commercially oriented. The marketed share among ethnic minorities is smaller, but this appears to be related to farm size, household size, market access, and other factors, rather than ethnicity per se.

Household size is significantly related to the share of crop output sold (see Table 6.5). As expected, larger households sell a smaller share of their harvest, presumably as a result of the greater consumption requirements of larger households. For a given household size (and controlling for other variables), households with more land sell a larger share of their crops.[27] Given the low opportunity cost of family labor, the high transaction costs of buying food, and the risk associated with commercial production, farmers generally prefer to produce their own rice. If the farm is large enough, they can

[27] The quadratic term indicates that the marketed surplus percentage levels off as farm size increases, reaching a maximum at 8.2 hectares. Since this is in the 99th percentile of sample households, the data are not sufficient to indicate that marketed surplus actually declines for the largest farms.

Table 6.5 Determinants of crop commercialization

pweight: wgt	Number of observations	=	3,651
Strata: urban	Number of strata	=	1
PSU: cluster	Number of PSUs	=	133
	Population size	=	10,583,747
Dependent variable:	*F*(21, 112)	=	24.05
Share of crop value sold	Prob *F*	=	0.0000

Variable	Coefficient	Std error	*t*
Age of head	0.00069	0.00290	0.24
Age squared	–0.00001	0.00003	–0.29
Education of head (yrs)	0.00165	0.00176	0.93
Ethnic minority	–0.02707	0.03412	–0.79
Female head	–0.01039	0.01208	–0.86
Household size	–0.01397	0.00304	–4.60***
Proportion children	0.00005	0.00025	0.20
Proportion older	0.00029	0.00024	1.24
Electricity	0.02060	0.02366	0.87
Farm size	0.09918	0.01615	6.14***
Farm size squared	–0.00604	0.00167	–3.61***
Share of land irrigated	–0.01714	0.02894	–0.59
Distance to market	–0.00342	0.00131	–2.61**
Distance to road	–0.00698	0.00434	–1.61
Months road impassible	–0.02938	0.01238	–2.37**
Northern Uplands	0.02477	0.04450	0.56
North Central Coast	0.01749	0.03119	0.56
South Central Coast	0.13578	0.03997	3.40***
Central Highlands	0.40859	0.06243	6.54***
Southeast	0.30183	0.05995	5.04***
Mekong River Delta	0.41572	0.04050	10.27***
Constant	0.26651	0.07768	3.43***
lnsigma	–1.46058	0.02880	–50.72***

Source: Analysis of the 1998 Vietnam Living Standards Survey.
Note: *** Indicates significance at the 1% level and ** at the 5% level.

produce enough for own consumption and still produce for sale.

Two of the market access variables are significantly related to the share of the crop that is marketed. As expected, the farther a household lives from a daily market, the smaller the percentage of the harvest sold. Other things being equal, a household living 50 kilometers from a daily market will sell 15 percentage points less of crop output than a household living next to a daily market. The number of months that the closest road is impassible is also correlated. If a household lives near a road that is impassible for 6 months a year, it sells 17 percentage points less of its crop output compared to a household living near an all-season road. For a given distance to market and road quality (and holding other factors constant), the distance from the household to the road is not a statistically significant factor (see Table 6.5).

Even after controlling for other factors, regional differences in marketed surplus are particularly strong. Households in the four southern regions (the South Central Coast, Central Highlands, Southeast, and Mekong Delta) have marketed shares that are significantly higher than those of households in the Red River Delta. The share of crops marketed in the Central Highlands and the

Table 6.6 Determinants of nonfarm income share

pweight: wgt	Number of observations	=	3,667
Strata: urban	Number of strata	=	1
PSU: cluster	Number of PSUs	=	133
	Population size	=	10,622,426
Dependent variable:	*F*(21, 112)	=	2.29
Share of income from nonfarm activities	Prob *F*	=	0.0030

Variable	Coefficient	Std error	*t*
Age of head	–0.02903	0.00664	–4.37***
Age squared	0.00026	0.00007	3.88***
Education of head (yrs)	0.00232	0.00443	0.52
Ethnic minority	–0.03602	0.06620	–0.54
Female head	0.03440	0.04190	0.82
Household size	0.06042	0.01382	4.37***
Proportion children	–0.00171	0.00068	–2.51**
Proportion older	–0.00779	0.00213	–3.66***
Electricity	0.12861	0.06004	2.14**
Farm size	–0.30439	0.06320	–4.82***
Farm size squared	0.02019	0.00530	3.81***
Share of land irrigated	–0.13470	0.06966	–1.93*
Distance to market	–0.00812	0.00652	–1.25
Distance to road	0.00354	0.01174	0.30
Months road impassible	–0.02791	0.02258	–1.24
Northern Uplands	–0.13787	0.09824	–1.40
North Central Coast	–0.06352	0.06732	–0.94
South Central Coast	0.05068	0.08370	0.61
Central Highlands	0.16904	0.10208	1.66*
Southeast	0.34135	0.13259	2.57**
Mekong River Delta	0.22116	0.08750	2.53**
Constant	0.81130	0.17818	4.55***
lnsigma	–0.29594	0.35661	–0.83

Source: Analysis of the 1998 Vietnam Living Standards Survey.
Note: *** Indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Mekong Delta is more than 40 percentage points higher than in the Red River Delta. The Central Highlands produced 46 percent of the 371,000 tons of coffee produced by Vietnam in 1998 (GSO 2002). Similarly, the Mekong Delta, the largest delta in Vietnam, is the "rice bowl" of Vietnam and has turned increasingly to commercial fruit production.

Determinants of the Share of Income from Nonfarm Activities

This section explores the determinants of the share of income from nonfarm activities, defined as wage labor and self-employment in nonfarm enterprises. As in the case of the share of crops sold, the share of income from nonfarm activities is bound between zero and one, so we carry out the analysis using a two-limit tobit model, implemented with the "svyintreg" command in Stata. As shown in Table 6.6, the age of the head of household is significantly correlated with the nonfarm income share. More specifically, the share of income from nonfarm activities tends to rise with the age of the head of household, reaching a maximum at 55 years and declining after that. This implies that accumulated experience contributes to the skills needed for nonfarm employment.

Large households with few children and few older members are also more likely to have a large share of income from nonfarm activities (see Table 6.6). In other words, the more working-age adults in a household, the higher the share of nonfarm income. This could be explained if (as is likely) the marginal product of labor in crop production declines with more labor input. Alternatively, if aptitude differs randomly across individuals, as is likely, then a larger household is more likely to have someone with an aptitude for nonfarm activities.

Contrary to expectations, the level of education and the ethnicity of the head of household is not significantly related to the share of income from nonfarm activities. Nor are female-headed households any different from male-headed households in this respect, after controlling for other factors, probably because nonfarm income is a highly diverse category that includes both agricultural wages and the salaries of government employees. It is difficult to separate skilled and nonskilled nonfarm income, but it is likely that skilled nonfarm income is correlated with education, but this type of nonfarm income is not common in the rural Northern Uplands of Vietnam.[28]

The availability of electricity in the household is positively and significantly related to the share of income from nonfarm activities (see Table 6.6). This is not surprising given that most non-enterprises in rural areas are operated from the home and having electricity facilitates the use of electric tools and appliances. A household with electricity earns 12 percentage points more of its income from nonfarm activities than one without it. Separate analysis (not shown) indicates that this is due to the effect on electrification on enterprise income; there is no relationship between electrification and the share of income from wage labor.

As expected, households with more land earn a smaller proportion of their income from nonfarm activities (see Table 6.6). After controlling for other factors (particularly household size), the marginal product of labor in crop production is higher when there is more land available, making it less likely that nonfarm activities will be able to compete in terms of returns to labor. The negative effect of farm size on nonfarm income share is large for the smallest farms but levels off for larger farms.[29]

The regional variables indicate that households in the Southeast and Mekong Delta earn a larger share of their income from nonfarm activities than those in the Red River Delta (the reference region). This may be related to the proximity of Ho Chi Minh City, the largest city in Vietnam, in the Southeast region but close to the border of the Mekong Delta region. The south in general, and the Southeast in particular, has higher incomes than the rest of the country, creating more of a demand for nonfood products.

These results should be interpreted with caution given the heterogeneity of nonfarm income. As discussed earlier, nonfarm activities include unskilled agricultural labor, the management of nonfarm enterprises, and skilled salaried work, such as government employees.

Determinants of the Per Hectare Value of Crop Production

The fourth definition of diversification concerns the shift from low-value crops and ac-

[28] Based on the results of separate regression analyses (not shown), education is not a statistically significant variable in either the share of nonfarm enterprises in rural income, nor the share of wages in rural income. If urban and rural samples are combined, however, education becomes a significant predictor of the share of wages in total income.

[29] The quadratic function reaches its minimum at 7.5 hectares. Given the small number of households with more than 7.5 hectares, we can only say that nonfarm income share declines with farm size over the bulk of the range of farm size.

Table 6.7 Determinants of per hectare crop income

pweight: wgt	Number of observations	=	3,594
Strata: urban	Number of strata	=	1
PSU: cluster	Number of PSUs	=	133
	Population size	=	10,443,759
	$F(21, 112)$	=	11.59
Dependent variable:	Prob > F	=	0.0000
Ln of crop income per hectare	R^2	=	0.2175

Variable	Coefficient	Std error	t
Age of head	0.02727	0.00967	2.82***
Age squared	–0.00023	0.00010	–2.34**
Education of head (yrs)	0.01778	0.00559	3.18***
Ethnic minority	–0.03801	0.11440	–0.33
Female head	–0.14773	0.04599	–3.21***
Household size	0.02383	0.00958	2.49**
Proportion children	–0.00086	0.00076	–1.13
Proportion older	–0.00120	0.00095	–1.26
Electricity	0.09008	0.09260	0.97
Farm size	–0.36828	0.05664	–6.50***
Farm size squared	0.02286	0.00517	4.43***
Share of land irrigated	0.37960	0.10092	3.76***
Distance to market	–0.00153	0.00679	–0.23
Distance to road	–0.01020	0.01446	–0.71
Months road impassible	–0.03336	0.03201	–1.04
Northern Uplands	–0.03870	0.13489	–0.29
North Central Coast	–0.14043	0.10328	–1.36
South Central Coast	–0.11316	0.10752	–1.05
Central Highlands	–0.34098	0.19616	–1.74*
Southeast	–0.57370	0.19050	–3.01***
Mekong River Delta	–0.24336	0.10980	–2.22**
Constant	8.31438	0.29605	28.08***

Source: Analysis of the 1998 Vietnam Living Standards Survey.
Note: *** Indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

tivities to higher-value crops and activities. Because of the difficulty of defining and measuring a high-value nonagricultural activity, we focus on the shift to high-value crops. This type of diversification can be measured by the net crop income per hectare of land. This variable is highly skewed, with many small values and a few large ones. We express per hectare crop income in logarithms form in order to make the dependent variable closer to a normal distribution and reduce heteroskedasticity.

As expected, the age of the head of household is positively related to per hectare crop income (see Table 6.7), although the effect of age declines and levels off at age 59. This is consistent with the view that farmers accumulate experience over their lives, allowing them to obtain higher yields, bargain for better prices, or try new crops with higher returns. Similarly, higher education is significantly related to higher per hectare crop income. Each additional year of education is associated with a 2 percent increase in per hectare crop income.

Somewhat surprisingly, per hectare crop income does not vary significantly between ethnic minority and other households, after controlling for other factors. On the other hand, female-headed households do have

about 15 percent lower crop income per hectare compared to male-headed households, which is statistically significant (see Table 6.7). This may be related to unequal access to inputs and/or extension advice.

Household size is positively related to per hectare crop income and farm size is negatively related.[30] This is because a high ratio of family labor to land makes it possible to apply more labor-intensive cultivation methods, which result in higher per capita crop income either because of higher yields or higher crop quality. Similarly, if a large share of the land is irrigated, the per hectare crop income will be higher, since water control increases yields (see Table 6.7).

Somewhat surprisingly, the three indicators of market access have no statistically significant effect on the per hectare crop income, in spite of the fact that distance from roads and markets should reduce the farm-gate price of crops and hence the per hectare crop income. Finally, households in the Southeast and, to a lesser degree, the Mekong Delta have lower per hectare crop revenue than households in the Red River Delta (the reference region). This is somewhat surprising given the fact that proximity to Ho Chi Minh City should imply a high agricultural demand and low transaction costs. However, this result makes sense in light of the relatively high wages and opportunities for nonfarm employment in these regions, which draw labor from crop production and induce the use of less labor-intensive methods in crop cultivation (see Table 6.7).

Summary

The results presented in this chapter regarding the determinants of different types of income diversification are summarized in Table 6.8. A look at the table suggests that the factors that most consistently influence the different measures of income diversification among rural households in Vietnam are household size and farm size. Household size is an indicator of available labor, particularly given the transaction costs involved in hiring wage labor to work for the household or hiring household members out. Similarly, farm size is an indicator of available land, particularly given that few rural households buy, sell, or rent land. Thus, household size and farm size are measures of the two most important factors of production in rural areas and influence the production possibilities of the household. If the labor/land ratio is high, households are more likely to (1) have multiple sources of income, (2) earn a larger share of income from wage labor and nonfarm enterprises, and (3) cultivate high-value crops and/or cultivate crops more intensively, as reflected in a higher per hectare crop income. If the labor/land ratio is low, the household is more likely to specialize in agriculture, have a larger marketed surplus, and cultivate low-value crops and/or cultivate crops less intensively. In the case of marketed surplus, household size seems to be an indicator of the consumption needs of the household rather than labor availability.

The age and education of the head of household are proxies for human capital and management skills, so it is not surprising that one or both are positively related to income diversity and crop diversity, as well as per hectare crop income. It is less clear why age is negatively related to the share of income from nonfarm activities (see Table 6.8).

With regard to ethnicity, the most interesting result is that only one of the five measures of income diversity shows a statistically significant difference between minority households and other households, after controlling for other factors. Although it is occasionally argued by policymakers and academics in Vietnam that ethnic minorities

[30] The quadratic function for farm size reaches a minimum at 8.1 hectares, implying that crop income falls throughout almost all the range of farm size.

Table 6.8 Summary of results on determinants of income diversification

Independent variable	Diversity in income sources	Diversity in crops	Marketed share of crop output	Share of nonfarm income	Crop income per hectare
Age	+	–	+		
Education	+	+			
Ethnic minority	+				
Female head	–	–			
Household size	+	+	–	+	+
Proportion of children	–	–			
Proportion of elderly	–	–			
Electricity	+				
Farm size	–	+	–	–	
Share of land irrigated	–	–	+		
Distance to market	–				
Distance to road	+				
Months that road is impassible	–				
Region	SCC, CH, SE –	SCC, CH, SE, MRD –	SCC, CH, SE, MRD +	SE, MRD +	SE, MRD –

are more subsistence oriented and resistant to new methods because of their personalities and/or cultural values, the evidence presented here suggests that most of the differences in livelihood strategies are due to different opportunities and circumstances (household size, farm size, education, and market access) rather than different economic decisions as a result of their ethnicity per se.

Electricity is associated with a larger share of income from nonfarm activities (particularly nonfarm enterprises), but it does not seem to affect income diversity, commercialization, or per hectare crop income (see Table 6.8).

As expected, an increase in the share of land that is irrigated is associated with lesser income diversity (as households specialize in crop production), lesser crop diversity (as household specialize in rice and a few other crops), and higher per hectare crop income (as water control increases yields).

The effect of market access on income strategies was weaker than expected. The diversity of crops and share of nonfarm income were not related to any of the three measures of market access. Income diversity was, contrary to expectations, *greater* for households living far from a road. The marketed share of crop output was the only diversification measure that met expectations, with marketed surplus declining with distance to a daily market and number of months that the road is impassible (see Table 6.8). One reason for the weak effect of the market access variables may be that they measure only the access of the household to local markets; it may be that distance to large cities is more relevant in terms of the economic decisions of rural households.

Finally, even after controlling for age, education, sex, ethnicity, farm size, irrigation, and other variables, there remain some marked regional differences. In general, the southern regions are more specialized in income and more specialized in crops, they produce less intensively, and they earn more income from nonfarm activities. These results may reflect one or more differences between the north and south in terms of a variable not included in the analysis. Hypotheses include the higher wage rate in the south, the more active labor and land markets, the proximity of the largest city in Vietnam, and cultural differences, possibly linked to the fact that the south has had a longer period of experience with market economics than the north.

CHAPTER 7

Contribution of Diversification to Rural Income Growth

In Chapters 5 and 6, we examined the trends in diversification over time and the patterns across different types of household. In this chapter, we focus on the contribution of diversification to income growth. As mentioned in Chapter 1, information on the sources of growth among rural households in the Northern Uplands sheds light on the policies and public investments that would maintain growth and reduce poverty in the region. Thus, this chapter focuses on the following questions:

- Which types of income have contributed the most to overall income growth among rural households in the Northern Uplands, particularly among poor rural households?
- Focusing on crop income growth, what has been the contribution of diversification into high-value crops relative to the contribution of other factors such as price increases, yield growth, and area expansion?

First, we examine the contribution of diversification from crop production into higher-value activities such as livestock, fisheries, nonfarm enterprises, and wage income. The contribution of a given activity is calculated as the change in income from that source as a percentage of the overall change in income. Second, we explore the contribution of crop diversification to the growth in overall net revenue from crop production. In this case, diversification is measured as the increase in income that can be attributed to the reallocation of land among crops, holding constant yields, prices, and total area cropped. The method for decomposing crop income growth is described in more detail in Chapter 3, section on measuring the contribution of diversification to income growth.

Contribution of Income Diversification

Income Diversification in the Northern Uplands

Among rural households in the Northern Uplands, net income increased from 6.9 million VND per household per year in 1993 to 11.0 million VND in 1998 and to 12.9 million VND in 2002 (expressed in constant terms at January 2002 prices). These imply growth rates of 59 percent over 1993–98 and 17 percent over 1998–2002.[31] The composition of income has changed slowly over time, with agriculture and enterprise income becoming less impor-

[31] These growth rates differ somewhat from the per capita income growth rates reported in Chapter 4 because of changes in the average household size.

Table 7.1 Contribution of each source of income to overall income in the rural Northern Uplands

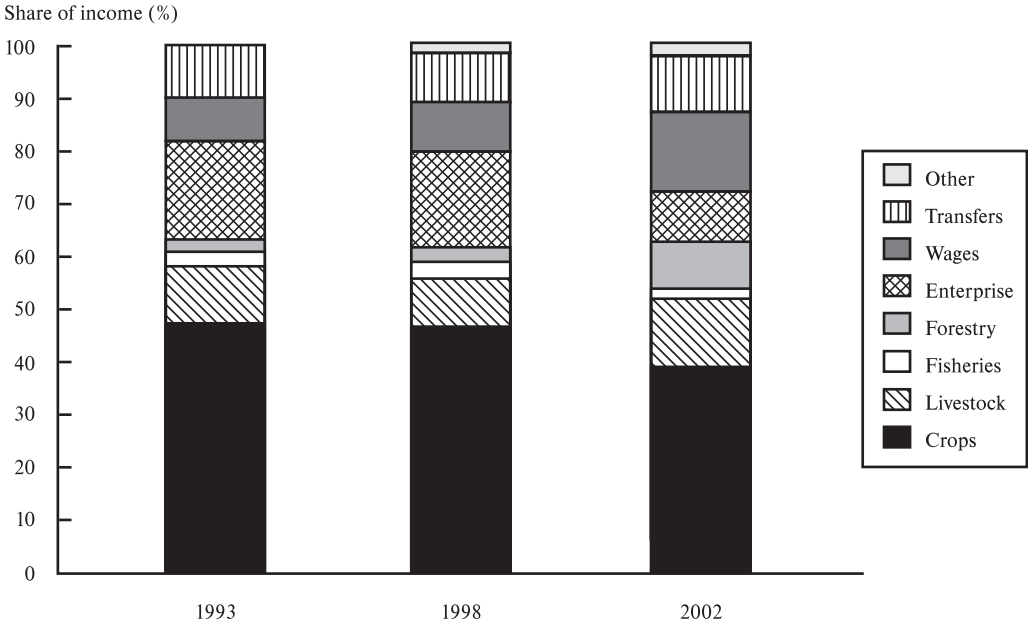
	Net income			Share of income		
Source	**1993**	**1998**	**2002**	**1993**	**1998**	**2002**
	(1,000 VND/household)			(%)		
Crops	3,249	5,065	4,939	47	46	38
Livestock	785	1,097	1,657	11	10	13
Fisheries	214	310	256	3	3	2
Forestry	137	380	986	2	3	8
Enterprise	1,309	1,941	1,324	19	18	10
Wages	539	982	2,009	8	9	16
Transfers	680	1,146	1,507	10	10	12
Other	14	64	229	0	1	2
Total	6,928	10,985	12,907	100	100	100

Source: Analysis of the 1993 and 1998 VLSS and the 2002 VHLSS.
Note: The values are expressed in Vietnamese dong at January 1998 prices. The exchange rate in January 1998 was 12,291 VND per US$.

tant and wage and forestry income becoming more important. Income from livestock, fisheries, and transfers remained roughly constant as a proportion of the total. Although the importance of crop income has declined, crop and livestock income still represent more than half of the rural income in the Northern Uplands (see Table 7.1 and Figure 7.1).

Table 7.2 shows the growth rates for income from each source and the contribution of each type of income to overall income growth. For example, between 1993 and 1998 crop income rose from 3.2 million

Figure 7.1 Composition of rural income by year



Source: Analysis of the 1993 and 1998 VLSS and the 2002 VHLSS.

Table 7.2 Growth of income from each source and contribution to overall growth of each source in the rural Northern Uplands

	Growth		Contribution to overall growth	
Source	**1993–98**	**1998–2002**	**1993–98**	**1998–2002**
Crops	56	–2	45	–7
Livestock	40	51	8	29
Fisheries	45	–17	2	–3
Forestry	178	159	6	32
Enterprise	48	–32	16	–32
Wages	82	104	11	53
Transfers	69	32	11	19
Other	344	258	1	9
Total	59	17	100	100

Source: Analysis of the 1993 and 1998 VLSS and the 2002 VHLSS.

VND to 5.1 million VND in 1998, while total income rose from 6.9 million VND to 11.0 million VND. Thus, the increase in net income from crop production (1.9 million VND) contributed 45 percent of the increase in total net revenue (4.0 million VND) over this period.[32]

Applying similar calculations to other activities, it appears that the growth in enterprise income accounts for 16 percent of the overall growth. This is somewhat surprising in light of the results presented in Chapter 5 showing that the proportion of households with enterprise income fell substantially between the 1993 and 1998 Vietnam Living Standards Surveys (VLSS). Given that the proportion of rural households in the region with enterprise income has fallen but the total enterprise income increased 48 percent in real terms, the data suggest that the small enterprise sector is undergoing some form of consolidation, as hypothesized in Chapter 5. In other words, fewer household operate enterprises but the average size of the enterprises is rising.

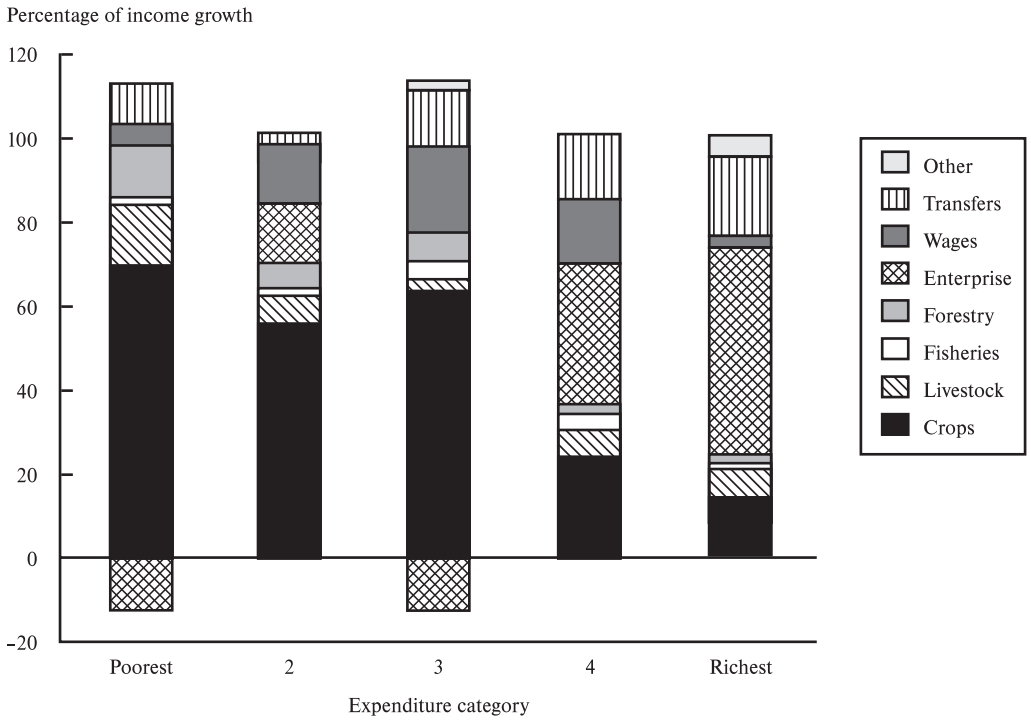
The growth in wage income and in transfers each account for 11 percent of the overall growth in the net revenue of rural households in the Northern Uplands over 1993–98, while growth in livestock income accounts for 8 percent of the total growth. Although forestry income shows the fastest growth among the eight income sources, its contribution to overall growth is still relatively small (6 percent) because it is such a small source of income (see Figure 7.2).

If we define livestock, fisheries, and forestry as high-value agricultural activities, then the growth in high-value agricultural activities accounts for 16 percent of the growth in overall income. If we consider nonfarm enterprises and wage labor together, then growth in nonfarm activities represents 27 percent of the overall growth in income.

The contribution of each type of income to income growth over 1998–2002 shows a very erratic pattern. According to Table 7.2, growth in wage income and forestry account for 85 percent of the overall income growth, while income from enterprises, crop production, and fisheries fell over this period. These results are very different from the 1993–98 results, and they are difficult to reconcile with economic trends in Vietnam. One explanation is that differences in the way the Vietnam Household Living Standards Sur-

[32]If we carry out the same analysis but limit the sample to those households in both the 1993 and 1998 samples, the results are almost identical. For example, crop income growth accounts for 46 percent of the rural income growth and growth in enterprise income contributes 16 percent over the period 1993–98.

Figure 7.2 Contribution of different sources to rural income growth, 1993–98



Source: Analysis of the 1993 and 1998 VLSS.

Note: Some columns extend below zero because households in that group have average enterprise income below zero (losses). The other sources must add up to more than 100 percent to offset these negative figures.

veys (VHLSS) collected income data and/or differences in the sampling design may have contributed to these. As described in Chapter 3, section on nationally representative household surveys, the VHLSS used a questionnaire less than half as long as the VLSS, including simplified modules for crop production, nonfarm enterprises, and salary income. Because of questions of comparability and because the patterns by region and by income category are even more unpredictable, we focus on the 1993–98 results in the next section.

Income Diversification in Other Regions

How does the contribution of each income source to overall growth in rural income vary across regions? Over the period 1993–98, the contribution of crop production to income growth varied from 30 percent in the North Central Coast and the Southeast to 75 percent in the Central Highlands. The small contribution in the Southeast is due to the high level of urbanization and the availability of nonfarm employment, meaning that wages are an important source of income growth in this region. The large contribution of crop income in the Central Highlands is linked to the boom in coffee production during the mid-1990s. In the other three regions, crop production accounts for 47–58 percent of the overall growth (see Table 7.3).[33]

In spite of the variation in the contribution of crop production growth to overall growth, it is noteworthy that crop production is the most important source of rural income growth in all seven regions of Vietnam.

[33] If we carry out this analysis only on households that are in both the 1993 and 1998 VLSS samples, the results are quite similar.

Table 7.3 Contribution to overall growth of each income source in rural areas by region between 1993 and 1998

Source	Northern Uplands	Red River Delta	North Central Coast	South Central Coast	Central Highlands	Southeast	Mekong River Delta	Rural average
				(% of overall income growth)				
Crops	45	47	30	55	75	30	58	48
Livestock	8	–1	7	8	10	10	9	7
Fisheries	2	4	3	0	1	1	8	3
Forestry	6	0	5	2	0	2	–2	2
Enterprise	16	21	7	2	11	10	12	11
Wages	11	16	17	30	1	26	7	15
Transfers	11	12	28	3	1	18	11	13
Other	1	1	3	–1	1	3	–3	1
Total	100	100	100	100	100	100	100	100

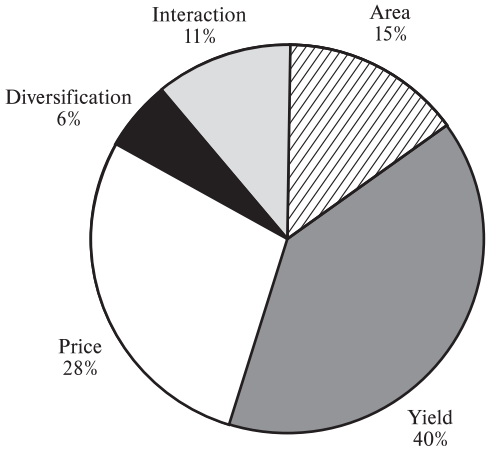
Source: Analysis of the 1993 and 1998 VLSS.

The second largest contributor to rural income growth varies across regions. In the Northern Uplands, the Red River Delta, the Central Highlands, and the Mekong River Delta, nonfarm enterprise income is the second largest contributor to rural income growth. In the South Central Coast and the Southeast, wages are the second largest contributor (see Table 7.3). In contrast, for urban households (not shown in Table 7.3), the sources of income growth are split almost exactly between wages, 50 percent, and nonfarm enterprise income, 49 percent.

Income Diversification by Income Group

The contribution of each income source to overall income and to income growth for each income group is shown in Figure 7.3 and Table 7.4. Here, the quintiles are defined in each year (1993 and 1998).[34] The top half of the table shows that crop and forestry income are more important to poor households, while enterprise income and transfers are more important to richer households. For example, the contribution of crop income declines from 59 percent in the poorest group to 22 percent in the richest.

Figure 7.3 Contribution of different factors to crop income growth in the rural Northern Uplands, 1993–98



Source: Analysis of the 1993 and 1998 VLSS.

The bottom half of Table 7.4 shows that growth in crop production is the most im-

[34]Although not shown here, the results are very similar if the income categories are defined in terms of the 1993 quintile, using only households interviewed in both years. In this case, the contribution of crop income growth falls from 65 percent among the poorest income group to 33 percent among the richest income group. The contribution of enterprise income growth rises from –17 percent in the poorest category to 58 percent in the richest category.

Table 7.4 Contribution of each income source to income and income growth by expenditure category in the rural Northern Uplands, 1993–98

Income source	Poorest	2	3	4	Richest	Average
			(% of income in 1998)			
Crops	59	53	50	31	22	38
Livestock	12	9	10	9	8	13
Fisheries	3	3	3	2	2	2
Forestry	5	4	4	2	1	8
Enterprise	9	14	12	30	33	10
Wages	6	10	11	13	6	16
Transfers	6	6	10	13	24	12
Other	0	0	1	0	3	2
Total	100	100	100	100	100	100
			(% of income growth 1993–98)			
Crops	69	55	63	23	14	45
Livestock	15	7	3	7	7	8
Fisheries	2	2	4	4	1	2
Forestry	12	6	7	2	2	6
Enterprise	–12	14	–13	34	49	16
Wages	5	14	20	15	3	11
Transfers	10	3	14	16	19	11
Other	0	0	2	0	5	1
Total	100	100	100	100	100	100

Source: Analysis of the 1993 and 1998 VLSS.

portant source of income growth for poor households, accounting for more than two thirds of the total. The contribution of crop production to income growth declines from 69 percent among households in the poorest group to just 14 percent among those in the richest group. In contrast, the contribution of nonfarm enterprise income to rural income growth is greatest among higher income households. Among the poorest households, enterprise income actually declined, so its "contribution" was –12 percent. In the highest income category, growth in nonfarm enterprise income accounted for almost half of the overall income growth. Livestock and forestry income make a greater contribution to the income growth of poor households than to rich ones, while the contribution of wage income seems to be greatest in the middle income categories.

If we limit the analysis to households in both the 1993 and 1998 samples and define the categories according to the per capita expenditure in 1993 (rather than 1993 and 1998 respectively), the results are similar. The contribution of crop income growth falls from 65 percent in the poorest category to 33 percent in the richest category.

Income Diversification by Gender of the Head of Household

Are the sources of income growth different between male- and female-headed households in the rural Northern Uplands? As discussed earlier, female-headed households have per capita income levels equal to or slightly above those of male-headed households, on average, and the growth in income appears to be similar for both groups. Table 7.5 shows the contribution of each source to overall income growth for male- and female-headed households. Almost half (46 percent) of the income growth of male-headed households can be attributed to growth in crop production, compared to just 33 percent among female-headed

Table 7.5 Contribution to overall income growth of each income source by gender of head of household in the rural Northern Uplands, 1993–98

Income source	Head of household		
	Male	Female	Average
	(% of overall income growth)		
Crops	46	33	45
Livestock	8	4	8
Fisheries	1	9	2
Forestry	6	5	6
Enterprise	19	–10	16
Wages	11	12	11
Transfers	7	40	11
Other	0	8	1
Total	100	100	100

Source: Analysis of the 1993 and 1998 VLSS.

Table 7.6 Contribution to overall income growth of each income source by ethnicity in the rural Northern Uplands, 1993–98

Income source	Ethnicity of head of household		
	Kinh/Hoa	Minority	Average
	(% of overall income growth)		
Crops	26	74	45
Livestock	8	7	8
Fisheries	2	3	2
Forestry	2	12	6
Enterprise	34	–13	16
Wages	12	10	11
Transfers	14	7	11
Other	2	0	1
Total	100	100	100

Source: Analysis of the 1993 and 1998 VLSS.

households. The other difference between them is that transfer income has grown more for female-headed households, contributing 40 percent of total income growth. These transfers are mainly remittances from family members (who may include a husband) working elsewhere. By contrast, for male-headed households, growth in transfers represents just 7 percent of the total.

Income Diversification by Ethnicity of the Head of Household

Have income growth patterns differed between Kinh/Hoa households and ethnic minority households in the rural Northern Uplands? Earlier in this chapter, we showed that ethnic minority households tend to be poorer than average and that the growth in their income has also been below average. Here, we compare the composition of the income growth between 1993 and 1998. Growth in crop income accounts for three quarters of the income growth of ethnic minority households. Forestry and wages are also important, each contributing 10–12 percent of the total. Enterprise income has declined, resulting in a negative contribution (see Table 7.6).

In contrast, crop income barely contributed one quarter of the total income growth for Kinh/Hoa households. The largest contributor to income growth was enterprise income, which accounted for more than one third (34 percent) of the total. Forestry is much less important as a source of income growth for these households compared to ethnic minority households.

Contribution of Crop Diversification

The previous section compared the contribution of crop production and other economic activities to overall rural income growth. This section focuses on the composition of the growth in crop income. This analysis focuses on the comparison of the 1993 and 1998 VLSS. This is because the questionnaire and sample design of the 2002 VHLSS differ significantly from the 1993 and 1998 VLSS. In particular, the 2002 VHLSS does not allow the calculation of net income from each crop, which is essential for calculating the contribution of diversification into higher-valued crops.

Crop Diversification in the Northern Uplands

According to the VLSS, the net revenue from crop production among rural farmers

in the Northern Uplands increased by about 2.0 million VND/farm/year in real terms between 1993 and 1998.[35] This section shows the composition of this growth by crop and by source of growth: area expansion, higher prices, yield improvement, and diversification into higher-value crops. The calculations for this analysis are explained in Chapter 3, section on measures of income an accessibility for the QSAID.

The last column in Table 7.7 shows the growth in net income from different crops between the two VLSS surveys. The growth in net income from rice was VND 618,000 per household per year, about 29 percent of the overall increase in net income from crops. Sugarcane and litchi/longan each contributed another 18–19 percent of the overall increase in net income from crop production. No other crop represents more than 6 percent of the total growth in crop income.

The other way to disaggregate the growth in crop income is by the source of the growth: overall area increase, increased prices, higher yields, and diversification toward higher-value crops. This decomposition is shown in each row of Table 7.7. For example, yield increases explain more than three quarters of the VND 618,000 increase in the net income from rice production. Similarly, yield growth is the main factor behind the expansion in maize output.

Price increases did not contribute much to the growth in the value of rice production, but it did explain much of the growth in value of sweet potatoes, cassava, and sugarcane. In the case of sugarcane, the higher prices are due to the government policy to achieve sugar self-sufficiency by restricting imports, which has raised the domestic price of sugar (and indirectly sugarcane) far above the international price.

The diversification column gives the increase in the value of crop income due to reallocation of land away from or toward that crop, holding prices, yields, and total cropped area constant. Expansion of sugarcane, litchi/longan, and "other industrial tree crops" all represented an increase in crop income due to crop diversification.

The bottom two rows of Table 7.7 show the decomposition of crop income growth by source, summing across all crops. The largest factor in the growth of crop income in the Northern Uplands was yield increases, which accounted for 852 VND/farm/year in additional income or 40 percent of the total increase in crop income. In fact, yield increases in rice alone account for almost one quarter (23 percent) of the overall increase in crop income. Price increases represented about 28 percent of the crop income growth, while expansion in cropped area accounts for 15 percent of the total. According to the comparison of the 1993 and 1998 VLSS studies, crop diversification increased the average annual net revenue from crop production in the Northern Uplands by VND 121,000/farm. In other words, if farmers in the Northern Uplands had maintained the same total crop area, the same yields, and the same real price, but had reallocated their land among crops following the historical pattern between 1993 and 1998, their crop income would have increased VND 121,000/farm. This represents about 6 percent of the total increase in income from crop production between the two surveys (see Table 7.7).[36] Overall, these results

[35] The income figures in this section differ somewhat from the ones presented in Table 7.1 for two reasons. First, the sample for this analysis is smaller, being restricted to rural households in the Northern Uplands *who grow crops* rather than all rural households in the Northern Uplands. Second, crop production was defined earlier to include by-products such as straw, hay, stems, and leaves. Since these by-products are not linked to specific crops in the questionnaire, they were excluded from this analysis.

[36] If we limit the analysis to households in both the 1993 and 1998 VLSS samples, the results are somewhat different. In the Northern Uplands, yield growth accounts for 44 percent of the overall growth in crop income, while price increases account for 35 percent, crop diversification 12 percent, and area expansion 17 percent. At the

Table 7.7 Composition of growth in crop income in the rural Northern Uplands, 1993–98

Crop	Area expansion	Price increases	Higher yields	Crop diversification	Total change
Rice	193	22	489	–104	618
Maize	30	38	111	–60	105
Sweet potatoes	7	126	–5	–20	66
Potatoes	1	10	–2	6	18
Cassava	20	112	–12	1	126
Other staple crops	1	–2	2	5	6
Kohlrabi, cabbage, cauliflower	6	51	3	–4	60
Other leafy greens	3	21	–3	1	24
Tomatoes	2	32	–3	–7	13
Water morning glory	6	47	26	–9	86
Fresh legumes	1	3	0	–1	3
Other vegetables	4	9	–6	24	35
Soybeans	9	–11	10	49	59
Peanuts	11	–30	54	–2	16
Sugarcane	11	141	–26	161	421
Tobacco	6	20	18	–21	12
Other annual crops	0	–1	11	0	0
Tea	5	–17	54	–4	17
Other industrial tree crops	0	–1	–1	11	–1
Cashew	0	0	0	0	0
Citrus	1	0	0	9	12
Pineapple	1	0	–2	2	–1
Bananas	5	–5	3	27	31
Mango	1	–2	–4	8	–4
Apple	0	–1	42	–3	3
Plum	1	7	2	1	15
Papaya	1	2	10	–2	10
Litchi, longan, andrambuttan	4	22	89	31	384
Custard apple	1	0	2	7	14
Jackfruit, durian	2	8	–7	6	6
Other fruit trees	1	1	–2	5	3
Total	333	602	852	121	2,157
Row percentage	15%	28%	40%	6%	100%

Source: Analysis of the 1993 and 1998 VLS.
Note: See Chapter 3 for explanation. Columns may not add up to total because interaction term is not shown.

indicate that, while crop diversification has contributed to income growth in the rural Northern Uplands, it has not been as important as growth in yields and increases in real prices.

Crop Diversification in Other Regions

The same analysis can be carried out for the rural areas of the other regions. In the interest of saving space, we do not present the

national level, diversification accounts for 24 percent of crop income growth. However, these results include life-cycle effects as the households in the 1993 sample age and change their household composition. For example, suppose new households start out growing low-value crops and tend to diversify into high-value crops as they get older, but there is no change in what each age-cohort grows. The panel data would show that crop diversification makes a large contribution to the growth in farm income, even if overall there is no change in crop patterns over time. If we are interested in the contribution of each factor to overall crop income growth, then we need to include in our analysis the effect of older households dying and newer households being formed.

Table 7.8 Sources of growth in net income from crop production by region, 1993–98

Region	Area expansion	Price increase	Higher yield	Crop diversification	Interaction	Total
Northern Uplands	15	28	40	6	11	100
Red River Delta	–16	78	44	10	–16	100
North Central Coast	–1	60	29	12	0	100
South Central Coast	10	52	23	2	13	100
Central Highlands	4	31	46	25	–6	100
Southeast	73	22	–9	26	–12	100
Mekong Delta	28	21	23	17	11	100
Average	15	42	29	12	2	100

Source: Analysis of the 1993 and 1998 VLSSs.

crop-level results, but Table 7.8 summarizes the contribution of each factor in crop income growth for the rural areas of each region. Area expansion plays a modest role in crop income growth in the Red River Delta and the two central coast regions. In fact, the Red River Delta shows a negative contribution, implying that the area cropped per farm household declined slightly between the two surveys. This is not surprising given that the growth of Hanoi and the high value of land are leading to the conversion of agricultural land to residential, industrial, and commercial uses. In contrast, area expansion is the most important growth factor in the Southeast. Although the growth of Ho Chi Minh City is also leading to conversion of farmland, the sown area per farm household has still increased. Increased cropping intensity probably accounts for much of this growth in sown area.

On a national level, crop diversification accounted for 12 percent of the growth in crop income between 1993 and 1998. The contribution of crop diversification to crop income growth is highest in the Central Highlands and Southeast. In the Central Highlands, this reflects the expansion of coffee production in the mid-1990s. In the Southeast, farmers are reallocating land from rice to the cultivation of fruit and other higher-value commercial crops for export and sale to Ho Chi Minh City. At the national level, yield increases represented 29 percent of the growth, and higher real prices contributed 42 percent.[37]

Crop Diversification by Income Group

The growth rate in crop income does not vary in a consistent way with the level of per capita expenditure in 1993. In other words, poor households in the rural Northern Uplands experienced as much growth in crop production income as higher income households in that region. The composition of this growth does, however, vary across income groups. Among the poorest quintile of farmers, the increase in yields accounts for about 60 percent of the increase in crop income (see Table 7.9).

The contributions of area expansion, yield increases, higher prices, and crop diversification to crop income growth in the rural Northern Uplands shows a somewhat erratic pattern. Area expansion seems to have played a more important role in crop income growth among the households that had relatively high income. This result suggests that households with relatively high incomes in

[37]If we focus the analysis on households in both the 1993 and 1998 survey, the results are very similar. Price increases account for 45 percent of the crop income growth, higher yields 29 percent, crop diversification 14 percent, and area expansion 11 percent.

Table 7.9 Sources of growth in net income from crop production by expenditure category

Expenditure category	Area expansion	Price increase	Higher yield	Crop diversification	Interaction	Total
Poorest	–5	30	61	10	4	100
2	12	33	48	0	9	100
3	–18	57	68	9	–16	100
4	24	32	40	3	1	100
Richest	68	32	–3	27	–24	100
Average	16	37	43	10	–6	100

Source: Analysis of the 1993 and 1998 VLSSs (panel households only).
Note: Expenditure categories are defined according to the level in 1993.

1993 were able to use those resources to secure more land for planting crops, either through the land allocation process, through the (formal or informal) purchase of land-use certificates, or through land rental. The contribution of yield increases, though inconsistent, seems to indicate that this factor plays a more important role in the crop income growth of poor rural households. This result is plausible since yields can be increased by applying labor more intensively and through the use of improved seed and fertilizer, which are generally scale-neutral forms of agricultural technology.[38] Though the pattern is not consistent, crop diversification may play a somewhat greater role in the crop income growth of higher income rural households. This result is supported by findings from the Qualitative Social Assessment, in which higher income farmers were more likely to cite crop diversification as an explanation for increases in their income over time (see Chapter 5).

These patterns are also seen across quintiles in other regions. Combining all the rural farm households together and classifying them by expenditure quintile, we see that crop diversification and area expansion contribute more to crop income growth among higher income households than among poor households. Furthermore, as in the Northern Uplands, poor households rely more on yield increases to boost the value of their crop income.

Summary

Comparing the 1993 and 1998 Vietnam Living Standards Surveys, rural income grew substantially. This growth was not caused by growth in any one type of activity, but rather proportional growth in income from each source: crops, livestock, fisheries, forestry, enterprises, wages, and other income. The growth in crop income accounted for 45 percent of the growth in overall income for the average rural household in the Northern Uplands, but crop income contributes an even higher percentage (69 percent) among the poorest rural households. Comparison of the 1998 VLSS and the 2002 VHLSS suggests a sharp decline in the contribution of crop income, but it is difficult to interpret these trends because of differences in the sampling and questionnaire design between the two surveys.

Decomposing crop income growth between 1993 and 1998, 40 percent is attributable to higher yields, 28 percent to higher real prices, and 6 percent to crop diversification (defined as the reallocation of sown crop land). Nationally, crop diversification accounts for 12 percent of the growth in

[38] Because seed and fertilizer can be purchased in small quantities, this type of agricultural technology is considered more scale-neutral (benefiting small and large farmers equally) than mechanical technology.

crop income. The sources of crop income growth vary across income groups. Poor households increased their crop income largely by achieving higher yields, particularly for rice, while richer households increased their incomes by expanding the area cultivated. The contribution of diversification shows an erratic pattern across income categories, but appears to be less important for poor rural households than others.

It should be noted that this analysis measures only the incremental income to *farmers* from diversification into higher-value crops. We have not taken into account the contribution of crop diversification to the income of rural households who work as employees in processing and other value-added activities. However, indirect evidence suggests that this effect is not large in the Northern Uplands of Vietnam. First, over 1993–98 the share of income from wages increased only modestly from 8 percent to 9 percent. Second, the high-value crops into which many Northern Upland farmers have diversified (fruits, sugarcane, maize, and tea) do not generate much employment, either because the processing is minimal (fruit and tea) or because the processing is not very labor intensive (sugarcane and maize). Third, the wage data from the 2002 VHLSS suggest that only 1 percent of wage income is attributed to food processing employees. Nonetheless, if this type of analysis is applied to other regions or other countries, it may be important to take into account these indirect effects.

CHAPTER 8

Income Diversification from the Farmers' Perspectives

Statistics from the General Statistics Office (GSO) describe diversification trends at the provincial level, while data from the nationally representative surveys show how these trends vary by type of household and allow us to measure the contribution of diversification to rural income growth. But these analyses are not able to examine the "how" and "why" of income diversification at the household level, nor the role played by traders, processors, and various levels of government. To gather information on the experiences with and perceptions of income diversification, we carried out a survey called the Qualitative Social Assessment of Income Diversification (QSAID). The methods used in collecting the QSAID data are described in Chapter 3. This chapter presents the results of the QSAID survey of rural households in the Northern Uplands region.

General Characteristics

To provide a concrete picture of the living standards of rural households in the Northern Uplands, we briefly describe some general characteristics of the households in the QSAID sample. The average household has 5.9 people, including 1.2 children younger than 10 years of age, and 0.4 adults older than 60 years of age. The head of the household is, on average, 41 years old and has 6.1 years of education. These results closely match those of the 1998 Vietnam Living Standards Survey (VLSS), in which rural households in the Northern Uplands had an average of 5.1 members, the average head of household is 44 years old, and the average head has 7.4 years of education. This provides some reassurance that, although our sample was not a random sample, the households were reasonably representative.

Fourteen ethnic groups were represented among the households in the QSAID sample; the most common were H'Mong (25 percent), Tay (24 percent), Kinh (18 percent), and Nung (10 percent). About three quarters of the heads of households speak Vietnamese and 62 percent indicate that they can read Vietnamese. Of the others, some claim to be able to speak or read "a little" Vietnamese.

About half (56 percent) of the roofs were tiled, while another 26 percent were straw, grass, or thatch. Finally, about half (49 percent) of the houses had earth floors, followed by concrete or brick (22 percent) and wood or bamboo (19 percent). Almost two thirds (64 percent) have electricity, although half of those with electricity started receiving it within the last 3 years.

Somewhat more than half the households in the sample owned a working radio, while similar percentages owned a television and a bicycle. The percentage owning a motorbike or other vehicle was 42 percent. The average farm size was 1.1 hectare, of which 16 percent was irrigated and 58 percent is documented with an official land-use certificate. Somewhat surpris-

ingly, farm size does not differ much across income groups within the sample, although those in the poorest tercile have a smaller share of irrigated land (12 percent) than those in the richest tercile (26 percent).[39] Households in the more remote villages generally have a similar amount of lowland but more upland area compared to those in villages with better market access,[40] which is presumably a reflection of the lower population density and lower productivity of land in the remote areas.

Food Security and Income

Perceived Level of Food Security and Income

How do households perceive their own situation regarding food security and income? Respondents were asked "concerning rice and other food crops,[41] last year you produced enough food to feed your household for how many months?" Almost 62 percent reported that their own food production was enough to feed the family for a full 12 months per year. On the other hand, 11 percent reported that it lasted 6 months or less. This information may be misleading because it measures household food self-sufficiency, rather than food security, defined as the ability to meet food consumption needs.

An alternative, perhaps better, way to measure food security is to ask if the household experienced hunger during the past year and, if so, for how many months. More than two thirds of the respondents (69 percent) said they had not experienced hunger. Another 10 percent said that they experienced four or more months of hunger during the year. Although these figures are affected by different definitions of "hunger," it seems clear that, although the majority of households are food secure, a significant minority are not.

Both of these indicators of food security are correlated with our index of household well-being. For example, the proportion of households with zero months of hunger rises from 47 percent in the lowest income group to 93 percent in the highest group. Similarly, the percentage of households that produces 12 months of food supply for itself rises from 42 percent in the poorest tercile to 79 percent in the richest tercile.

Perceived Changes in Income

Respondents were asked to assess their current standard of living compared to their standard of living in 1994. Given the rapid economic growth that Vietnam has experienced, it is not surprising that many households report being better off now. Almost 83 percent of the households reported that they were better off than in 1994. Another 16 percent said they are about the same, and just 1 percent (3 households) reported being worse off (see Table 8.1). Even if we take into account the fact that some of these responses may be exaggerated, these results suggest that the benefits of economic growth have not been limited to the larger cities or the more favored rural areas.[42]

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[39] To calculate an index of standard of living for the QSAID, the 1998 VLSS data were used to estimate an equation to predict per capita expenditure as a function of various household characteristics. This equation was applied to the same household characteristics in the QSAID, generating a proxy for per capita expenditure for the QSAID sample households. See Chapter 3 for further details.

[40] The measure of accessibility used in this analysis is based on an index developed by the government to pay hardship allowances to public employees located in remote communes. See Chapter 3 for further details.

[41] In Vietnam, "food" is generally defined to include rice, maize, sweet potatoes, and cassava.

[42] There may be a bias toward improved standard of living to the extent that households experiencing a decline in standard of living are more likely to die than migrate out of the Northern Uplands. Nonetheless, we believe this bias to be small or negligible.

Table 8.1 Standard of living compared to 1994 by accessibility

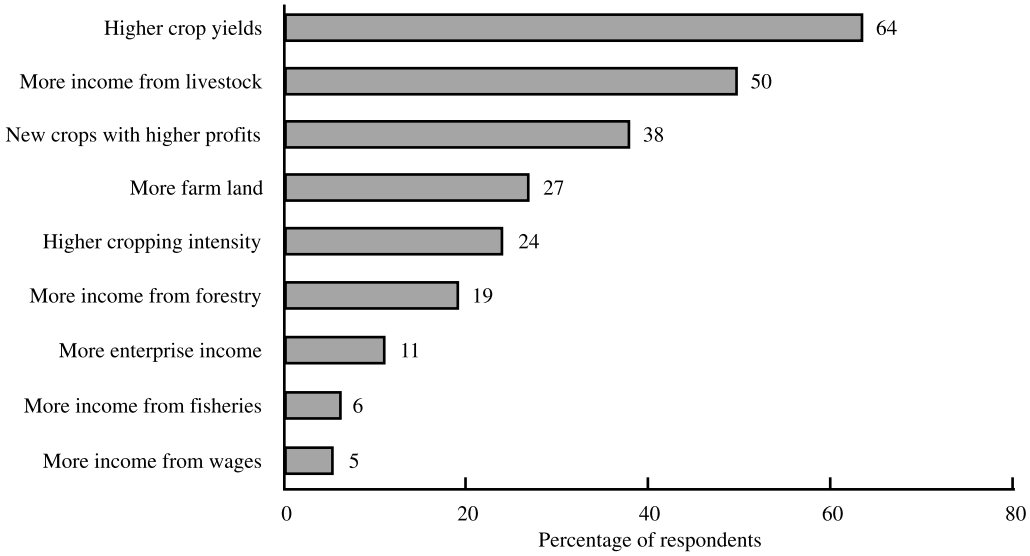
Standard of living compared to 1994	Accessibility				
	Low	2	3	High	Total
Better	79	83	82	89	83
No change	21	16	17	9	16
Worse	0	1	1	2	1
Total	100	100	100	100	100

Source: QSAID Household Survey.

The percentage of household reporting improvement is higher among those in more accessible villages (89 percent) compared to those in the least accessible villages (79 percent), but even in the most inaccessible villages in the sample, more than three quarters of the households reported rising standards of living (see Table 8.1).

Given the large numbers of rural households that feel that their standard of living has improved over the last 8 years, an obvious question is, What are the main factors behind this improvement? Households were asked to name up to three factors that were important in contributing to the change in income since 1994. The questionnaire has nine precoded responses, but respondents were allowed to give other answers as well. Among households reporting an improved standard of living, the most common explanation, offered by 64 percent of the respondents, was that their crop yields had increased (see Figure 8.1 and Table 8.2). In addition, 50 percent said that their household had benefited from increased income from livestock production. The third most common response, cited by 38 percent, was that the household grows new crops that are more profitable than before. Less common responses included more land to cultivate (27 percent), higher cropping intensity (24 percent), more income from forestry-related activities (19 percent), and more income from nonfarm enterprises (11 percent).

Figure 8.1 Reported reasons for improved standard of living of household



Source: QSAID Household Survey.

Table 8.2 Reported reasons for improved standard of living of household by income tercile

Reasons for improved living conditions	Income tercile			Total
	Lower	Middle	Upper	
	(% of respondents)			
Increase in crop yields	62	63	65	64
Earns more income from livestock	46	46	56	50
Grows new crops with higher profits	17	41	56	38
Increase in land available for farming	17	36	29	27
Increase in cropping intensity	22	24	27	24
Earns more income from forestry	10	22	24	19
Earns more income from nonfarm business	2	12	19	11
Earns more income from fisheries	0	10	7	6
Earns more income from wages	2	5	7	5
Other	10	15	17	14
Total	189	274	308	257

Source: QSAID Household Survey.
Note: Percentages sum to more than 100% because respondents were allowed to give multiple responses.

The responses differed by income group, however. For example, growing new crops with higher profits was mentioned by 56 percent of those in the upper-income group, 41 percent in the middle group, and just 17 percent in the lower-income group. Higher-income households were also more likely to cite area expansion, livestock income, forestry, and nonfarm enterprise income. On the other hand, higher crop yields was the most common response in all three categories, being cited by more than 60 percent of the households in each group. Thus, it appears that the poorest rural households are more likely to report gains from higher yields and greater livestock income, while better-off rural households cite gain from a combination of higher yields, more profitable crops, and greater livestock income.

The large number of households citing higher yields as an important factor in rising rural incomes is consistent with the results of the analysis of household surveys in Chapter 7, in which yield growth was the largest factor contributing to crop income growth. In the context of Vietnam, it is likely that yields showed a noticeable rise as a result of improvements in irrigation infrastructure, water management, and production methods. All three of these factors may be linked to the distribution of "red book" land-use certificates. The 1993 Land Law called for the distribution of land-use certificates as a way of formalizing the *de facto* allocation of cooperative farm land among member households. This gave rural households greater confidence that the reforms would not be reversed and that the returns to farm-level investments would accrue to the household.

These results indicate that income diversification has played a role in increasing rural incomes in the Northern Uplands over the last 8 years. Agricultural diversification (from crops into livestock) was the second most common explanation given for rising incomes and crop diversification (from low-value to high-value crops) was the third most common response. Diversification into forestry, nonfarm enterprises, and fisheries is also cited, though less often.

What about households whose standard of living has declined since 1994? As mentioned above, only three households in the sample reported being worse off, so we cannot draw any useful information from their experience. All respondents were also asked, however, about others in the village whose well-being had declined and what

the reasons behind that decline were. Here, there was much less consensus. The most common responses were less land for cultivation (28 percent), many children (18 percent), that they were lazy (11 percent), and that they lack capital for productive investment (11 percent). Other reasons given included lack of production knowledge, illness, reduced income from livestock, and lack of labor.

Sources of Income

This section focuses on the livelihood strategies of rural households in the Northern Uplands. In particular, we are interested in the sources of income earned by the households and how these patterns have changed over the last 8 years.

Current Income Sources

The survey asked households to rank their three most important sources of income and list any others. The responses were coded into 39 possible activities, including 16 crop categories, 6 livestock categories, 7 forestry and fishing categories, and 10 types of nonagricultural income. Rice continues to be the most important source of income in spite of gradual diversification into other crops and noncrop activities. Over half (55 percent) of the households in the sample cited rice production as their most important source of income. Maize is a distant second, identified by 13 percent of the households as the most important source. Litchi, pigs, and tea are also mentioned, but by smaller numbers of households.

Overall, 90 percent of the households report some income from rice production. Large proportions of households are also involved in pig production (86 percent), maize cultivation (75 percent), and poultry production (73 percent). No other activity is reported by more than half of the respondents, although cassava and buffalo come close with 48 percent and 44 percent, respectively (see the last column in Table 8.3).

There is some variation in income sources across income categories, but the differences are surprisingly small. Households in the poorest income group are more likely to report income from maize, cassava, cattle raising, and agricultural wages, but they are less likely to earn money from fruit production, trading, processing, and remittances. The differences in crop mix may be explained by the fact that poorer households have more upland farm area, less irrigated area, and less liquidity for investment in tree crops such as fruit. Differences in the importance of trading and processing may reflect lack of skills or capital for investment among the poor.

As discussed earlier, diversification can be defined in terms of the number of economic activities or in terms of the importance of nonfood and nonagricultural activities in the family budget. Overall, the average household in the sample reported income from 6.8 of the 36 income-generating activities[43] (see Table 8.4). Virtually all households have some nonfood income (99 percent) and some noncrop income (98 percent), and 31 percent have nonagricultural income. Income diversity is greater among higher-income households, but the differences are modest. The number of households having nonagricultural income is also greater among those in the highest tercile (37 percent) compared to the middle and lower terciles (28 percent in each).

Changes in Income Sources since 1994

To explore the changes in income sources over time, the QSAID respondents were asked which of their current income-generating activites had started within the previous 8 years (since 1994) and which

[43] For these calculations, we exclude the three types of transfer income: remittances, family aid, and government aid.

Table 8.3 Changes in sources of income between 1994 and 2002

	Income source started since 1994	Income source abandoned since 1994	Income source is now more important than in 1994	Income source is now less important than in 1994	Income source in 1994	Income source in 2002
			(% of households)			
Rice	6	0	54	7	84	90
Maize	5	2	37	6	72	75
Sweet potato	0	1	0	3	15	14
Potato	2	0	0	1	2	4
Cassava	3	14	4	30	58	48
Beans	5	4	2	3	22	23
Other legumes	2	1	0	1	8	9
Vegetables	1	0	0	0	13	14
Litchi	14	0	11	1	4	17
Longan	3	0	0	1	6	7
Other fruit	13	1	7	7	15	27
Tea	14	1	12	0	8	20
Sugarcane	1	1	1	0	1	1
Pepper	0	1	0	0	1	0
Other industrial crops	10	3	8	1	5	7
Opium poppies	0	4	1	2	4	0
Beef cattle	6	2	7	0	16	21
Dairy cattle	0	0	1	0	2	2
Buffalo	7	2	11	5	38	44
Pigs	8	1	35	8	78	86
Poultry	3	0	8	19	71	73
Other animals	2	0	2	2	7	9
Fishes	4	1	3	0	10	13
Fisheries	0	0	0	1	3	3
Firewood	1	3	1	5	16	15
Other wood	2	2	1	1	4	4
Medicinal plants	4	0	2	0	2	5
Wildlife	0	2	0	1	2	0
Other forest products	7	3	5	5	10	14
Mining	0	2	0	2	2	0
Agricultural trading	1	1	1	0	1	2
Other trading	3	1	2	0	4	6
Agro-processing	3	0	2	0	1	4
Other business	4	0	0	0	1	5
Agricultural wages	3	1	2	1	6	8
Nonagricultural wages	5	1	4	1	6	10
Remittances	6	2	5	1	13	17
Family aid	0	0	0	0	2	2
Government aid	8	0	7	0	15	23

Source: QSAID Household Survey.
Note: Columns 1–4 and column 6 based on household interviews. Column 5 calculated as column 6 minus column 1 plus column 2.

ones did they have in 1994 but have since given up. An impressive 83 percent of the respondents had adopted at least one new source of income since 1994. Furthermore, this experimentation was not limited to the rural rich: at least 80 percent of the households in each income tercile reported adopting a new crop or income-earning activity. The most commonly cited new income sources were tea (14 percent of the

Table 8.4 Measures of income diversification by income category

Income tercile	Number of income sources	Percentage of households with		
		Nonfood income	Noncrop income	Nonagricultural
Lower	6.45	99	98	27
Middle	6.80	99	97	27
Upper	7.17	100	99	37
Total	6.80	99	98	31

Source: QSAID Household Survey.

households), litchi (14 percent), "other fruit" (13 percent), and "other industrial crops" (10 percent) (see first column Table 8.5).

Fewer households reported abandoning a crop or income activity. The most commonly mentioned crops that were no longer grown by the household were cassava (14 percent of the households), beans (4 percent), and opium poppies[44] (4 percent) (see the second column of Table 8.5).

We can reconstruct the types of income earned by our sample households in 1994 by combining information on current income sources, new sources, and abandoned sources (see the fifth column of Table 8.5). Comparing the income sources in 1994 and 2002, it is clear that there has been some diversification away from starchy staples (mainly cassava) and toward higher-value crops (e.g., tea, litchi, and "other fruit"), livestock (e.g., beef cattle, buffalo, and pigs), and various nonfarm activities. The percentage of sample households earning some income from nonfarm activities (wages or enterprise income) increased from 17 percent to 31 percent. This contrasts with the VLSS results, in which the proportion of households with nonfarm enterprise income has fallen in most regions of Vietnam.

One exception to the trend of diversification away from staple food crops is the increasing share of households growing rice (from 84 to 90 percent). This may reflect investments in irrigation that have made expansion of rice area possible. In addition, it may reflect changes in rice policy. In the early 1990s, a government-imposed rice export quota kept exports at about 2 million tons. Since 1997, the government has gradually relaxed the quota allowing exports to rise to about 4 million tons, though low international prices have since partially reversed this trend (Minot and Goletti 2000).

Rural households in the Northern Uplands have increased the diversity of their income sources since 1994. Of the 36 in-

Table 8.5 Respondents with successful and unsuccessful experiences adopting new crops by income tercile and accessibility

	Successful crops	Unsuccessful crops
	(% of respondents)	
Overall	56	26
Income		
Lower	44	20
Middle	60	25
Upper	63	34
Accessibility		
Low	44	15
2	45	41
3	58	22
High	82	29

Source: QSAID Household Survey.

[44] Since it is illegal to grow opium poppies, we must interpret these results with caution. It is likely that farmers would under-report current income from this crop, but it is not clear whether they would under-report or over-report having given up opium poppy cultivation.

come activities listed (excluding transfers), the average number of income sources per household has increased from 5.9 to 6.8. In addition, the percentage of households earning nonagricultural income has increased from 17 percent to 31 percent over the 8-year period. Further, these trends are found in poor rural households as well as those somewhat better off.

Income diversification does not have to involve giving up an income-generating activity or adopting a new one, however. It may mean changing the relative importance of different sources of income. To capture this type of change, the QSAID Household Survey asked which activities have become more important since 1994 and which ones have become less important. When asked about activities whose importance has increased, respondents cited rice (mentioned by 61 percent of the households), maize (44 percent), and pigs (41 percent). When asked about activities that have become less important to the household, the most common responses were cassava (45 percent of the respondents), poultry (22 percent), and firewood (12 percent) (see third and fourth columns of Table 8.5).

These results indicate that rural households in the Northern Uplands have been involved in gradual income diversification since 1994. This is true whether we define diversification in terms of the number of activities, the proportion of households growing fruit and industrial crops, or the proportion involved in nonfarm activities. Further, income diversification is not limited to the rural elite or those in accessible villages near roads and cities.

Experiences with Diversification

The results in the previous section suggest that rural households are trying new crops, but we do not know what motivates them to do so, whether they have experienced any failures in their experimentation, and what they think are the main constraints to income diversification. These questions are addressed in this section.

Success in Adopting New Crops

Overall, 56 percent of the households in the sample report that they have *successfully* introduced a new crop since 1994, where success is defined in terms of the decision to continue growing the crop. A larger percentage of households reporting at least one successful crop adoption was higher among those in the high-income tercile (65 percent) than among those in the low-income tercile (44 percent), but successful introduction of new crops is occurring even among the poorest rural households. The rate is even more strongly correlated with accessibility. The proportion of households successfully introducing one or more new crops rises steadily from 44 percent in the remote villages to 82 percent in the villages with good market access (see Table 8.6).

Not all experiments succeed. Roughly one quarter of the respondents (26 percent) said that they had had an *unsuccessful* experience with a new crop, where failure is defined in terms of the farmer's decision to stop growing it. The proportion of households reporting failed experiments was higher among households in the high-income tercile than among those in the low-income tercile, but the ratio of successes-to-failures is similar across income groups (see Table 8.6).

The most commonly cited crops that were successfully adopted are tea, litchi, anise, and new varieties of rice. Tea was mentioned by households in all income terciles with equal frequency, while litchi was more frequently mentioned by those in the upper-income tercile. For the unsuccessful experiences, respondents were asked to name the crop that they tried to adopt and then gave up, or, if there were more than one, the crop that was the least profitable. Plum and apricot were mentioned most frequently, each cited by 13 percent of those with an unsuccessful experience (see Table 8.6).

Table 8.6 Crops listed as most and least successful new crops by respondents

Crop	Most successful new crops (% of those reporting a successful adoption)	Least successful new crops (% of those reporting an unsuccessful adoption)
Rice (new variety)	7	4
Maize (new variety)	5	1
Taro	2	—
Litchi	18	4
Longan	1	8
Plum	4	13
Orange	1	6
Sapodilla	3	4
Fruit (various)	2	3
Anise	8	—
Cinnamon	2	—
Dia Lien (medicinal)	1	5
Sa moc (medicinal)	2	—
Tea	27	3
Coffee	4	6
Sugarcane	2	4
Pine	7	—
Cassava	—	11
Soybean	—	4
Orange	—	6
Apricot	—	13
Coconut	—	3
Sticklac	—	3
Other	4	9
Total	100	100

Source: QSAID Household Survey.
Note: Includes only responses in which at least 2% of respondents mentioned the crop as successful or unsuccessful.

Motivation for Adopting New Crops

In 42 percent of cases of successful adoption, the new crop was suggested or encouraged by an extension agent or local authorities. In most cases (54 percent), the response was "other." After examining the uncoded responses in the questionnaires, it appears that most of these (37 percent of all respondents) refer to cases in which the farmer got the idea of trying the new crop from another farmer. It is interesting to note that private traders and state enterprises played almost no role in introducing new crops to farmers. Similarly, the 41 percent of unsuccessful experiences was encouraged by the local authorities or an extension agent. For unsuccessful crops, 58 percent of the response was "other." When they were broken down, it shows that half of them said they "grow on their own," which we interpret meaning that they just see other people doing and follow their example (see Table 8.7).

In cases in which someone was responsible for introducing the crop and/or encouraging the farmer to grow it, we asked what types of assistance or incentive were provided. In three quarters of the cases, the farmer was given some information about how to produce the crop and in about half the cases (56 percent) the farmer was sold inputs. The farmer received inputs free or on credit in less than one-third of the cases, though the proportion was about half when the farmer was motivated by an extension agent. No more than 10 percent received

Table 8.7 Person/institution that encouraged new crop

Person or institution	Successful crops	Unsuccessful crops
Who encouraged new crop?		
Extension agent	25	18
Local authorities	17	23
State enterprise	4	2
Other	54	58
Total	100	100
What type of assistance?		
Show how to grow	75	53
Provided inputs for sale	56	39
Provided inputs free on credit	32	19
Marketing information	8	11
Marketing agreement	10	4

Source: QSAID Household Survey.
Note: The totals in "types of assistance" is more than 100% because multiple responses were allowed.

marketing information or a marketing contract (see Table 8.7).

For unsuccessful respondents, about half the farmers received some information about how to grow the crop and 39 percent of the farmers were sold inputs. Fewer than 20 percent of the farmers received inputs free or on credit. The farmer was given some information on marketing and marketing agreement was 10 and 4 percent, respectively. Thus, it appears that in the majority of cases, the farmer adopts the new crop with no more assistance than information on how to grow it (see Table 8.7).

Perceptions Regarding Diversification

In addition to questions about their experience with diversification, the survey asked respondents about their views regarding the potential for different types of income diversification to improve their income and whether it could raise the income of poor households in their village. Fewer than half (43 percent) believe that they could increase their income by growing different crops, though households in the upper tercile were somewhat more optimistic (51 percent) than those in the lower tercile (36 percent) (see Table 8.8).

Those who answered "yes" were asked which crops (up to three) would increase their income. A wide range of crops were mentioned by the respondents, but the most commonly mentioned ones were litchi, longan, sapodilla, mango, anise, tea, and bamboo. These seven crops accounted for about two thirds of the responses given.

If these crops would help them increase their income, the obvious question is why they are not growing them now. The most common response was lack of capital (21 percent), while other reasons include lack of seeds, lack of land, and lack of information about production methods. Some respondents said that market and transport are the main constraints for them.

One third of the households felt that they could increase their income by getting involved in noncrop activities (see Table 8.8). Those that answered "yes" were asked which activities would be more profitable. More than half (57 percent) mentioned some type of livestock production, mainly cattle and buffalo raising. Another 18 percent cited nonfarm businesses, with small numbers listing processing, hired labor, motorbike repair, and transportation, among others. What are the constraints that prevent them from engaging in these noncrop activities?

Table 8.8 Perception of ability to raise income from crop diversification and noncrop activities

Could earn more money	Crop diversification (n = 304)	Noncrop activities (n = 302)
	(% of respondents saying yes)	
Overall	43	33
Income		
Lower	36	33
Middle	42	26
Upper	51	41
Accessibility		
Low	36	28
2	45	47
3	50	26
High	38	34

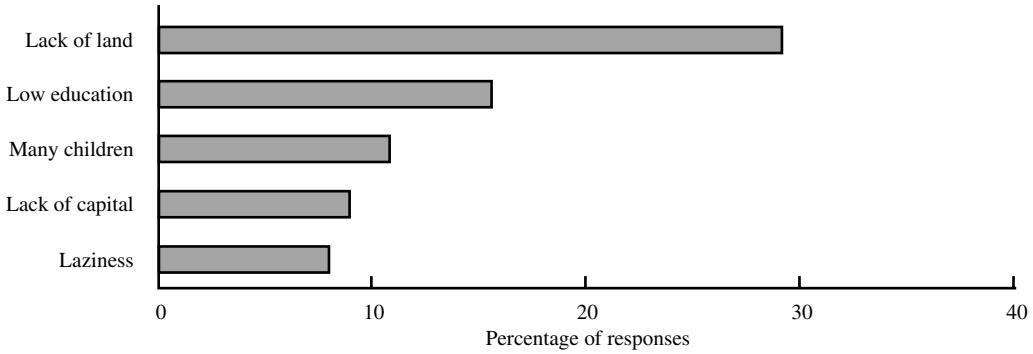
Source: QSAID Household Survey.

More than half cited lack of capital as the main constraint. Others mentioned lack of labor, animal diseases, lack of seeds/seedlings, lack of pasture, small children, and lack of information.

The survey also included some questions to address more directly the problems of the poor and whether income diversification would help alleviate poverty. We started with a very general question about the main causes of poverty in their village. The most common reason given (30 percent of the respondents) was lack of land. Other common responses were the low level of knowledge or education (16 percent), large numbers of children (11 percent), lack of capital (9 percent), and laziness (8 percent). Poor health, lack of labor, infertile soils, and drug addiction were also mentioned as causes of poverty. These responses mirror those discussed earlier regarding the reasons for the deterioration in standards of living of some households (see Figure 8.2).

There is little doubt that lack of capital is the most common response to questions about constraints to diversification. It is important, however, to interpret these results with caution for two reasons. First, credit programs managed by the government and by nongovernmental organizations are often heavily subsidized either through below-market interest rates or through easy forgiveness of loans. From the responses, it is not clear whether the respondents are stating

Figure 8.2 Perceptions of main causes of poverty



Source: QSAID Household Survey.

Table 8.9 Opinion on difficulty of trying new crops for women and ethnic minorities

	Respondents saying yes (%)
Is it more difficult for women to diversify?	
Male respondents	21
Female respondents	20
Average	21
Is it more difficult for ethnic minorities to diversify?	
Kinh/Hoa respondents	14
Ethnic minority respondents	26
Average	24

Source: QSAID Household Survey.

their need for credit (at market interest rates) or their interest in receiving subsidies through a credit program. Second, although the research purposes of the survey were explained to every respondent, some respondents may feel that reporting a problem of credit will increase their chances of receiving credit in the future, thus biasing their responses.

Finally, the survey asked whether it was more difficult for ethnic minorities or women to try new crops or activities. Ethnic minorities may face several barriers to diversification: (1) language differences may make it difficult for them to obtain technical and market information on new crops; (2) lower levels of education may interfere with their ability to make use of technical or marketing information, (3) cultural differences may make it harder for them to find a buyer that they trust or that trusts them; and (4) it may be more difficult for them to apply for or obtain credit. Women may face similar barriers, as well as the fact that they usually do not have land titles or other forms of collateral for credit.

In light of these constraints, it is somewhat surprising that only 21 percent of the respondents felt that it was more difficult for women to diversify into new crops or activities. There was little difference between male and female respondents in their answers to this question (see Table 8.9).

With regard to ethnicity, about one quarter (24 percent) of the respondents said that ethnic minorities faced additional constraints when trying to diversify into new crops or activities. Again, dividing the sample into two groups, the percentage was 26 percent among ethnic minorities and 14 percent among others.[45] Thus, ethnic minorities are more likely to say that they face additional constraints than others, but even among ethnic minorities barely one quarter believe those additional constraints exist.

Role of Traders and Processors

Traders and processors are normally the link between farmers and markets. As such, they transmit market signals to the farmer, either implicitly through the prices they are willing to pay for different commodities, or explicitly by passing on market information to the farmer. Since traders succeed or fail based on their knowledge of the market, they are potentially a useful source of information about market conditions in general and about opportunities to grow new crops

[45] This category includes the Kinh (ethnic Vietnamese) and Hoa (ethnic Chinese), following the convention used in Vietnam.

in particular. Further, because traders and processors are often larger and more liquid enterprises than farm households, they are a potential source of credit. On the other hand, traders are often seen as exploitative middle-men, taking advantage of the isolation and ignorance of farmers to pay them less than a "fair" price. To the extent that farmers distrust traders or see the market as inherently unstable, they will be reluctant to diversify into higher-value commercial crops. This section explores the perceptions of farmers with regard to the role of traders and processors in agricultural marketing in the Northern Uplands.

Almost all households in the sample (92 percent) sell at least some of their agricultural production (including crops, livestock, forestry, and fisheries). The proportion of farmers selling is higher among better-off households, but even among the poorest third of rural households, 80 percent sell some of their output. Similarly, the percentage is higher among those with good market access, but even among those living in the most inaccessible villages, 82 percent have agricultural sales.

The respondents were asked to name three most important commodities they sell. The most frequently mentioned commodity was pigs, sold by at least 63 percent of all households in the sample. Maize and rice are each sold by 22 percent of the respondents, followed by poultry, litchi, and tea. Rice and poultry are more often cited by poor households, while fruit and tea are much more common among households in the upper-income tercile.

The buyer is usually a private trader. Traders account for 78 percent of the sales transactions recorded in the survey. Consumers and private processors are in a distant second and third place, representing less than 10 percent of the sales transactions each. State enterprises and state processors together account for just 4 percent of the farm-level buyers, although they may receive the commodities further along the supply chain. Households in remote locations are more likely to sell to consumers than other households, but private traders still account for the bulk of their sales (see Table 8.10).

The buyer rarely provides any assistance to the farmer in terms of production information, inputs, credit, or marketing contract. Just 6 percent of the sales transactions involved any type of assistance from the buyer. In other words, almost all the sales transactions were on the spot market, regardless of the income or location of the farmer and regardless of the type of buyer.

To assess the level of competition in agricultural markets, we asked how many buyers are there to choose from in the same location where the sales transaction was made. In 62 percent of the transactions,[46] there were five or more buyers (see Table 8.10). In 7 percent of the cases, there was just one buyer and in 13 percent the respondent did not know. The percentage of respondents who did not know how many buyers there were was much higher in the most remote villages (19 percent) than among those who had good market access (4 percent). This confirms the view that market information is more limited in remote areas.

When asked the reason that a particular buyer was selected, 74 percent of the responses were that he or she offered the best price. Concerns that previous debts or personal relationships would obligate a farmer to sell to one buyer appear to be unfounded on the whole. In fact, not only is debt not a factor in the choice of buyer, but it is very rare for a farm household to owe money to a buyer (see Table 8.10).

Two other questions were used to explore the relationship between the farm house-

[46] In calculating the percentages for questions 2 through 5 in Table 8.10, sales to consumers are excluded, since the questions are not relevant in this case.

Table 8.10 Characteristics of crop buyers

	Accessibility				
	Low	**2**	**3**	**High**	**Total**
Type of buyer					
Private trader	68	83	74	89	78
State enterprise	0	2	4	0	2
Private processor	5	3	4	7	5
State processor	0	1	6	0	2
Consumers	22	5	6	2	9
Other	5	5	6	1	4
Total	100	100	100	100	100
Number of buyers					
More than 10	38	33	22	57	36
6–10 buyers	17	26	32	26	26
2–5 buyers	21	11	27	12	18
Just 1 buyer	4	4	16	1	7
Don't know	19	26	4	4	13
Total	100	100	100	100	100
Reason for choosing buyer					
Only one	5	5	13	0	6
Offers assistance	0	1	1	0	1
Gives best price	65	74	65	88	74
Trust/relationship	13	12	19	10	14
Owe money to him	0	2	0	0	0
Other	17	7	1	2	5
Total	100	100	100	100	100
Years selling to buyer					
Many years	7	11	3	9	7
Several years	14	16	21	30	21
Just a few years	30	44	56	39	44
This was first year	50	29	21	21	28
Total	100	100	100	100	100
Level of trust of buyer					
Trust for fair price	42	42	35	29	36
Trust but verify	44	53	61	68	58
Don't trust much	13	5	2	0	5
Don't trust at all	0	0	1	4	1
Total	100	100	100	100	100

Source: QSAID Household Survey.

Note: Responses to first three questions refer to three most important crop sold. Responses to last two questions refer to most important crop sold. Percentages in questions 2–5 exclude sales to consumers, for which questions are not relevant.

hold and the most important buyer (in value terms). When asked how many years the household has sold to this buyer, 28 percent of the respondents said this was the first year and 44 percent said just a few years (see Table 8.10). This suggests that not only do farmers sell in spot markets for the most part, but there is a great deal of turnover in the farmer–buyer relationship. This is positive in demonstrating that farmers have a choice and are not locked into a relationship, but it is also a matter of concern because it indicates that buyers are not likely to provide assistance (in the form of market information, credit, or inputs) to farmers under these conditions.

When asked how much the respondent trusts that they are getting a "fair price" from the buyer, 36 percent reported that they trust the buyer to give a fair price and another 58 percent state that they "trust the buyer more or less but verify prices." Just 6 percent said they "don't trust much" or "don't trust at all." (see Table 8.10).

Finally, respondents were asked whether a private trader or processor had ever given the household any encouragement or assistance to try a new crop. Given the results presented earlier, it is not surprising that 99 percent of the respondents said no.

In summary, the bad news is that there is little or no "vertical coordination" between farmers and buyers. Farmers sell on spot markets and receive virtually no guidance (much less credit or other assistance) from buyers regarding market opportunities. The good news is that farmers usually have a choice of buyers and seem to trust that the prices they receive are fair. On the basis of farmer perceptions, there is little evidence of exploitative relationships between farmers and buyers, even in the more remote villages.

Role of Government

In the section on motivation for adopting new crops, we presented results indicating that, in about 40 percent of the cases where farmers adopted a new crop, the main factor in the decision was the encouragement or assistance of an extension agent or local authority. In this section, we examine in more detail the perceptions of farmers regarding the role of the government in promoting income diversification in the Northern Uplands.

The households in the survey had relatively good contact with the extension service. About 41 percent had attended an extension meeting in the past 12 months. Of those that did not attend a meeting, 78 percent received extension information indirectly (e.g., through the village leader, a friend, a brochure, or a radio program). Higher-income farmers were somewhat more likely to attend meetings and receive extension information indirectly (see Table 8.11).

More than half (53 percent) of the households said they had received encouragement or assistance from extension agents or other government officials to try a new crop. Of those receiving some kind of encouragement or assistance, almost all (97 percent) said they were shown how to grow the crop, more than half (59 percent) were provided with inputs for sale, and somewhat less than half (41 percent) were provided inputs for free or on credit. On the other hand, only 8 percent were offered a marketing agreement and almost none (3 percent) were offered marketing information (see Table 8.11). Thus, it appears that the assistance provided was heavily oriented toward production, with little attention to marketing issues.

The proportion of farmers receiving different types of assistance did not vary much by income group, except that low-income households were more likely to get inputs free or on credit, while higher-income households were more likely to be offered inputs for sale. On the one hand, these results suggest that subsidized input delivery is targeted to poor households. On the other hand, despite the targeting, one-third of households in the second and third terciles received subsidized inputs (Table 8.11).

Overall, 75 percent of the respondents reported that they felt the assistance was "useful." This percentage did not vary substantially between lower- and high-income households (see Figure 8.3), nor between households in remote and accessible villages. Among those who said it was useful, most of them reported good yields and higher income as a result of the assistance. Of those who said it was not useful, some complained of insufficient assistance, while others cited production problems (lack of water, poor yields) and marketing problems (the price was too low). Some noted that the seed provided by the extension service was of poor quality.

Table 8.11 Experience with extension service

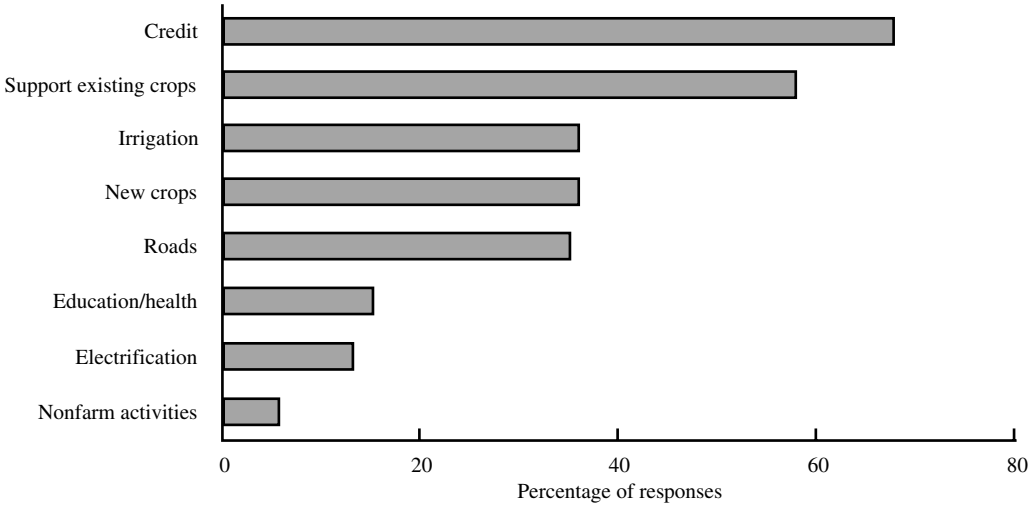
	Income tercile			
	Lower	Middle	Upper	Total
Attended extension meeting in last 12 months (%)	38	36	50	41
Extension suggested new crop (% saying yes)	58	45	55	53
Type of assistance provided (% saying yes)				
Show how to grow	100	98	93	97
Provided inputs for sale	45	73	63	59
Provided inputs free on credit	55	33	34	41
Marketing information	2	5	2	3
Marketing agreement	11	9	4	8
Usefulness of assistance (% saying yes)	81	73	71	75
Extension suggested new activity (% saying yes)	16	8	9	11

Source: QSAID Household Survey.
Note: Percentages under "Type of assistance" and "Usefulness of assistance" refer to the percentage of those offered encouragement or assistance by the extension service to grow a new crop.

The extension service and other local government officials were much less involved in providing assistance or encouragement to households to do noncrop activities. Only 11 percent of the respondents (33 farmers) reported assistance or encouragement of this type (see Table 8.11).

Finally, respondents were asked to identify up to three of the most useful types of government assistance to reduce poverty. Two thirds of the households (68 percent) said that improved access to credit is a key strategy for reducing poverty. Over half (58 percent) called for better support for

Figure 8.3 Most useful types of government assistance



Source: QSAID Household Survey.

Table 8.12 Most useful type of government assistance by income group and by accessibility

	Income tercile			
	Lower	**Middle**	**Upper**	**Total**
Most useful government assistance				
Better education and health care	3	5	7	5
Build better road to village	13	10	13	12
Build or expand irrigation	10	15	12	12
Expand or improve electrification	8	3	3	5
Improve access to clean water	4	1	1	2
Better access to credit	23	24	23	24
Promote new crops and marketing	11	14	13	13
Better support for existing crops	22	23	15	20
Promote nonfarm employment	1	1	3	2
Other	4	4	10	6
Total	100	100	100	100

	Accessibility				
	Low	**2**	**3**	**High**	**Total**
Most useful government assistance	3	5	9	1	5
Better education and health care	14	14	13	4	12
Build better road to village	13	5	21	8	12
Build or expand irrigation	8	9	0	1	5
Expand or improve electrification	5	2	0	1	2
Improve access to clean water	18	25	22	30	24
Better access to credit	13	15	7	18	13
Promote new crops and marketing	20	20	18	23	20
Better support for existing crops	0	1	3	2	2
Promote nonfarm employment	5	4	6	12	6
Other	3	5	9	1	5
Total	100	100	100	100	100

Source: QSAID Household Survey.

existing crops, while the promotion of new crops was mentioned by 36 percent. Also cited by at least one third of the respondents was build or expand irrigation and improve road to village. Better education and health care and electrification were each mentioned by at least 10 percent of the respondents (see Figure 8.3 and Table 8.12).

There were some differences on priorities across income terciles. Lower-income households were somewhat more likely to call for electrification and clean water, probably because they are least likely to have these amenities. Higher-income households were more likely to mention health and education. But all three income categories mentioned improved access to credit and better support for existing crops as their first and second priorities, respectively (see Figure 8.3).

Some differences were also observed between the responses of households in remote villages and those in accessible villages. Not surprisingly, better roads were mentioned by 14 percent of those in isolated villages but just 4 percent of those in accessible villages. Similarly, electrification and clean water were cited by a higher proportion of households in remote villages. On the other hand, improved credit was mentioned by 30 percent of those in the most accessible category but just 18 percent of

those in the least accessible category. But similarities remain. In three out of the four accessibility categories, credit and support to existing crops are the two most important priorities for rural households (see Figure 8.3).

Summary

The results of the QSAID Household Survey indicate that the standards of living in the rural Northern Uplands have improved for the vast majority (83 percent) of rural households. When asked about the reasons for their improved standard of living, 80 percent cited higher crop yields, 62 percent mentioned higher livestock income, and 47 percent said that they now grow new, more profitable crops. The importance of yield increases in income growth confirms the results of the VLSS analysis in Chapter 6, though the importance of livestock income and crop diversification seems greater in the QSAID than would be expected based on the VLSS analysis. The poorest respondents were more likely to attribute income gains to higher yields, while their higher-income neighbors were more likely to credit crop diversification and diversification into nonfarm activities. These results also mirror those obtained from the VLSS.

Staple food crops remain important in rural livelihoods, however. Ninety percent of the respondents grow rice and more than half said it was the most important source of income. Pigs, maize, and poultry were also listed among the top three sources by more than 70 percent of the households. Nonfarm income was more common among higher-income households than poorer households.

An impressive 83 percent of the respondents had adopted at least one new crop or source of income since 1994. Farmers report that the share of income from rice, maize, pigs, buffalo, tea, and litchi has increased, while that of cassava, poultry, and firewood has decreased. Over half had successfully adopted at least one new crop, although this is considerably less common among poor and remote households. Friends and extension agents are most commonly credited with encouraging the adoption of the new crop and farmers received inputs on sale or on credit in over half the cases. About one quarter reported unsuccessful experiences with new crops, with plum and apricot mentioned most frequently.

Regarding the role of traders, there appears to be little or no vertical coordination between farmers and buyers. Farmers sell on spot markets and receive virtually no guidance or assistance from buyers. On the other hand, farmers generally have a choice of buyers and seem to trust that the prices they receive are fair. There is little evidence of exploitation, even in remote villages.

Extension agents and local government officials are quite involved in diversification. More than half the rural households sampled had received guidance or assistance on new crops from an extension agent, and three quarters felt the assistance was useful. Regarding the constraints to diversification, the most common response was "lack of capital," but lack of labor, animal disease, lack of seed/seedlings, and lack of pasture were also cited. When asked about the most useful forms of government intervention, 24 percent said better access to credit, 20 percent cited better support for existing crops, and 12 percent mentioned promotion of new crops. Among the most remote villages, greater weight was put on infrastructure improvements (roads, water, and electricity) and less weight on credit.

CHAPTER 9

Diversification from the Perspective of Local Government

Local government plays a key role in the process of income and crop diversification. Although development targets, agricultural policies, and major public investment decisions are made in Hanoi, provincial and district authorities are responsible for implementing these policies and programs. Differences across provinces in administrative, financial, and technical capacity mean that the implementation differs across provinces. The goal of the Qualitative Social Assessment of Income Diversification (QSAID) was to study the process of income diversification to identify constraints and opportunities as perceived by key participants in the process: farmers, local authorities, traders, and processors. In this chapter, we describe the results of the interviews with local authorities. The interview guidelines for the provincial and district officials consisted of 24 questions and one table to complete. The guidelines for the commune officials were similar to the QSAID household questionnaire. The sample consisted of eight provinces in the Northern Uplands, two districts in each selected province, and one commune in each selected district. The interviews were carried out by two teams of three Vietnamese researchers each in 2002. The methods are described in more detail in Chapter 3.

Patterns of Diversification

The local authorities interviewed as part of the QSAID are almost unanimous in their view that the types of crops grown by farmers have changed since 1994, though the types of change vary from place to place.

The adoption of hybrid maize on a large scale was mentioned by officials in several provinces and districts. For example, it is estimated that 40–50 percent of the maize area in Bac Kan province is now planted with hybrid maize. In Bac Giang province, hybrid maize is said to have completely replaced the use of retained seed. New maize varieties or expanded maize area was also cited by officials in Lai Chau, Son La, Ha Giang, and Lang Son provinces, as well as many district officials. As described earlier, the most dramatic increase in maize production has been in Son La province, which has more than doubled its maize output over 1995–2000. The expansion of maize production is to meet the demand created by the livestock industry, particularly poultry producers, which have been expanding to meet the growing demand for meat in urban areas.

Numerous provincial and district officials reported that farmers were adopting and/or expanding production of various types of fruit trees. In Bac Kan province, apricot, persimmons, peach, and mango areas are increasing. In Lang Son province, officials also cited the expansion of fruit production. But Bac Giang province is the leading fruit producer in the Northern

Uplands. In this province, the litchi area has grown from 270 hectares in 1990 to 32,000 hectares today, one third of which is not yet mature. Under a project to provide pineapples for a new processing plant, the pineapple area in Bac Giang is scheduled to increase from 1,400 hectares to 38,000 hectares. Persimmons were not grown in the province before 1996, but there are now 1,300 hectares of persimmons.

Five of the eight provinces visited as part of the QSAID report that more farmers are growing tea. Yen Bai province is the leading tea producer in the Northern Uplands and is second only to Lam Dong province (in the Southeast region) in Vietnam. Yen Bai, Thai Nguyen, and Phu Tho provinces produce two thirds of the tea in the Northern Uplands and one third of the tea in Vietnam.

Other crops mentioned in interviews with local authorities include anise, cinnamon, cardamon, sugarcane, coffee, bamboo, flax, tobacco, soybeans, and rice. Only a few officials reported an increase in rice area, although officials in Bac Kan noted that high-yield varieties of rice have been adopted widely by farmers so that these varieties now account for 70–80 percent of the rice area.

The degree of market access (defined as distance to large urban centers) appears to make a difference in the type of crop diversification occurring. Bac Giang and Thai Nguyen provinces have the best market access, being the closest to Hanoi and the Red River delta among the eight provinces visited. These provinces have experienced significant expansion of litchi and longan. Thai Nguyen also had an increase in sugarcane, while Bac Giang reports a wide variety of new crops including pineapple, persimmons, custard apple, pig, and poultry production. Authorities in Bac Giang report the widest array of new crops and activities among the eight provinces visited.

Three provinces have intermediate market access: Bac Kan, Yen Bai, and Son La. In Bac Kan province, rice, maize, tobacco, and tea are reported to be expanding in several districts each. In Yen Bai, tea expansion is cited in six of the eight rural districts. In Son La, increases in maize and sugarcane production are reported in several districts, which is not surprising given the dramatic growth in maize production according to agricultural statistics (GSO 2001). However, unlike Thai Nguyen and Bac Giang, several districts in Son La and Yen Bai do not have any crops that have increased in importance since 1994. All three of the districts in Son La with no reported diversification are rated "poor" in market access by provincial authorities.

The three provinces in the sample that are the most remote are Lao Cai, Ha Giang, and Lai Chau. More than half the districts are rated "poor" in market access by provincial authorities. In Ha Giang, the crops that are growing in importance are maize, tea, and citrus. In Lang Son, cattle production is said to be expanding in three districts. In Lai Chau, cardamom, sugarcane, tea, soybean, fruit trees, and chicken are mentioned, but six of the twelve districts in Lai Chau are said not to have any diversification, according to provincial officials.

These results indicate that some diversification is occurring in most districts of the Northern Uplands, but the pace of diversification is greater in areas with good market access. The average number of new crops or activities listed by provincial authorities is 1.4 among districts with "poor" market access and 2.8 among districts with "good" market access. In 29 percent of the districts with "poor" market access, provincial authorities could not name a crop or activity whose importance has increased over time. In contrast, none of the districts with "good" market access was without new crops or activities.

Further, the type of diversification depends on the degree of market access. In provinces close to Hanoi and the delta, farmers are diversifying into litchi, longan, and other fruit crops. Farther out, farmers are diversifying into tea, sugarcane, and tobacco. And in the most remote provinces,

any diversification that occurs tends to be into hybrid maize or cattle production.

What are these new crops replacing? Local officials were asked which crops were declining in importance. The most common responses were upland rice, cassava, and sweet potato. However, it is too simplistic to view the trend as a shift from staple food crops to commercial crops. In some cases, the area under specific high-value crops is declining as farmers discover that the soils are not appropriate or in response to lower market prices. In Son La, the area planted with mulberry, apricot, and plum is said to be falling. In Bac Giang, the area under citrus is reported declining. Coffee growers in Ha Giang and elsewhere are discouraged by low international prices.

There appears to be little diversification into livestock activities, according to local officials. There is little government support for expanding livestock production except in selected areas. One exception is Ha Giang, which has a program to promote cattle production. Of course, owning small-scale livestock is quite common. Many households have one or two pigs and some chickens for own consumption and occasional sale. But livestock development does not appear to be a high priority for local officials, and they are not aware of major changes in breeds, production methods, or innovation. This result contrasts with the QSAID Household Survey in which farmers reported that pig production was one of the three most important factors in the improved living standards of their household since 1994. Interviews with local officials also suggest that diversification into nonfarm activities is rare, particularly in the more remote villages. In general, it is difficult for people in remote mountain villages to find jobs, particularly outside the agricultural sector. Most farmers and commune authorities were not able to provide any suggestions for promoting nonfarm activities. The reasons given for this pattern are that there are no markets for nonfarm goods, people do not have the education and skills for nonfarm work, and, being isolated, it is difficult to work as hired labor in other areas. These results parallel those of the QSAID Household Survey, which found that few households had started nonfarm enterprises since 1994 and few felt that nonfarm enterprises were a promising way for poor households to raise their incomes.

Role of Government in Promoting Diversification

Almost all the local officials attribute the adoption of new crops mainly to policies and subsidies offered by the government.[47] In Lai Chau, farmers are switching to modern irrigated-rice varieties partly because of the higher yields and partly because the government offers subsidies for new terracing.[48] Similarly, the adoption of hybrid maize is motivated by higher yields and by the fact that hybrid maize seed is subsidized. In Bac Kan and Son La, local officials described the adoption process as being influenced by both spontaneous decisions of farmers and government efforts to promote new crops. In Yen Bai, local officials reported that adoption of new crops was determined by "strategic direction" from the central government and said that there are no crops that farmers have spontaneously adopted. Similarly, officials in Ha Giang, Bac Giang, and Lang Son stressed the role of government programs and subsidies in determining the direction and extent of crop diversification. Bac Giang has a large fruit sector, taking advantage of

[47] This appears to be contradicted by the farmer survey in which only 42 percent of farmers who successfully adopted a new crop said that they got the idea from a local official or extension agent. On the other hand, they may have gotten the idea from a friend or neighbor who learned about it from a local official or extension agent.

[48] Under Decision 186/CP, farmers are given VND 5 million for each new hectare of terraced land.

its relatively good soil and market access. Various policies are used to promote diversification into new crops.

Input Subsidies

In every province visited, seeds and planting materials are subsidized or even provided to farmers free-of-charge. This policy is usually implemented through the provincial state enterprises that supply agricultural inputs. For example, in Ha Giang the Provincial Input Supply Company buys new varieties of seed and sells it to farmers at a subsidized price. Poor households are supposed to receive a 70 percent subsidy, while others receive a 30 percent subsidy. Households in communes identified as poor by Program 135 are entitled to receive 5 kg of seed and 20 kg of fertilizer at no cost. In Bac Giang, seed subsidies are available for rice, maize, peanuts, and pineapple. In Yen Bai, the Van Huong Coffee Company offers coffee seedlings and fertilizer on credit, with the cost to be deducted from the crop revenue payments when the trees begin to produce. Bac Kan province has a subsidy policy on transport for all types of crop seeds. Before the planting season, households make production plans, including planting areas, planned crop verities, and so on. Based on these plans, commune, district and province authorities work together to supply the needed inputs at the fixed price.

Transport Subsidies

In Bac Kan and Lai Chau, officials cited subsidies on transportation costs to encourage farmers to try new crops. Remote districts also qualify for subsidized transportation of fertilizer from Hanoi. The goal of this policy is to ensure that farmers in remote locations are able to buy fertilizer at prices equal to (or at least closer to) the price paid by lowland farmers near Hanoi. The subsidy is available only on fertilizer supplied by state-owned input companies, so they are often the only suppliers in remote areas.

Low-Interest Loans

The Vietnam Bank for Agriculture and Rural Development is the main formal source of credit for the agricultural sector. It has close to 1,500 branches and employs more than 20,000 people, but small farmers complain that the procedures are too complicated and the interest rates too high. The VBARD has recently tried to make credit available in smaller amounts with lower transaction costs, often with support from international organizations. The Vietnam Bank

Box 9.1 Input subsidies in Lai Chau

In Lai Chau province, in order to implement a policy on input subsidies, the province classifies regions to identify suitable scope and support level among regions. For example, for zone 1, seed support level is 50%, for zone 2, it is 70%, and for zone 3, it is 90–100%. In addition to this policy, there is a separate policy on support for crops damaged by natural calamities. To develop tea in Phong Tho, the Lai Chau Provincial People Committee approved a plan to fund supplementary support to agricultural production in 2001 (Decision No. 1382/QD-UB, January 1, 2001). Total support was VND 224 million, subsidizing 50 percent of the cost of tea seedlings to plant in 2001. With Decision No. 161/QD-UB dated March 8, 2001, the Lai Chau Provincial People Committee began supporting coffee planting by households that had suffered damage from natural calamities. The support level is 100% of value of coffee seedlings for those who have to replant, 100% of interest rate for loans borrowed from banks, lengthened repayment terms of more than 1 year for loans invested in coffee plantations that were damaged by frost.

for the Poor (VBP) was formed in 1996 to engage in microfinance, lending small amounts to poor households. The lending interest rates are lower, but the VBP relies heavily on subsidies from government and funding from international organizations. The People's Credit Fund (PCF) is a new approach involving decentralized credit unions with local participation in decisions. The network of PCFs has grown rapidly over the last 5 years.

Various government programs are used to provide low-interest loans to farmers to adopt new crops, particularly fruit trees, tea, and coffee, which require 3–5 years before the first harvest. For example, Ha Giang provides VND 1 million in credit for 3 years for each hectare of tea planted. Growers of flax receive 2-year loans equivalent to 1 ton of maize per hectare of flax planted. Similarly, officials in Yen Bai noted that funds from the Resettlement Program and Program 327 are used to promote new crops, particularly tree crops.

Technical Assistance

Most programs to promote a new crop involve technical assistance from agricultural extension officers. Typically, one or more extension agents will be assigned to focus on a crop being promoted in a specific area. For example, in Son La technical assistance and budget support are used to promote the expansion of sugarcane area.

The extension unit of Cho Moi district (Bac Kan) has 14 agents that are based in different communes. They are supposed to help communes prepare the annually production plan and monitor it, as well as introduce new production techniques. In fact, the main activity of most of them is to provide technical training at the beginning of the crop season.

In Yen Chau (Son La), the extension unit was established in 1994 and has 11 agents. Each of them will be in charge of one particular program. The goal is to make them more responsible and to work independently. Most of them work only with the head of the commune or village. Direct assistance to farmers is limited.

In 2001, the Lai Chau agricultural and forestry extension center organized 82 technical training courses for a total of 4,100 farm households: 25 on food crop production, 15 on industrial and fruit trees, 15 on forestry extension, and 27 on livestock and fishery.

Land Allocation Policy

The 1993 Land Law (Decree 64/CP) initiated the process of distributing land-use certificates (LUCs) to farming households. The distribution of land-use certificates for lowland land is almost complete, but the distribution of LUCs for upland areas has been much slower. This is partly because upland areas had less clearly defined user rights than lowland areas and partly because the allocation of LUCs is complicated by the goal of protecting existing forest land and stimulating reforestation. Some have expressed concern about the social impact of the land distribution. There is a widespread impression that the gap between small and large farms is widening.

Land allocations in Thai Nguyen and Bac Kan are based on the historical distribution of land rather than the number of family members. This has led to a situation in which some households have more land than their family labor can farm, while others have too little. In Son La, the system of allocating agricultural land is slightly different. Here, there is not much irrigated land. Most of the fields there are uplands, formerly cultivated using slash-and-burn methods. If the plot lies in the areas planned for reforestation, it will be taken back to the state. If not, it will be divided among local households based on the numbers of people in the family. In Lai Chau, land allocation was implemented only with the irrigated fields. People in Dien Bien Dong and Muong Lay districts are still cultivating in their land without any land-use certificates.

Box 9.2 Agroprocessing in Lai Chau

To develop tea production, the Lai Chau has invested in two processing plants with a capacity of 500 kg/day operated by the agricultural breeding company in Tua Chua district. The policy of purchasing fresh bud tea at VND 2,500/kg has helped to mobilize fresh bud tea from all the district and created income for the H'mong people in upland areas in Tua Chua.

Regarding coffee, the Lai Chau Peoples Committee issued Decision No. 1368/QD-UB dated September 28, 2001, approving a purchasing price and options to support coffee assembly and processing in Lai Chau in order to market coffee for farmers. The goal is to stabilize coffee price in the face of the rapidly falling international price.

Land-Use Policy

The General Department of Land Administration has responsibility for land use planning, with technical assistance from the National Institute for Agricultural Planning and Projection (NIAPP). Campaigns to promote new crops may begin with a new land use plan for the district or province. During most of the 1990s, land-use restrictions made it difficult for farmers to convert riceland to other crops. As it became clear that Vietnam could reliably produce a surplus in rice and in response to the falling international price of rice in the late 1990s, central government policy shifted in favor of diversification from rice into high-value commodities. Local governments were given more flexibility in regulating land use, but restrictions still apply in many regions. Officials in Bac Giang listed various policies to promote new crops including a policy to allow farmers to convert some agricultural land into fruit. Generally, agricultural credit is only available for investments that are compatible with the land-use plan for the area.

Marketing Assistance

There is a general recognition that high-value crops often face serious marketing problems due to high quality requirements, perishability, and unstable prices. Some provinces attempt to stabilize the price by creating state-owned processing-export companies to buy the output. In Bac Giang, a provincial processing company signs contracts with pineapple farmers, offering a fixed price in order to ensure adequate supply for the plant. In Yen Bai, the province has established four or five tea processing plants. These efforts may reduce intra-annual price fluctuations, but they cannot prevent shifts in demand or export competitiveness that will affect domestic prices. Indeed, officials in Yen Bai report that farmers are puzzled and dissatisfied with the tea market because prices have been so volatile. Officials in Bac Giang were the only ones to mention training and workshops on marketing and processing. Most of the provinces visited as part of the QSAID were not actively involved in helping farmers with agricultural marketing, except to the extent of creating state-owned enterprises to buy and process raw materials.

The provincial budget for subsidies and assistance in promoting new crops is difficult to pin down because it involves a number of components. In Bac Kan, an official estimated the cost to be VND 3–4 billion (US$200,000–266,000), while Ha Giang estimated the cost of subsidies for rice and maize at VND 9 billion (US$600,000). In Bac Giang, the estimated cost of subsidies for promoting rice, maize, peanut, and pineapple production (mostly with seed subsidies) was about VND 17 billion (US$1.1 million).

Box 9.3 Marketing problems in Son La

Mr. Ha Van Binh, chairman of Chieng Bom commune (Son La) said "There are three main agricultural products that farmers sell: cassava, rice, and maize. The quantities are not large. When farmers want to sell their products, they have to bring them to district market or mill paddy and retail to consumers. Traders don't go to village to assemble agricultural products partly because of the bad roads and also because the quantity is often small." The poverty rate of the commune now is more than 70 percent. The income from selling agricultural products is only enough to buy fish source, salt, and oil.

Role of Traders in Diversification

Provincial officials were asked if there were any crops that had expanded significantly without being promoted by the provincial government. The officials were unanimous in reporting that there were no cases of crop production expanding spontaneously. In their view, traders play an essentially passive role, marketing whatever is produced but not trying to guide farmers in production decisions. Although it is true that local officials may not be aware of the efforts of traders and others to promote new crops, the QSAID Household Survey supports the idea that traders do not play a catalytic role in diversification. As described in Chapter 8, farm households were asked to identify the main source of encouragement or support in their decision to adopt a new crop, and traders were mentioned by fewer than 4 percent of the respondents. On the other hand, about half the respondents cited friends or neighbors. Thus, informal exchange of information with other farmers and simply observing what other farmers' experiences are is an important factor in farmer decisions on whether to adopt a new crop.

Officials were asked whether private traders play a positive or negative role in promoting new crops. Most officials argued that traders have an important role because they often market the output of the new crop, buying it from farmers to sell to processors, wholesalers, or consumers. Officials noted that traders are able to set the price, while farmers are forced to accept the price offered to them. They did not seem to appreciate the fact that individual traders may not have much control over their own selling prices, and that traders face the risk that the market price will decline between the time they buy and when they sell.

Role of State-Owned Enterprises

State-owned enterprises play a role in diversification both as suppliers of seed and other inputs and as processors of output. As mentioned earlier, provincial enterprises play an important role in the distribution of fertilizer and seed, particularly in the more remote provinces. The Lai Chau Agricultural Input Supply Company was cited by officials in that province as playing a key role in their programs to promote new crops. In Ha Giang as well, officials mentioned the role of the Provincial Input Supply Company, although private traders also sell fertilizer and seed. In Lang Son, there is also a provincial input supply company, though it tends to focus on the sale of seed for food crops.

In marketing, a number of the provinces have at least one provincial enterprise involved in agricultural processing. Unlike in the case of input supply companies, provincial processing companies appear to be more common in the centrally located provinces. In Son La, there is a provincial enterprise that buys maize to produce animal feed. In Ha Giang, one provincial company, the Bac Quang Food Company, produces wine from plums, while another, the Viet Lam Tea and

Box 9.4 A trader in Son La

Mr. Nguyen Duc Khue in Thuan Chau district, Son La province, has been trading agricultural products since 1981. In the beginning, he did not have enough money, so he just bought agricultural products at home. Some years later, after he had gained more confidence, he borrowed from the bank to buy a truck. Having a truck, he expanded the business network to the whole village and even goes to Dien Bien town to buy rice.

After the harvest, he buys rice from the lowland to sell in Son La. It is not difficult to buy rice from the lowlands: he just calls the wholesaler and informs him/her about the details of his order. In addition, he also provides rice and maize milling services. He has never encouraged or helped farmers to plant any new plant species; however, he sometimes lets buyers pay later if they have difficulty paying him immediately.

He does not face any difficulties in business with local authorities, though he sometimes finds it difficult to collect the debts. He loses about VND 2 million annually on average due to bad loans.

Coffee Company, processes tea. Bac Giang has several provincial processors including an agricultural export–import company and six animal feed processing plants. In Lang Son, provincial companies are involved in producing bamboo flooring and making wrapping paper, but neither company is financially stable. To the knowledge of our respondents, none of the provincial enterprises is undergoing any restructuring or equitization under the state enterprise reform program.

Perceived Constraints on Diversification

Provincial, district, and commune officials were asked what constraints prevent farmers in the Northern Uplands from diversifying into higher-value crops and activities. The following is a summary of these discussions.

Unfavorable Production Conditions

As described in Chapter 4, the production conditions in many parts of the Northern Uplands are very difficult. A large portion of the land area is hilly or mountainous, with less fertile soils and steep slopes. Although the government has given priority to the development of irrigation systems in these provinces, because of the uneven topography and fragmented cultivated areas, the irrigation systems are mainly on a small scale, with limited capacity. A majority of cultivated lands rely on rain, affecting production potential and limiting improvements in the living standard. Water is becoming an increasingly serious issue, both for irrigation and for human consumption.

Low Level of Education and Training

The level of education of upland farmers is low, particularly in the more remote areas and particularly among ethnic minorities. According to the QSAID Household Survey, the average head of household had just 6 years of education, and fewer than 20 percent had more than 7 years. The education levels are even lower among households in the more isolated provinces such as Lai Chau.

Further, lack of Vietnamese language skills among ethnic minorities often makes it more difficult to learn new methods. Many people in rural areas, especially women, do not know Vietnamese. Thus, the improvement of technical knowledge and production organization skills is made more difficult.

Population Pressure on Land Resources

Terrace-based farming is common in northern mountainous provinces. In general, the amount of cultivated land area depends on the food demand and the labor capacity of households. Local officials argue that farmers do not pay enough attention to soil protection and improvement. Traditionally, farmers would leave the land fallow for 8–10 years. In recent years, the implementation of land allocation policy and high population growth rate have led to intensification of production, which leads to shorter fallow period (3–4 years). Cultivation of steep slopes leads to erosion and soil loss. These problems are not only affecting cultivating capacity in the next land-use cycle, but also the environment, since cultivated terraces can lose their restoration capacity and become barren lands.

Lack of Credit

Many households and some local officials argue that one of the main constraints in production is the lack of capital. Other information suggests that this issue may be overstated. The results of the QSAID showed that it is common to see households with access to credit, but who do not use it productively for various reasons. The Chieng Bom commune (Son La province) is one of the poorest ones visited. Interviews with local officials revealed that 411 poor households in the commune had received loans with total amount of VND 602 million. Currently, 30 percent of these households have not repaid the loan and are not expected to be able to. The amount of unrepaid loans over the last 2 years is VND 38 million. The main reasons for the non-repayment, according to commune officials, is that farmers did not use all the money on productive capacity as stated in the loan application, but rather spent the money on consumption needs. In some cases, social events such as marriages and funerals require significant spending. For example, one interviewed man in Bac Kan province felt obliged to purchase 200 kilograms of pork and spend more than VND 1.0 million (US$66) on his mother's funeral. It took him almost 3 years to pay off the debt.

Poor Infrastructure

The lack of infrastructure, particularly roads, was frequently mentioned as a constraint on diversification. Apart from national roads, which are generally usable in all seasons, the internal road system is often not usable during the rainy season. The transportation system within communes is minimal, often suitable only for walking. For example, to reach the Thuong Quan commune (Bac Kan province) takes a full day of walking.

In recent years, the government has implemented special programs to invest in poor and remote communes, but the size of the fund is small relative to the large investment needs of these communes. As a result, improvements in road infrastructure are slow.

Inappropriate Development Projects

The development of the production capacity of rural villages has relied heavily on direction from local authorities. In many places, because of impatience in the economic development toward industrialization, funds have not been used effectively. For example, in Son La province, many households need to buy new pig and poultry breeds to develop livestock, but there are no breeding stations available. Villagers have to travel to other provinces such as Ha Tay and Hung Yen in the Red River Delta to buy breeding animals. Another example is sugarcane development. Sugar prices are supported by tight import quotas on refined sugar, while decisions regarding the establishment of new sugar refineries have sometimes followed political and development criteria at the expense of agroclimatic suitability. As a result, some sugar processing plants are still losing money after 4 years of establishment, kept running only with direct subsidies or indi-

rect subsidies through credit from the banking system.

Lack of Information

Market information plays an important role in decisions regarding agricultural investments, planting decisions, and use of inputs. However, most of households in the four surveyed provinces have conducted their activities on production and trade with little or no access to information about market conditions. Consequently, some argue that villagers do not know whether the selling prices of their products are fair or not, what the market prospects are, how to market their output, and so on. It should be noted that, according to the QSAID Household Survey, many households believe that the prices they receive are reasonably fair, but they may be wrong.

In addition to the lack of market information, farmers often do not have good information on the production characteristics of new crops, including the growth rate, life cycle, disease/pest problems, methods of treatment, and so on. Farmers may not be knowledgeable about their soil characteristics and the requirements of different crops, leaving them with little basis from which to decide which crops would be suitable for their farms.

Marketing Problems

Agricultural marketing involves coordination between farmers and buyers, particularly when the buyer is a processor. In the Northern Uplands, other than staple food crops (rice, maize, and cassava), the quantities marketed of each agricultural commodity are often small. Given the small quantities, it is difficult to justify investment in agricultural processing facilities. And without the demand created by processing facilities, there may be little incentive for farmers to produce significant marketed surpluses. From the point of view of the processor (often a provincially managed state-owned enterprise), the problem is how to ensure that the availability of raw materials will be sufficient at prices that allow a profit before the plant is constructed.

The development of fruit trees is an example. In 1999, 1 kilogram of plums in Son La sold for VND 2,500; in 2002, the price of plums was just VND 200 per kilogram, barely enough for to cover the cost of harvesting them. As a result, many households did not bother to harvest their plums. In the QSAID Household Survey, plums were one of the most commonly cited unsuccessful new crops. Further, it is difficult for rice grown in the Northern Uplands provinces to compete with that produced in Red River Delta. On the other hand, maize is said to be easy to sell because of the high demand for animal feed.

Weak Extension Service

The extension service is one of the main avenues for providing information to farmers regarding the opportunities for crop diversification, but the extension services suffers from some systemic weaknesses. Problems identified during the field interviews included the following:

- The number of extension workers is small, with just only one per commune. In the sparsely populated upland areas, the communes tend to be large in area, posing extra cost and challenges on extension agents. Further, the agents must cover all the activities of agricultural extension in addition to some related to off-farm activities, reducing their effectiveness.
- The low education level of extension agents is also an issue. Most of them have finished secondary school only. In some places, such as Xa Ho Commune (Yen Bai province) and Van Chai Commune (Ha Giang province), extension workers have not finished secondary school.
- The extension workers at commune level are under 3-year contracts with very low monthly salaries and little support in their work.

Summary

The QSAID involved interviews with local authorities in eight provinces, 16 districts, and 16 communes in the Northern Uplands. The interviews covered various topics including the types of diversification being undertaken, the policies being implemented to support diversification, and the perceived constraints at the farm level.

The types of diversification vary by province. Most provinces cited diversification into fruit and tea, while a wide range of new crops were mentioned by local officials including anise, cinnamon, cardamom, sugarcane, coffee, bamboo, flax, tobacco, and soybeans. Farmers are also adopting new varieties of rice and hybrid maize in much of the Northern Uplands. Local officials report that there is little diversification into livestock and nonfarm enterprises, though it is possible that they are less aware of these trends because they occur with less government support.

Some diversification is occurring in most districts of the Northern Uplands, but the pace of diversification is greater in areas with good market access. Further, the type of diversification depends on the degree of market access. In provinces close to Hanoi and the delta, farmers are diversifying into litchi, longan, and other fruit crops. Farther out, farmers are diversifying into tea, sugarcane, and tobacco. In the most remote provinces, any diversification that occurs tends to be into maize or cattle production.

Local authorities are quite active in identifying and promoting promising new crops. They use various policy tools to encourage the adoption of new varieties including input subsidies, transportation subsidies, technical assistance, low-interest loans, land allocation policy, land use restrictions, and (less often) marketing assistance. Traders seem not to be very involved in promoting new crops, according to interviews with local officials, a finding confirmed by the results of the QSAID Household Survey.

Constraints to diversification include unfavorable production conditions, the low level of education and training of farmers, population pressure on land resources, lack of credit, and poor infrastructure. Inappropriate development projects, lack of markets, and weak extension services were also mentioned.

CHAPTER 10

Summary and Conclusions

Summary

This report examines the process of income diversification in the Northern Uplands of Vietnam. We use four distinct but related definitions of income diversification: the diversity of income sources, the shift from subsistence to commercial production, the shift from agriculture to nonagricultural activities, and the shift from low-value staple crops and activities to higher-value crops and activities. In this report, patterns and trends in all four are examined, but the focus is on diversification into high-value crops and noncrop activities. The objectives of the study are to describe the patterns and trends in diversification, to assess its contribution to income growth and poverty reduction, to identify determinants of income diversification, to describe constraints to diversification, and to draw implications for the design of policies and investment to facilitate diversification and maximize its benefits for poor households in the Northern Uplands.

The study makes use of three sources of information. First, we used agricultural and economic statistics collected by the General Statistics Office (GSO) of Vietnam. These data illustrate changes in the economy over the second half of the 1990s at the provincial level. Second, we compared three national household surveys: the two Vietnam Living Standards Surveys (VLSS) carried out in 1992–93 and 1997–98 and the Vietnam Household Living Standards Survey (VHLSS) implemented in 2002. These data are used to study changes in the sources of income, variations in diversification patterns across different types of households, the determinants of income diversification, and the contribution of diversification to income growth. The third component is the Qualitative Social Assessment of Income Diversification (QSAID), a survey carried out by the International Food Policy Research Institute (IFPRI) involving interviews with some 300 rural households and roughly 90 local government officials. The interviews focused on experiences with income diversification and perceived constraints to diversification.

Previous Research on Diversification

Diversification has been defined in various ways. Some studies define it as an increase in the number of income-generating activities or the balance among them. Others focus on the transition from subsistence farming to commercial agriculture. A third definition concentrates on diversification from farming into nonfarm activities. A fourth definition emphasizes the reallocation of resources from crops with low returns (typically staple food crops) to crops and activities with higher returns.

Rural households adopt multiple income-generating activities to manage risk, to meet household consumption needs in the face of high transaction costs, to take advantage of positive externalities among activities, and to respond to diseconomies of scale. Diseconomies of

scale can, in turn, be caused by land constraints, seasonal variation in agricultural labor productivity, and heterogeneous skills in the household. Diversification into high-value activities is often inhibited by barriers to entry, including lack of liquidity for investment, lack of information about production and marketing, lack of education or language skills, lack of social capital, and poor infrastructure. Empirical research indicates that, in some cases, income diversity is a risk-management strategy of poor households in response to unpredictable weather and low agricultural potential. In other cases, income diversity is associated with higher-income farmers switching into high-value crops and nonfarm activities.

Diversification into commercial production is motivated by the gains from trade. The main constraints to commercial production are (1) the risk associated with market participations and (2) high transaction costs that make food purchases more expensive and reduce the farm-gate price of commercial crops. The transaction cost rationale helps explain empirical studies showing that subsistence production tends to be more important in remote areas far from markets. Although there is concern that commercialization may adversely affect food security, most studies show that cash-crop farmers are better off than otherwise similar subsistence farmers.

Diversification into nonfarm activities is associated with the growth in demand for nonfood products as income rises. The share of nonfarm income among rural households tends to be greater among households with higher education, electricity, good market access, and relatively high income. In some cases, nonfarm income is also important to the rural poor, particularly if there is a large landless population that relies on unskilled labor wage income (e.g., India).

Diversification into high-value crops and activities is constrained by lack of access to credit, lack of production and marketing information, risk aversion, and poor infrastructure. This type of diversification is associated with access to high-income markets and the level of education. Some of these constraints can be relieved via institutions that facilitate vertical coordination, such as contract farming, farmer associations, market information systems, and so on.

Interest in income and crop diversification was modest in the 1970s and 1980s when Vietnam was struggling to achieve self-sufficiency in rice production. The Vietnamese government became particularly interested in diversification in the late 1990s in response to falling world prices for rice and coffee. Studies of diversification in Vietnam indicate that market reforms have stimulated both intensification of rice production in the lowlands and diversification into higher-value commercial crops (such as fruit and tea) in the uplands.

Background of the Northern Uplands

The Northern Upland region can be characterized as follows:

- The topography is hilly to mountainous, with altitudes typically between 500 and 1,000 meters but with some mountainous areas with peaks above 3,000 meters.
- The infrastructure is poor, leading to communities being relatively isolated from the rest of the economy.
- The population density is low (111 people/km^2) compared to the country as a whole (231 people/km^2).
- Approximately half the population is a member of an ethnic minority, compared to just 12 percent nationally.
- The region is less urbanized and more dependent on the agricultural sector than other regions of Vietnam.
- The incidence of poverty is probably highest in the Northern Uplands, though some studies rank the North

Central Coast and the Central Highlands as equally poor.

Nonetheless, there is considerable diversity across the Northern Uplands. The topography is highest and most rugged in Lai Chau, Lai Cau, and Son La, while provinces adjacent to the Red River Delta have significant lowland areas. The infrastructure is better and the population density much higher in the provinces near the Delta such as Thai Nguyen, Bac Giang, and Phu Tho. Although ethnic minorities dominate in most of the Northern Uplands, Kinh are the largest ethnic group in large areas of Thai Nguyen, Bac Giang, Phu Tho, and Quang Ninh. Furthermore, there is tremendous diversity in ethnic composition from one district to another. The level of urbanization varies from 7 percent in Bac Giang to 44 percent in Quang Ninh. Similarly, the incidence of poverty varies widely, being highest in the border provinces such as Lai Chau, Ha Giang, and Son La and lowest in Quang Ninh and provinces adjacent to the Delta.

National accounts data from GSO indicate that per capita GDP grew 7 percent in real terms over 1995–2000. Comparison of the three surveys indicates substantial growth in income and expenditure over 1993–98 and more modest but respectable growth over 1998–2002. The gains for rural households have been widespread across regions and types of households. The gap between poor and rich rural households has widened somewhat since 1993, although even the poorest quintiles have seen significant increases in per capita expenditure.

At the same time, crop production continues to be the most important source of income for rural households, accounting for 38 percent of the net income in the Northern Uplands. Poor rural households depend even more on crop income than other rural households. Staple food crops, particularly rice, continue to play a dominant role in crop production. Rice alone accounts for 46 percent of the net value of crop production.

Patterns and Trends in Diversification

The patterns and trends in income diversification in the Northern Uplands depend on which definition is used. One definition of diversification is based on the number of income sources and balance among them. Among rural households in the Northern Uplands, there is evidence of increased diversity in broad income categories, but little change in the number or balance in crops grown. Income diversity is higher among rural households than among urban households, and crop diversity is higher among poor rural households than among better off rural households. Farmers in the Northern Uplands have the most diverse cropping systems, growing more than eight crops on average. This is consistent with the international patterns discussed earlier, in which poor farmers with limited market access grow numerous crops to reduce risk and satisfy diverse food consumption demands via home production.

There is also clear evidence of increasing commercial orientation among farmers in the Northern Uplands. The share of crop production that is marketed rose from 22 percent to 33 percent in the Northern Uplands and from 40 to 61 percent in rural areas as a whole. Although poor households are less commercially oriented, households in all income categories shifted toward commercial production over this period.

If diversification is defined as the shift from agricultural activities to nonagricultural activities, it appears that the overall economies in the Northern Uplands are diversifying, but rural households are not. Apparently, the growth in the share of nonagricultural gross domestic product (GDP) is due to growth in income and population in urban areas rather than shifting incomes among rural households.

If we define diversification in terms of the shift toward high-value crops, livestock, fisheries, and nonfarm income sources, several conclusions emerge. Between 1993 and

1998, all sectors grew at similar rates, so the percentage composition did not change markedly.[49] Between 1998 and 2002, the share of income from agriculture shrank, while that of forestry and wages increased, though this may have been the result of differences in the way the two surveys were designed. There is evidence of crop diversification, with farmers reducing the area planted with rice and increasing the area planted to either sugarcane and fruit (according to the 1998 VLSS) or maize and tea (according to the 2002 VHLSS).

Determinants of Income Diversification

Regression analysis was used to examine the household characteristics that best "explain" variation in five measures of income diversification: the number of income sources, the number of crops, the share of crop output sold, the share of income from nonfarm activities, and the per hectare value of crop output. The household factors that most consistently influence the different measures of income diversification in rural Vietnam are household size and farm size. Household size is an indicator of available labor, particularly given the transaction costs involved in hiring wage labor to work for the household or hiring household members out. By the same measure, farm size is an indicator of available land, since few rural households buy, sell, or rent land. Thus, household size and farm size are indicators of the two most important factors of production in rural areas and influence the production possibilities of the household. If the labor/land ratio is high, households are more likely to (1) have multiple sources of income, (2) earn a larger share of income from wage labor and nonfarm enterprises, and (3) cultivate high-value crops and/or cultivate crops more intensively, as reflected in a higher per hectare crop income. If the labor/land ratio is low, the household is more likely to specialize in agriculture, have a larger marketed surplus, and cultivate low-value crops and/or cultivate crops less intensively. In the case of marketed surplus, household size plays a stronger role as an indicator of the consumption needs of the household than as a measure of labor availability.

The age and education of the head of household are proxies for human capital and management skills, so it is not surprising that one or both are positively related to income diversity and crop diversity, as well as per hectare crop income. It is less clear why age is negatively related to the share of income from nonfarm activities.

With regard to ethnicity, the most interesting result is that only one of the five measures of income diversity shows a statistically significant difference between minority households and other households, after controlling for other factors. It is occasionally argued by policymakers and academics in Vietnam that ethnic minorities are more subsistence oriented and resistant to new methods because of their personalities and/or cultural values. But the evidence presented here suggests that most of the differences in livelihood strategies are the result of different opportunities and circumstances (household size, farm size, education, and market access) rather than different economic decisions as a result of their ethnicity per se.

Electricity is associated with a larger share of income from nonfarm activities (particularly nonfarm enterprises), but it does not seem to affect income diversity, commercialization, or per hectare crop income.

As expected, an increase in the share of land that is irrigated is associated with lesser income diversity (as households specialize in crop production), lesser crop diversity (as

[49]Although the share of income from nonfarm enterprises did not change, the percentage of rural households operating an enterprise fell sharply, suggesting consolidation in which there are fewer enterprises but they are larger on average.

households specialize in rice or perhaps vegetables), and higher per hectare crop income (as water control increases yields).

The effect of market access on income strategies was weaker than expected. The diversity of crops and share of nonfarm income were not related to any of the three measures of market access. Income diversity was, contrary to expectations, *greater* for households living far from a road. The marketed share of crop output was the only diversification measure that fit expectations, with marketed surplus declining with the distance to a daily market and the number of months that the road is impassible. One reason for the weak effect of the market access variables may be that they measure only the access of the household to local markets; it may be that the distance to large cities is more relevant in terms of the economic decisions of rural households.

Finally, even after controlling for age, education, sex, ethnicity, farm size, irrigation, and other variables, there remain some marked regional differences. In general, the southern regions are more specialized in income and more specialized in crops, they produce crops less intensively, and they earn more income from nonfarm activities. These results may reflect one or more differences between the north and south in terms of variables not included in the analysis. Hypotheses include the higher wage rate in the south, the more active labor and land markets, proximity to the largest city in Vietnam, and cultural differences, possibly linked to the fact that the south has had a longer period of experience with market economics than the north.

Contribution of Diversification to Rural Income Growth

Comparing the 1993 and 1998 VLSS, rural income grew substantially. It is not accounted for by growth in any one type of activity, but rather by proportional growth in income from each source: crops, livestock, fisheries, forestry, enterprises, wages, and other income. The growth in crop income accounts for 45 percent of the growth in overall income for the average rural household in the Northern Uplands, but crop income contributes an even higher percentage (69 percent) among the poorest rural households. Comparison of the 1998 VLSS and the 2002 VHLSS suggests a sharp decline in the contribution of crop income, but it is difficult to interpret these trends because of differences in the sampling and questionnaire design between the two surveys.

Decomposing crop income growth between 1993 and 1998, 40 percent is attributable to higher yields, 28 percent to higher real prices, and 6 percent to crop diversification (defined as the reallocation of sown crop land). Nationally, crop diversification accounts for 12 percent of the growth in crop income. The sources of crop income growth vary across income groups. Poor households increased their crop income largely by achieving higher yields, particularly for rice, while richer households increased their incomes by expanding the area cultivated. The contribution of diversification shows an erratic pattern across income categories, but appears to be less important for poor rural households than for others. Overall, the contribution of crop diversification in poverty reduction is relatively minor, at least for the period considered in the study (1993–98).

Income Diversification from the Farmers' Perspective

The QSAID entailed semistructured interviews of a sample of 307 households in 32 villages, located in 16 communes and eight Northern Upland provinces. The results of the QSAID confirm the finding from the VLSS data that standards of living in the rural Northern Uplands have improved significantly. Fully 83 percent of the respondents said that their standard of living was higher today than in 1994. When asked about the reasons for their improved standard of living, 80 percent cited higher crop yields, 62 percent mentioned higher livestock income, and 47 percent said that they now

grow new, more profitable crops. The importance of yield confirms the results of the VLSS, though the importance of livestock income and crop diversification seems greater in the QSAID than would be expected based on the VLSS analysis. Part of the explanation may be that the QSAID uses a difference reference period (1994–2002) than the VLSS analysis (1993–98). The poorest respondents were more likely to cite yield improvements, while their higher income neighbors were more likely to mention crop diversification and diversification into nonfarm activities. These results also mirror those obtained from the VLSS.

Staple food crops remain important in rural livelihoods, however. More than half the respondents said that rice was the most important source of income. Pigs, maize, and poultry were also important sources of income. Nonfarm income was somewhat more common among higher-income households than poorer households.

An impressive 83 percent of the respondents had adopted at least one new crop or source of income since 1994, the most common ones being litchi, other fruit, tea, and "other industrial crops." Fewer households reported giving up a crop or income source, the most common ones being cassava, beans, and opium. Farmers reported that the share of income from rice, maize, pigs, buffalo, tea, and litchi had increased, while that of cassava, poultry, and firewood had decreased. Fifty-six percent had successfully adopted at least one new crop (where success is defined by continued cultivation), although successful adoption is considerably less common among poor and remote households. Tea, litchi, anise, and new varieties of rice were the most frequently mentioned. Friends and extension agents were most commonly credited with encouraging the adoption of the new crop and farmers received inputs on sale or on credit in over half the cases. About one quarter reported unsuccessful experiences with new crops, plum and apricot being mentioned most frequently. One of the most common problems mentioned was that production campaigns promote crops without adequate consideration of market potential, leading to flooded markets and low prices. Regarding the role of traders, there appears to be little or no "vertical coordination"[50] between farmers and buyers. Farmers sell on spot markets and receive virtually no guidance or any other assistance from buyers. On the other hand, farmers generally have a choice of buyers and seem to trust that the prices they receive are fair. There is little evidence that farmers feel they are being "exploited," even in the most remote villages.

Extension agents and local government officials are quite involved in the process of diversification. More than half the respondents had received guidance or assistance on new crops from an extension agent, and three quarters felt the assistance was useful. Regarding the constraints on diversification, the most common response was "lack of capital," but lack of labor, animal disease, lack of seed/seedlings, and lack of pasture were also cited. When asked about the most useful forms of government intervention, 24 percent said better access to credit, 20 percent cited better support[51] for existing crops, and 12 percent mentioned promotion of new crops. Among the most remote villages, greater weight was put on infrastructure

[50] "Vertical coordination" refers to various types of communication between buyers and sellers to ensure that supply and demand match each other in terms of product, quality, timing, and location. In agriculture, vertical coordination often takes the form of buyers providing seeds, chemicals, and technical assistance to farmers in exchange for the farmer agreeing to sell to the buyer.

[51] Although the respondents were not asked to define "support," we assume it refers to assistance from researchers and extension agents to introduce new varieties and production methods that increase yields, manage pests and disease, and use inputs more effectively.

improvements (roads, water, and electricity) and less weight on credit.

Income Diversification from Local Governments' Perspective

The QSAID involved interviews with local authorities in 8 provinces, 16 districts, and 16 communes in the Northern Uplands. The interviews covered various topics including the types of diversification being undertaken, the policies being implemented to support diversification, and the perceived constraints at the farm level.

The types of diversification vary by province. Most provinces cited diversification into fruit and tea, with a wide range of new crops mentioned by local officials including anise, cinnamon, cardamom, sugarcane, coffee, bamboo, flax, tobacco, and soybeans. Farmers are also adopting new varieties of rice and hybrid maize in much of the Northern Uplands. Local officials report that there is little diversification into livestock and nonfarm enterprises, though it is possible that they are less aware of these trends because they occur with less government support.

Some diversification is occurring in most districts of the Northern Uplands, but the pace of diversification is greater in areas with good market access. Furthermore, the type of diversification depends on the degree of market access. In provinces close to Hanoi and the delta, farmers are diversifying into litchi, longan, and other fruit crops. Farther out, farmers are diversifying into tea, sugarcane, and tobacco. And in the most remote provinces, any diversification that occurs tends to be into maize or cattle production.

Local authorities are quite active in identifying and promoting promising new crops. They use various policy tools to encourage the adoption of new varieties including input subsidies, transportation subsidies, technical assistance, low-interest loans, land allocation policy, land use restrictions, and (less often) marketing assistance. Traders seem not to be very involved in promoting new crops, according to interviews with local officials, a finding confirmed by the results of the QSAID Household Survey.

Constraints to diversification include unfavorable production conditions, the low level of education and training of farmers, population pressure on land resources, lack of credit, and poor infrastructure. Inappropriate development projects, lack of markets, and weak extension services were also mentioned.

Conclusions and Implications for Policy

This section draws some overall conclusions from this study and identifies some implications for rural development policy and public investment. In particular, we examine the implications for rural development strategy, agricultural research, extension, input subsidies, and public investment.

Implications for Rural Development Strategy

Growth in income and expenditure in the rural Northern Uplands has been strong. Per capita expenditure growth in the region, one of the poorest in Vietnam, was almost 6 percent per year, equal to the nationwide rural growth rate. Growth in estimated per capita income grew at an even greater pace, though income is less accurately measured in survey data. *The strong growth in household income is a confirmation of the positive impact of the economic reforms carried out over the last 15 years.* Giving responsibility for production decisions to individual households and greater assurance of land tenure has increased the incentives for farmers to invest time and money in expanding production and making good use of resources. The main criticism of the market reforms is that they have widened the gap between rich and poor and between urban and rural households (see Henin 2002). Inequality in rural areas increased slightly over this period. The growth in per capita income of the poorest quintile lagged behind the average, although the growth in per capita

expenditure does not show this pattern. This is consistent with other analyses of the VLSS, which show significant growth in per capita expenditure, small increases in inequality, and overall poverty reduction (Joint Working Group 2000). Furthermore, the growth in income and expenditure appears to have been slower among ethnic minorities than among other rural households. *Thus, continued efforts to strengthen the productivity of poor households are needed if poor and ethnic minority households are to share fully in the benefits of economic growth.*

Crop production is by far the most important source of income for rural households. Furthermore, crop production has played a central role in income growth, contributing 45 percent of the growth in income over 1993–98. The implication is that *rural development strategy must focus on ways to increase the labor and land productivity of crop production,* including yield increases, diversification to high-value crops, and other means of increasing the economic returns to crop production.[52] This does not mean that the government and international organizations should abandon efforts to develop livestock, aquaculture, nonfarm enterprises, and other income sources, but these activities cannot be expected to reach the majority of rural households.

The contribution of crop production in the income growth of the poorest farmers is greatest (69 percent) among the poorest farmers. Thus, *policies and programs to raise the incomes of poor households must also focus on increasing the income from crop production.* It may be argued that they are poor *because* they are specialized in agriculture, but this is misleading. It will take at least 10 years for nonfarm employment to become a major source of income in the Northern Uplands. The absence of nonfarm enterprises is a reflection of the composition of demand. Rather than push them into nonfarm activities, it is preferable to help farmers raise productivity in their existing activities, combined with measures to facilitate gradual diversification into other activities.

Diversification from staple food crops to higher-value crops is a gradual but consistent trend among farmers in the Northern Uplands and elsewhere in Vietnam. The average number of income sources per household, the average number of crops grown, and the share of output that is sold have all increased, while the share of land allocated to rice production has declined. In spite of this diversification away from rice, per capita rice production has increased as a result of higher yields and greater cropping intensity. Thus, *intensification of rice production in the Northern Uplands has enabled income and crop diversification to proceed without sacrificing per capita rice availability.* This finding should provide some reassurance to policymakers concerned about the food security implications of income and crop diversification. It also suggests that rice intensification and crop diversification may be complementary rather than competing strategies for rural development in Vietnam.

Between 1993 and 1998, the share of crop income growth attributable to crop diversification was 8 percent in the rural Northern Uplands and 17 percent in rural Vietnam. Thus, *the government and international organizations working in Vietnam should consider crop diversification to be one important avenue for income growth, but not the only one.* Programs to promote diversification into tea, fruits, medicinal herbs, and other high-value crops have the potential to improve the income and standards of living of rural households, but this should

[52] It is true that income growth patterns in the past are not always a good guide for the future. In the long run, the share of the agricultural sector will shrink and nonfarm enterprises will become an important source of growth. However, structural transformation is a slow process, even in a rapidly growing country like Vietnam, so growth patterns of the recent past (1990s) are likely to be a good guide for the near future.

be an integral part of a broader program to improve the productivity of rural households. In general, the government should facilitate informed decision-making and competitive markets while providing public goods, rather than setting targets for specific commodities or sectors.

One somewhat surprising finding is that only one of the five measures of diversification (number of crops grown) shows a statistically significant difference between minority households and other households, after controlling for farm size, household composition, education, distance to market, and other factors. This suggests that most of the differences in livelihood strategies are due to different opportunities and circumstances rather than ethnicity per se. The policy implication is that *programs to help farmers raise farm income through diversification should focus on improving economic conditions and opportunities rather than addressing cultural attributes of ethnic minorities.*

Implications for Agricultural Research

According to various analyses carried out in this report, yield increases are the most important source of growth in income from crop production. First, the analysis of the two VLSS reveals that yield increases were the most important source of crop income between 1993 and 1998. Second, the review of agricultural statistics indicated that yield growth was the most important factor in the expansion of rice production in the Northern Uplands over the period 1995–2000. Third, farmers in the Northern Uplands attribute much of their income growth over the last 8 years to higher yields. When our QSAID Household Survey asked rural households in the Northern Uplands why their standard of living had increased, the most common response, cited by 80 percent of the respondents was higher yields. *Thus, agricultural research and extension efforts aimed at improving yields has been the cornerstone of efforts to raise rural incomes in the Northern Uplands.* Higher yields may be achieved by various means including higher-yielding varieties, enhanced disease resistance, better farming practices, improved water control, or better management of fertilizer and other chemicals. Although diversification into nonfarm income will presumably become more important in the long run, in the short and medium term, yield increases are likely to remain the largest source of rural income growth.

These conclusions are reinforced by recent research on public investment in China and India. Using provincial data on investment, income, and poverty in rural China over 1970–1997, Fan, Zhang, and Zhang (2002) find that investment in agricultural research and development had the greatest rate of return among the six types of investment examined. Each yuan of investment in agricultural research and development was estimated to increase rural GDP by 9.6 yuan. The study of India, using a similar method, found that investment in agricultural research and extension had the greatest impact on productivity growth among the eight types of investment considered (Fan, Hazell, and Thorat 1999).

We also find that the contribution of crop income growth to overall income growth is greatest among poor rural households and that the contribution of yield increases to crop income growth is greatest among the poor. Yield increases account for 61 percent of the income growth of the lowest income category, but only 24 percent of the growth of the highest category. Thus, the rural poor are much more dependent on yield increases to boost income than are other rural households. The policy implication is that *investment in agricultural research and extension focused on yield improvement has a proportionately greater effect on the incomes of the poor than on the incomes of the less poor.* This is because (1) the poor are more dependent on crop production and (2) they are less able to increase crop income through area expansion or diversification.

These findings are again consistent with the two econometric studies of public

investment mentioned earlier. In China, agricultural research ranks second (after rural education) in terms of the number of people lifted from poverty per yuan of investment (Fan, Zhang, and Zhang 2002, 45). The poverty-reducing impact was greatest in western China, the least developed of the three regions included in the analysis. In India, agricultural research was ranked second (after roads) in poverty reduction (Fan, Hazell, and Thorat 1999).

Our analysis indicates that improvements in rice yields account for 59 percent of the gains associated with yield increases and 23 percent of the gains in crop income. In the long run, the importance of rice in farm income may decline, but in the short and medium terms, these continue to be important crops. Thus, *agricultural research and extension should continue to give priority to improved varieties of rice (and maize to a lesser degree).* Although increases in rice yields are perhaps the largest *single* contributor to rural income growth, it is important to keep in mind other factors (price increases, crop diversification, and yield increases for other crops) still account for three quarters of crop income growth and that growth in noncrop activities accounts for more than half of overall income growth.

Implications for Input Subsidies

The QSAID in this project highlighted the key role of the Ministry of Agriculture and Rural Development and its local branches in promoting crop diversification. Production targets are developed at the central level and transmitted to the local authorities and extension agents in the form of production plans. Various means are used to induce farmers to comply with these plans, including land-use restrictions, technical assistance, credit, the provision of free or subsidized inputs, and the establishment of state-owned processing facilities. The cost of input subsidies in each province seems to range between VND 3 billion and 17 billion per year. *The high cost of programs to provide inputs on credit suggest that these programs should be monitored and evaluated on a regular basis to ensure effectiveness.* In these evaluations, the costs of the program, including the subsidies and the labor of extension agents and others, should be compared to the benefits of the program in terms of additional income from crop production. The program might be justified on equity grounds even if the costs exceed the benefits, but the tradeoff between equity and cost should be made explicit.

Some subsidization of farmer innovation can be justified on economic grounds. First, because farmers are risk averse, they will avoid new production technologies even if it pays off on average (i.e., even if the expected net return is positive). From the point of view of the economy as a whole, the innovation is worthwhile if the expected net value is positive, so there is a rationale for subsidizing new technology to compensate for the risk aversion of farmers. Second, because farmers are cash constrained and credit markets do not function well, farmers may not be able to invest in new production technologies even if the net return is positive. Thus, there is a second rationale for subsidizing investments associated with new production technology.

At the same time, even though there is an economic justification for *some* subsidies for innovation, this does not mean that *any* spending to promote new crops is worthwhile. In particular, subsidies to introduce new crops should be limited in time. For example, the use of import restrictions to raise the domestic price of sugar and sugarcane imposes a net cost on the Vietnamese economy and is unlikely to lead to a more competitive sugar sector (see IFPRI 1998). Further, the subsidy should be enough to offset the risk aversion of farmers, but it should not cover the entire costs of production. If the subsidy is too large, then many farmers will participate only to receive the subsidy rather than because they hope the technology will be profitable. Finally, subsidies should be focused on new crops or new technologies. More research in Vietnam may be needed to

quantify the distribution of benefits of fertilizer subsidies, but studies in other countries indicate that fertilizer subsidies are not an effective means of assisting the poor (see Kherallah et al. 2002).

Implications for Agricultural Extension

The QSAID highlighted both the strengths and weaknesses of the extension service. Of those that received assistance from the extension service, three quarters said it was useful, and of those adopting new crops, approximately half did so with the encouragement or assistance of an extension agent. At the same time, fewer than half the farmers had direct contact with an extension agent during the previous year. Much of the dissemination seems to occur indirectly via the village headman or word-of-mouth. In interviews, local officials identified three weaknesses of the extension service:

- Insufficient number of agents (roughly one per commune);
- Low level of education of extension agents; and
- Low salaries and job security.

Although this study does not have evidence to claim that the benefits of increasing the number and salary of extension agents would be greater than the costs, *one option would be to experiment with a more intensive extension effort in selected districts and evaluating the results after several years.*

Most of the criticism of the extension service relates to their undercapacity, but sometimes they are actually too successful. Production campaigns that combine extension effort and subsidized inputs are sometimes so successful in stimulating production that it creates a situation of oversupply and low prices. The QSAID found numerous examples of programs to promote new crops that succeeded in stimulating production, but failed in raising farmer income because there was "no market" for the additional output. In some cases, the product characteristics were not suitable for the intended buyer, often a processor or an exporter. In other cases, the production zone was too far from the market to make transport worthwhile. Not only do these cases impose losses on small farmers, but they also make farmers more reluctant to participate in future production campaigns. The QSAID surveys indicate that farmers rarely receive any assistance with marketing new crops and that the campaigns are focused almost exclusively on production. Furthermore, one quarter the rural households in our survey indicated that they had had at least one unsuccessful experience, adopting a new crop only to abandon it later as unprofitable. Usually, the problem was that there was "no market," which generally means that the market price, after the cost of transportation from the producer to the buyer is deducted, is too low to justify continued production.

If the government is going to promote new crops, the production campaigns need to pay much greater attention to marketing issues in the selection of crops. Currently, the selection of crops to promote at the local level seems to be largely determined by provincial and central plans for land use and production. These, in turn, are determined by the agroecological potential, particularly soil, temperature, and rainfall. To the extent that estimates of the cost of production and profitability are carried, they tend to ignore spatial variation in producer prices associated with transportation costs. Plans to promote a specific crop in a certain commune should be based on some form of simplified cost–benefit analysis that takes into account:

- The value of the harvest, taking into account the cost of transporting the output to a market;
- The expected yield given local soils and climate, as well as farmer experience with the crop;
- The cost of hired labor and purchased inputs, including the cost of transporting them to the farm;
- The requirements in terms of family labor and land inputs, with some

estimate of the opportunity costs in terms of alternative uses;
- The expected variability in yield and market price based on historical experience; and
- The likely impact on crop prices of a successful campaign to promote the crop.

Such an analysis would be useful for evaluation purposes as well. If the crop turns out not to be profitable in that area, it would be useful to review the assumptions to determine which was, in retrospect, overly optimistic. Such feedback would, over time, assist local authorities in improving their cost–benefit analyses.

A larger issue is whether local officials and extension agents should be promoting specific crops in the first place. It could be argued that the government should not be trying to "pick winners," that the decision to adopt new crops should be left to farmers who already have strong incentives to select profitable crops. Not only do government officials have less incentive to choose well, but by coordinating the decisions of many farmers, they may increase the risk that the new crop will saturate the local market at harvest. On the other hand, the economies of scale in distributing inputs, in providing technical assistance, and in crop marketing create some cost advantages when production of some crops is clustered. This creates a situation in which profitable opportunities may be missed because of lack of coordination among farmers. Similarly, there may be a coordination problem between farmers and processors where investments are profitable only when carried out together. In these cases, some form of coordination may be necessary for farmers to take advantage of a profitable opportunity, coordination that could be provided by a cooperative, farmer association, or extension agent. Without the guidance of economic theory, the effectiveness of production campaigns is an empirical issue. It is safe to say that *the policy of promoting specific crops through production campaigns should be subject to a thorough cost–benefit analysis.*

Regardless of whether the government continues to launch production campaigns, *the messages delivered by agricultural extension agents need to include more information about market conditions.* Most farmers report receiving technical assistance, some report receiving free or subsidized inputs, but very few report getting any information about marketing conditions. This information is less important if the crop is primarily for home consumption, but Vietnamese farmers are becoming more and more commercialized, even in the Northern Uplands. Agricultural extension must adapt to this change by increasing its attention on the market conditions for crops. When a new crop is being promoted, farmers need to know not just how to plant and care for it, but where the market is, how variable the prices are, what product characteristics are valued by consumers, and so on.

The background and training of most agricultural extension agents is in production technology. Thus, *it is necessary to increase the capacity of agricultural extension agents and others in analyzing agricultural markets,* assessing the farm-level profitability of new crops, and estimating the impact of production campaigns on prices. This will involve either recruiting marketing specialists or providing additional training to existing staff. Given the high ratio of farmers to agents, it may also involve using voluntary farmer groups (such as cooperatives) to help deliver extension messages to farmers, gather market information, and provide marketing services that have economies of scale.[53]

[53] "Economies of scale" describes activities whose per unit costs fall if they are carried out in large volumes. For example, processing and transport are often less costly per kilogram if done on a larger scale.

Implications for Public Investment

One of the most difficult questions facing policymakers is how to allocate public investment among regions and sectors. In principle, investment decisions could be made on the basis of a series of cost–benefit analyses that take into account the distribution of impact across different types of households. Unfortunately, by their very nature, most public investments generate benefits that extend over many years and are widely distributed among the population.

This study does not examine the actual returns to alternative public investment, but the QSAID Household Survey sheds light on the priorities of rural households in the Northern Uplands. The QSAID examined the priorities of rural households regarding public investment choices. Among the public investment alternatives,[54] rural households in the QSAID survey ranked "better support for existing crops" as the highest priority. This response probably implies an interest in agricultural research and extension services, though other "support," such as market information, may also be implied. Roads, irrigation, and promotion of new crops were next, all having a similar rating. Better education and health care, electrification, and clean water were ranked much lower by the respondents in the survey. Thus, *according to the stated preferences of rural households, the government should give priority to investments to support existing crops, promote new crops, irrigation, and rural roads, in that order.*

Of course, there are limitations to this type of inquiry. It is not clear if respondents are comparing the value of public investments of similar value. For example, they may be mentally comparing a new paved road to the village with a new village water pump, ignoring the fact that the road would require a much larger investment. Nonetheless, the results are approximately consistent with econometric analysis of public investments. In the studies of India and China mentioned earlier, the three types of public investment with the greatest impact on income and poverty reduction were agricultural research and extension, roads, and rural education (see Fan, Hazell, and Thorat 1999; Fan, Zhang, and Zhang 2002).

Another finding from the QSAID is that the priorities of rural households in the Northern Uplands vary by location. *Based on the stated priorities of rural households, public investment should give greater weight to roads, electrification, and clean water in the more remote areas of the Northern Uplands.* Presumably, this reflects the fact that households in the lowlands and near major roads already have good infrastructure and so their priorities for government assistance are elsewhere. Even in remote areas, however, support for existing crops is given the highest priority by rural households.

Implications for Credit Policy

The QSAID Household Survey asks respondents about the most useful forms of government intervention. Better access to credit is the most common response, cited by two thirds of the respondents. This is a common finding in surveys of rural households throughout the developing world, and "better access to credit" is one of the most common recommendations made to governments by applied researchers. But the issue is complex. First, it is difficult to know whether rural households would like better access to credit at market interest rates or if it is a request for subsidized credit. Since subsidized credit and loan forgiveness are often used by governments to transfer resources to households, sometimes for political purposes, it

[54] The question asked more broadly about the most useful types of government assistance. "Better access to credit" was cited most often by our respondents. Although this has implications for the development of the financial sector, it is not directly related to public investment priorities.

would not be surprising if the QSAID responses reflected an interest in subsidized credit.

Second, even if rural households really would like better access at market rates, there is no obvious and easy strategy for the government to "improve access." The interviews with traders indicate that they are very reluctant to offer credit to farmers and almost always operate on a cash basis. The few traders that offer credit admit to having problems with repayment. Although the QSAID reveals the interest in credit on the part of farmers, it does not provide much insight in how the government can help meet this demand.

Implications for Livestock Development

This study finds contradictory evidence regarding livestock development. According to the analysis of the VLSS, livestock activities contributed 9–13 percent of overall income of rural households in the Northern Uplands and 8 percent of the income growth over 1993–98. Yet, when the QSAID asked households the reasons for the growth in their income since 1994, 62 percent cited livestock income as one of the three most important causes (only "higher yields" was cited more often). And 72 percent agreed that livestock and aquaculture development are good ways to help the poor increase their income. There are three possible reasons for this discrepancy:

- Perhaps livestock development has taken off in recent years, so it was recorded by the QSAID in 2002 but not the VLSS in 1998.
- Perhaps the growth in livestock income is underestimated by the VLSS, which is plausible given the fact that livestock income is dominated by large, infrequent transactions, implying a margin of error that is larger than for other types of income.
- Perhaps the QSAID results are not representative, either because of the small sample size or because households overestimate the contribution of livestock to their income growth.

In any case, the consumption of meat and other animal products will rise rapidly as incomes grow. At the same time, large-scale production of animals, particularly poultry, is taking off. The real question is the degree to which small farmers in the Northern Uplands will be able to participate in the growing livestock sector or whether they will be squeezed out by large-scale industrial operations. The implication is that *the government should study institutional mechanisms for involving small farmers in livestock production for urban markets.* Based on the experience of other developing countries, one promising approach is contract farming arrangements for poultry production (Delgado et al. 1999).

Implications for Promoting Nonfarm Employment

The share of income from nonfarm enterprises tends to be greater among higher-income rural households. Therefore, *programs to develop existing nonfarm rural enterprises will probably directly assist higher-income households more than the poor.* To the extent that the existing patterns reflect some inherent advantage of higher-income households in managing nonfarm enterprises (such as greater tolerance of risk or greater liquidity), it may be difficult to assist poorer households to start enterprises. Further, few rural households in the Northern Uplands believe that nonfarm enterprises are a promising approach to helping poor rural households. On the other hand, promoting the development of nonfarm rural enterprises may promote regional growth and could have indirect benefits for the poor by increasing the efficiency and competition in services they use, such as rice milling, agricultural trade, or repair services.

The analysis of the VLSS data indicate that the nonfarm enterprise sector is very diverse. Even a broad category such as food processing accounts for less than one quar-

ter of the enterprises in the rural Northern Uplands. One implication of this heterogeneity is that sector-specific technical assistance will have a potential audience that would be small compared to (for example) growers of rice or maize. *Thus, providing technical assistance to nonfarm enterprises would be difficult because of the extreme heterogeneity of the sector.* Even though it is costly to provide technical assistance to specific types of nonfarm enterprises, the sector as a whole can be promoted by creating a supportive environment. In other words, *the promotion of nonfarm enterprises is best done through policies and regulations that assist the sector as a whole.* This would include simplifying the registration process, avoiding unnecessary regulations, making tax policy fair and transparent, and improving the access to credit for small enterprises.

APPENDIX

Constructing an Index of Standard of Living for the QSAID Household Survey

Calculating household income or expenditure directly requires a large number of questions that typically occupy tens of pages when done thoroughly. When income and expenditure are estimated based on small numbers of questions, the reliability of the results may be low. In this study, we construct an index of household standard of living by combining household characteristics collected in our survey with an analysis of the relationship between household characteristics and per capita expenditure in the 1998 Vietnam Living Standards Survey (VLSS). This method follows an approach used to generate poverty maps using household survey and census data (see Hentschel et al. 2000 and Minot 2000).

The first step is to select a set of household characteristics that may be correlated with standard of living and are found in both the Qualitative Social Assessment Income Diversification (QSAID) Household Survey and in the 1998 VLSS. The household characteristics used in this analysis are shown in Table A.1. The descriptive statistics of these variables from the QSAID Household Survey are show in Table A.2. In the 1998 VLSS, there are 663 households in the rural areas of the Northern Uplands. The descriptive statistics of the same household characteristics for these households are shown in Table A.3.

The respondents of the QSAID Household Survey are generally similar to those in the 1998 VLSS. The household heads in the QSAID Household Survey are slightly younger (41 vs. 44 years old), somewhat less educated (5.3 years vs. 7.5 years), and significantly more likely to be ethnic minorities (81 percent vs. 48 percent). The household size and composition are very close to what was found in the 1998 VLSS, as is the percentage of houses with electricity. In our sample, wood and bamboo walls were the most common, whereas the VLSS had more houses of fired brick and stone. In both surveys, earth floors were the most common, followed by concrete or brick, though earth floors were more common in our survey (49 percent vs. 40 percent). In both surveys, tile roofs were the most common, representing 56 percent of the responses in our survey and 67 percent of the responses in the VLSS. With regard to ownership of consumer goods, the QSAID respondents were somewhat more likely to own a radio (56 percent vs. 43 percent) and a television (51 percent vs. 43 percent), less likely to own a bicycle (54 percent vs. 72 percent), and more likely to own a motorbike or other vehicle (41 percent vs. 11 percent). Some of these increases in ownership of consumer goods may represent changes in rural incomes between 1998 when the VLSS was carried out and 2002 when the QSAID Household Survey was implemented. Thus, overall, the two surveys had similar samples, the most significant difference being that our survey had a larger proportion of ethnic minority households and a larger proportion of households owning radios, televisions, and motor vehicles.

Table A.1 Household characteristics used to predict standard of living

Variable name	Description of variable
Age	Age of head of household (years)
Educ	Education of head of household (years)
Ethnic	Head of household is ethnic minority (0 = Kinh or Hoa, 1 = other minority)
Hhsize	Size of household (number of members)
Under 10	Number of children under 10 years old
Over 60	Number of adults over 60 years old
Elect	Electrification of the household (0 = no, 1 = yes)
Wall 2	Walls of fired brick or stone (0 = no, 1 = yes)
Wall 3	Walls of unfired brick (0 = no, 1 = yes)
Wall 4	Walls of earth (0 = no, 1 = yes)
Wall 5	Walls of bamboo or wood (0 = no, 1 = yes)
Floor 1	Floor made of marble or tile (0 = no, 1 = yes)
Floor 2	Floor made of concrete or brick (0 = no, 1 = yes)
Floor 4	Floor made of earth (0 = no, 1 = yes)
Floor 5	Floor made of other material (0 = no, 1 = yes)
Roof 1	Roof of concrete (0 = no, 1 = yes)
Roof 2	Roof of tile (0 = no, 1 = yes)
Roof 3	Roof of metal (0 = no, 1 = yes)
Roof 4	Roof of wood or bamboo (0 = no, 1 = yes)
Roof 6	Roof of other material (0 = no, 1 = yes)
Radio	Household owns a working radio (0 = no, 1 = yes)
TV	Household owns a television (0 = no, 1 = yes)
Bike	Household owns a bicycle (0 = no, 1 = yes)
Vehicle	Household owns a motorbike or other vehicle (0 = no, 1 = yes)

Table A.2 Descriptive statistics of household characteristics in QSAID Household Survey

Variable	Number of observations	Mean	Standard deviation	Minimum	Maximum
Age	307	41.00977	10.94863	19	73
Educ	307	5.315961	3.227917	0	16
Ethnic	307	.8078176	.3946589	0	1
Hhsize	307	5.856678	2.492927	2	18
Under 10	307	1.18241	1.233764	0	7
Over 60	307	.4462541	.6998207	0	2
Elect	307	.6351792	.4821658	0	1
Wall 2	307	.2052117	.4045156	0	1
Wall 3	307	.019544	.1386529	0	1
Wall 4	307	.218241	.4137263	0	1
Wall 5	307	.5211726	.5003671	0	1
Floor 1	307	.0684039	.2528499	0	1
Floor 2	307	.218241	.4137263	0	1
Floor 4	307	.4918567	.5007499	0	1
Floor 5	307	.029316	.1689661	0	1
Roof 1	307	.0618893	.2413477	0	1
Roof 2	307	.5602606	.4971658	0	1
Roof 3	307	.0325733	.1778068	0	1
Roof 4	307	.0586319	.2353181	0	1
Roof 6	307	.0260586	.1595698	0	1
Radio	307	.5635179	.4967588	0	1
TV	307	.5114007	.5006861	0	1
Bike	307	.5407166	.499153	0	1
Vehicle	307	.4136808	.4932967	0	1

Table A.3 Descriptive statistics of household characteristics from the rural Northern Uplands from the 1998 Vietnam Living Standards Survey

Variable	Number of observations	Mean	Standard deviation	Minimum	Maximum
Age	663	44.0724	12.90791	20	87
Educ	663	7.45098	3.941444	0	18
Ethnic	663	.4751131	.4997573	0	1
Hhsize	663	5.122172	1.697298	1	12
Under 10	663	1.152338	1.07962	0	5
Over 60	663	.4208145	.692638	0	4
Elect	663	.6576169	.4748653	0	1
Wall 2	663	.4147813	.4930562	0	1
Wall 3	663	.0693816	.2542938	0	1
Wall 4	663	.1674208	.373633	0	1
Wall 5	663	.3152338	.4649597	0	1
Wall 6	663	.0331825	.1792481	0	1
Floor 1	663	.0422323	.2012705	0	1
Floor 2	663	.3092006	.462513	0	1
Floor 3	663	.1372549	.3443761	0	1
Floor 4	663	.3966817	.4895782	0	1
Floor 5	663	.1146305	.318816	0	1
Roof 1	663	.0708899	.2568346	0	1
Roof 2	663	.6651584	.4722914	0	1
Roof 3	663	.0060332	.0774974	0	1
Roof 4	663	.0060332	.0774974	0	1
Roof 5	663	.2368024	.425441	0	1
Roof 6	663	.015083	.121975	0	1
Radio	663	.4268477	.4949932	0	1
TV	663	.4313725	.4956418	0	1
Bike	663	.7179487	.4503379	0	1
Vehicle	663	.1116139	.3151285	0	1

The second step in the analysis is to estimate the relationship between per capita expenditure (in natural logarithm form) and the household characteristics using the 1998 Vietnam Living Standards Survey. After some experimentation with different sets of variables, the specification shown in Table A.4 was adopted. The regression analysis was carried out with adjustments for the sample design effects of the VLSS.[55] The results are shown in Table A.4. The value of R^2 indicates that the household characteristics explain about 55 percent of the variation in the dependent variable, per capita consumption expenditure.

Age and education are statistically significant and positively correlated with per capita expenditure. Household size and number of children below 10 are significant and negatively correlated. *F*-tests of the joint significance of the housing characteristics indicate that the type of wall is not statistically significant, but the type of floor and the type of roof are significant. Ownership of televisions and vehicles are statistically significant and positively correlated, as expected.

[55]Compared to a pure random sample, a typical survey is stratified to improve the accuracy of estimates and clustered to reduce the costs of data collection. Stratification tends to reduce the standard errors of econometrically estimated coefficients, while clustering increases them, relative to a simple random survey. In Stata, the "svyreg" command takes into account these sample design effects in calculating standard errors.

Table A.4 Estimation of per capita expenditure using the VLSS

Dependent variable: Log of per capita consumption expenditure			
pweight: hhsizewt	Number of observations	=	663
Strata: reg10	Number of strata	=	1
PSU: commune	Number of PSUs	=	21
	Population size	=	11,832,003
Subpopulation number of observations = 663			
Subpopulation size = 11,832,003	R^2	=	0.5500

Variable	Coefficient	Standard error	*T*
Age	.0042999	.0014245	3.02***
Educ	.0105377	.0052516	2.01*
Ethnic	–.014118	.0616715	–0.23
Hhsize	–.0782434	.0085664	–9.13***
Under 10	–.0499272	.0187303	–2.67**
Over 60	–.0268649	.0147785	–1.82*
Elect	.0350259	.0466919	0.75
Wall 2	–.0239807	.0542616	–0.44
Wall 3	.017033	.076278	0.22
Wall 5	.0619671	.0546473	1.13
Wall 6	.0691974	.0715245	0.97
Roof 1	.300134	.0545428	5.50***
Roof 2	.1412324	.036459	3.87***
Roof 3	.5579362	.209306	2.67**
Roof 4	.1399553	.083177	1.68
Roof 6	.1961712	.0747631	2.62**
Floor 1	.2407958	.0862533	2.79**
Floor 2	.1446203	.0539832	2.68**
Floor 3	.0590639	.0754611	0.78
Floor 5	.1952154	.0619933	3.15***
Radio	.0230109	.0319163	0.72
TV	.1801767	.0302906	5.95***
Bike	–.0018102	.043775	–0.04
Vehicle	.290211	.0283423	10.24***
Constant	7.317791	.1242968	58.87***

Note: ***Indicates significant at the 1% level, ** at the 5% level, and * at the 10% level.

Electrification of the house is not statistically significant, perhaps because this is determined more by location and village characteristics than household purchasing power. Ownership of radios and bicycles are also not significant; possibly, high-income households are more likely to use televisions for communication and motorbikes for transport.

The third step is to apply this equation to the same household characteristics in the QSAID Household Survey. This generates an estimated log per capita expenditure for each household in the sample. We use this variable to divide our sample into three groups of equal size to compare the patterns of diversification across categories. Although the categories represent terciles of estimated per capita consumption expenditure based on household characteristics, we use the terms "income tercile" and "income category" for convenience. It should be kept in mind that the "higher-income" tercile represents the top third of rural households in the North Upland region, but they are still poor by international standards and even compared to Vietnamese households in urban areas and many rural areas.

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