

ACTIVITY AND INCOME DIVERSIFICATION:
TRENDS, DETERMINANTS AND EFFECTS
ON POVERTY REDUCTION
THE CASE OF THE MEKONG RIVER DELTA

DIVERSIFICATIE VAN ACTIVITEITEN EN INKOMEN:
TRENDS, DETERMINANTEN EN EFFECTEN OP
ARMOEDEBESTRIJDING
DE SITUATIE IN DE MEKONG RIVIERDELTA

Thesis

to obtain the degree of Doctor from the
Erasmus University Rotterdam
by command of the Rector Magnificus
Professor dr H.G. Schmidt
and in accordance with the decision of the Doctorate Board

The public defence shall be held on
Wednesday 14 April 2010 at 16.00 hrs

by

Le Tan Nghiem
born at Can Tho, Vietnam



Doctoral Committee

Promotors

Prof.dr. A.S. Bedi

Prof.dr. M.N. Spoor

Other Members

Prof.dr. B.W. Lensink, University of Groningen

Associate Prof.dr. Nguyen Tri Khiem, An Giang University

Associate Prof.dr. K. Jansen



Acknowledgements

The journey to attain my doctoral degree has come to an end. It is my pleasure to express my gratitude to all who supported me and were involved in one way or the other in this learning process.

My enrollment in the PhD program at the International Institute of Social Studies (ISS) arose in part due to the presence of an NPT project—a cooperative agreement between the School of Economics and Business Administration of Can Tho University and the Faculty of Economics and Business of the University of Groningen. I would like to thank the Boards of the faculties of these universities and the executive board of the NPT project for offering me the opportunity to pursue a PhD program. My particular gratitude is to Prof. Mai Van Nam, Prof. Robert Lensink, Gonny Lakerveld, Anita Veltmaat and Wiebe Zijlstra for their assistance in solving administrative and financial issues during my PhD program.

The design, implementation and completion of this thesis would have been impossible without the help and contribution of my supervisors at the ISS. In the first place, I would like to express my deepest gratitude to Prof. Arjun Bedi for his academic supervision from the start of my official entry into the PhD program, his inspiration and invaluable assistance, especially insights on the data, thesis structure and writing. My sincere gratitude also goes to Prof. Max Spoor for his fruitful guidance and advice and for translating my abstract into Dutch. In addition, my special thanks for the supervisory support provided by my former promotor, Prof. Ben White, my former co-promotor, Prof. Haroon Akram-Lodhi (formerly an ISS staff member), and also my thanks to Prof. Nguyen Tri Khiem (An Giang University) for commenting on my work. I would also like to extend my thanks to the members of the committee of my thesis, Prof. Robert Lensink, Dr. Karel Jansen, Prof. Nguyen Tri Khiem, Prof. Michael Grimm, and Prof. Marc Wuyts for reading and evaluating my manuscript.

During my stay in The Hague, I greatly benefited from the membership of the MMDP research cluster at ISS. I would like to express my gratitude

to all members of the cluster for offering me opportunities to present my research and also my thanks to them for their useful comments. In addition, I would like to acknowledge the kind support and assistance on various administrative matters to other ISS staff members, particularly Ms. Ank van der Berg, Ms. Dita Dirks, Ms. Maureen Koster, and Mrs. Cynthia Recto-Carreon.

I am also grateful to colleagues at the ISS: Mallika, Manohara, Rose, Filmon, Francisco, Gig, Pedro and Maazullah, and colleagues at the University of Groningen: Tra, Thong, Khoi, Tu, Uyen, Dut and Hau (also my brother) for their useful discussions, advice and mental help during my study period. I apologize to the other friends of mine for not including them in this list.

Last but not least, I am deeply indebted to my family members: my wife, my parents, my mother-in-law, my sisters and brothers, my wife's sisters and brothers and other members for their understanding, provision of continuous encouragement and support during my PhD program. Without their support, I would not have been able to finish this thesis. Finally, my exceptional thanks to my wife, Chi, for her untiring patience and willingness to undertake complete responsibility of taking care of our children so that I could concentrate on my work.

Le Tan Nghiem



Contents

<i>Acknowledgements</i>	<i>i</i>
<i>List of Tables, Figures, Maps and Appendices</i>	<i>vi</i>
<i>Acronyms</i>	<i>ix</i>
<i>Abstract</i>	<i>xi</i>
<i>Samenvatting</i>	<i>xiii</i>
1 INTRODUCTION	1
1.1 Selected policy reforms	3
1.2 Mekong River Delta: A background on diversification	8
1.3 Data	14
1.4 Thesis outline	14
Notes	15
2 INCOME DIVERSIFICATION: PATTERNS AND TRENDS	17
2.1 Introduction	17
2.2 Diversification-related issues in previous studies	19
2.2.1 Object of diversification analysis	19
2.2.2 Conceptualizations and measures of income diversification	21
2.2.3 Diversification motives and strategies	23
2.3 Data	26
2.4 Methods	26
2.4.1 Operationalization of income diversification	26
2.4.2 Classification of household income sources	27
2.5 Performance of income diversification in the MRD	33
2.5.1 Measures of diversity in the number of income sources	33
2.5.2 Measure of diversity in income shares	34
2.5.3 Measure of diversity in shares of earning time allocation	41

2.5.4 Agricultural commercialization as diversification	46
2.6 Concluding remarks	47
Notes	48
3 DETERMINANTS OF INCOME DIVERSIFICATION	51
3.1 Introduction	51
3.2 Conceptual framework	52
3.3 Data	58
3.4 Model specification and descriptive statistics	59
3.4.1 Model specification-dependent variable	59
3.4.2 Model specification-independent variables	62
3.5 Determinants of time-allocation patterns: cross-sectional analysis	64
3.5.1 Time-allocation in 1993	64
3.5.2 Time-allocation in 1998	67
3.5.3 Time-allocation in 2002	69
3.5.4 Time-allocation in 2004 and 2006	71
3.6 Temporal income diversification	75
3.6.1 Descriptive statistics	75
3.6.2 Determinants of temporal income diversification	78
3.7 Concluding remarks	85
Notes	86
4 HOUSEHOLD CONSUMPTION, POVERTY, AND INCOME DIVERSIFICATION	88
4.1 Introduction	88
4.2 Expenditure, poverty, and inequality	89
4.2.1 Household expenditure per capita	90
4.2.2 Poverty reduction	92
4.2.3 Inequality	97
4.3 Determinants of consumption and poverty—Empirical framework	98
4.3.1 Static correlates of total household expenditure	98
4.3.2 Examining changes in total household expenditure	99
4.3.3 Modelling poverty dynamics in rural MRD	101
4.4 Empirical results	102
4.4.1 Static correlates of total household expenditure	102
4.4.2 Decomposition of growth in household consumption expenditure	106
4.4.3 Panel data analysis of household expenditure	109

Contents

v

4.4.4 Analysis of poverty dynamics	113
4.5 Effects of income diversification—Indirect approach	117
4.6 Concluding remarks	129
Notes	131
<i>Appendices</i>	<i>133</i>
<i>References</i>	<i>151</i>



List of Tables, Figures, Maps and Appendices

Tables

1.1	Major characteristics of eight regions in 2006	8
1.2	Poverty rates	10
2.1	Trends in income diversification, by the number of income sources	33
2.2	Trends of income diversification, by income shares	36
2.3	Trends of income diversification, by household income shares and expenditure quintiles	39
2.4	Trends of income diversification, by household time allocation and expenditure quintiles	42
2.5	Trends of income diversification, by household time allocation and expenditure quintiles	44
2.6	Share of agricultural output that is sold, by expenditure quintile	46
3.1	Statistics of time shares and proportion of households with zero time amount spent on a given source	59
3.2	Definition and statistics of independent variables in full MRD samples	61
3.3	Determinants of time-allocation patterns, 1993	66
3.4	Determinants of time-allocation patterns, 1998	67
3.5	Determinants of time-allocation patterns, 2002	70
3.6	Determinants of time-allocation patterns, 2004	71
3.7	Determinants of time-allocation patterns, 2006	73
3.8	Mean of earning time shares among households in panel data sets, by types of employment	76
3.9	Statistics of independent variables in the panel sample, 1993/98	77

3.10	Statistics of independent variables in the panel sample, 2002/04/06	78
3.11A	Determinants of the temporal income diversification, 1993/98 (Tobit model with random effects)	79
3.11B	Determinants of the temporal income diversification, 1993/98 (OLS model with random and fixed effects)	80
3.12A	Determinants of the temporal income diversification, 2002/04/06 (Tobit model with random effects)	82
3.12B	Determinants of the temporal income diversification, 2002/04/06 (OLS model with random and fixed effects)	83
4.1	Mean of PCE by selected characteristics, in thousand VND	91
4.2	Changes in poverty incidence, by household characteristics in rural MRD	97
4.3	PCE levels and measures of inequality	97
4.4	Results of regression on (log) total household expenditure (equation 4.1)	103
4.5	Decomposition results of growth in total household consumption expenditure	110
4.6	Results of regression on (log) total household consumption	113
4.7	Relative risk ratio estimates from a multinomial logit model, panel sample 1993/98	115
4.8	Household income diversity and expenditure, sample 1993	118
4.9	Household income diversity and expenditure, sample 1998	119
4.10	Household income diversity and expenditure, sample 2002	121
4.11	Household income diversity and expenditure, sample 2004	122
4.12	Household income diversity and expenditure, sample 2006	123
4.13	Household income diversification and expenditure, panel sample 1993/98	126
4.14	Household income diversification and expenditure, panel sample 2002/04/06	128
Figures		
2.1	Classification of household income sources	28
Boxes		
2.1	Who does Pangasius farming in Thot Not district?	37

2.2	Rice production and commercialization	47
-----	---------------------------------------	----

Maps

1.1	Vietnam and Mekong River Delta	7
-----	--------------------------------	---

Appendices

1.1	Summary of major reforms implemented in Vietnam (1981-2006)	133
1.2	GDP of Vietnam and MRD, by economic sector (%)	135
1.3	Proportion of population aged 15 years old and above by highest certificates in 2006	136
1.4	Sown areas and production of agricultural products	136
2.1	Distribution of income sources among rural households (%)	137
2.2	Shares of private transfers by origins	137
3.1	Determinants of time-allocation patterns, 1993	137
3.2	Determinants of the temporal income diversification (Tobit model with fixed effects)	139
4.1	Descriptive statistics of variables used in Equation (4.1)	140
4.2A	Descriptive statistics of variables used in Equation (4.3)	141
4.2B	Descriptive statistics of variables used in Equation (4.3)	142
4.3A	Initial characteristics and movements in and out of poverty (1993-1998)	143
4.3B	Initial characteristics and movements in and out of poverty (2002-2006)	144
4.3C	Initial characteristics and movements in and out of poverty (2002-2004)	145
4.3D	Initial characteristics and movements in and out of poverty (2004-2006)	146
4.3E	Changes in characteristics and movements in and out of poverty	148
4.3E	(cont.) Changes in characteristics and movements in and out of poverty	148
4.4	Results of regression on (log) total household consumption expenditure	149



Acronyms

ASEAN	Association of Southeast Asian Nations
CPI	Consumer Price Index
CPV	The Communist Party of Vietnam
CPRGS	Comprehensive Poverty Reduction and Growth Strategy
CTU	Can Tho University
FAO	Food and Agriculture Organization
FE	Fixed Effects
GDP	Gross Domestic Product
GSO	General Statistical Office
HCMC	Ho Chi Minh City
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
LSMS	Living Standards Measurement Survey
MARD	Ministry of Agriculture and Rural Development
MDPA	Mekong Delta Poverty Analysis
MOLISA	Ministry of Labour, Invalids and Social Affairs
MRD	Mekong River Delta
NACA	Network of Aquaculture Centers in Asia-Pacific
OLS	Ordinary Least Square
PCE	Per Capita Expenditure
PPP	Purchasing Power Parity
PSU	Primary Sampling Unit
SRVN	The Socialist Republic of Vietnam
RE	Random Effects

RNFE	Rural Non-farm Economy
UN	United Nations
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
IFM	Institute of Fisheries-Management
RIA	Research Institute for Aquaculture No.1
RRD	Red River Delta
RRR	Relative Risk Ratio
VHLSS	Vietnam Household Living Standards Survey
VLSS	Vietnam Living Standards Survey
VND	Vietnamese Dong
WB	World Bank
WWF	World Wide Fund for Nature



Abstract

Until the 1980s, Vietnam was one of the poorest countries in the world, characterized by economic stagnation and widespread poverty. However, since the late 1980s, this picture has changed. Since 1986, Vietnam has experienced a sharp drop in the incidence of poverty which has fallen from 58 percent in 1993 to 15.5 percent in 2006 (GSO 2004b, 2007, 2008). The country, thanks to its high and stable economic growth, has already met the first Millennium Development Goal target of halving poverty. These dramatic achievements are largely ascribed to the success of various policy reforms implemented during the course of *Doi Moi* ('renovation'), a policy which was initiated by the 6th National Congress of the Communist Party of Vietnam (CPV) in 1986.

In addition to overall economic growth, this period has also witnessed notable changes in agriculture, the sector where Vietnam's program of renovation was initiated. Agriculture was for a number of years even the motor of growth. However, over the years there has been a change in the structure of GDP with an increase in the share of industry and a decline in agriculture showing a clear transformation towards a more industrialized and diversified economy.

While a number of authors and empirical studies have examined the pattern of poverty reduction in Vietnam, relatively little attention has been paid to income diversification issues especially in rural areas. Little is known about how economic policy changes required by the renovation in Vietnam determined the livelihoods or income structure of rural households in the Mekong River Delta (MRD). This thesis provides an in-depth investigation of various aspects of economic activity and income diversification in these areas, with the support of a large database, with micro data from the LSMSs conducted in Vietnam over the period 1993-2006. The data is used to examine the patterns, the trends, the determinants, and the links between diversification and household welfare. The study explores the cross-section and panel elements of the data.

The empirical evidence that is presented in this thesis shows that over time there is a clear movement away from reliance on farming activities towards more non-farming activities. The empirical analysis further displays that while households endowed with more educated labour as well as simply more labour regardless of education are more likely to move to non-farming activities, across all household groups there is a clear movement in this direction. The patterns suggest that while household capacity does play a role in influencing movement out of farming the bulk of the change in time-allocation patterns may be attributed to changes in the price and incentive structure facing households.

In terms of the link between poverty reduction and diversification the analysis shows that some of the same factors that drive diversification (household labour quantity and quality) also drive increases in consumption while household access to land increases consumption but prevents movement out of farming activities. However, the main conclusion emerging from the analysis is that while household capacity does play a role in influencing outcomes, it is the range of institutional and policy changes that have implemented in Vietnam in the past more than twenty years that have provided the main impetus for the spectacular growth and poverty reduction experienced in the MRD.



Samenvatting

Diversificatie van activiteiten en inkomen: trends, determinanten en effecten op armoedebestrijding. De situatie in de Mekong rivierdelta

Tot aan 80'er jaren was Vietnam een van de armste landen van de wereld, gekarakteriseerd door economische stagnatie en wijdverspreide armoede. Vooral sinds 1986 is dit beeld veranderd, en is het percentage van de bevolking onder de armoedegrens in Vietnam van 58 procent in 1993 gedaald tot 15.5 procent in 2006 (GSO 2004b, 2007, 2008). Het land heeft, dank zij de sterke en stabiele economische groei de eerste Millennium Ontwikkelingsdoelstelling van het halveren van de armoede (sinds 1990) reeds gehaald. Deze dramatische successen worden vooral toegeschreven aan de verscheidene economische hervormingen die gedurende de *Doi Moi* (renovatie) politiek zijn doorgevoerd, sinds deze werden geïnitieerd door het 6^e Nationale Congres van de Communistische Partij van Vietnam (CPV) in 1986.

Naast algemene economische groei, laat deze periode ook de nodige veranderingen in de landbouwsector zien, de sector waarbinnen het programma van 'renovatie' werd gestart. De landbouwsector was voor een aantal jaren zelfs de drijvende kracht achter de groei van Vietnam. Niettemin, gedurende deze hele periode is de structuur van het Binnenlands Bruto Product (BBP) veranderd, met een toename van de bijdrage van de industrie en een afname in die van de landbouw, wat duidt op een transformatie richting een meer geïndustrialiseerde en gediversifieerde economie.

Terwijl een aantal auteurs en empirische studies het patroon van armoedevermindering in Vietnam hebben bestudeerd, is er relatief weinig aandacht gegeven aan inkomensdiversificatie, in het bijzonder in plattelandsgebieden. Weinig is bekend over hoe de veranderingen in economische politiek in Vietnam bepalend waren voor het levensonderhoud en inkomensdiversificatie in de plattelandsgebieden van de Mekong rivierdelta

(MRD). Dit proefschrift presenteert een gedetailleerd onderzoek naar verschillende aspecten van economische activiteit en inkomstdiversificatie deze gebieden, met behulp van een grote database, met micro-gegevens van de LSMSs (*Living Standards Measurement Survey*) die zijn uitgevoerd in Vietnam gedurende de periode 1993-2006. De gegevens worden gebruikt om patronen, trends, bepalende factoren, en links tussen diversificatie en welvaart van de huishoudens te onderzoeken. Deze studie gebruikt daarbij zowel de cross-sectionele als wel panel-elementen van de data.

Het empirisch bewijsmateriaal dat in dit proefschrift wordt gepresenteerd laat zien dat met de tijd er een duidelijke beweging is weg van de afhankelijkheid van landbouw- naar meer niet-landbouw gerelateerde activiteiten. De empirische analyse laat verder zien dat terwijl huishoudens die meer opgeleide arbeid hebben of gewoon meer arbeid onafhankelijk van het opleidingsniveau, een grotere kans hebben om meer niet-landbouw-activiteiten te gaan ondernemen, is er een duidelijke beweging binnen alle groepen van huishoudens in deze richting. Deze patronen suggereren dat terwijl de capaciteit van de huishoudens een rol speelt in het beïnvloeden van de beweging weg van de landbouw, het overgrote deel van de verandering in patronen van tijdsallocatie kan worden toegewezen aan de veranderingen in de prijs en incentive structuur waarmee de huishoudens worden geconfronteerd.

In termen van de verbinding tussen armoedevermindering en diversificatie laat de analyse zien dat een aantal van dezelfde factoren die diversificatie stimuleren (zoals de hoeveelheid en de kwaliteit van arbeid) ook toename van consumptie bevorderen, terwijl toegang tot land de consumptie van de huishoudens doet toenemen, maar een beweging weg van de landbouw voorkomt. Niettemin, de belangrijkste conclusie die uit de analyse naar voren komt is dat het scala van veranderingen in instituties en economische politiek dat in de afgelopen meer dan twintig jaar zijn doorgevoerd de voornaamste oorzaak zijn van spectaculaire groei en armoedevermindering in de MRD.

1

Introduction

In the 1980s, Vietnam was one of the poorest countries in the world, characterized by economic stagnation and widespread hunger. Over the period 1980-85, gross domestic product (GDP) grew at around 5.2 percent per year. GDP based on purchasing power parity (PPP) per capita (current international dollars per capita) was US\$ 492 in 1985 (IMF 2009) and 70 percent of the country's population was estimated to be living in poverty (Dollar and Litvack 1998, Glewwe et al. 2004). Given this performance, views on the future of the Vietnamese economy were pessimistic and “there was little indication that Vietnamese had any hope of raising their level of welfare” (Glewwe 2004: 1).

However, since the late 1980s, this picture has changed. Annual average GDP growth accelerated to 7 percent over the period 1989-1993 and rose further to an annual rate of 7.6 percent between 1994 and 2006. GDP based on PPP per capita reached US\$ 839 in 1993 and US\$ 2,357 in 2006—approximately four times higher than that in 1985. At the same time, Vietnam experienced a sharp drop in the incidence of poverty which fell from 58 percent in 1993 to 37 percent in 1998, to 29 percent in 2002 and to 15.5 percent in 2006 (GSO 2004b, 2007, 2008). The country, thanks to its high and stable economic growth, has already met the first Millennium Development Goal target of halving poverty by reducing the proportion of people living below the international poverty line (UNDP 2005).¹ These dramatic achievements are largely ascribed to the success of various policy reforms implemented during the course of *Doi Moi* (‘renovation’), a policy which was initiated by the 6th National Congress of the Communist Party of Vietnam (CPV) in 1986.²

In addition to overall economic growth, this period has also witnessed notable changes in agriculture, the sector where Vietnam's program of renovation was initiated (Minot and Goletti 1998). Over the years there

has been a change in the structure of GDP with an increase in the share of industry and a decline in agriculture (see Appendix 1.2), showing a clear transformation towards a more industrialized and modernized economy. Country-wide, the share of agricultural employment in the labour force has fallen from 73 percent in 1990 to 55 percent in 2006. Specifically in rural areas, the percentage of individuals relying on agriculture as their main occupation was 65.4 percent of the rural population (age 15 and above) in 2006 as compared to the 1998 figure of 82 percent. These figures clearly show that over time there is a trend of labour movement out of agriculture and into other sectors. This together with the structural transformation of the GDP reflects an on-going process in which households in the country in general and in rural areas in particular have reallocated their resources to engage in and to earn additional income from non-agricultural sources. In other words the economic renovation process in Vietnam has been accompanied by a declining reliance on agriculture as a source of income and jobs.

While a number of authors and empirical studies have examined the pattern of poverty reduction in Vietnam (for instance, Glewwe et al. 2004, Minot et al. 2003, UNDP 2004, World Bank 1999), relatively little attention has been paid to income diversification issues. The limited work includes papers by van de Walle and Cratty (2004) and by Minot et al. (2006). The first study examines changes in the determinants and effects of one specific indicator of income diversification—diversification into non-farm self-employment—for rural Vietnam over the period 1993-98. The study is based on panel data constructed from the first two nation-wide Living Standards Measurement Surveys (LSMS) conducted in 1993 and 1998. The second study also focuses on rural Vietnam in its entirety but differs from the first in terms of its use of a wider range of indicators to conceptualize income diversification. However, the study does not examine dynamics and restricts itself to an assessment of patterns, trends, and determinants of income diversification based on three individual cross-section LSMSs conducted in 1993, 1998, and 2002.

While these studies examined patterns of diversification for the entire country, as pointed out by (Barrett and Reardon 2001, Ellis 2000), the character of income diversification varies across space and over time. While country-wide studies have the advantage of scope they are not able to delve too deeply into a single region. For instance, despite these studies, little is known about how policy changes required by the renova-

tion in Vietnam determined the livelihoods or income structure of rural households in the Mekong River Delta (MRD). This thesis provides an in-depth investigation of various aspects of income diversification in the rural MRD, with the support of an updated database. Its strategy is to use micro (household level) data from the LSMSs conducted in Vietnam over the period 1993-2006 to examine the patterns, the trends, the determinants, and the links between income diversification and household welfare. The study exploits the cross-section and panel elements of the data.

This chapter sets the stage for the thesis. The first part of the chapter describes the selected policies that Vietnam has adopted since the start of the master renovation program, in 1986. The second part provides a presentation of the macro background of the Mekong River Delta, with a focus on income diversification. The next part provides information on the data used in the subsequent chapters of the thesis while the final section outlines the structure of the thesis.

1.1 Selected policy reforms

As mentioned earlier, Vietnam experienced poor economic performance in the mid-1980s and in response to this limited economic progress, the government began executing a comprehensive reform of the economy and society. Officially, the transformation process was initiated by the government at the 6th National Congress of the CPV (1986). With regard to economic reform the main targets were to replace central planning with a *socialist-oriented market economy* or regulated market economy and to open the economy to the rest of the world. In short, enterprises and households were allowed greater autonomy in producing and trading their products based on market principles. As a consequence of these economic reforms, the private economic sector was legalized and price controls for most goods and services were removed by 1989.

In particular, the first essential policy changes occurred in the rural/agricultural sector. In general, diversifying economic activities in rural/agricultural areas and industrialization and modernization of agriculture have been the two major targets of rural reform. These are still the main points supporting the development process of the farm economy. Specific objectives of interest for rural reform, clarified in Resolution number 10, are to create favourable conditions and environment to develop the production of a variety of agricultural commodities, processing

of agricultural products, and provision of agricultural services and development of rural jobs. In other words, these policies are designed to directly and indirectly stimulate the process of income diversification in Vietnam in general and in rural areas in particular. These objectives were reinforced and further instituted in Decree number 132 of the Government issued in 2000.

In 1987 and 1988, the former system of controlling prices for agricultural commodities was steadily lifted and farmers were no longer prevented from selling surplus products to the non-State market at a price level they were willing to accept. The issuance of Resolution number 10/NQ-TW dated 5th April 1988 on reforming agricultural production management brought about another important change. Agricultural land, which had been united for production in co-operatives, was allocated by the State to rural households who had worked for those co-operatives on the basis of a lease of 15 or more years. Beneficiaries had to pay taxes upon receiving the right to use the plots of land and became owners of the output after tax payment. These changes, together with the removal of many export restrictions in the late 1980s, led Vietnam to become the world's third largest rice exporter in 1992 as compared to being a net rice importer few years prior to the adoption of the renovation (Glewwe 2004, Tang and Yue 2006).

In the 1990s, the agricultural sector continued to experience changes in land management policy and trade policy. The Land Law released in 1993 supported and protected the achievements of reform in agriculture and provided more rights and security to those who had been allocated land. This law stipulated that households and individuals who had been allocated land were authorized to exchange, transfer, lease, inherit, and mortgage their land-use rights. Additionally, the duration of land-use lease was extended to 20 years for annual cropland and 50 years for perennial cropland. In terms of trade policy, the enactment of the 1997 Trade Law relaxed all constraints on internal trading in rice. In 1997, exports were further liberalized and the private economic sector was (the State was already doing so) allowed to export rice directly and in 1999 the private sector received full freedom to import and export rice. Along with others, these reforms led to rice exports of 4.5 million tons in 1999, a significant increase over the less than one million tons exported in 1992 and a dramatic transformation from the position of a net rice import country prior to 1990.

Another important aspect of the policy changes has been the development of a multi-sector economy. Prior to the renovation, the State sector was considered the epitome of the socialist economy and provided with favourable conditions to develop while the private sector was completely disallowed. This viewpoint was corrected by the 6th Congress of the CPV with an official recognition of private sector and an initial legal infrastructure for it to operate. In addition, foreign enterprises were encouraged to start businesses in Vietnam as one part of the ‘open door’ policies. Along with the course of renovation, the continuity of the movement towards a multi-sector economy was strengthened and further facilitated by the passage of a series of important laws concerning the framework for domestic and foreign enterprises to operate, including the Enterprise Law (1992, 1999, 2005), and other relevant laws and policies.

In terms of employment, driven by the various institutional changes, there has been rapid growth in employment opportunities in the non-state sector—which encompasses collective-run economic sector, individual-run and smallholder-run sector, private sector, and foreign investment sector (Tang and Yue 2006: 65). Between 1986 and 1994, this non-state sector expanded by seven million individuals, accounting for more than 30 million employees or 90 percent of total working employees in 1994 (Tang and Yue 2006). This sharp absorption helped Vietnam avoid a sizable increase in unemployment which may have occurred due to the sharp reduction in public sector jobs due to restructuring of State-owned enterprises (about 800,000 employees) over this same period (Glewwe 2004).

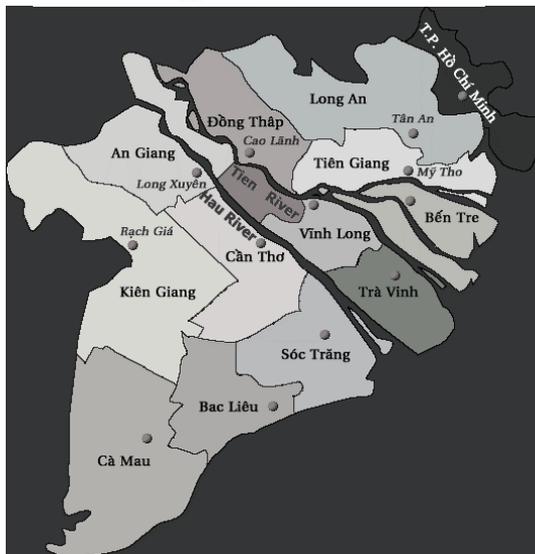
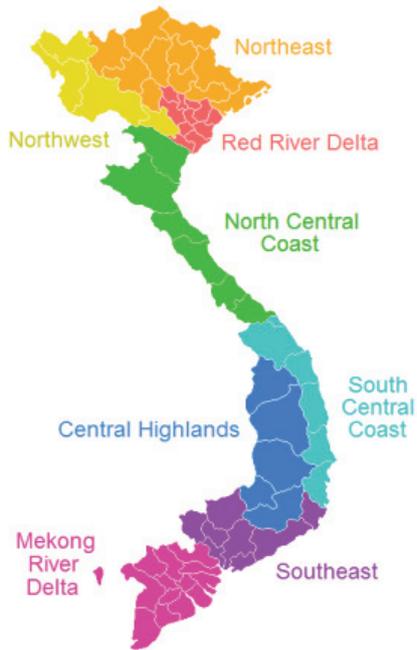
Of the above-mentioned changes, the Enterprise Law promulgated in 1999 and implemented in January 2000 has particularly significant meaning in the development and formalization of Vietnam’s private sector. This law simplified the registration procedure to the absolute minimum such that entrepreneurs may operate any business not specifically prohibited. Registration no longer required the acquisition of a number of licenses and sub-licenses, allowing entrepreneurs to make better use of time and promptly respond to business opportunities. Registration costs were standardized leading to an increase in transparency and reduction in costs faced by entrepreneurs. The law removed the requirement of minimum levels of registered capital and enterprises were granted greater access to government investment incentives. In general, the implementa-

tion of the law led to an ever better business environment than was expected by entrepreneurs. Soon after the passage of the law, in 2000 itself, about 13,500 new enterprises were registered and 300,000 jobs were created. The corresponding figures were 23,000 and 500,000 in 2003.

In terms of social policy, education policy also experienced major changes under the renovation process. In 1989, private schools were legalized. State spending on education increased significantly, from about 1.8 percent of GDP in 1992 to 3.5 percent in 1998 (Glewwe 2004). This investment reported by the Ministry of Education and Training was about 6 percent in 2006 and recently accounted for about 20 percent of the total State budget. A program of increasing net enrollment at different levels of basic education was targeted with a concentration on primary and lower secondary level as well as pupils in remote areas and those belonging to ethnic minorities. Given these policy changes educational performance has improved; for example, each person aged 15-60, on average, spent 7 schooling years in 1993 and 7.7 years in 1998.

A final dimension of policy change has been in the international trade arena. In 1992, a preferential trade agreement was signed between Vietnam and the European Economic Community, while in 1994, Vietnam and the United States re-established diplomatic relations and signed a bilateral trade agreement in 2001. Vietnam became a member of the Association of Southeast Asian Nations (ASEAN) and the ASEAN Free Trade Area in 1995, and the Asia-Pacific Economic Co-operation in 1998. Since 2006, the country has also been a member of the World Trade Organization.

Map 1.1
Vietnam and Mekong River Delta



Sources: <http://commons.wikimedia.org/wiki/File:VietnameseRegions.png> and <http://cantho.cool.ne.jp/ameder/map/blank6.gif>.

1.2 Mekong River Delta: A background on diversification

Geographically, the Mekong River Delta (MRD) lies in southwestern Vietnam and is a region where the Mekong River approaches and empties into the sea through a network of distributaries. It shares borders with the Southeast region—Vietnam’s most dynamic economic zone, including Ho Chi Minh City. It borders Cambodia to the North, the Gulf of Thailand to the Southwest, and the South China Sea to the Southeast. The MRD is a low-level plain about three meters above sea level and is criss-crossed by a system of canals and rivers.

Table 1.1
Major characteristics of eight regions in 2006

Region	Population (mill. pers)	Population density (pers/km ²)	Total area (mill. ha)	Agricultl. land (mill. ha)	Forest land (mill. ha)
<i>Vietnam</i>	84.16	254	33.12	9.41	1.44
Red River Delta	18.21	1,225	1.49	0.76	0.12
North East	9.46	148	6.40	0.98	3.55
North West	2.61	69	3.75	0.50	1.77
North Central Coast	10.67	207	5.16	0.80	2.85
South Central Coast	7.13	215	3.32	0.58	1.46
Central Highlands	4.87	89	5.47	1.60	3.07
South East	13.80	396	3.48	1.61	1.25
Mekong River Delta	17.42	429	4.06	2.58	0.36

Source: GSO (2007).

The MRD is considered the most important agricultural producing region of Vietnam. As seen in Table 1.1, it covers an area of 4.06 million ha (12 percent of Vietnam’s area); of which, 2.58 million ha (63.5 percent) is land used for agricultural production, accounting for 27.4 percent of the country’s total agricultural land. Annually, the MRD accounts for 51 percent of the country’s rice production, 70 percent of fruit production and 80 percent of fish production. Agriculture dominates the region’s GDP, accounting for a 43.2 percent share in 2006.

This important region in terms of agricultural production, consists of 12 provinces and one municipality (Can Tho City) and is home to more than 17 million persons—about one-fifth of the Vietnamese population in 2006. Nearly 80 percent of the MRD population lives in rural areas. In 2006, the average population density was 429 persons per square kilome-

ter, approximately 1.7 times higher than that of the country and one-third of that in the Red River Delta (RRD). The region's population has grown at about 1.2 percent per annum in recent years. In 2006, there were more than ten million individuals in the region's labour force.

In terms of ethnicity, there are four races of people living in this region: *Kinh*, *Khmer*, *Chinese*, and *Cham*. The *Kinh* people account for more than 92 percent of the population. Of the ethnic minorities, the *Khmer* are the largest group, accounting for about 6 percent of the region's population, the *Cham* account for 1.4 percent, and the *Chinese* for the rest. Across ethnicities, the *Kinh* and the *Chinese* experience better living standards than the rest and the *Khmer* are 'the most economically and socially disadvantaged' group (MDPA 2004).

In terms of education, the LSMS 2006 shows that the MRD does not perform very well as compared to the rest of the country (see Appendix 1.3). According to the table, only 2.1 percent of the population aged 15 years and above has college/university education, while 27.1 percent have "No certificate" and 10.6 percent have never been to school. This may be compared with a no school rate of 8.1 for the entire country, a no certificate rate of 14.5 and a college/university education rate of 4.4 percent.

As a region with a largely agricultural economic base, the highest share of the region's GDP emanates from agriculture. While this share has declined from 58.9 percent in 1996 to 43.2 percent in 2006, agriculture continues to account for the largest share of the region's GDP. Between 2000 and 2005, this sector grew at about 7 percent per annum while industry at 16.2 percent per annum and the services sector at 12.6 percent per annum. The regional economy also experienced an average growth rate of 10.2 percent over this period, a higher rate of growth as compared to the rest of the country over the same period. GDP per capita at constant 1994 prices was about US\$ 432.2 in 2004—a notable increase over the 1996 GDP of US\$ 241.5 (GSO 2004a, 2006b).

As has been widely recorded, the early reforms led to significant economic achievements and poverty reduction in Vietnam (see Table 1.2). Over 1993-2006, the country experienced a sharp reduction in poverty, from 58.1 percent to 15.5 percent. Sharing this overall trend, the proportion of poor households in the MRD fell from 47.1 percent in 1993 to 13.0 percent in 2006. However, a comparison of the MRD with the RRD, that is, the two biggest deltas in Vietnam, shows that the MRD has

experienced a slower rate of poverty reduction as compared to the RRD, suggesting that heavy reliance on agricultural production may have slowed down the performance of poverty reduction in the MRD.

Table 1.2
Poverty rates

Region	1993	1998	2002	2004	2006
<i>Vietnam</i>	58.1	37.4	28.9	18.1	15.5
Red River Delta	62.9	29.3	22.4	12.9	10.1
North East	78.6	62.0	38.4	23.2	22.2
North West	78.6	73.4	68.0	46.1	39.4
North Central Coast	74.5	48.1	43.9	29.4	26.6
South Central Coast	49.6	34.5	25.2	21.3	17.2
Central Highlands	70.0	52.4	51.8	29.2	24.0
South East	32.7	12.2	10.6	6.1	4.6
Mekong River Delta	47.1	36.9	23.4	15.3	13.0

Note: The poverty rates for 2004 were calculated basing on the new poverty line of the Government for the period 2006-2010 converted to price of January 2004 (GSO, 2008).

Source: GSO (1995, 2004, 2007).

So far, the preceding paragraphs have described the main characteristics of the MRD. The remainder of this section goes on to provide a macro background on income diversification in the region.

The MRD has a long history of rice production. Traditionally, the land-use system in the MRD has been characterized as single floating rice and deep-water rice. While the process of crop diversification may be considered as beginning in the late 1970s (with the introduction of modern high yielding and short duration varieties of rice) it was only in the late 1980s and the early 1990s that the process of diversification picked up pace.

Under the renovation program there were changes in land-use rights, liberalization of agricultural prices and the establishment of the agricultural extension network. For example, farmers were introduced to the integrated farming systems of rice + fish/shrimp, fruit trees + fisheries + animal husbandry, crop + livestock, etc., namely, *VAC* or *VACR* system (V stands for “Vuon” = fruit tree orchard, A for “Ao” = fish ponds, C for “Chuong” = animal house, and R for “Ruong” = rice field). New high yielding varieties, especially for paddy, were introduced on farms. Other economic reforms, for example, adoption of trade liberalization

policies stimulated producers to adjust their production to meet market demand for food variety as well as to reap more benefits. At a macro level, these institutional changes appear to have exerted a clear influence as both sown areas and quantity of agricultural plants, fruit tree, aquaculture and livestock and poultry heads have increased sharply over the period 1990-99 (see Appendix 1.4). In addition, in recent years, the MRD has experienced rapid growth of aquaculture in terms of both farming area and production of catfish regardless of fluctuating output prices, and high capital entry barriers (Anh 2007). The super-profit from catfish farming, say, an average net income of VND 140 million/1,000 m² per 6-8 month duration in 2006 (IFM et al. 2006), is the main motivation for the current 'boom' of catfish farming in the region (Dung 2007).

Apart from crop diversification and the development of alternative agriculture related activities, the MRD has also witnessed the expansion of non-farming earning options.

On the back of the unified Enterprise Law introduced in 2000, there has been a sharp increase in the number of officially registered enterprises located within the MRD. Between 2000 and 2002, the number of enterprises increased from 9,837 in 2000 to 10,900 in 2002 and the number of employees working in these enterprises also rose from 244,366 to 309,386 persons between these two years GSO (2007). After 2002, the development of the non-farm sector has continued to strengthen in the region and in 2006 this sector accounted for 15,325 enterprises providing employment for 463,762 workers. These figures do not account for workers in numerous individual non-farm establishments that are not classified as formal enterprises under the Law, whose business employs at least one full-time worker. In 2002, approximately, 900,000 workers in 486,000 units were engaged in these types of enterprises. While in 2006, the corresponding figures were more than 1.2 million workers in 691,000 units. In terms of ownership of these enterprises the bulk of these enterprises were in the private sector and in mid-2002, according to data from the MRD provinces' department of planning and investment, sole proprietorships and limited and joint stock companies accounted for most of these enterprises (78.4 and 12.9 percent of total enterprises respectively); collectives accounted for 5.5 percent, state sector with 1.9 percent and foreign direct investment for the rest (1.3 percent) (Taussig et al. 2003).

These non-farm enterprises operate in a variety of economic sectors and for the most part have little to do with agriculture. According to statistics provided by the Vietnam Chamber of Commerce and Industry in Can Tho, in 2000, trading and repair of motorized vehicles and consumer goods accounted for 53 percent of the total registered private enterprises, followed by manufacturing (34 percent), construction, restaurants and hotels, transport, storage, and communication accounted for 11 percent while agri-based enterprises accounted for the remaining 2 percent (Taussig et al. 2003, Figure 3.6, page 27).

In addition to the broad patterns of diversification within agriculture and the development of non-farm enterprises an additional change that merits attention is migration patterns. In Vietnam, internal migration was limited by legal regulations until it was supported with the loosening of the *ho khau* (the household residence certificates) restrictions (in 1999) and in 2006, the law allowing freedom to reside anywhere in Vietnam—Law on Residential Housing. These institutional changes have encouraged higher internal migration, especially migration to urban areas since the launch of the renovation policy in the country.

Although data are limited, it is clear that permanent migration out of the MRD has been increasing over time.³ Over 1984-1989, data from the Population and Housing Censuses show that the number of out-migrants, age 5 and above was 187,126 persons. This figure doubled in the period 1994-1999 (Phan and Coxhead 2007). There have been two major inter-provincial migration flows: the movement of individuals across provinces in the MRD and rural-to-urban flow from the MRD into Ho Chi Minh City (HCMC). According to the data summarized by Phan and Coxhead (2007), migration within the MRD provinces accounts for a 42 to 45 percent share of out-migrants over each of the two mentioned periods while the flow from the MRD to HCMC increased from 24.9 percent in the first period to 38.7 percent in the latter. Recently, the 2004 Vietnam migration survey reported that 29.7 percent and 16.1 percent of the total migrants who are 15 and above in HCMC and the Southeast Industrial Zone of Binh Duong and Dong Nai, respectively, originate from the MRD (GSO and UNFPA 2005a).⁴ In addition, in a recent report by GSO and UNFPA (2005b), the regions with the largest outflows to the Southeast—a region with the most dynamic economy and many of the biggest cities in the country—originate from the MRD, North Central Coast, South Central coast and Red River

Delta. These individuals migrate in search of work in the non-farm sector in the country's biggest industrial zones.

The existing research does not provide detailed information on migrants from a specific region but provides information at the country level. According to these reports, migration flows from rural to urban areas dominate. Migrants are largely young people in their early 20s, have higher education as compared to non-migrants in the rural areas and in terms of their education are comparable to the non-migrants residing in urban areas. They are not in the poorest group of households in their places of origin. Although migrants tend to be males, there is an increasing proportion of females moving to urban and industrial zones. The main reason for migration at the individual level is the search for better income and employment opportunities (reported by 70 percent of the migrants). At a more macro level, the relaxation of the household registration system and the rapid growth of employment opportunities in big cities are major factors influencing the increasing volume and the patterns of rural-urban migration flows during the economic transformation in the country (GSO 2006a, GSO and UNFPA 2005a, 2005b, UNFPA 2007).

Based on a 2004 survey, UNFPA (2007) finds that 80 percent of migrants had higher current incomes than prior to migration. 48 percent of male migrants and 54 percent of female migrants sent money home. On average, these earnings accounted for 10 percent of total earnings for males and 17 percent for females. Women in the Southeast industrial zones sent back more than a quarter of their income.

Apart from internal permanent migration, temporary migration to work abroad has been observed in the MRD. According to the Ministry of Labour, Invalids and Social Affairs (MOLISA), the export of skilled and unskilled labour has been emphasized as important solutions to increases in employment demand in Vietnam (issued by the Political Bureau in 1998). Every year, over the period 2000-2005, more than three thousand workers have left the MRD to work in foreign labour markets (Minh 2008). Given the increase in intra-country migration and in international migration of relatively educated workers it is quite likely that since the launch of the renovation policy or in particular since the launch of reforms that allowed internal and external migration, transfer incomes may play a role in shaping household incomes and poverty. In fact, according to a vice minister of the MOLISA in a press conference

in 2006: “a poor household would successfully escape from poverty in three years later if there is one member engaging in labour export” (Trao 2006).

1.3 Data

Data for this thesis come from five nation-wide surveys: Vietnam Living Standards Survey (VLSS) 1993, Vietnam Household Living Standards Survey (VHLSS) 2002, VHLSS 2002, VHLSS 2004 and VHLSS 2006 [hereafter called LSMS 1993, LSMS 1998, LSMS 2002, LSMS 2004, and LSMS 2006]. These are nationally representative, high quality surveys with comprehensive and carefully collected data (GSO 2004b, World Bank 1995). Each sample was selected to be representative at the region-level; the sample sizes are large—4,800, 6,000, 30,000, 9,000 and 9,000 households for the LSMS 1993, 1998, 2002, 2004 and 2006 respectively. Interviewers were GSO staff members who were specifically trained to collect data. All surveys include information on household income sources and expenditure and this supports a temporal analysis of diversification. More particularly, these were collected repeatedly by similar questionnaires in each survey, so they are comparable and, consequently, serve well for depicting and comparing income diversification patterns within and across years of concern. Since the focus of this thesis is on understanding income diversification among rural households in the MRD, a sub-sample consisting of those who live in this region is extracted from each of the five datasets. Specifically, findings in this study are based on 800, 830, 5,079, 1,488 and 1,473 rural households in the MRD drawn from the LSMS conducted in 1993, 1998, 2002, 2004 and 2006 respectively.

1.4 Thesis outline

The thesis is structured as follows. Chapter 2 reviews diversification-related issues in previous studies and provides a description of the patterns and trends of income diversification in the MRD. In this chapter, I describe and analyze the cross-sectional patterns of income diversification in 1993, 1998, 2002, 2004, and 2006 and the temporal patterns of income diversification over 1993-2006 at the household-level. Income diversification is measured by four different indicators: the number of income sources, share of income from different sources, shares of time

spent on different earning activities, and the proportion of agricultural output that is sold to the market (agricultural diversification as commercialization).

Chapter 3 provides an empirical analysis of the factors driving income diversification in rural MRD. It follows the conceptual framework introduced by Reardon et al. (2006) to develop an empirical model. A double censored tobit model is used and the chapter estimates the determinants of diversification using each of the individual cross-section data sets gathered in 1993, 1998, 2002, 2004, and 2006 as well as explores determinants of diversification using panel data.

In chapter 4, the primary objectives are to understand the determinants of household welfare as measured by household consumption, temporal changes in household welfare level, and the link between income diversification and household consumption and poverty. The chapter starts with an overall description of poverty performance during 1993-2006 in the MRD. This is followed by the use of Oaxaca's decomposition method to analyze changes (growth) in total household consumption in order to identify sources of growth over sub-periods between 1993 and 2006. To analyze poverty dynamics the chapter applies a multinomial logit model to estimate different probabilities of escaping from poverty over time. Finally, recognizing the potential endogeneity between diversification and household consumption a reduced form approach is used to identify the association between income diversification and consumption.

The last section of chapter 4 brings the thesis to a close and contains concluding remarks.

Notes

¹ For the whole country, the income Gini coefficient was 0.42 in 2004 and 2006, 0.418 in 2002 and 0.39 in 1999 (GSO 2008: 35).

² See Appendix 1.1 for more details on reforms implemented since 1986.

³ Data on migration in Vietnam are relatively limited and have been derived from the Population and Housing Census 1989 and 1999, and recently the 2004 Vietnam Migration Census.

⁴ The 2004 Viet Nam Migration Survey was a sample survey on internal migration to major areas. The survey was conducted in eleven cities and provinces, which were selected to represent five areas. These areas were: Area 1: Hanoi; Area 2: Northeast Economic Zone, including Quang Ninh, Hai Phong and Hai

Duong; Area 3: Central Highlands, including Gia Lai, Dak Lak, Dak Nong and Lam Dong; Area 4: Ho Chi Minh City; and Area 5: The Southeast Industrial Zone of Binh Duong and Dong Nai (GSO 2005).

2

Income diversification: Patterns and trends

2.1 Introduction

Based on the potential role of income diversification in stabilizing incomes and alleviating rural poverty, governments in several developing countries have devoted increasing attention to output diversification policies (Petit and Barghouti, 1992). Vietnam is not an exception and in the follow-up to the launch of the renovation process—marked by the implementation of Resolution 10 in 1988—the government has devised and implemented various economic reforms to stimulate economic development and output diversification. As discussed in detail in the previous chapter, the strategic objectives of the series of reforms launched by the government are to liberate and deregulate the economy, to develop a multi-sector economy, to renovate the economic structure, to stabilize the socio-economic environment—including improvement of people’s living standards, and to open the country’s economy to the rest of the world. Specific objectives of interest for rural development are to create more jobs, to raise agricultural and rural industry-related income, and to develop services and off-farm activities. In other words, these policies are designed to directly and indirectly stimulate the process of income diversification in Vietnam in general and in rural areas in particular.

As has been widely recorded, the early reforms led to significant economic achievements in the post-1990 period and between 1993 and 1998 the country experienced a high level of economic growth as well as a sharp reduction in poverty. Between 1993 and 1998 the economy grew at an annual rate of 9.8 percent, which may be compared with a 5.1 percent growth in 1990 (GSO 2002). Remarkably, the country’s overall poverty rate declined from 58 percent in 1993 to 37 percent in 1998 (Haughton 2001).

This period also witnessed noticeable improvements in agriculture, the sector where Vietnam's program of renovation was initiated. Between 1986 and 1998 a range of institutional changes provided households with long term land-use leases, better access to agricultural input and output markets, and more autonomy in decision making on production. Of the various institutional changes, the removal of all restrictions on internal trading in rice, increases in the rice export quota and the unrestricted import of fertilizers directly resulted in a sharp drop in the price of fertilizer and significant increase in the price of rice, especially in southern Vietnam (Benjamin and Brandt 2002). These sharp price changes strengthened the effects of the 1988 reforms—which were marked by decentralization of decision making—and affected the supply and marketing decisions of farm households and exerted positive effects on their incomes and welfare (*ibid*).

After 1998, Vietnam's renovation program continued with reforms along multiple dimensions with agriculture and rural development remaining one of the most important concerns for generating sustainable growth and poverty reduction. During the period 1998-2006, Vietnam's economic growth rate has remained high and stable, and by 2006, poverty had fallen to 15.5 percent. The structure of GDP has changed and over the years there has been an increase in the share of industry and a decline in agriculture (details were provided in chapter 1), showing a clear transformation towards a more industrialized and modernized economy. These changes imply a reduction in the importance of agriculture and over time, suggest an ongoing process of diversification at the macro level.

At a micro level, reforms implemented under Vietnam's renovation framework may be expected to lead to income diversification mainly through indirect channels. That is, reforms are likely to have influenced the decision making of households towards production and engagement in certain income earning options, which, in turn, leads to income diversification. Besides reforms, other variables such as changes in consumption behaviour, and variability in markets for factors of production and output, may also lead to changes in household decision-making.

As discussed earlier, while a number of authors and empirical papers have examined the pattern of poverty reduction in Vietnam (for instance, Glewwe et al. 2004, Minot et al. 2003, UNDP 2004, World Bank 1999), relatively little attention has been paid to income diversification issues.

Furthermore, the existing work on diversification in Vietnam examines patterns of diversification for the entire country. As pointed out by (Barrett and Reardon 2001, Ellis 2000), the character of income diversification varies across space and over time. While country-wide studies have the advantage of scope they are not able to delve too deeply into a single region. For instance, despite these studies, little is known about how policy changes required by the renovation in Vietnam determined the livelihoods or income structure of rural households in the Mekong River Delta (MRD).

Accordingly, this chapter focuses on patterns and trends in diversification over time in one region of the country, namely the MRD. The aim of this chapter is not to examine possible effects of either a specific reform or a variable but to acquire an understanding of the patterns and trends in income diversification among rural households. The chapter's analysis is based on rural households residing in the MRD and draws mainly on data from five rounds of LSMS surveys conducted in 1993, 1998, 2002, 2004 and 2006. These datasets allow an examination of the patterns of diversification over a thirteen year period and shed light on the dynamics of the diversification process. This chapter is restricted to a description of the changes.

The chapter is organized as follows. The following section provides a summary of diversification-related issues in the literature. Sections 2.3 and 2.4 provide information on the data and methods of analysis. Section 2.5 discusses cross-sectional and temporal patterns of income diversification among rural households in the MRD. Section 2.6 concludes.

2.2 Diversification-related issues in previous studies

2.2.1 Object of diversification analysis

The selection of an object for diversification analysis is discussed in a relatively detailed manner by Barrett and Reardon (2001: 9-12). Assets are factors that directly or indirectly generate cash or in-kind returns. In portfolio theory, on which the diversification literature is based, assets are emphasized as objects of agent's choice for the sake of income maximization, risk (reducing income variability) minimization or both. Accordingly, assets can be chosen as an object of diversification analysis and a number of authors (see Carney et al. 1999 for example) have used assets to characterize and study diversification. However, Barrett and

Reardon (2001) also point out two disadvantages when using assets to approach diversification. First, a productive asset cannot always be allocated to a particular activity instead of being used across activities, so it is relatively hard to sum up assets in a single activity. Second, calculating the *true* value of some assets is difficult due to insufficient development of asset markets in developing countries. Consequently, it is argued that in order to study *asset* diversification, assets must be treated as a vector of physical quantities rather than a single, money-metric aggregate (Barrett and Reardon 2001). This is, in turn, unable to fully capture patterns of diversification of households across all income-generating and unearned income options.

As an alternative, activity can be used to study diversification but it also has some drawbacks, according to Barrett and Reardon (2001). First, although we can identify which assets are used in each activity, they cannot be fully valued as mentioned above. Therefore, as in the case of assets, activities cannot be aggregated in a single money-metric aggregate and hence cannot be used to examine diversification patterns. Second, if based on activities, unearned income sources are completely ignored. This may lead to an incomplete understanding of the relationship between diversification and poverty reduction. However, if researchers purposively ignore unearned income sources and define diversification as participation in income-generating activities, activity diversification can be adopted as a suitable measure. Thus time allocated to, or income earned from each activity may be used to analyze diversification. Unfortunately, another weak point is that reported employment share of non-farm activities is believed to be understated (Lanjouw and Feder 2001: 34). Because non-farm activities are widely recognized to provide supplementary work during slack periods of the agricultural cycle, real working time allocated to those activities is often unintentionally added to the total account of agricultural employment—the primary source of income of farmers. This, thus, causes an underestimate of the actual proportion of labour time that is devoted to non-farm activities (Barrett and Reardon 2001).

Given the shortcomings of the asset and activity based approaches, income has often been used in empirical work on diversification. Using income may offer several advantages. First, since the two main motives of diversification are maximization of income and stabilization of income, or both, discussing diversification in terms of income diversifica-

tion appears to be a natural candidate (Ellis 2000, Barrett et al. 2001). Second, income is the end outcome of income-generating activities, to which both productive and non-productive assets are allocated, and of unearned income options, for example transfers, as well. It is also easier to convert in-kind payments into a money-metric due to higher development of goods market compared with asset market (Barrett and Reardon 2001). Third, income is closely related to the concept of absolute poverty as it is more or less used to define the poverty line and measure household wealth. Due to these reasons it seems that, defining diversification in terms of income may be the most suitable approach (for a review of various empirical studies that used income approach, see in Reardon 1997). However, Barrett and Reardon (2001) point out that selecting income as an object of analysis will give the best picture of diversification if diversification motives are clearly distinguished between choice and necessity.

They also go on to add that, given the advantages and disadvantages of each object, it may be better to simultaneously use several objects to provide a more complete idea of the extent of diversification (Barrett and Reardon, 2001).

2.2.2 Conceptualizations and measures of income diversification

Empirical studies in this field have based their analysis on at least one of the following five definitions of income diversification.

First, this is the simplest definition and possibly closest to the meaning of the word. That is, diversification is referred to a process by which the presence of multiple income sources is created (Minot et al. 2006). The number of income sources that each household has at a given point in time is used as a measure of income diversity while the difference in the number of income sources that one household has at different points in time indicates the level of income diversification pursued by that household over that corresponding period. Accordingly, households with more income sources are treated as households with higher levels of diversity in income and the greater the increase in the number of sources over time the greater the increase in diversification over time. This indicator, the number of income sources, has the advantage that it is simple to understand and provides an easily visible picture of income diversification. However, as the focus is solely on the number of sources, this conceptualization of income diversification treats every source of income

equally instead of taking into account the importance of, or the income share from each of the sources. This is its main weakness and due to this, it is not widely used, or is used as a complementary indicator, in empirical studies in this field. In their study, Minot et al. (2006) employ this measure along with other measures to examine the patterns and determinants of income diversification among rural households in Vietnam.

To overcome the above-mentioned weakness, an approach that takes into consideration both the number of income sources and the contribution of each source to total household income may be used. In this conceptualization, income diversification is understood as a process in which households increase not just the number of sources but also achieve a greater balance in terms of the relative share of the various income sources in their portfolio (Ellis 2000, Minot et al. 2006). This conceptualization is operationalized by using the following indices: the original Herfindahl index, the inverse Herfindahl index, and the Simpson index.¹ Although the underlying idea of this approach sounds useful, these two-dimensional indices are not able to reveal the type of diversification pursued by different households that have the same value of the indices or within a single household at different points in time. They are an inappropriate measure for any study in which understanding diversification into a given source, for example non-farm employment, is the central concern. Possibly, these disadvantages make the definition less preferred. Examples of research using this conceptualization include Ellis (2000), Joshi (2003) and Minot et al. (2006).

The third, and also the most widely used definition relates to non-farm employment. At the household-level, income diversification is defined as a process in which rural households increase their employment and income from the non-farm sector (Barrett and Reardon 2001, Barrett et al. 2001, Davis and Bezemer 2003, Ellis 2000, Lanjouw and Feder 2001). Regarding this, either the share of time spent on or the share of earnings from non-farm activities is used to highlight the importance of non-farm income in a household's livelihood. A number of papers have adopted this conceptualization including Ellis (2000), Escobal (2001), Abdulai and CroleRees (2001), van de Walle and Cratty (2004) and Minot et al. (2006).

A fourth definition of income diversification refers to commercialization. In the words of Minot et al. (2006: 5), "a less ambiguous term ... is

agricultural commercialization” and that “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 non-farm activities.” With this conceptualization, income diversification is referred to in terms of the level and change over time in the proportion of home produced agricultural product that is sold. This measure is useful as it provides a sense of the level of market integration and is an outcome of farmers’ production and sales decisions. However, it does not provide a complete portrait of income diversification in rural areas—where there are a number of households who are not farmers and whose earnings are solely from non-farm employment.

Finally, income diversification is used and defined by Minot et al. (2006: 6) as “the process of switching from low-value crop production to high-value crops, livestock, and non-farm activities”. The distinction between “high value” and “low value” is based on the net revenue per hectare or per day of labour from each of the activities undertaken by rural households. This criterion can be viewed as an extension of the use of “labour productivity” or “capital productivity”. The underlying argument for this approach is that “high value” options are more likely to be used by better-off than worse-off households, while the opposite pattern is expected for “low value” options.

2.2.3 Diversification motives and strategies

Having defined the various ways in which diversification may be measured, this section deals with the motives for diversification. With regard to this, there appear to be three main motives for diversification. By observing the observed diversification patterns, one can draw inferences about the motives that drive diversification at the household and community level.

Risk motivation

Risk refers to variance in an outcome, e.g., profits or income, of a production process. There are two channels that may lead to a link between risk and income diversity among households. First, if a household (predictably) confronts considerable risk or uncertainty in income, it may make a plan to reallocate productive resource across several uncorrelated risk activities (Dercon and Krishnan 1996, Start 2001). This is because expected income generated from a single activity is likely to be more

variable than from a range of different activities. In this case, a household has to face a trade-off between a lower total income and a higher level of security since some activities may fail to benefit from increasing marginal returns to scale (Ellis 2000, Barrett and Reardon 2001). Second, multiple income sources may result from a situation in which households are faced with shocks. A loss in its main income source may force households to allocate its resource to various activities to compensate for the loss and to smooth consumption (Ellis 2000, Barrett and Reardon 2001, Start 2001). At the same that risk may drive diversification it may also work towards inhibiting it. Households may fear the higher risk associated with a new activity and, for example, may limit off-farm self-employment and continue to work more intensively on on-farm production (van de Walle and Cratty 2004). This refers to prohibitive risks and indicates risk aversion among certain groups of households.

There are a number of authors who argue that risk is not the main motive for income diversification (Ellis 2000, Lanjouw and Feder 2001, Start 2001) and instead argue that increasing incomes is the prime force driving diversification. First, diversity in income sources is to take advantage of high-yielding farming systems, such as mixed cropping crops, or some combination of paddy-fish, and paddy-shrimp on the farm. Second, diversification is used as a way to take advantage of wage labour in periods of slack in agricultural production. Third, different household members with different skills/education levels are motivated to work in different labour markets and some individuals from the same household may earn money from work with a high wage rate whereas some others with lower ones. Given such arguments, households are obviously motivated to diversify for higher levels of total income accumulation rather than risk-lowering.

For these reasons, while risk does play a role in driving diversification, it is not viewed as a necessary condition for households to choose to diversify (Barrett and Reardon 2001: 4). It motivates but it also constrains diversification and as van de Walle and Cratty (2004: 248), note, 'households make decisions about diversifying into new economic activities based on a calculation of the expected costs and benefits of participation allowing for uninsured risk'. This means that to choose an activity to work, return is a necessary condition, and in fact, risk is already factored into that decision.

Poverty motivation

Poor households in developing countries are typically confronted with resource or market constraints. Poverty motivation for diversification relates to a situation in which these constraints prevent poor households from expanding any single income-generating activity up to a level that would be able to meet their basic needs (Dunn 1997, Ellis 2000, Barrett and Reardon 2001, Start 2001). For example, a household at a point in time may have identified a highly profitable primary activity but may not be able to expand due to insufficient investment resources. Since such constraints prevent expansion of the primary activity, the household cannot use its labour endowment. Subsequently, excess labour may be allocated to additional production or wage activity. Similarly, if expansion of the primary activity is prevented by geographical or other market access constraints, the household may allocate its underutilized resource to other income-earning opportunities (Dunn 1997, Lanjouw and Feder 2001). In such situations households are motivated to diversify as the total amount of income generated from all sources is likely to be greater than income earned by using all of its resources in a single income-generating option. This motivation is also termed “necessity” (Ellis 2000) or “push-distress diversification” (Davis and Bezemer 2003, Start 2001).

Economic expansion motivation

This motivation explains diversification as part of efforts made by households to expand their economic base. Under the expansion motivation for diversification, the household may open up its existing income-generating options or set up a new one by using wealth accumulated from their existing income sources, or underutilized or accessible resource outside the household. Such an expansion may reflect household’s response to new economic opportunities (Davies and Bezemer, 2003) or simply a desire to increase income. This motivation is sometimes considered as a “choice” (Ellis 2000) or “demand-pull diversification” (Davis and Bezemer 2003, Start 2001).

While both poverty and expansion motivation may lead to an increased income portfolio, they may be contrasted with each other in various ways, at both the household and the wider level. First, the attitude and purpose are different. Income diversification motivated by the former is ascribed to households who are eager to meet basic needs and to end difficulties while in the case of the latter it is motivated by a desire

for better economic standards. Second, there is a difference in the nature of the external stimulus that leads to diversification. People under the poverty motivation react to a constraint that prevents their expansion of the primary activity for sufficient basic needs; in contrast, the expansion motivation is the household's response to attractive opportunities, which provide employment or other options to diversify (Dunn 1997). The last difference, at the household level, is that push-distress diversification concentrates on the role of a household's current income in driving diversification while demand-pull diversification focuses on the role of future income streams in driving the process. At a wider level, diversification is ascribed to the poverty motive when there are market imperfections, there is poor physical infrastructure, underutilized employment, low resource endowment or a decreasing trend of a given primary income source. Conversely, diversification is ascribed to the expansionary motive in situations where conditions are the opposite to those prevailing in the case of the poverty motive (Davis and Bezemer 2003, Ellis 2000, Lanjouw and Feder 2001, Start 2001).

2.3 Data

As already introduced in the previous chapter, data used in this chapter are extracted from five rounds of LSMS conducted over the period 1993 to 2006. The data offer a cross-section and a panel element. Specifically, the findings in this chapter are based on 800, 830, 5,079, 1,488 and 1,473 rural households in the MRD drawn from the LSMS conducted in 1993, 1998, 2002, 2004 and 2006 respectively.

2.4 Methods

2.4.1 Operationalization of income diversification

In order to highlight the role of farm self-employment but also that of other sources, the income share—from the output side—and the share of hours worked (activity approach)—from the input side—across different sources are used to examine patterns of diversification in the specific context of the MRD. Income diversification is understood as a process by which rural households choose to increase their income share and the earning time spent from a source other than cropping production, for example non-farm wage employment. Additionally, the number of income sources and the proportion of agricultural output sold are also

used to shed light on the patterns of diversification. For reasons provided earlier, two-dimensional indices are not a useful choice and the unavailability of data precludes the use of the “high value” *versus* “low value” activity approach. In short, analyses of the temporal and cross-sectional patterns of income diversification among rural households in the MRD in this chapter is based on four types of indicators: share of income from various earning sources, share of working time spent on various activities, number of income sources and the proportion of agricultural output that is sold.

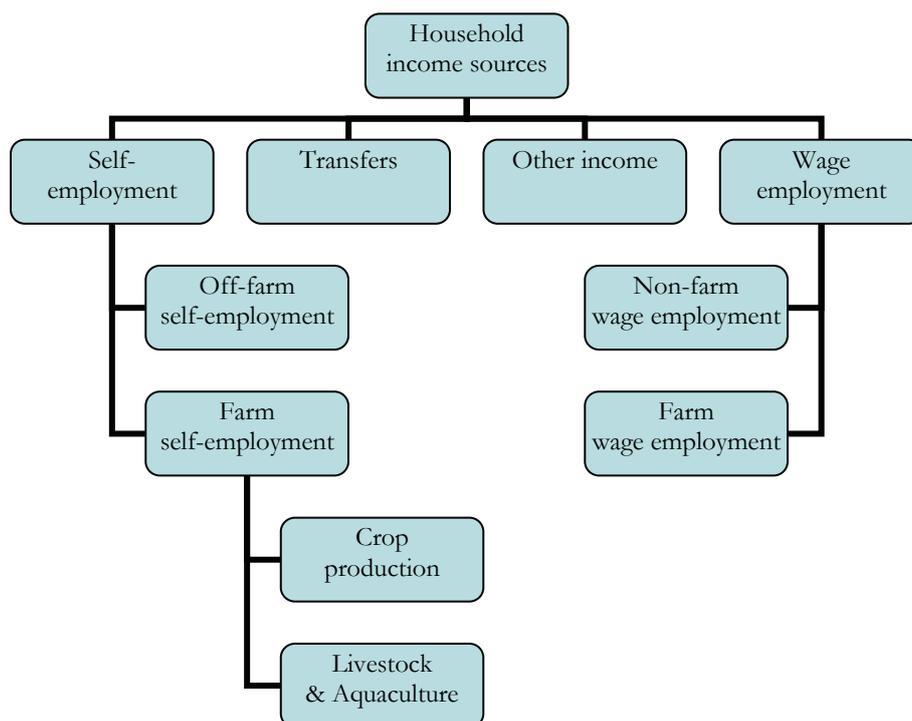
The analysis presented below relies on the household as the unit of analysis. To be more specific, a household is a unit comprising members who have shared lodging, income and expenditure for at least 6 months during the 12 months preceding the survey (GSO 2006c). Accordingly, analysis of income shares and time allocated to different activities is based on total household income and total household working time which are defined as the sum of income earned and the amount of working time spent on various activities by each household member over the past 12 months.

2.4.2 Classification of household income sources

As developed and displayed in Figure 2.1, each household in this study can obtain income from *two* types of employment, that is, self-employment and wage employment and through transfers and other income. Self-employment is further divided into farm self-employment and off-farm self-employment while wage employment is sub-grouped into farm wage employment and non-farm wage employment. There are two sources under the farm self-employment sub-category, namely crop production, and livestock and aquaculture. Overall, household income can be obtained from *seven* income sources.

Farm self-employment consists of crop, livestock, and aquaculture related activities which are carried out on “household-run farms”. Off-farm self-employment refers to self-employed activities other than those related to crops, livestock and aquaculture production that takes place away from household-run farms. Off-farm self-employment includes processing of any kind of goods for sale whose input materials can be either home-produced agricultural commodities or bought from markets. It also includes the provision of agricultural services which are provided on farms not run by the household.

Figure 2.1
Classification of household income sources



Farm wage employment refers to agricultural related activities (including aquaculture) which involve the supply of paid labour on farms other than those owned by household members. Non-farm wage employment encompasses a wide range of work for wages and covers employment in public administration, in large corporations, small manufacturing factories, those working in construction and transportation and professionals in various sciences, education and training.

Farm self-employment consists of crop, livestock, and aquaculture related activities which are carried out on “household-run farms”. Off-farm self-employment refers to self-employed activities other than those related to crops, livestock and aquaculture production that takes place away from household-run farms. Off-farm self-employment includes processing of any kind of goods for sale whose input materials can be

either home-produced agricultural commodities or bought from markets. It also includes the provision of agricultural services which are provided on farms not run by the household.

Farm wage employment refers to agricultural related activities (including aquaculture) which involve the supply of paid labour on farms other than those owned by household members. Non-farm wage employment encompasses a wide range of work for wages and covers employment in public administration, in large corporations, small manufacturing factories, those working in construction and transportation and professionals in various sciences, education and training.

Calculation of income

While it is relatively straightforward to compute income from activities such as farm wage employment, non-farm wage employment and transfers, in the case of crop production, livestock and aquaculture, and off-farm self-employment, the term “income” refers to the amount of net revenues from each activity.² The general formula for computing income from each of these three sources is in terms of subtracting total costs of production, excluding labour inputs by household members, from the total value of production. The total value of a production activity, in turn, consists of two components, that is, the value of sales and the value of home uses (food and animal feed). The exclusion of the costs of labour inputs by household members in assessing these three sources of income follows van de Walle’s (1998: 128) argument that this is “largely because of uncertainty about how to measure the opportunity cost of family labour.”

More specifically, crop income is defined as the sum of income from annual, perennial and forestry crops earned by a household over the past twelve months preceding the survey. It is a bit more complicated to assess the crop income for the LSMSs conducted in 1990s than for the LSMSs conducted in the 2000s. For the first two surveys, the share of crop income is computed on the basis of information recorded in two modules: agricultural production and expenditure. For each crop, the sale value, the value of crop by-products and the value of home consumption are available in the corresponding module. The value of home-produced agricultural crop that is used as input materials to produce goods for sale is calculated by multiplying the average price of that commodity being sold with the total quantity being used. Therefore, the total value of crop

production is obtained. Then, the total amount of all crop production costs that are paid for seeds, fertilizers, pesticides, land rental, hired labour, storage, and marketing, are deducted from the total value of sale and home uses of all crops to get the cropping income. For the survey conducted in the 2000s, these required pieces of information are directly available in the dataset.

The combined account of income from livestock and aquaculture is assessed as follows. For the LSMS 1993 and 1998, data about the sales value of animal, animal products (milk and eggs) and aquaculture are directly obtained from the datasets; the value of home consumption of meat from animals and animal products as well as that of aquatic products are found in the expenditure section of the questionnaire. In terms of costs, the purchases of young animals and the mixed costs of producing livestock and aquaculture are also available in the datasets. With these pieces of information, the combined income from livestock and aquaculture is computed in the same way as for crop income. For the LSMS conducted in the 2000s, the combined income from livestock and aquaculture is obtained by adding up the separate information available for each of these sources of income. The data for each of these sources of income contains information on home consumption and production costs and supports the computation of income earned from this source..

In the case of off-farm self-employment, income is the sum of all amounts earned by a household from all self-employed activities over the past twelve months. In the LSMS 1993 and 1998, data on the amount of money that the household retains after paying for hired labour and other business expenses as well as the value of home-consumed enterprise goods and home processing of home-produced crops are collected to estimate the net revenue from this activity. Data for computing the amount of net earnings from supplying agricultural services are also directly available. Subsequently, the total income from off-farm self-employment is reached. Although there is a difference in the questionnaire designed for LSMS 2000s compared with LSMS 1990s, the same way of computing is used to obtain income from this source.

Incomes earned from farm and non-farm wage employment are calculated in a similar manner. In the LSMSs, data collected in the employment section includes information on the industry in which each activity pursued by the household or household member is carried out, and this information is used to differentiate the total time allocated to and in-

come earned from agriculture and non-agricultural wage employment. In terms of calculation, each type of wage income is defined as the sum of annual earnings in wages and bonuses from the most time-consuming job (the main job) and the second most time-consuming job (the secondary job) over the past twelve months.

There is further information on income earned from jobs other than the primary and the secondary job but the breakdown of these jobs into different sectors is not available and income from such sources is categorized as “other income”.³

Transfers capture the total amount of all private transfers, which are remittances and value of in-kind presents from people who are not household members at the time of surveys, which all household members received over the past twelve months. These amounts are unrelated to sources such as funds or programs related to government poverty programs and NGO, private or international assistance, pensions, interests of savings and loans, lottery winnings, and rental income, which are, in turn, summed up in the “other income” account.

In the LSMS questionnaires, there is a separate section to directly collect information about the money received from the one-time sales of assets such as buildings, home productive assets, vehicles, gold, or jewellery. These amounts are windfall gains and are not included in the definition of income.

Total household income is obtained by summing up these various amounts and the income share from each source is obtained by dividing the amount of income earned from that source by the total household income for each of the seven sources.

Calculation of total household working time

On the input side, in principle we would like to have the share of hours worked in all seven corresponding sources of income. Unfortunately, such detailed information is not available and we can only divide the allocation of household labour time into four categories. These are farm self-employment, off-farm self-employment, farm wage employment, and non-farm wage employment. The first group consists of all crops, livestock and aquaculture production while the last three are similar in scope and definition to their income counterparts.

As mentioned above, the employment module in each LSMS provides information on hours worked in a main and secondary job for every in-

dividual in the household. Based on these data, the amount of earning hours spent in each of the four employment groups as well as the total amount of earning hours for each *household* is obtained. Subsequently, the share of time spent in each of the four types of employment activities is computed.⁴

Calculation of the ratio of agricultural commercialization

Agricultural commercialization refers to the proportion of agricultural output that is sold. This is defined in terms of the ratio of sales value to the total value of all agricultural output produced by a household in the last twelve months. Agricultural output includes crops, livestock and aquaculture production.

Analytical methods

This chapter relies on univariate and bivariate analysis to display cross-sectional and temporal patterns in income diversification at the household-level. To capture differences between the rich and the poor or, more broadly, across different levels of household welfare the chapter provides an account of overall diversification patterns and an analysis of patterns conditional on per-capita expenditure quintiles.

For both descriptive and analytical purposes, although income per capita may seem to be the most obvious candidate, expenditure is argued to be the best indicator in terms providing a more accurate picture of household welfare. Dollar and Glewwe (1998) point out that heavily indebted households with large amounts of current earned income may be thought of as having high living standard levels but their consumption may be low as a consequence of using income to pay for debts. Second, savings may allow households to enjoy high levels of consumption even if their current incomes experience a short-term decline.

Finally, it is necessary to take the time span of conducting these five rounds of LSMS in Vietnam into account. The LSMS 1993 starts in October 1992 and ends in September 1993. The LSMS 1998 began in November 1997 and continued till October 1998. The surveys 2002, 2004, and 2006 were also conducted over several months. To enhance comparisons, information on expenditure and income collected from households at different points of time needs to be adjusted to the same base. Therefore, expenditure in this chapter is measured in real terms and is

adjusted to January of each year (1993, 1998, 2002, 2004 and 2006) in which the data were collected.

2.5 Performance of income diversification in the MRD

2.5.1 Measures of diversity in the number of income sources

Table 2.1 displays the average number of income sources of rural households conditional on household per capita expenditure-based quintiles.

Table 2.1
Trends in income diversification, by the number of income sources

Quintiles	1993		1998		2002		2004		2006		2006/1993	
	Mean	SD.	Diff.	p-value								
Poorest	3.51	1.10	3.71	1.07	3.05	1.03	4.01	1.07	4.21	1.11	0.70	0.0000
Poorer	3.64	1.16	3.58	1.01	3.09	1.04	4.00	1.11	4.06	1.09	0.42	0.0002
Middle	3.68	1.12	3.58	0.89	2.99	1.00	3.89	1.11	4.01	1.04	0.33	0.0023
Richer	3.60	1.11	3.58	0.94	2.84	1.04	3.91	1.16	3.89	1.16	0.29	0.0092
Richest	3.60	1.05	3.49	1.05	2.65	1.03	3.53	1.07	3.73	1.15	0.13	0.2193
Overall	3.61	1.11	3.59	1.00	2.92	1.04	3.87	1.12	3.98	1.12	0.37	0.0000

Note: The number of observation is 800, 830, 5079, 1488, and 1473 respectively for the 1993, 1998, 2002, 2004 and 2006 sample.

Source: Author's calculation from the LSMS 1993, 1998, 2002, 2004 and 2006.

Table 2.1 shows that in 1993, an average household had 3.61 income sources in 1993, while the most diversified household had 7 sources of income. Over time, there is limited variation in the number of sources and between the end-points of the period under consideration (1993-2006), the size of increase in overall income sources is small (0.37), although statistically significant, indicating an increase in income diversification over the entire period.⁵

In terms of cross-sectional patterns, the level of income diversity does not appear to differ across expenditure quintiles in 1993. As seen in Table 2.1, the average number of income sources for households in the 'poorest quintile' is 3.51 and it is the highest for those in the 'middle quintile' (3.68). None of the variations in this measure of income diversification across the five quintiles is statistically significant. This indicates that the rich and the poor are not different in terms of the level of diversity in income sources in 1993. This cross-sectional pattern of diversity

remains unchanged in the 1998 sample. The lack of variation in this measure across expenditure quintiles in the MRD is different from the patterns for the country as a whole. According to Minot et al. (2006), in 1993 and in 1998, the pattern of diversity as measured by the number of income sources has an inverted U-shape indicating that households located in the middle quintiles have the largest number of sources of income while those at the ends of the distribution are not as diversified.

Beyond 1998, Table 2.1 shows a clear pattern of income diversity within individual cross-section samples. In 2002, 2004, and 2006, the average number of income sources is always the lowest for households in the 'richest quintile' while it is the highest for those in the first two quintiles indicating a higher level of income diversity amongst poorer households. The pattern of higher diversification amongst the poor provides support for the "push-distress diversification" strategy. The pattern observed in the MRD is different from patterns observed in other contexts. For example, in rural Zimbabwe in 1990/91 and 1995/96, richer households were more likely to rely on a larger number of income sources (Ersado 2006).

Across quintiles and across years, figures in the last column of Table 2.1 show another clear pattern of income diversification. Between 1993 and 2006, there is an increase in the number of income sources across expenditure quintiles but the increase is highest for the poorest households (0.7), slightly less for the 'middle quintile' (0.33) and for the 'richest quintile' there is no statistically significant increase in the number of income sources. The expansion of the number of income sources amongst poorer households suggests that diversification in Vietnam, at least on the basis of this measure, may be characterized as push-distress diversification.

2.5.2 Measure of diversity in income shares

Table 2.2 provides information on overall patterns and trends of income diversification pursued by all households while Table 2.3 shows detailed patterns and trends across expenditure groups within and over the period 1993-2006.

As shown in the first column of Table 2.2, in 1993, crop income is the most important source of household income accounting for 32.7 percent of total household income. Off-farm business and farm wage employment take the second and third place accounting for 20.4 percent

and 18.1 percent of household income, respectively. Aquaculture accounts for 12.2 percent of income while non-farm wages and transfers account for 7.2 and 3.4 percent respectively. The heavy reliance on crop production in particular and agricultural self-employed activities (crop, livestock and aquaculture production) in rural MRD is also found in a number of other developing countries.⁶

Five years later, the contribution of crop income to total income in the MRD is somewhat higher at 39.5 percent—an increase of about 7 percentage points. As discussed earlier, due to internal and external trade liberalization over this period, there was a sharp increase in prices of agricultural commodities, especially rice, and the higher share of income from crops may be attributed to these price increases. Whether these changes also induced an increase in time devoted to cultivation of crops or should be viewed as essentially a price effect requires an examination of time allocation patterns, which appears in the following sub-section. As far as other income sources are concerned, there is a reduction in the contribution of off-farm business and farm wage work while the share of other income sources remains about the same.

In 2002, the share of crop income returns to the 1993 level and it remains the largest source of household income. The main change in 2002 *versus* the previous years is the sharp increase in the income share of non-farm wage employment. As displayed in Table 2.2, the income share from this source goes up to 13.6 percent in 2002 from around seven percent in both 1993 and 1998. Given the fluctuating prices of agricultural commodities, it is not clear whether these changes represent direct price effects or real outcomes of household decision-making process based at least partially on relative price incentives or signals, or both.⁷ This needs to be complemented by looking at time allocation patterns, as discussed in the next section. Nonetheless, the increased income share from non-farm wages is probably driven by better access to non-farm wage earning options and the expansion of non-farm enterprises in the MRD and in the industrial zones of the Southeast region as a consequence of the unified Enterprise Law introduced in 2000.⁸

The expansion of the importance of non-crop sources of income continues in 2004. This expansion appears to be consistent with an increased level of diversity, measured by the number of income sources as already described in section 2.5.1. While crop income maintains its primacy its share drops to 27.9 percent, livestock and aquaculture, off-farm

business, and farm wages each provide 13-15 percent of total household income in 2004. Non-farm wage income remains stable at 13.8 percent. The main change in 2004 is the sharp increase in the share of income from transfers in total household income which records a contribution of 11.3 percent in 2004, as compared to a share of 2-4 percent in earlier years. Analysis of the sources of these transfers (see Appendix 2.2) shows that 95 percent of these transfers are internal and are remitted from urban to rural areas.

Table 2.2
Trends of income diversification, by income shares

Income source	1993		1998		2002		2004		2006		2006/1993	
	Mean	SD.	Diff.	p-value								
Crops	.327	.306	.395	.335	.324	.330	.279	.301	.259	.289	-.068	.0000
Livestock & Aquaculture	.122	.200	.118	.216	.148	.234	.139	.223	.136	.227	.014	.1290
Off-farm business	.204	.297	.169	.278	.164	.289	.145	.258	.153	.265	-.051	.0001
Farm wages	.181	.285	.133	.251	.154	.266	.127	.240	.109	.222	-.072	.0000
Non-farm wages	.072	.184	.069	.173	.136	.257	.138	.250	.161	.270	.089	.0000
Transfers	.034	.125	.037	.125	.020	.108	.113	.188	.123	.198	.089	.0000
Other	.060	.129	.079	.177	.054	.138	.058	.135	.058	.127	.002	.7214

Note: The number of observation is 800, 830, 5079, 1488, and 1473 respectively for the 1993, 1998, 2002, 2004 and 2006 sample.

Source: Author's calculation from the LSMS 1993, 1998, 2002, 2004 and 2006.

The sharp increase in the share of income from transfers in this year is remarkable. However, as discussed in chapter 1, in 1999 there was a change in internal migration restrictions which promoted an increase in migration from the rural areas of the MRD to urban areas and industrial zones of the Southeast. As discussed earlier, UNFPA (2007) estimates that in 2004, on average, migrants remitted between 10 to 17 percent of their income to their areas of origin. Accordingly, while it is a large jump as compared to the situation in 2002, the increase in the share of income from transfers in 2004 does not seem unreasonable.

In 2006, the pattern of income diversity observed in previous rounds tends to strengthen. The income share from crops and farm wages continues to decline, and they account for 25.9 percent and 10.9 percent of household income, respectively. In contrast, the contribution of income earned from non-farm wage employment increases to 16.1 percent of total income and by 2006 is higher than the share of off-farm business,

further asserting the importance of non-farm wage employment. The increase in the income share from transfers remains stable at the 2004 level suggesting that the spike in income from transfers was not a temporary effect.

Box 2.1

Who does Pangasius farming in That Not district?

The stability in income share that may be attributed to livestock and aquaculture is unexpected given the large profits that are possible from this activity. However, the capital required to set up such a business leads to entry barriers.

According to the head of a Farmers' Union in a district in the MRD: In recent years, That Not district in the MRD has seen the emergence of Pangasius fish farming. If successful, it helps people who are involved in it to become rich, or even very rich. However, about half of the recent Pangasius farms [in 2007] in the district are owned by joint-venture companies. A majority of the rest belong to local [provincial and district-level] authorities and rich people living in the urban central town of the district. Local residential households also do Pangasius farming but that is a minority and they must have enough capital to do it. That is because it [Pangasius farming] requires farmers to have enough financial capacity to provide feed every day over a 6 to 8 month period.

Source: Author's semi-structured interview 2007

Over the entire period 1993-2006, there are two major temporal trends in diversification, which were also reflected in the macro background on income diversification discussed in the previous chapter. First, there is a marked decline in the share of income from crops and farm wages. The share of these income sources declines from above 50 percent to about 37 percent. The decline is equally divided amongst these two sources of income. Second, there is a marked increase in the share of income from non-farm wages and from transfers. The share of other income sources such as off-farm business (at least between 1998 and 2006) and livestock and aquaculture remains relatively stable.⁹

Table 2.3 presents the distribution of income shares conditional on expenditure quintiles for the period 1993-2006. As seen in this table, in 1993, across quintiles, households in the poorest quintile derived the smallest share of their income from crops. The share of income attributed to crops increases across quintiles reaching a peak of 38.9 percent for the fourth quintile and falling to 28.6 percent for the richest. Essentially, the level of reliance on crop income source is a concave-quadratic function of PCE level. The lowest crop income shares for the poorest

can be best explained by their lower level of land holdings—for example, around 18 percent, 29 percent, and 36 percent of the poorest quintile of the rural population were landless in 1993, 1998 and in 2002 in the region (MDPA 2004). The lower share of income from this source amongst the richest households is probably due to their access to other earning opportunities such as off-farm business.

In 1993, the pattern of income shares across quintiles is quite clear in terms of the share of income from off-farm business and farm wage employment. The richest households draw the largest share of their income from off-farm business (30.7 percent). Households in the two poorest quintiles have the smallest share (roughly 15 percent) while households in other quintiles have shares that lie in between these two limits.^{10 11} In contrast, in terms of agricultural wages, the poorest households rely most heavily on this source of income (38 percent) while for the richest households agricultural wages contribute about 5.6 percent of their income (see Table 2.3). Indeed, the poorer the household the higher its share of income from farm wages. The share of income from other income sources does not appear to be very different across different quintiles in 1993. Having described the share of reliance on different income sources across expenditure quintiles in 1993, I now turn to changes between 1993 and 2006. Changes over time are provided in the bottom part of Table 2.3. The negative sign across all quintiles in crop income share between 1993 and 2006 indicates a movement away from this traditional income source among households across all quintiles. However, the level of movement away from this income source varies across quintiles. Households in the ‘poorest quintile’ reduce their reliance on crop income by 5.2 percentage points while those in the fourth quintile (richer) experience a reduction of 11.9 percentage points. The reduction among households in the ‘richest quintile’ (3.0 percentage points) is not statistically significant.

In term of reliance on farm wages there are clear patterns. As may be expected, given their greater reliance on farm wages in 1993, households in the poorest quintiles experience the largest drop in their reliance on farm wages as a source of income as compared to the richest. Indeed, the poorer the household the more it tends to move away from farm wages as an income source. As seen in Table 2.3, the average reduction is 10.4 percentage points for the poorest households while it is 3.6 percentage points for the richest households.

Table 2.3
Trends of income diversification, by income shares and expenditure quintiles

Year & expenditure quintiles	Crops		Livestock & aquaculture		Off-farm self-employment		Farm wages		Non-farm wages		Transfers		Other		
	Mean	SD.	Mean	SD.	Mean	SD.	Mean	SD.	Mean	SD.	Mean	SD.	Mean	SD.	
1993	Poorest	.240	.273	.116	.180	.154	.253	.380	.348	.044	.151	.029	.134	.037	.111
	Poorer	.347	.310	.105	.182	.147	.240	.230	.302	.092	.217	.026	.113	.053	.122
	Middle	.373	.297	.114	.169	.204	.289	.146	.249	.082	.196	.023	.080	.059	.126
	Richer	.389	.329	.135	.223	.209	.294	.091	.187	.067	.171	.039	.134	.070	.135
	Richest	.286	.291	.143	.236	.307	.366	.056	.166	.074	.175	.054	.148	.080	.144
1998	Poorest	.358	.327	.079	.164	.093	.186	.315	.336	.100	.212	.014	.057	.040	.086
	Poorer	.388	.333	.112	.207	.167	.274	.178	.279	.057	.150	.022	.089	.074	.150
	Middle	.426	.330	.120	.207	.173	.267	.106	.209	.070	.176	.021	.082	.084	.175
	Richer	.390	.330	.183	.289	.186	.290	.049	.135	.051	.142	.045	.129	.097	.212
	Richest	.415	.350	.096	.177	.228	.337	.014	.060	.066	.170	.081	.202	.100	.221
2002	Poorest	.250	.286	.168	.229	.095	.218	.333	.334	.104	.228	.006	.043	.044	.112
	Poorer	.313	.310	.135	.201	.131	.249	.214	.287	.134	.254	.012	.073	.060	.141
	Middle	.363	.334	.147	.228	.150	.270	.131	.230	.152	.270	.010	.079	.047	.121
	Richer	.372	.346	.139	.234	.195	.308	.081	.209	.143	.255	.019	.103	.051	.148
	Richest	.315	.351	.153	.271	.243	.352	.027	.117	.145	.271	.051	.180	.065	.159
2004	Poorest	.213	.272	.137	.194	.079	.185	.317	.321	.135	.255	.062	.109	.057	.141
	Poorer	.286	.293	.149	.225	.136	.244	.150	.229	.141	.258	.080	.147	.059	.134
	Middle	.316	.312	.143	.223	.160	.263	.107	.222	.130	.236	.096	.159	.048	.108
	Richer	.324	.309	.150	.234	.152	.258	.053	.164	.141	.241	.130	.190	.050	.108
	Richest	.255	.304	.119	.233	.198	.308	.011	.052	.145	.262	.194	.266	.078	.171

Table 2.3 (cont.)
Trends of income diversification...

Year & expenditure quintiles	Crops		Livestock & aquaculture		Off-farm self-employment		Farm wages		Non-farm wages		Transfers		Other	
	Mean	SD.	Mean	SD.	Mean	SD.	Mean	SD.	Mean	SD.	Mean	SD.	Mean	SD.
2006 Poorest	.188	.246	.148	.224	.083	.199	.276	.314	.158	.262	.086	.162	.060	.121
Poorer	.275	.289	.107	.166	.169	.270	.137	.222	.156	.273	.093	.138	.062	.130
Middle	.302	.307	.137	.230	.155	.275	.077	.178	.157	.265	.127	.187	.045	.101
Richer	.270	.296	.167	.264	.171	.269	.040	.126	.165	.281	.135	.217	.051	.126
Richest	.256	.291	.123	.235	.185	.286	.020	.103	.170	.269	.175	.250	.071	.151
Changes over 1993-2006														
	Diff.	p-value	Diff.	p-value	Diff.	p-value	Diff.	p-value	Diff.	p-value	Diff.	p-value	Diff.	p-value
Poorest	-.052	.0456	.032	.0982	-.071	.0023	-.104	.0018	.114	.0000	.057	.0001	.023	.0417
Poorer	-.099	.0010	.002	.9082	.022	.3725	-.093	.0007	.064	.0065	.067	.0000	.009	.4634
Middle	-.071	.0167	.023	.2247	-.049	.0800	-.069	.0021	.075	.0007	.104	.0000	-.014	.2272
Richer	-.119	.0002	.032	.1721	-.038	.1762	-.051	.0022	.098	.0000	.096	.0000	-.019	.1434
Richest	-.030	.2948	-.020	.3751	-.122	.0003	-.036	.0133	.096	.0000	.121	.0000	-.009	.5322

Note: At the bottom rows, figures listed under each "Diff." column represent the difference in the respective income share from sources between the corresponding groups of households between 1993 and 2006 while those under the "p-value" show the lowest probability below which the difference is statistically equal to zero.

Source: Author's calculation from the LSMS 1993, 1998, 2002, 2004 and 2006.

Over the same period, as shown in Table 2.3, while there is a clear decline in the role of off-farm business in contributing to household incomes there are variations across quintiles. Households in the two extremes of the consumption distribution tend to experience sharper declines (7.1 and 12.2 percentage points for the poorest and the richest respectively). The increasing trend of reliance on non-farm wages and transfers displayed for the entire sample is also present in every quintile. Between 1993 and 2006, households in the 'poorest quintile' experienced a 11.4 percentage point increase in the share of income from non-farm wages, the highest acceleration as compared to other quintiles.

Over this period, reliance on transfers as a source of income increases across all quintiles. From a 3 to 5 percent share in a household's income portfolio in 1993, transfers account for between 8.6 to 17.5 percent of household income in 2006. There are clear patterns across quintiles with the richest group experiencing the greatest increase in reliance on transfers (12.1 percentage points) while the poorest group experiences a more modest 5.7 percentage point increase. This pattern may be expected as according to GSO (2006) and UNFPA (2007) internal temporary migrants are more likely to come from non-poor households located in rural areas.

Overall, the patterns for the total sample show a decline in reliance on crop income and on farm employment as an income source and an increase in the share of non-farm wage employment and transfers as a source of income. Analysis of the patterns, conditional on expenditure, shows that the changes are not restricted to a particular quintile but occur across all quintiles. While the extent of the changes does differ, indeed all quintiles are less likely to rely on traditional income sources—crop income, farm wage activities, and off-farm business and are more likely to rely on non-farm wage activities and private transfers. The main point emerging from the quintile-specific analysis is that the patterns of change are not dominated by one quintile but are experienced by all quintiles. These patterns also suggest that while diversification may be driven by different motives (for the rich and the poor) the outcomes appear to be similar.

2.5.3 Measure of diversity in shares of earning time allocation

Changes in income shares are likely to be strongly affected by changes in prices of agricultural products and wage rates, and may reflect, in part,

price effects rather than changes in household decision-making with regard to allocation of labour (which are based at least partially on relative price incentives or signals). Therefore, this section uses the share of earning time devoted to various activities as a complimentary indicator of diversification. In other words, the trends of income diversification in this section focus on the input side while the trends discussed in the previous section focused on the output side. Earning time shares from various sources are displayed in Table 2.4 for the overall MRD and in Table 2.5 for each household expenditure group. In these tables, farm self-employment includes cropping, and livestock and aquaculture production—these activities are only separable on the output-side of the analysis. The other types of employment are based on the same classification as already provided in the case of income.

Table 2.4
Trends of income diversification, by household time allocation and expenditure quintiles

Source	1993 (N=795)		1998 (N=824)		2002 (N=5014)		2004 (N=1459)		2006 (N=1431)		2006/1993	
	Mean	SD.	Mean	SD.	Mean	SD.	Mean	SD.	Mean	SD.	Diff.	P-value
Farm self-employment	.619	.355	.597	.368	.487	.444	.478	.388	.459	.383	-.160	0.0000
Off-farm self-employment	.162	.275	.173	.285	.192	.340	.194	.319	.207	.327	.045	0.0006
Farm wage employment	.147	.251	.139	.249	.179	.332	.157	.282	.136	.260	-.011	0.3282
Non-farm wage employment	.073	.185	.090	.202	.142	.271	.171	.286	.198	.309	.125	0.0000

Source: Author's calculation from the LSMS 1993, 1998, 2002, 2004 and 2006.

Starting with 1993, on average each household in the MRD spent up to 61.9 percent of its time on farm self-employment activities. Off-farm self-employment accounted for 16.2 percent (which is similar to the country average of 15.0 percent (van de Walle and Cratty 2004: Appendix A1)), while farm wage employment accounted for 14.7 percent. In this initial year, non-farm wage employment accounted for the smallest proportion of earning time (7.3 percent). Thus, seven years after the launch of the master renovation plan, households in the MRD continued to spend about 76.6 percent of their time on agriculture related activities.

The rest of their time (23.4 percent) was supplied to two types of non-farm employment activities. The share of time spent on non-farm employment activities is substantially lower than the 43 percent time spent on these activities by rural households in other parts of Asia in the 1970s-1990s (Reardon et al. 1998: Table 11).

Despite initial reforms as well as consecutive agriculture-related reforms during 1993-98, notably changes in trade policy, in 1998 the allocation of time to different activities is not very different as compared to 1993. The limited changes in time allocation may be compared with the increase in the income share from crops (a major part of farm self-employed income source) observed in section 2.6.2. The increased income share from crops combined with the slight reduction in time allocated to farm self-employment supports the idea that the increased income share from this source may be attributed largely to price increases.

It is possible that the unchanged pattern of time-allocation between 1993 and 1998 was partly due to limited access to alternative earning options. However, by 2002, there seems to be a remarkable change. The share of farm self-employment drops to 48.7 percent—a 13.2 percentage point reduction as compared to 1993 and an increase in the time allocated to non-farm wage employment from 7.3 to 14.2 percentage points. While the time allocated to farm self-employment drops the income share remains at the 1993 level suggesting increased labour productivity. At the same time the increase in the allocation of time to non-farm wage employment highlights the increasing range of such opportunities in rural areas.

Two years later in 2004, the allocation of time across different types of employment is quite similar to the pattern observed in 2002. The share of farm self-employment remains at about 48 percent while the share of non-farm wage employment increases by three percentage points to 17.1 percent. With this increase, the time allocated to non-farm wage employment no longer occupies the smallest share of a household's time. In 2006, the pattern of change continues to strengthen with the share of time spent on farm self-employment declining to 45.9 percent, while the share of non-farm wage employment climbs to 19.8 percent (see Table 2.4).

The last column of Table 2.4 provides information about changes in the pattern of income diversification across employment types in rural MRD over the period 1993-2006. As shown in the table, there is a reduc-

tion of 16 percentage points in the share of time allocated to farm self-employment over this period, with the sharpest change occurring between 1998 and 2002. At the same time there is an increase in the share of hours devoted to non-farm wage employment (12.5 percentage points). Once again the sharpest changes take place between 1998 and 2002. The decline in the share of time allocated to farm self-employment is larger (16 percentage points) than the decline in the income share of these activities (about 5.4 percentage points) suggesting that over this period households have become more productive in terms of their self-employed agriculture-related activities. In contrast the share of farm wage employment in terms of time allocation remains stable while the returns from this activity (income share) decline (7.2 percentage points) suggesting limited increase in farm wages over this period. From a supply side perspective the increase in agricultural productivity may have allowed the release of labour for alternative purposes while the increase in the number of non-farming enterprises is likely to have increased the demand for rural labour.

An assessment of patterns of income diversity across expenditure quintiles and across types of employment is provided in Table 2.5. As shown in the table, starting with the 1993 figures, across quintiles, the time allocated to farm self-employment can be described as a quadratic function of the PCE level, with the lowest share (53.3 percent) for the poorest quintile, followed by the richest (57.9 percent) while other quintiles spend a larger proportion of their time on farm self-employment (63 to 71 percent). The share of farm wage employment is highest amongst the poorest (31.2 percent) and declines with increases in PCE and accounts for only 4.1 percent of the time of the richest households. Thus, in 1993, farming related activities account for 84.5 percent of the earning time of the poorest households and 62 percent of the earning time of the richest households. Off-farm self employment and non-farm wage employment account for 27.9 percent and 10.1 percent of the time allocated by richest households while the corresponding figures for the poorest are 11 and 4.5 percent respectively.

Table 2.5
Trends of income diversification, by household time allocation and expenditure quintiles

Year & expenditure category	Farm self-employment		Off-farm self-employment		Farm wage employment		Non-farm wage employment		
	Mean	SD.	Mean	SD.	Mean	SD.	Mean	SD.	
1993	Poorest	.533	.379	.110	.228	.312	.340	.045	.166
	Poorer	.630	.341	.107	.216	.188	.264	.075	.183
	Middle	.645	.337	.160	.260	.117	.216	.078	.190
	Richer	.708	.317	.153	.262	.074	.151	.065	.165
	Richest	.579	.374	.279	.354	.041	.120	.101	.212
1998	Poorest	.515	.375	.086	.171	.302	.320	.097	.205
	Poorer	.602	.362	.153	.258	.182	.273	.063	.154
	Middle	.621	.346	.183	.277	.119	.219	.077	.180
	Richer	.649	.355	.189	.293	.060	.160	.101	.222
	Richest	.599	.389	.260	.367	.027	.095	.114	.235
2002	Poorest	.406	.438	.112	.268	.364	.433	.118	.260
	Poorer	.478	.446	.158	.307	.219	.362	.145	.284
	Middle	.526	.442	.171	.320	.148	.302	.155	.284
	Richer	.526	.431	.217	.346	.109	.255	.148	.263
	Richest	.491	.454	.297	.411	.073	.183	.140	.262
2004	Poorest	.381	.355	.099	.232	.374	.370	.147	.267
	Poorer	.474	.369	.172	.300	.186	.270	.169	.289
	Middle	.505	.387	.215	.327	.126	.245	.153	.263
	Richer	.542	.389	.203	.314	.074	.207	.181	.282
	Richest	.489	.420	.285	.379	.021	.104	.205	.324
2006	Poorest	.381	.348	.108	.242	.323	.349	.188	.294
	Poorer	.423	.363	.219	.329	.170	.268	.188	.315
	Middle	.492	.384	.208	.329	.103	.218	.196	.307
	Richer	.509	.404	.241	.342	.058	.165	.192	.305
	Richest	.485	.395	.259	.356	.030	.130	.227	.321
Changes over 1993-2006									
		<i>Diff.</i>	<i>p-value</i>	<i>Diff.</i>	<i>p-value</i>	<i>Diff.</i>	<i>p-value</i>	<i>Diff.</i>	<i>p-value</i>
	Poorest	-.152	.0000	-.002	.9308	.011	.0000	.143	.0000
	Poorer	-.207	.0000	.112	.0000	-.018	.4930	.113	.0000
	Middle	-.153	.0000	.048	.0907	-.014	.5133	.140	.0000
	Richer	-.199	.0000	.088	.0025	-.016	.2994	.127	.0000
	Richest	-.094	.0139	-.020	.5719	-.011	.3727	.126	.0000

Source: Author's calculation from the LSMS 1993, 1998, 2002, 2004 and 2006.

Consistent with the changes for the total sample, the picture does not change much between 1993 and 1998. However, between 1998 and 2002 and after 2002 new patterns emerge and continue to strengthen. Focusing on the figures presented in the bottom panel of Table 2.5 we see that the changes noted for the overall sample are not restricted to a particular expenditure quintile. Rural households in all groups tend to spend a lower proportion of their earning time on farm self-employment and more on non-farm wage employment. For instance, the share of time allocated to non-farm wage employment increases between 11.3 and 14.3 percentage points across quintiles and the gaps across quintiles are less

pronounced in 2006 as compared to 1993. Similarly, the reduction in time spent on farm self-employment lies between 9 and 15 percentage points across quintiles. Thus, over time, it seems that regardless of whether the focus is on the time share or the income share indicators, households across all PCE quintiles move away from traditional occupations to non-farm wage employment. The similarity in diversification patterns across quintiles suggests a pattern of inclusive growth.

2.5.4 Agricultural commercialization as diversification

As discussed in 2.2.2, it is also of interest to examine agricultural commercialization as diversification in the MRD, which is conceptualized as an increase in the share of agricultural output that is sold. Table 2.6 provides information on the share of agricultural output that is sold among and across quintiles over time.

Table 2.6
Share of agricultural output that is sold, by expenditure quintile

Expenditure category	1993 (N=676)		1998 (N=684)		2002 (N=4044)		2004 (N=1195)		2006 (N=1166)		2006/1993	
	Mean	SD.	Mean	SD.	Mean	SD.	Mean	SD.	Mean	SD.	Diff.	P-value
Poorest	.560	.254	.658	.227	.745	.220	.744	.208	.730	.234	.170	.0000
Poorer	.594	.219	.681	.217	.794	.180	.771	.184	.792	.185	.198	.0000
Middle	.620	.244	.724	.206	.829	.161	.821	.153	.828	.156	.208	.0000
Richer	.683	.205	.772	.186	.843	.158	.833	.151	.857	.137	.174	.0000
Richest	.700	.219	.774	.192	.874	.149	.853	.170	.862	.171	.162	.0000
Overall	.634	.234	.724	.211	.818	.180	.804	.178	.814	.185	.199	.0000

Notes: The number of observation is 676, 684, 4,044, 1,195, and 1,166 respectively for the 1993, 1998, 2002, 2004 and 2006 sample. Households without any agricultural production are excluded.

Source: Author's calculation from the LSMS 1993, 1998, 2002, 2004 and 2006.

The overall share of agricultural output that is sold increases from 63.4 percent in 1993 to 81.4 percent in 2006. The change is uniform across quintiles with increases in the share of output sold of between 16 to 21 percentage points. It is likely that this rapid growth reflects an increased degree of market integration (increases in prices of agricultural produce) which may be a result of the implementation of economic reforms, notably trade liberalization policies during 1993-1998, under the renovation program in Vietnam as presented in section 2.3.1. Apart from sales, the remaining quantity of output produced is kept for home con-

sumption, mainly foods and animal feed. An increased rate of commercialization does not mean a reduction in the amount of home consumption. Instead of self-subsistence on home-produced outputs, households may prefer to buy processed foods, for example milled rice, for their consumption and cattle-feed for animal husbandry using the money received from selling home-produced commodities. The increase in the share of produce that is sold reflects a combination of an increase in productivity which allows sales of a greater proportion of output as well as an increase in the price of agricultural products. However, the main point here is that while diversification is occurring in terms of movement away from traditional sources of income, even within the traditional sources of income there is a movement away from traditional practices and a greater reliance on markets. This point is further supported by the case outlined in Box 2.2, which are the voices of a farming couple when discussing the situation of rice production and commercialization, and home uses of rice produced in their household as well as in their village.

Box 2.2

Rice production and commercialization

Male farmer: Today, selling rice output is very convenient, not very difficult as before. If we want to sell, the middleman immediately comes to our own house. Today, you know, they [the rice middleman] very often come to the rice field to buy and to pay the money and then take rice output away, even when the rice is not dry enough, right at our rice field. So, we don't have to spend time sun-drying, storing or incur other costs.

Female farmer: In terms of rice consumption at home, it is now very easy for us to buy milled rice from the surrounding market places where we can choose any kind of rice we prefer. We don't have to spend time and energy in taking, moving and waiting for paddy to be milled. Instead of doing that, we do other things at home or go out for other purposes.

Source: Author's semi-structured interview 2007

2.6 Concluding remarks

Based on five LSMSs conducted over a thirteen year period (1993 to 2006), this chapter examined patterns of income diversification in rural areas of the MRD.

While the chapter relied on a number of measures of diversification it paid special attention to assessing income diversification from the input side, in terms of time spent on different activities, and from the output

side, in term of income shares attributable to different sources. On the input side, the time spent on farm self-employment declined by 16 percentage points while time spent on non-farm wage employment rose by 12.5 percentage points. Time spent on other activities such as off-farm self-employment and farm-wage employment remained relatively stable. On the output side, the importance of income from crops, off-farm self-employment and farm wage employment declined by about 5 to 7 percentage points for each source while the share of non-farm wage employment and transfers increased by about 9 percentage points each.

In terms of quintile specific patterns, over the period 1993-2006, across all quintiles there is a sharp reduction in the time spent on farm self-employment (9.4 to 20.7 percentage points) and an increase in the share of time spent on non-farm wage employment (11.3 to 14.3 percentage points). While there are differences across quintiles, the patterns are broadly similar across expenditure groups and it does not seem that the increase in non-farm wage employment is restricted to particular groups of households. As may be expected given the changes in the activity-allocation pattern, over time, there is an increase in reliance on non-farm wage income by about 6.4 to 11.4 percentage points across quintiles. The interesting aspect is that while households in the poorest income quintiles still continue to rely heavily on agriculture related income (61.2 *versus* 39.9 percent for the richest quintile) they experience similar patterns of change in terms of a movement from relying on farm income to non-farm sources of income. While the factors that drive diversification is the subject of the next chapter, the similar patterns experienced across different quintiles suggests that the movement towards non-farm wage employment may be driven by policy changes that affect the entire economy and not just specific groups of households.

Notes

¹ For details on these indices see Barrett and Reardon (2001) for the Herfindahl index, Ellis (2000) for the inverse Herfindahl index, and Minot (2003) for the Simpson index.

² Production costs of livestock and aquaculture were combined in the questionnaire used in LSMS 1993 and 1998. Accordingly, income from these two sources is combined into one for 1993 and 1998. To enable comparisons across time, although information about livestock and aquaculture produce were collected

separately in later surveys, combined information is presented even for the survey years 2002, 2004 and 2006.

³ Except for the survey conducted in 2002, it is possible to make a distinction between earnings from a primary job, earnings from a secondary job and earnings from other jobs. In the case of the 2002 survey, information is restricted to earnings from a primary job and other jobs, including the secondary job are lumped together. Thus, for 2002 the earnings information is restricted to earnings from the primary job while earnings from other jobs including the secondary job appear as other income.

⁴ Time spent by household members on their most time-consuming and second most time-consuming job is used to calculate allocation of time across various activities except for 2002. In 2002, the data collected did not make a distinction between secondary jobs and other jobs and hence in 2002, total household working time is defined as the sum of working time spent by all household members allocated to each member's most time-consuming activity only.

⁵ While there is not much change in the number of sources of income between 1993 and 2006, the table shows a decline in number of income sources for all quintiles as well as for the whole sample in 2002. The reason for the dip in 2002 and the return to the 1993/1998 pattern in 2004 and 2006 is not clear.

⁶ For example, agricultural self-employed activities provided up to 61.5 percent of farm household incomes in Guangdong (China) in 1990. Similarly, such activities accounted for 53.2 percent of household income in Mindanao (Philippines) in 1985/86 (computed from Delgado and Siamwalla 1997: Table 2). Non-farm employment activities in the MRD account for 27.6 percent of rural household income. This is comparable to 32 percent in Asia, 35 percent in East-Asia between 1970s and 1990s (Reardon et al. 1998), 30 percent in Vietnam as a whole in 1993, and 33.8 percent in Guangdong in 1990 (Delgado and Siamwalla 1997).

⁷ The price of rice was lower in 2002 than in 1998. This as well as the fluctuating price of this commodity can be seen in Table 3.2 in the next chapter.

⁸ The increase in the non-farm wage employment share in total income leads to an increase in the share of non-farm income (off-farm business and non-farm wage employment) to 31.4 percent. For a comparison, this similar account was about 38 percent in selected villages in rural China in 2000 (Xiaoping 2007) and 50 percent of household income in rural China as a whole in 2001 (Janvry et al. 2005).

⁹ The empirical picture provided here is similar to the story in other synthesis studies, for example Carletto et al. (2007) and Reardon et al. (1998) which report the growing importance of non-farm employment over time, including non-farm wage employment, across developing and transition economies.

¹⁰ The difference in the share of income from off-farm business between the two poor groups is not supported by a t-test.

¹¹ These patterns are not uniform across countries. The situation in Vietnam is similar to the situation observed in Ecuador (1995), but different from the situation in Kenya (1975) and Pakistan (1989). Ethiopia (1990) and India (1999) display structures that are neutral across expenditure groups (Lanjouw 2006: Table 3.1).

3

Determinants of income diversification

3.1 Introduction

The analysis in Chapter 2 showed that, over time rural households are less likely to spend time and earn their income from farm self-employment and are more likely to rely on non-farm wage employment activities. While the previous chapter was concerned with examining trends over the period 1993 to 2006, this chapter seeks to identify the determinants of both cross-sectional and temporal income diversification among rural households in the MRD during the course of economic transition in Vietnam.

As mentioned earlier, the existing literature on income diversification in Vietnam provides a country-wide picture and is based on information gathered in the 1990s. For example, van de Walle and Cratty (2004) focus on the determinants of off-farm self-employment in rural Vietnam over the period 1993 and 1998, while Minot et al. (2006) rely on cross-section data sets gathered in 1993, 1998, and 2002. In contrast this paper uses data which covers a much longer period (1993 to 2006) and exploits the cross-section and the panel element of the data to examine factors that drive diversification.

Given the specific context of the MRD wherein farm self-employment is the traditional and primary income source while non-farm wage employment is a non-traditional source as well as the increasing movement into the latter, this chapter's analysis focuses on these two sources of income. To elaborate, as displayed in chapter 2, the two main trends which emerge from the preceding analysis are that there is a sharp decline in the share of time spent on farm self-employment from 61.9 to 45.9 percent and an increase in time spent on non-farm wage employment from 7.3 to 19.8 percent. The time spent on other activities such as off-farm self-employment and farm wage employment remains relatively

stable. Given these changes the analysis in this chapter focuses on time spent on farm self-employment and non-farm wage employment.

In terms of data, this chapter also relies on the five MRD samples used in the previous chapter. Each sample is independently assessed to understand determinants of cross-sectional income diversification while the first two samples 1993 and 1998 and the samples from 2002, 2004 and 2006 are used to create two distinct panel sets to examine temporal patterns. In addition to these data, additional information from other official sources collected by the Vietnam GSO is also used.

The rest of this chapter is organized as follows. Section 3.2 provides a conceptual framework. Model specification is outlined in section 3.3. Detailed information about the data used is in section 3.4. Sections 3.5 and 3.6 are respectively for discussions on determinants of cross-sectional and temporal income diversification. Section 3.7 contains concluding remarks.

3.2 Conceptual framework

The literature tends to define income diversification in terms of increasing participation of rural (farm) households in non-farming activities. Theoretically, the time-allocation of rural households to different activities draws on Chayanov's theory of the agricultural household as a producer and a consumer.

The common strength of these farm household models, especially the Barnum-Squire model (1979), is 'to provide a framework for generating predictions about the responses of the farm household to changes in domestic (household size and structure) and market (output prices, input prices, wage rates, and technology) variables' (Ellis 1993: 131, 2000). For income diversification, the household model conceptualizes time allocation to different activities as a function of the relative returns to labour time from non-farm *versus* on-farm income generating options. That is, given its endowments—land, labour and other production factors—the household will make decisions on whether more labour time should be allocated to farm production or shifted to non-farm wage or other self-employment activities by comparing the marginal return between these opportunities. On this basis, these models argue that factors that lead to higher on-farm returns, for example, increases in farm output price or in farm productivity, would tend to reduce the motivation to diversify. In contrast, (exogenous) changes that provide higher earnings opportunities

from non-farm self-employment or an increase in off-farm/non-farm wage rates are more likely to motivate a movement away from farm income sources (Ellis 2000).¹

While the agricultural household model sketched above with its focus on the role of relative prices and incentives in determining diversification is a useful starting point, it has been criticized. Ellis (2000: 57) argues that the farm household model is not “always very good at capturing inter-temporal dimensions of livelihoods strategies, nor at describing the circumstances of survival under stress.” Departing from a formal model, as discussed in chapter 2, he goes on to motivate diversification in terms of “demand-pull diversification” (for wealth accumulation objectives) *versus* “push-distress diversification” (to manage risk, cope with shock or to escape from declining farm income). The former strategy is mainly driven by “pull factors” while the latter is, conversely, motivated by “push factors” (see Barrett et al. 2001, Davis 2003, Davis and Bezemer 2003, Ellis 2000, Haggblade et al. 2002, Start 2001).

Recently, Reardon et al. (2007: 115-140) argue that the literature on determinants of income diversification which characterizes it in terms of pull and push factors also gives undue importance to the incentives underlying diversification and does not pay enough attention to household capacity variables. In Reardon’s approach, the household capacity variables, defined as capital assets, play a central role in determining the extent of diversification. According to this approach, the extent of participation in a certain activity (diversification strategy) is modeled as a function of variables capturing household available capacity and incentives to undertake that activity (diversification strategy). The household in this case is assumed to maximize earnings subject to constraints imposed by its limited resources and a desire to minimize risk (Reardon et al. 2007).

In this framework, there are two groups of variables that determine diversification—a set of variables falling under the category of household capacity and another in the category “incentives to diversify”. All variables under these two groups can be at both the meso-level and micro-level. The “incentives to diversify” group may be further divided into variables such as relative prices of inputs and outputs associated with farm and non-farm activities and variables which reflect the relative risk associated with farm and non-farm activity. In fact, these two sets of

“incentives” variables are similar to the two familiar and widely used terms: the “pull factors” and “push factors.”

In terms of the “pull factors”, many empirical studies (see, for example the comprehensive review by Reardon 1997 or Ellis 1998), have supported the influence of relative earnings opportunities across farm and non-farm work in driving and supporting diversification. Income gained from non-farm activities speeds up capital accumulation which in turn facilitates larger investments in agriculture, in the existing non-farm enterprise or provides the initial financial requirements for setting up a new activity. Reardon et al. (2007) point out the dynamic interactive process between earning options, sectors and income strategies (Reardon et al. 2007).

The “push factors” driving households towards non-farm activities may be triggered by circumstances with which a specific household, a group of households or even all households within the region are confronted. The push factors include both those that *push* households to undertake non-farm options as either “risk management strategies” (*ex ante* diversification) or “risk coping strategies” (*ex post* diversification) for the sake of income smoothing (Reardon et al. 2007). These relate to what is noted by Alderman and Paxson (1992) as “the fundamental bifurcation of strategies to deal with risk and cope with shocks” and are discussed in the literature (see Barrett et al. 2001, Davis 2003, Davis and Bezemer 2003, Ellis 2000, Haggblade et al. 2002, Start 2001). More specifically, the “push” factors leading rural households to diversify into non-farm employment are large variations in farm income which may be driven by weather conditions, rainfall fluctuations, drops in land productivity, and/or changes in policy and weaknesses in rural factor (credit, insurance) markets (Reardon et al. 2007).

The household capacity variables refer to various types of assets that enable households to engage in non-farm activities and include all forms of capital broadly defined as—human, physical, financial, and social capital. Under Reardon et al.’s (2007) framework as well as in the literature in general, capital implies not just private assets but also household accessibility to public assets. In other words, the category of capacity variables proposed as determinants of income diversification may be measured at different levels: micro-level (household- and/or individual-level) and meso-level (regional- or village-level).

At the meso-level, the infrastructure (communication, roads, transport) faced by a household/village is considered an important factor driving diversification. Better access to institutional and physical infrastructure may be expected to lower the cost of acquiring information, lower transport and transaction costs, and may enhance the potential returns from and the probability of involvement in non-farm activity (Barrett and Reardon 2001, Davis 2003, Ellis 2000, Lanjouw and Feder 2001, Reardon et al. 2007). At the same time, improvements in road and information accessibility may lead to higher agricultural incomes and may make farming more attractive and reduce movement towards non-farm activity (Reardon et al. 2007: 127). Previous empirical studies tend to use proximity to towns, access to roads, electricity and water to examine the effect of public infrastructure system on non-farm employment (see Barrett et al. 2001, Ellis 1998, Reardon et al. 2007). Alternative approaches use dummy variables indicating the residence of households (commune or region) to capture differences in capital. Examples of this approach are the studies by van de Walle and Cratty (2004) and Minot et al. (2006) for Vietnam.

Social capital is the second capacity variable and is typically measured at the meso and the micro-level (Reardon et al. 2007). Social capital is defined by Moser (1998) as ‘reciprocity within communities and between households based on trust deriving from social ties’ (Ellis 2000: 36). For a clearer vision of its role, social capital at the individual level is defined, according to Fafchamps and Minten (1998), as ‘the degree of interaction with others in the context of social networks, can enable economic agents to reduce transaction costs and partially address access constraints arising from imperfect markets’ (Davis 2003: 11). Social networks are extended to personal and family networks, formal and informal organizations. Social capital is clearly difficult to describe in other than broad qualitative terms (Ellis 2000). Very few studies have thus attempted to measure quantitatively the impact of social capital on household income level and diversification (Davis 2003, Reardon et al. 2007). Instead, qualitative variables or proxies, such as membership in organizations and “connections,” are used to identify the impact of social capital on diversification (Reardon et al. 2007).

The third, crucial, set of capacity variables refers to private goods at the micro-level, including human, physical and financial capital mainly possessed or accessed by the household. Human resources include the

quality of labour (education, experience, health) available to the household (Carney *et al.* 1999, Ellis 2000) and the quantity (Reardon *et al.* 2007). Both the quality and quantity of labour are necessary to meet the minimum requirements of any production process and hence will play a role in determining income diversification. As a key source of human capital, education has received a lot of attention as it is the most likely means through which individuals and households can access high return non-farm earning options. Findings from empirical studies in Nicaragua (Corral and Reardon 2001), India (Lanjouw and Shariff 2002) and Bangladesh (Hossain 2004) all show that less educated households (head) remain in low paid farm wage employment or are engaged in very low productivity non-farm options, while more educated households tend to earn more from non-farm skilled activities (Abdulai and Delgado 1999).

A number of authors (Reardon, 1997; Ellis, 1998) have examined the effect of the quantity of labour on non-farm participation. Typically, rural households with more workers tend to have a higher probability of engaging in non-farm activities. Households with a larger number of household members experience land scarcity and are unable to fully absorb household labour in traditional employment resulting in low or zero returns to a marginal worker. This provides the impetus to seek and participate in non-farm activities which may provide a higher return as compared to the low or zero level of return if they would remain in farm production. To examine the effects of household labour quantity on diversification, variables such as total number of workers in a household, the proportion of workers to the size of household, and household size are often used in empirical studies.

In terms of physical capital at the household level, landholding of rural households is a widely used measure. Landholdings may play an important role in diversification. First, the size of a household's landholdings is likely to be highly correlated with farm income and also provides access to credit. Larger landholdings may allow a household to pursue non-farm activities through earnings generated from the farm, through sale of land or through greater access to credit. At the same time, households with smaller landholdings and the landless may be pushed into non-farm activities due to limited access to land. Second, owning land may be a necessary requirement for joining some organizations, for example farmers' union, which increases social capital and, in turn, opens more options for households to diversify away farm income source. Ac-

cordingly, landholdings are most likely to be an important determinant of diversification into non-farm activities, but, its effect on diversification may be non-linear. Larger landholdings may offer access to capital and allow a household to generate resources to move away from farming but at the same time larger landholdings may also make farming a more attractive option. The empirical literature supports this idea as a larger amount of landholding increases the household capacity to diversify into non-cropping income sources (cotton, livestock and non-farm activities) in Southern Mali (see Abdulai and CroleRees 2001 for example) while it reduces the share of non-farm income in Vietnam (see Minot *et al.* 2006 for instance).

The final capacity variable refers to financial capital. This capital is conceptualized as stocks of money, mainly savings and borrowings, to which the household has access (Ellis 2000). However, missing or poorly functioning formal financial markets as are likely to occur in rural developing countries, for example in sub-Saharan Africa, makes it more likely that household savings are stored in other forms, such as livestock and gold.. For this reason, the value of livestock at hand or/and access to credit have been used as proxies to examine the role of financial capital as a potential determinant of income diversification (see Escobal 2001). Empirically, the effects of financial capital differ depending on the type of proxy used to capture this type of capital and across types of diversification. For example, using data from Peru, Escobal (2001) finds that higher values of livestock lower the level of income attributable to non-farm self-employment and non-farm wage employment while having access to credit supports movement towards self-employed activities but does not significantly change the income share from non-farm wage employment.

To conclude, this section has briefly reviewed the theoretical and empirical literature on determinants of income diversification into non-farm activity among rural households in developing countries. The empirical work that follows draws on this discussion and especially the classification of the determinants of diversification into household capacity variables and variables that influence the incentives to diversify to specify econometric models and subsequently to interpret the estimates.

3.3 Data

The data used for the analyses in this chapter is drawn from five rounds of the LSMS and integrated with information drawn from other official sources collected by the Vietnam GSO. Since, basic information about the LSMSs has already been provided in the previous chapter, the description in this section is restricted to providing additional information on the variables and sub-samples used in this chapter.

While all the LSMSs are designed to be representative at the national and regional level,² their sample sizes differ. The samples drawn from the MRD are quite different across the various survey years. The 1993 sample consists of 800 rural households randomly selected from 25 communes. The 1998 sample is similar in size and scope to the 1993 sample and includes 830 households drawn from 26 communes. The survey conducted in 2002 was much larger than the previous surveys and while it has fewer households from each commune it covers a much larger number of communes—5,079 households in 500 communes. The 2004 survey was much smaller than the preceding survey but resurveyed some households who had been included in 2002 and covers 1,488 households in 496 units. The last survey canvassed in 2006 includes 1,473 households living in 491 communes and also resurveyed some households who had been interviewed in 2002 and 2004.

These five cross-section data sets spanning a thirteen year period allow an assessment of cross-sectional patterns of the factors that determine household income from farm self-employment and non-farm wage employment. We also use these samples to construct two panel datasets. The first panel dataset [hereafter called panel I] is formed by combining information from the first two surveys 1993 and 1998 while the second [hereafter called panel II] is obtained by combining the last three surveys 2002, 2004 and 2006. Potentially, panel I consists of 1,600 observations, with 800 households from each survey while panel II contains 945 observations with 315 households drawn from each survey. However, due to missing or incomplete data for some of the variables and/or missing identifiers, the sample size reduces to 1,414 observations for panel I and 939 for panel II. Given the relatively small attrition rate it is unlikely that sample attrition plays a large role in terms of influencing the estimates.

3.4 Model specification and descriptive statistics

3.4.1 Model specification-dependent variable

Given the patterns presented in chapter 2, the empirical work focuses on the spatial and temporal determinants of farm self-employment and non-farm wage employment. Following the discussion in section 3.2, the potential determinants of these two sources of employment are divided into two main categories: (i) variables that reflect household capacity to undertake non-farm activity and (ii) variables that influence the incentive to diversify.

As discussed in the previous chapter, the most appropriate measures of diversification are either the shares of income earned from different sources or the time spent on different activities. Consistent with the conceptual framework sketched above where prices of commodities play an important role in determining household time-allocation decisions, the analysis here relies on time-based measure of diversification. Clearly, using an income-based measure is not reasonable as the income-based measures are a product of commodity prices and output produced.

Table 3.1
Statistics of time shares and proportion of households with zero time amount spent on a given source

Source	1993 sample		1998 sample		2002 sample		2004 sample		2006 sample	
	Mean	%								
Farm self-employment	.619 (.355)	9.8	.597 (.368)	12.3	.487 (.444)	34.5	.478 (.388)	18.2	.459 (.383)	18.5
Off-farm self-employment	.162 (.275)	62.1	.173 (.285)	61.5	.192 (.340)	7.8	.194 (.319)	67.3	.207 (.327)	64.6
Farm wage employment	.147 (.251)	56.6	.139 (.249)	6.3	.179 (.332)	72.5	.157 (.282)	67.0	.136 (.260)	68.7
Non-farm wage employment	.073 (.185)	78.4	.090 (.202)	74.9	.142 (.271)	74.0	.171 (.286)	67.6	.198 (.309)	64.6
N	795		824		5,014		1,459		1,431	

Note: The numbers in parentheses are standard deviations.

Accordingly, the share of time spent in specific sources of employment is used as the dependent variable in our econometric model. Table 3.1 provides information on the time spent by households in different activities and as displayed, over time the main changes are in the share of

time spent on farm self-employment and non-farm wage employment. In terms of estimation, since the share of time spent by households in each form of employment cannot be below zero or above one, a double-censored regression model, in particular a two-limit tobit model is used to analyze the determinants of time spent on farm employment and non-farm wage employment. Time spent on each activity is specified as below (for simplicity, indices for the i^{th} household and the j^{th} time share of each household in the sample are not included in the equation),

$$S^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + u$$

$$S = \begin{cases} 0 & \text{if } S^* \leq 0 \\ 1 & \text{if } S^* \geq 1 \\ S^* & \text{if } 0 < S^* < 1 \end{cases}$$

Here, X_1, X_2, \dots, X_n denote independent variables that have a bearing on time allocation. S^* is a latent variable indicating the desired share of time that a household would like to spend on each activity while S is the observed share of time worked by a household in a specific type of employment in question. The relationship between the observed and latent variable is provided above and u is an error term which is assumed to follow a standard normal distribution.

Since a tobit model is used, a decomposition approach suggested by McDonald and Moffitt (1980) may be used to obtain the marginal effects of the independent variables on the outcome. That is, a change in an independent variable has two effects—(i) it affects the conditional mean of S^* in the part of the distribution between 0 and 1 and (ii) it affects the probability that the observation will fall in that part of the distribution. Mathematically, these effects can be displayed as below (Greene 2003: 764-773)

$$\frac{\partial E[S | X]}{\partial X} = \text{Pr ob}[0 < S < 1] \frac{\partial E[S | X, 0 < S < 1]}{\partial X} + E[S | X, 0 < S < 1] \frac{\partial \text{Pr ob}[0 < S < 1]}{\partial X}$$

Or, in a more visible form,

$$\frac{\partial E[S | X]}{\partial X} = \beta \times \text{Pr ob}[0 < S^* < 1]$$

Table 3.2
Definition and statistics of independent variables in full MRD samples

Variables	1993 sample	1998 sample	2002 sample	2004 sample	2006 sample
HH characteristics					
Female head = 1	0.234 (0.423)	0.227 (0.419)	0.232 (0.422)	0.235 (0.424)	0.235 (0.424)
Ethnic minority group = 1	0.098 (0.297)	0.103 (0.304)	0.069 (0.253)	0.066 (0.245)	0.069 (0.254)
Household size	5.473 (2.242)	5.149 (1.953)	4.635 (1.809)	4.438 (1.707)	4.184 (1.685)
Household labour resource					
Number of male members	1.104 (0.742)	1.160 (0.724)	1.206 (0.768)	1.246 (0.801)	1.165 (0.745)
19-59 age group (A)					
Number of female members	1.174 (0.701)	1.204 (0.710)	1.186 (0.710)	1.150 (0.719)	1.120 (0.743)
19-54 age group (B)					
Number of members	0.549 (0.755)	0.604 (0.749)	0.493 (0.716)	0.451 (0.668)	0.419 (0.642)
15-18 age group					
Share of main LF (A+B):	0.202 (0.247)	0.216 (0.255)	0.201 (0.256)	0.192 (0.253)	0.185 (0.255)
males with primary educ.					
Share of main LF (A+B):	0.287 (0.282)	0.293 (0.277)	0.255 (0.268)	0.231 (0.254)	0.217 (0.251)
females with primary educ.					
Share of main LF (A+B):	0.154 (0.243)	0.148 (0.235)	0.162 (0.237)	0.172 (0.240)	0.173 (0.250)
males with secondary educ.					
Share of main LF (A+B):	0.104 (0.215)	0.107 (0.209)	0.134 (0.226)	0.131 (0.216)	0.133 (0.225)
females with secondary educ.					
Share of main LF (A+B):	0.059 (0.168)	0.061 (0.155)	0.076 (0.183)	0.091 (0.196)	0.092 (0.202)
males with tertiary educ.					
Share of main LF (A+B):	0.043 (0.154)	0.038 (0.145)	0.047 (0.150)	0.052 (0.156)	0.061 (0.167)
females with tertiary educ.					
Household non-labour capitals					
Farm size (hectare)	0.875 (1.005)	0.859 (1.012)	0.760 (1.127)	0.789 (1.057)	0.788 (1.164)
Amount of land with land-use rights certificate (ha)	0.811 (0.950)	0.847 (0.985)	0.641 (1.051)	0.740 (1.137)	0.762 (1.168)
Value of houses and other real estate (million VND) ^(a)	8.053 (13.05)	13.698 (17.43)	26.193 (40.58)	46.236 (84.52)	44.863 (57.78)
Number of current migrants	0.270 (0.703)	0.238 (0.633)	-	0.205 (0.572)	0.008 (0.100)
Communal/provincial level variables					
Access to paved road = 1 ^(b)	0.400 (0.490)	0.316 (0.465)	0.304 (0.460)	0.383 (0.486)	0.431 (0.495)
Own irrigation system = 1	-	-	-	0.631 (0.483)	0.658 (0.474)
Number of natural disasters in the commune	3.200 (1.939)	5.043 (5.903)	-	1.417 (1.126)	1.367 (1.197)
Price of paddy ('000 VND/kg)	1.013 (0.099)	2.005 (0.216)	1.976 (0.191)	2.067 (0.163)	2.559 (0.203)
N	800	830	5,079	1,488	1,473

Notes: ^(a) The value of houses and real estate is measured in real January 1993 prices.

^(b) It is a road for motor vehicles for 1993 while a road for cars for 1998, 2002, and 2006. LF stands for labour force.

3.4.2 Model specification-independent variables

Following section 3.2 time spent on different activities is modeled as a function of household capacity variables and variables that reflect the incentive to diversify. As far as the former are concerned, household labour capacity is captured by 9 variables. Three of them capture the quantity of labour, that is, the number of male members in the age group 19-59, number of female members in the age group 19-54 and the number of children aged 15 to 18. The first two variables include those individuals that are considered as part of the main labour force as is officially recognized by Vietnamese Labour Laws. The child group represents a supplementary source of labour. Statistics in Table 3.2 indicate that each rural household has less than three main workers and is gender balanced. In addition to the main labour force, there are 4-6 other members aged between 15 and 18 for every 10 rural households.

Several variables are used to capture the quality of the main labour force. Workers are first segmented by gender and further by four education attainment levels into eight sub-categories. These are men *versus* women without schooling, men *versus* women with primary education, men *versus* women with secondary education and male *versus* female with higher than secondary education (tertiary).³ Of the three educational categories, main workers with higher educational attainment account for the smallest proportion, 6-8 percent for males and 4-5 percent for females; the figures for secondary level education are 15-17 and 10-13 percent of the main labour force for men and women respectively; the figures for primary education are 19-22 and 22-29 for males and females, respectively. The descriptive statistics show evidence of labour quality improvement in rural MRD over 1993-2006; that is over time there is an increase in the proportion of males and females with secondary and higher levels of education and a decline in the proportion of individuals with only primary education.⁴

Farm size is used as a proxy for physical capital and access to financial capital. It is defined as the total amount of land that a household has for agricultural production including a household's own landholdings and land that has been rented in. On average, each household does farming on less than 0.9 hectare in 1993 and 1998 and about 0.8 hectare since 2002. Over time there is a moderate decline in farm size. It is possible that this decline provides a motivation, more particularly a push factor, which may drive households from farm self-employment to alternative

sources of employment. Thus, farm size may reflect not just a household's capacity to diversify but the decline over time may be viewed in terms of providing an incentive to diversify.

In addition to farm size, variables such as the size of the landholding with land-use right certificate and the value of a household's dwelling and other types of real estate are used to proxy household financial holding as well as access to credit. In Vietnam, an official land-use right certificate (recently, including house built on the land) is regarded as appropriate collateral to get loans from banks. In reality, households can use these types of assets to access both formal and informal credit markets. Therefore, households owning more land and real estate have the financial capital and the ability to access credit markets that may be needed in order to diversify. Figures in Table 3.2 show an increase in the average value of houses and other real estates over time. In terms of land-use certificates almost all households have these for their entire landholding.

Social capital is a difficult variable to operationalize. To capture the availability of access to new information and new ideas I use the number of current migrants per household.⁵ These are members of a household who have been away from the household for at least one month over the past twelve months preceding the survey. The average quantity of migrants is quite small and has a value of 0.27 in 1993 and 0.008 in 2006. Information on this variable was not collected in 2002. Attempts were also made to include variables such as individual's membership of the Vietnamese Communist Party in the specifications. Unfortunately, the number of households (individuals) having this honour is too few to create a variable.

I now turn to variables that capture the incentive to diversify. Theoretically, such incentives may be measured at the household-level or at a higher level of aggregation (commune-level). The variables included are commune access to paved road, commune access to irrigation systems and the number of natural disasters experienced in a commune. Access to physical infrastructure/roads is expected to lower transport and transaction costs and influence time-allocation decisions. Access to an irrigation system reduces reliance on rainfall and thereby reduces the risks associated with rain-fed agricultural production. An increase in the number of natural disasters experienced by a commune may provide an incentive to move away from vulnerable agricultural production.⁶

Since rice is the dominant agricultural product in the MRD, commune level rice prices are included as a measure of the incentive to diversify. Data on rice prices are collected from commune surveys for the years 1993 and 1998 and monthly statistics available from the Vietnamese GSO for the remaining years. The real prices displayed in Table 3.2 pertain to the January of each year and show a sharp increase between 1993 and 1998 and then a gentler increase between 2002 and 2006.

In addition to the variables discussed above, household characteristics such as household size, gender of household and ethnic group, are included in the empirical model. These variables are included to control for the role of household demographic and ethnic attributes in influencing time-allocation patterns.

Table 3.2 provides the definition and descriptive statistics of these variables.

3.5 Determinants of time-allocation patterns: cross-sectional analysis

Tables 3.3 to 3.7 display Tobit estimates of the time spent by a household on farm self-employment (column 1) and non-farm wage employment (column 3) over the five years 1993, 1998, 2002, 2004 and 2006, respectively.⁷ The marginal effects of each variable on the outcome are presented in columns 2 and 4.

3.5.1 Time-allocation in 1993

Beginning with household characteristics, we see in Table 3.3, that female-headed households and ethnic minority groups spend a smaller share of their time on farm self-employment as compared to male-headed households and those belonging to the majority group. The marginal effects are about 7.2 percentage points. The lower time allocation to farming is not surprising and is similar to other studies and probably reflects the lower landholdings of female headed households and ethnic minorities in rural MRD (UNDP 2004, World Bank 1999).

The quantity of household labour does not appear to have any bearing on the time spent on farm self-employment or non-farm wage employment. In sharp contrast, the quality of household labour resources is sharply associated with time-allocation patterns. Households with a greater share of females with the highest level of education (tertiary) are

far less likely to spend their time on farm self-employment and more likely to spend it on non-farm wage employment. The estimates indicate that a 10 percentage point increase in the share of the female labour force with highest education reduces time spent on farm activities by 2.2 percentage points and increases time spent on non-farm activities by 1.5 percentage points. For male workers with similar education levels there is no effect on farming activities but there is a clear impact on engaging in non-farm activities—a marginal effect of about 1.1 percentage points.

Several studies have found that household landholdings play a role in driving time allocation decisions. For instance, in rural China smaller per capita landholdings increase the probability of participation in non-farm activity (de Janvry et al. 2005). A similar finding is reported for many Latin American countries (Reardon et al. 2001). A negative association between landholdings and share of time spent in non-agricultural self-employment has also been previously reported in Vietnam (van de Walle and Cratty 2004). In the MRD, Table 3.3 indicates that there is a quadratic relationship between landholdings and time spent on farm self-employment. As farm size increases the share of time spent on farming activities increases up to a maximum of 5.4 hectares. Beyond this farm size there is a reduction of time spent in farming activities. Given that the average farm size is about one hectare, the main point here is that as in other studies, for most households larger landholdings lead to more time being spent on agricultural activities.⁸ The value of houses and the number of current migrants also play a role in determining time allocation patterns. The higher the value of houses and other real estate owned by a family the more likely it is to engage in non-farm wage employment. However, the marginal effect seems quite small. The larger the number of migrants the lower the share of time allocated to traditional farm production while the higher the share of time spent on non-farm wage employment. The greater share of time spent on non-farming activities by such households may be due to their greater information and awareness—a proxy for household social capital (through their “connectedness to social network”) or it may simply be a reflection of the employment activities in which current migrants are engaged. To examine the extent to which the simultaneous determination of migrant status and employment activities may influence the estimates a model excluding the variable was also estimated. For the most part exclusion of this variable has no effect on the rest of the estimates (see Appendix 3.1 and 3.2).

Table 3.3
Determinants of time-allocation patterns, 1993

Variables	Farm self-employment		Non-farm wage employment	
	Coef.	Effect	Coef.	Effect
Household characteristics				
Female head = 1	-.097*** (.033)	-.072*** (.025)	.004 (.065)	.001 (.013)
Ethnic minority = 1	-.097* (.051)	-.072* (.039)	-.114 (.117)	-.020 (.017)
Household size	-.034 (.032)	-.025 (.023)	.022 (.041)	.004 (.008)
Household size squared	.002 (.002)	.002 (.002)	-.001 (.003)	-.000 (.001)
Household labour resource				
Number of male members	-.011 (.026)	-.008 (.019)	.047 (.056)	.009 (.011)
19-59 age group (A)				
Number of female members	-.025 (.026)	-.018 (.019)	.067 (.044)	.013 (.009)
19-54 age group (B)				
Number of members	-.025 (.025)	-.018 (.019)	.039 (.042)	.008 (.008)
15-18 age group				
Share of main labour force (A+B):	.006 (.116)	.004 (.085)	.174 (.250)	.034 (.050)
males with primary education				
Share of main labour force (A+B):	-.020 (.084)	-.015 (.061)	.093 (.134)	.018 (.026)
females with primary education				
Share of main labour force (A+B):	.016 (.117)	.012 (.086)	.287 (.203)	.056 (.041)
males with secondary education				
Share of main labour force (A+B):	-.033 (.113)	-.024 (.082)	-.009 (.194)	-.002 (.038)
females with secondary education				
Share of main labour force (A+B):	-.026 (.134)	-.019 (.098)	.576*** (.157)	.112*** (.031)
males with tertiary education				
Share of main labour force (A+B):	-.302** (.113)	-.221** (.081)	.787*** (.176)	.153*** (.036)
females with tertiary education				
Household non-labour capitals				
Farm size (hectare)	.351*** (.061)	.257*** (.041)	-.123** (.058)	-.024* (.012)
Farm size squared	-.032*** (.011)	-.024*** (.008)	.008 (.007)	.002 (.001)
Value of houses and real estate (million VND)	-.000 (.001)	-.000 (.001)	.004*** (.001)	.001*** (.000)
Number of current migrants	-.085*** (.021)	-.062*** (.014)	.060* (.031)	.012* (.006)
Communal/provincial level variables				
Access to paved roads = 1	-.056 (.098)	-.041 (.071)	.093 (.079)	.019 (.016)
Number of natural disasters over previous years within commune	.013 (.017)	.010 (.012)	-.002 (.026)	-.000 (.005)
Unit price of paddy ('000 VND/kg)	.755 (.447)	.551 (.339)	-.426 (.327)	-.083 (.065)
Constant	-.132 (.478)		-.394 (.376)	
Number of PSUs		25		25
Number of observations		795		795
- Left-censored (at zero)		78		623
- Uncensored		528		165
- Right-censored (at one)		189		7
Pseudo R²		0.1780		0.1113
Log pseudolikelihood		-1,460,835.0		-969,766.8
Pr(0<S<1)		0.7302		0.1949

Note: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level.

For the most part, the communal/provincial level variables have limited effects on household time-allocation patterns.

3.5.2 Time-allocation in 1998

In 1998, female headed households and ethnic minorities are still less likely to work in agriculture (see Table 3.4). However, a clear change as compared to 1993 is that ethnic minority households appear to spend more time on non-farm wage activities (marginal effect of about 7 percentage points). Unlike 1993, household size begins to exert an influence on time allocation patterns and larger households are less likely to spend time on agricultural activities.

Similar to the household size effect, Table 3.4 also shows the emerging role of household labour quantity in determining activity patterns. According to the estimates, households with a larger number of male prime age workers are less likely to be self-employed in agriculture and more likely to allocate time to non-farm wage activities. The marginal effect of an additional male worker is a 3.4 percentage point increase in the time allocated to non-farm wage employment and a 5.4 percentage point reduction in the time share of farm self-employment.

At the same time, the role of the quality of household labour in determining activity patterns strengthens. We see that households where male and especially female workers have secondary or higher levels of education are increasingly likely to insert themselves in non-farming wage activities. As shown in Table 3.4, a 10 percentage point increase in the share of labour with secondary/tertiary education may be expected to increase time spent on non-farming wage activities by about 0.9 to 1.4 percentage points.

Table 3.4
Determinants of time-allocation patterns, 1998

Variables	Farm self-employment		Non-farm wage employment	
	Coef.	Effect	Coef.	Effect
Household characteristics				
Female head = 1	-.046 (.042)	-.034 (.032)	.066 (.051)	.015 (.013)
Ethnic minority = 1	-.261*** (.075)	-.198*** (.053)	.237*** (.070)	.066*** (.022)
Household size	-.106** (.043)	-.078** (.033)	.054 (.064)	.012 (.014)

Variables	Farm self-employment		Non-farm wage employment	
	Coef.	Effect	Coef.	Effect
Household size squared	.009*** (.003)	.007*** (.002)	-.007 (.005)	-.002 (.001)
Household labour resource				
Number of male members	-.073** (.034)	-.054** (.024)	.156*** (.044)	.034*** (.010)
Number of female members	-.059* (.033)	-.044* (.024)	.056 (.056)	.012 (.012)
Number of members	-.002 (.032)	-.002 (.024)	.048 (.036)	.011 (.008)
Share of main labour force (A+B):				
males with primary education	.076 (.113)	.056 (.082)	-.151 (.199)	-.033 (.044)
Share of main labour force (A+B):				
females with primary education	-.038 (.113)	-.028 (.084)	.130 (.187)	.029 (.041)
Share of main labour force (A+B):				
males with secondary education	.000 (.121)	.000 (.089)	.145 (.185)	.032 (.041)
Share of main labour force (A+B):				
females with secondary education	-.232** (.111)	-.172* (.085)	.345 (.208)	.076* (.044)
Share of main labour force (A+B):				
males with tertiary education	-.144 (.125)	-.107 (.094)	.418** (.201)	.092** (.044)
Share of main labour force (A+B):				
females with tertiary education	-.021 (.156)	-.016 (.116)	.647** (.233)	.143** (.052)
Household non-labour capitals				
Farm size (hectare)	.607*** (.085)	.449*** (.076)	-.285*** (.070)	-.063*** (.016)
Farm size squared	-.085*** (.016)	-.063*** (.013)	.040*** (.013)	.009*** (.003)
Value of houses and real estate (million VND)	.001 (.001)	.001 (.001)	-.002 (.001)	-.000 (.000)
Number of current migrants	-.128*** (.035)	-.095*** (.024)	.165*** (.037)	.037*** (.008)
Communal/provincial level variables				
Access to paved roads = 1	-.201* (.098)	-.151** (.071)	.245*** (.060)	.061*** (.013)
Number of natural disasters over previous years within commune	-.003 (.007)	-.003 (.005)	-.001 (.004)	-.000 (.001)
Unit price of paddy ('000 VND/kg)	.666* (.324)	.494* (.253)	-.138 (.232)	-.030 (.051)
Constant	-.345 (.652)		-.535 (.507)	
Number of PSUs		26		26
Number of observations		824		824
- <i>Left-censored (at zero)</i>		101		617
- <i>Uncensored</i>		504		200
- <i>Right-censored (at one)</i>		219		7
Pseudo R²		0.2729		0.1561
Log pseudolikelihood		-1,670,398.8		-1,197,964.6
Pr(0<S<1)		0.7406		0.2210

Note: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level.

Farm size and number of migrants have effects that are similar to the patterns observed in 1993. As in 1993, the proxy for access to financial capital has no bearing on engaging in agricultural activities.

As discussed earlier, due to trade reforms between 1993 and 1998, there was a sharp increase in rice prices. This is reflected in the descriptive statistics (Table 3.2) and shows that in 1998, as compared to 1993, there has been an increase in the level and variation of rice prices. Consistent with expectations, there is a statistically significant and positive association between the unit price of paddy and the share of time worked in farm self-employment. The estimates indicate that the time share of farm self-employment increases by 4.9 percentage points for a one unit increase in the price of paddy. Of the remaining communal/provincial level variables, households living in communes with access to better physical infrastructure spend a higher share of their time in non-farming wage activities (marginal effect is 6.1 percentage points). It is quite likely that the better physical infrastructure attracts non-farming enterprises and the link between increasing time spent on non-farm wage activities in communes with better infrastructure is probably a reflection of the demand for labour induced by the location of such enterprises.

3.5.3 Time-allocation in 2002

In 2002, household characteristics such as sex of head of household, ethnicity and household size display the same patterns as observed in 1998. The key difference in 2002 as compared to the earlier years is the role played by quantity and especially the quality of household labour in determining activity patterns. Four of the six labour-quality variables influence time allocation patterns—these are (i) males with secondary education level (ii) females with secondary education level (iii) males with tertiary education level and (iv) females with tertiary education level. Households with a greater proportion of any of these types of workers tend to allocate a greater proportion of their time to non-farm wage employment. Based on the marginal effects displayed in Table 3.5, a 10-percentage point increase in the proportion of workers with tertiary education leads to a reduction of time allocated to farming activities of between 2.6 to 3.3 percentage points and is mirrored by an increase in time allocated to non-farm wage employment of almost 2 percentage points. Beside quality, quantity of household labour resource, measured by the number of males and females in the 19-59 age group, and children in the 15-18 age group, is strongly associated with allocation of time to non-farming activities. A unit increase in household labour resources is associated with a 2 to 3 percentage point increase in time allocated to non-

farming activities. The sharp increase in the role played by the quantity and quality of labor resources in determining allocation of time to non-farming activities is in sharp contrast with the limited role played by these variables in 1993. In 1993, only the most educated workers could access non-farming opportunities, while over time it seems that workers with lower levels of education are able to access such opportunities and more importantly from the perspective of inclusive growth, households with additional labour resources regardless of level of education are also able to access non-farming opportunities. Other variables such as farm size, price of paddy and access to paved roads have effects that are similar to those observed in previous years.

Table 3.5
Determinants of time-allocation patterns, 2002

Variables	Farm self-employment		Non-farm wage employment	
	Coef.	Effect	Coef.	Effect
Household characteristics				
Female head = 1	-.105*	-.037*	.052	.011
	(.060)	(.021)	(.048)	(.011)
Ethnic minority = 1	-.234**	-.082**	-.130	-.026
	(.097)	(.034)	(.092)	(.017)
Household size	-.129**	-.045**	.011	.002
	(.060)	(.021)	(.047)	(.010)
Household size squared	.009*	.003*	-.002	-.001
	(.005)	(.002)	(.004)	(.001)
Household labour resource				
Number of male members	-.030	-.011	.151***	.033***
19-59 age group (A)	(.050)	(.018)	(.040)	(.009)
Number of female members	-.183***	-.065***	.096**	.021**
19-54 age group (B)	(.058)	(.021)	(.043)	(.009)
Number of members	-.092**	-.032**	.096***	.021***
15-18 age group	(.040)	(.014)	(.031)	(.007)
Share of main labour force (A+B):				
males with primary education	-.239	-.084	.215	.046
	(.141)	(.049)	(.149)	(.032)
Share of main labour force (A+B):				
females with primary education	-.023	-.008	.211	.046
	(.140)	(.049)	(.136)	(.029)
Share of main labour force (A+B):				
males with secondary education	-.154	-.054	.467***	.101***
	(.154)	(.054)	(.141)	(.030)
Share of main labour force (A+B):				
females with secondary education	-.034	-.012	.326**	.070**
	(.165)	(.058)	(.157)	(.034)
Share of main labour force (A+B):				
males with tertiary education	-.743***	-.261***	.842***	.182***
	(.201)	(.070)	(.160)	(.034)
Share of main labour force (A+B):				
females with tertiary education	-.939***	-.330***	.896***	.194***
	(.214)	(.074)	(.163)	(.035)
Household non-labour capitals				
Farm size (hectare)	1.264***	.445***	-.404***	-.087***
	(.082)	(.028)	(.042)	(.009)
Farm size squared	-.103***	-.036***	.032***	.007***
	(.015)	(.005)	(.005)	(.001)
Value of houses and real estate (million VND)	-.001	-.000	-.000	-.000
	(.001)	(.000)	(.000)	(.000)

Variables	Farm self-employment		Non-farm wage employment	
	Coef.	Effect	Coef.	Effect
Communal/provincial level variables				
Access to paved roads = 1	-.286*** (.068)	-.100*** (.023)	.146*** (.053)	.033*** (.012)
Unit price of paddy ('000 VND/kg)	.495*** (.163)	.174*** (.057)	.102 (.125)	.022 (.027)
Constant	-.191 (.360)		-1.226*** (.280)	
Number of PSUs		500		500
Number of observations		5,014		5,014
- <i>Left-censored (at zero)</i>		1,731		3,708
- <i>Uncensored</i>		1,370		1,143
- <i>Right-censored (at one)</i>		1,913		163
Pseudo R²		0.1779		0.0772
Log pseudolikelihood		-2,566,406.7		-1,774,140.3
Pr(0<S<1)		0.3517		0.2162

Note: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level.

3.5.4 Time-allocation in 2004 and 2006

The discussion of time allocation patterns for both these years is presented together as they are quite similar to each other and similar to the patterns observed in 2002. The stability of the patterns inspires confidence that the analysis is able to identify some of the key factors driving time-allocation patterns of households.

Table 3.6
Determinants of time-allocation patterns, 2004

Variables	Farm self-employment		Non-farm wage employment	
	Coef.	Effect	Coef.	Effect
Household characteristics				
Female head = 1	-.110*** (.033)	-.076*** (.023)	.114** (.054)	.036** (.018)
Ethnic minority = 1	-.099** (.050)	-.068** (.035)	.043 (.119)	.013 (.038)
Household size	-.041 (.041)	-.029 (.029)	.057 (.060)	.017 (.018)
Household size squared	.002 (.004)	.001 (.003)	-.005 (.005)	-.001 (.002)
Household labour resource				
Number of male members	-.031 (.025)	-.022 (.017)	.107*** (.038)	.032*** (.011)
19-59 age group (A)				
Number of female members	-.104*** (.030)	-.073*** (.021)	.074* (.045)	.022* (.013)
19-54 age group (B)				
Number of members	-.005 (.023)	-.003 (.016)	.035 (.038)	.010 (.011)
15-18 age group				
Share of main labour force (A+B): males with primary education	-.137 (.091)	-.095 (.063)	.083 (.165)	.025 (.049)

Variables	Farm self-employment		Non-farm wage employment	
	Coef.	Effect	Coef.	Effect
Share of main labour force (A+B): females with primary education	-.064 (.089)	-.045 (.062)	.028 (.145)	.008 (.043)
Share of main labour force (A+B): males with secondary education	-.177* (.095)	-.123* (.066)	.297* (.162)	.088* (.048)
Share of main labour force (A+B): females with secondary education	-.104 (.099)	-.072 (.069)	.159 (.156)	.047 (.046)
Share of main labour force (A+B): males with tertiary education	-.456*** (.103)	-.317*** (.072)	.858*** (.161)	.255*** (.048)
Share of main labour force (A+B): females with tertiary education	-.393*** (.129)	-.273*** (.090)	.758*** (.188)	.225*** (.055)
Household non-labour capitals				
Farm size (hectare)	.624*** (.048)	.434*** (.034)	-.375*** (.048)	-.111*** (.014)
Farm size squared	-.067*** (.012)	-.046*** (.009)	.037*** (.008)	.011*** (.002)
Value of houses and real estate (million VND)	-.000 (.000)	-.000 (.000)	-.000 (.000)	-.000 (.000)
Number of current migrants	-.034 (.026)	-.024 (.018)	.152*** (.036)	.045*** (.011)
Communal/provincial level variables				
Access to paved roads = 1	-.066** (.031)	-.046** (.022)	.038 (.048)	.011 (.015)
Own irrigation system = 1	-.013 (.033)	-.009 (.023)	.063 (.049)	.018 (.014)
Number of natural disasters over previous years within commune	.009 (.013)	.006 (.009)	-.002 (.020)	-.001 (.006)
Unit price of paddy ('000 VND/kg)	.006 (.097)	.004 (.068)	.238 (.147)	.071 (.044)
Constant	.633*** (.228)		-1.267*** (.351)	
Number of PSUs		496		496
Number of observations		1,459		1,459
- <i>Left-censored (at zero)</i>		265		987
- <i>Uncensored</i>		815		437
- <i>Right-censored (at one)</i>		379		35
Prob > F		0.0000		0.0000
Pseudo R ²		0.2352		0.1159
Log pseudolikelihood		-2,249,580.5		-1,935,643.7
Pr(0<S<1)		0.6962		0.2967

Note: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level.

As has been observed for all the other years, households belonging to ethnic minorities and female-headed households are less likely to be engaged in farming and more likely to seek non-farming opportunities. Households with a larger number of members are also more likely to be engaged in non-farming opportunities.

Table 3.7
Determinants of time-allocation patterns, 2006

Variables	Farm self-employment		Non-farm wage employment	
	Coef.	Effect	Coef.	Effect
Household characteristics				
Female head = 1	-.103*** (.036)	-.070*** (.024)	.087 (.053)	.029 (.018)
Ethnic minority = 1	-.035 (.060)	-.024 (.041)	-.020 (.109)	-.006 (.034)
Household size	-.093** (.041)	-.063** (.028)	.170*** (.060)	.054*** (.019)
Household size squared	.006 (.004)	.004 (.002)	-.014** (.005)	-.004** (.002)
Household labour resource				
Number of male members	-.066** (.029)	-.045** (.020)	.130*** (.049)	.041*** (.015)
19-59 age group (A)				
Number of female members	-.043 (.029)	-.029 (.020)	.128*** (.044)	.041*** (.014)
19-54 age group (B)				
Number of members	.022 (.023)	.015 (.016)	.041 (.038)	.013 (.012)
15-18 age group				
Share of main labour force (A+B):				
males with primary education	-.109 (.095)	-.074 (.065)	.256 (.168)	.082 (.054)
Share of main labour force (A+B):				
females with primary education	-.237*** (.089)	-.162*** (.060)	-.044 (.138)	-.014 (.044)
Share of main labour force (A+B):				
males with secondary education	-.107 (.093)	-.073 (.063)	.383** (.161)	.122** (.051)
Share of main labour force (A+B):				
females with secondary education	-.119 (.100)	-.081 (.068)	.092 (.145)	.029 (.046)
Share of main labour force (A+B):				
males with tertiary education	-.228** (.105)	-.156** (.072)	.842*** (.170)	.268*** (.054)
Share of main labour force (A+B):				
females with tertiary education	-.511*** (.121)	-.348*** (.082)	.760*** (.179)	.242*** (.057)
Household non-labour capitals				
Farm size (hectare)	.457*** (.053)	.311*** (.038)	-.360*** (.044)	-.115*** (.014)
Farm size squared	-.037*** (.012)	-.025*** (.008)	.026*** (.006)	.008*** (.002)
Value of houses and real estate (million VND)	.000 (.000)	.000 (.000)	-.000 (.000)	-.000 (.000)
Number of current migrants	.090 (.187)	.061 (.127)	.033 (.305)	.011 (.102)
Communal/provincial level variables				
Access to paved roads = 1	-.091*** (.033)	-.062*** (.023)	.053* (.050)	.017* (.016)
Own irrigation system = 1	-.004 (.035)	-.003 (.024)	.026 (.051)	.008 (.016)
Number of natural disasters over previous years within commune	.022 (.014)	.015 (.009)	.005 (.018)	.002 (.006)
Unit price of paddy (thousand VND/kg)	.051 (.081)	.035 (.055)	.164 (.119)	.052 (.038)
Constant	.644*** (.234)		-1.490*** (.344)	
Number of PSUs		496		496
Number of observations		1,431		1,431
- <i>Left-censored (at zero)</i>		264		925
- <i>Uncensored</i>		824		469
- <i>Right-censored (at one)</i>		343		37
Pseudo R²		0.1861		0.1186
Log pseudolikelihood		-2,403,652.0		-2,090,226.5
Pr(0<S<1)		0.6811		0.3187

Note: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level.

Although magnitudes differ, the effects of household labour resources both quantity and quality are clear and indicate that households with more labour resources, regardless of education levels, are more likely to engage in non-farm wage employment and over time the effects of these variables continue to strengthen (marginal effects of 2.2 to 3.2 percentage points in 2004 and about 4.1 percentage points in 2006). The effects of the labour quality variables remain qualitatively similar in both years but are slightly larger than the estimated effects in 2002. The estimates suggest that a 10 percentage point increase in the share of labour with tertiary education increases time spent on non-farming activities by about 2.2 to 2.7 percentage points.

The effect of farm size remains consistent across all specifications and shows that households with larger farms spend more time on farming activities. The effect of the number of current migrants, a proxy for social capital is also stable. Access to paved roads which may capture the overall effect of better access to physical infrastructure and attract enterprises increases the share of household time spent on non-farming employment by about 1.7 percentage points.

So far I have used five cross section samples from the MRD to examine factors that drive time allocation patterns. Broadly, while the factors that drive activity patterns are the same in the 1990s (1993 and 1998) they tend to differ from the patterns observed in the 2000s (2002, 2004 and 2006). The key change across time is the increasing importance of the variables capturing household labour quality. The descriptive statistics in Table 3.2 show that over time there is an increase in the proportion of workers with secondary and tertiary levels of education while at the same time there is an increase in the importance (magnitude) of these variables in shaping time-allocation patterns. Their increasing magnitude despite the increase in supply of educated workers suggests that the demand for educated workers in non-farming activities outstrips supply. At the same time between 1993 and 2006, households with more labour, regardless of their education also increase the share of their time spent in non-farming enterprises. This suggests that the demand for labour in non-farming activities is not confined to households with higher education levels.

3.6 Temporal income diversification

So far the paper has relied on cross-section data and spatial variation to identify factors that determine time-allocation patterns. As proposed in section 3.4, this section uses two panel datasets—namely, panel I (1993/98) and panel II (2002/04/06) to examine the dynamics of income diversification. While the cross-section analysis suggests that factors such as labour quantity and labour quality are associated with a reduction in time allocated to farming activities and an increase in time allocated to non-farming wage activities it is possible that households that acquire education also possess several unobserved attributes (ability, motivation, hard work, social connections) that allows them to access non-farming jobs as well as acquire more education. Thus, it is possible that the effect of household labour resources on accessing non-farming wage employment is not due to the resources that household possess but due to unobserved attributes that drive both household access to labour and time-allocated to non-farming wage activities. To control for such a possibility this section uses panel data to analyze the effect of changes in various factors on changes in time-allocation patterns. The availability of panel data makes it possible to control for unobserved attributes, such as a household's inherent ability and motivation, which are unlikely to change over time.

3.6.1 Descriptive statistics

Table 3.8 provides information on the time allocated to different types of employment for the panel sample of 707 households from Panel I and 305 households from Panel II. While the focus here is also on farm self-employment and non-farm wage employment the section begins by providing a brief comparison of the panel and cross-section samples.

Similar to the full sample, over the period 1993-1998 there is little change in mean time-allocation patterns. While there is a large change between 1998 and 2002, at least between 2002 and 2006 there is little change in terms of time allocated to farm self-employed activities (about 49 percent). Unlike the full sample, Panel II shows a somewhat greater decline in farm wage employment (reduction of about 8 percentage points as compared to about 4 for the full sample) and an increase in share of time spent on non-farm wage employment from 16.3 percent in 2002 up to 21.8 percent in 2006, which is comparable to the patterns seen in the full sample.

Table 3.8
Mean of earning time shares among households in panel data sets, by types of employment

	Farm self-employment		Off-farm self-employment		Farm wage employment		Non-farm wage employment	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
<i>Panel I (N = 1414)</i>	.614	.361	.163	.276	.143	.250	.080	.191
'93 sample (N = 707)	.628	.352	.155	.267	.145	.250	.072	.180
'98 sample (N = 707)	.600	.369	.171	.284	.141	.250	.088	.202
<i>Panel II (N = 915)</i>	.491	.436	.177	.327	.136	.302	.196	.316
'02 sample (N = 307)	.484	.440	.173	.323	.180	.332	.163	.290
'04 sample (N = 305)	.498	.435	.169	.322	.126	.302	.207	.323
'06 sample (N = 303)	.493	.436	.189	.336	.101	.262	.218	.334
	Diff.	p-value	Diff.	p-value	Diff.	p-value	Diff.	p-value
Changes over '93-'98	.027	.1550	.015	.2949	-.004	.7596	.016	.1154
Changes over '02-'06	.009	.8101	.017	.5335	-.079	.0011	.055	.0325

Note: SD stands for the standard deviation.

Descriptive statistics for the independent variables is provided in Tables 3.9 and 3.10. The discussion focuses on Panel II as there is little difference in the descriptive statistics in the case of Panel I. A comparison of Panel II figures with the statistics for the full sample shows that the two are quite similar. Also, over time there is little change in the means of most of the characteristics. A few noticeable changes are the declining share of workers with only primary education (a decline from 21 to 17 for males and a decline from 24 to 19 percent for females), and an increase in the proportion of households with higher levels of education. There is also an increase in the quality of physical infrastructure as reflected in the proportion of communes with access to paved roads. While the means of the various characteristics do not show much change they may hide substantial variation across households.

Table 3.9
Statistics of independent variables in the panel sample, 1993/98

Variables	1993	1998
Household characteristics		
Female head = 1	.233 (.423)	.256 (.437)
Ethnic minority = 1	.100 (.301)	.100 (.301)
Household size	5.55 (2.24)	5.19 (2.00)
Household labour resource		
Number of male members	1.117	1.150
19-59 age group (A)	(.743)	(.740)
Number of female members	1.187	1.209
19-54 age group (B)	(.699)	(.740)
Number of members	.569	.627
15-18 age group	(.762)	(.752)
Share of main labour force (A+B):	.204	.220
males with primary education	(.247)	(.260)
Share of main labour force (A+B):	.290	.292
females with primary education	(.278)	(.279)
Share of main labour force (A+B):	.154	.148
males with secondary education	(.243)	(.235)
Share of main labour force (A+B):	.101	.107
females with secondary education	(.214)	(.209)
Share of main labour force (A+B):	.058	.055
males with tertiary education	(.167)	(.148)
Share of main labour force (A+B):	.044	.039
females with tertiary education	(.155)	(.148)
Household non-labour capitals		
Farm size (hectare)	.912 (1.03)	.860 (.99)
Amount of land with land-use rights certificate (hectare)	.845 (.973)	.849 (.965)
Value of houses and real estate (million VND) ^(a)	8.522 (13.62)	13.772 (17.11)
Number of current migrants	.267 (.705)	.246 (.649)
Communal/provincial level variables		
Access to paved roads = 1 ^(b)	.409 (.492)	.332 (.471)
Number of natural disasters over previous years within commune	3.24 (1.95)	5.29 (6.31)
Unit price of paddy ('000 VND/kg) ^(c)	1.008 (.099)	1.235 (.091)
N	707	707

Notes: Figures in parentheses are the standard deviation of the mean.

^(a) The value of houses and real estate is measured in real January 1993 prices.

^(b) It is a road for motor vehicles for 1993 while a road for cars for 1998.

^(c) The price of paddy is measured in real January 1993 prices.

Table 3.10
Statistics of independent variables in the panel sample, 2002/04/06

Variables	2002	2004	2006
Household characteristics			
Female head = 1	0.208 (0.406)	0.217 (0.413)	0.214 (0.411)
Ethnic minority = 1	0.051 (0.221)	0.051 (0.221)	0.051 (0.221)
Household size	4.581 (1.792)	4.364 (1.719)	4.153 (1.649)
Household labour resource			
Number of male members	1.265 (0.736)	1.259 (0.760)	1.246 (0.780)
19-59 age group (A)			
Number of female members	1.163 (0.722)	1.083 (0.679)	1.070 (0.722)
19-54 age group (B)			
Number of members	0.482 (0.734)	0.447 (0.649)	0.364 (0.562)
15-18 age group (B)			
Share of main labour force (A+B):	0.212 (0.267)	0.215 (0.276)	0.171 (0.242)
males with primary education			
Share of main labour force (A+B):	0.241 (0.252)	0.198 (0.234)	0.188 (0.234)
females with primary education			
Share of main labour force (A+B):	0.169 (0.235)	0.159 (0.233)	0.169 (0.257)
males with secondary education			
Share of main labour force (A+B):	0.119 (0.214)	0.133 (0.220)	0.124 (0.221)
females with secondary education			
Share of main labour force (A+B):	0.099 (0.214)	0.107 (0.218)	0.126 (0.240)
males with tertiary education			
Share of main labour force (A+B):	0.054 (0.154)	0.059 (0.160)	0.067 (0.167)
females with tertiary education			
Farm size (hectare)	0.764 (1.096)	0.728 (0.934)	0.731 (0.951)
Amount of land	0.577 (0.900)	0.684 (0.940)	0.713 (0.960)
with land-use rights certificate (hectare)			
Value of houses and real estate (million VND) ^(a)	31.211 (49.01)	45.234 (67.65)	34.308 (37.64)
Number of current migrants	- -	0.220 (0.588)	0.006 (0.080)
Communal/provincial level variables			
Access to paved road = 1	0.339 (0.474)	0.383 (0.487)	0.511 (0.501)
Own irrigation system = 1	- -	0.623 (0.485)	0.623 (0.485)
Number of natural disasters in the commune	- -	1.387 (1.069)	1.262 (1.130)
Price of paddy ('000 VND/kg) ^(b)	1.973 (0.207)	1.837 (0.165)	2.212 (0.181)
N	313	313	313

Notes: Figures in parentheses are the standard deviation of the mean.
^(a) The value of houses and real estate is measured in real January 1993 prices.
^(b) The price of paddy is measured in real January 2002 prices.

3.6.2 Determinants of temporal income diversification

Tobit and OLS estimates, using both a random effects (RE) and a fixed effects (FE) specification are used to estimate the impact of various

characteristics on time-allocation patterns (see Tables 3.11A, 3.11B, 3.12A, 3.12B). For both panels the results are qualitatively similar, however, given the greater variation in Panel II, the discussion below focuses on Panel II estimates.

Table 3.11A
Determinants of the temporal income diversification, 1993/98
(Tobit model with random effects)

Variables	Farm self-employment		Non-farm wage employment	
	Coef.	Effect	Coef.	Effect
Household characteristics				
Female head = 1	-.066*	-.048*	.049	.011
	(.034)	(.025)	(.052)	(.012)
Ethnic minority = 1	-.083*	-.061	.074	.017
	(.050)	(.037)	(.078)	(.019)
Household size	-.065***	-.047***	.051	.011
	(.024)	(.018)	(.040)	(.008)
Household size squared	.005***	.004***	-.005*	-.001*
	(.002)	(.001)	(.003)	(.001)
Household labour resource				
Number of male members	-.041	-.030	.124***	.026***
	(.026)	(.019)	(.039)	(.008)
Number of female members	-.042*	-.030*	.024	.005
	(.025)	(.018)	(.038)	(.008)
Number of members	-.009	-.006	.051*	.011*
	(.017)	(.013)	(.028)	(.006)
Share of main labour force (A+B):				
males with primary education	.014	.010	.030	.006
	(.075)	(.054)	(.131)	(.027)
Share of main labour force (A+B):				
females with primary education	.003	.002	.143	.030
	(.062)	(.045)	(.108)	(.023)
Share of main labour force (A+B):				
males with secondary education	-.059	-.043	.243*	.051*
	(.078)	(.056)	(.130)	(.027)
Share of main labour force (A+B):				
females with secondary education	-.134*	-.097*	.264**	.055**
	(.079)	(.057)	(.129)	(.027)
Share of main labour force (A+B):				
males with tertiary education	-.087	-.063	.478***	.100***
	(.102)	(.074)	(.159)	(.033)
Share of main labour force (A+B):				
females with tertiary education	-.184*	-.133*	.801***	.167***
	(.103)	(.075)	(.152)	(.032)
Household non-labour capitals				
Farm size (hectare)	.346***	.251***	-.161***	-.034***
	(.025)	(.018)	(.037)	(.008)
Farm size squared	-.032***	-.023***	.015**	.003**
	(.004)	(.003)	(.006)	(.001)
Value of houses and real estate	-.000	-.000	.000	.000
(million VND)	(.001)	(.000)	(.001)	(.000)
Number of current migrants	-.092***	-.067***	.116***	.024***
	(.017)	(.012)	(.026)	(.005)
Communal/provincial level variables				
Access to paved roads = 1 ^(a)	-.078***	-.057***	.126***	.027***
	(.027)	(.020)	(.042)	(.010)
Number of natural disasters over	-.003	-.002	-.002	-.000
previous years within commune	(.002)	(.002)	(.004)	(.001)
Unit price of paddy (thousand VND/kg)	.542***	.393***	-.188	-.039
	(.124)	(.090)	(.199)	(.042)

Variables	Farm self-employment		Non-farm wage employment	
	Coef.	Effect	Coef.	Effect
Time dummy variable				
T = 1998	-.137*** (.034)	-.099*** (.025)	.089 (.058)	.019 (.012)
Constant	.284* (.152)		-.704*** (.251)	
Number of groups		704		704
Number of observations		1,403		1,403
- <i>Left-censored (at zero)</i>		146		1,079
- <i>Uncensored</i>		897		312
- <i>Right-censored (at one)</i>		360		12
Wald chi2(30)		326.09		129.53
Prob > chi2		0.0000		0.0000
Log likelihood		-909.6002		-622.6050
Pr(0<S<1)		0.7245		0.2090

Notes: * , ** , *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level.
(a) It is a road for motor vehicles for 1993 while a road for cars for 1998.

Table 3.11B
Determinants of the temporal income diversification, 1993/98
(OLS model with random and fixed effects)

Variables	Farm self-employment		Non-farm wage employment	
	RE.	FE.	RE.	FE.
Household characteristics				
Female head = 1	-.046** (.023)	.003 (.043)	.008 (.014)	-.047* (.028)
Ethnic minority = 1	-.048 (.034)	.000 (.000)	-.003 (.020)	.000 (.000)
Household size	-.048*** (.016)	-.036 (.023)	.008 (.010)	.020 (.015)
Household size squared	.004*** (.001)	.003* (.002)	-.001 (.001)	-.002* (.001)
Household labour resource				
Number of male members	-.023 (.017)	.000 (.023)	.032*** (.010)	.029** (.015)
Number of female members	-.024 (.017)	-.042* (.022)	-.005 (.010)	-.001 (.014)
Number of members	-.003 (.011)	-.012 (.014)	.006 (.007)	.006 (.009)
Share of main labour force (A+B):				
males with primary education	.019 (.050)	-.040 (.065)	-.011 (.030)	-.020 (.042)
Share of main labour force (A+B):				
females with primary education	.013 (.042)	.038 (.060)	.023 (.025)	.022 (.038)
Share of main labour force (A+B):				
males with secondary education	-.004 (.052)	-.113 (.071)	.026 (.031)	.045 (.045)
Share of main labour force (A+B):				
females with secondary education	-.083 (.053)	-.041 (.079)	.045 (.031)	.001 (.051)
Share of main labour force (A+B):				
males with tertiary education	-.048 (.068)	-.191* (.098)	.098** (.040)	.125** (.063)
Share of main labour force (A+B):				
females with tertiary education	-.127* (.069)	-.061 (.114)	.273*** (.041)	.016 (.073)

Variables	Farm self-employment		Non-farm wage employment	
	RE.	FE.	RE.	FE.
Household non-labour capitals				
Farm size (hectare)	.235*** (.016)	.078*** (.024)	-.045*** (.009)	-.025 (.016)
Farm size squared	-.022*** (.002)	-.004 (.003)	.004*** (.002)	.002 (.002)
Value of houses and real estate (million VND)	-.000 (.000)	-.001 (.001)	.000 (.000)	.000 (.000)
Number of current migrants	-.064*** (.012)	-.033** (.014)	.025*** (.007)	.022** (.009)
Communal/provincial level variables				
Access to paved roads = 1 ^(a)	-.058*** (.018)	-.008 (.023)	.034*** (.011)	.006 (.014)
Number of natural disasters over previous years within commune	-.002 (.002)	.000 (.000)	.000 (.001)	.000 (.000)
Unit price of paddy (thousand VND/kg)	.376*** (.082)	.215** (.092)	-.046 (.050)	-.017 (.059)
Time dummy variable				
T = 1998	-.101*** (.023)	-.061** (.025)	.023 (.014)	.013 (.016)
Constant	.334*** (.101)	.549*** (.122)	.054 (.061)	.012 (.079)
Number of observations	1,403	1,403	1,403	1,403
Number of groups	704	704	704	704
Wald chi2	403.44		169.42	
Prob>chi2	.0000		.0000	
F		2.52		2.08
Prob>F		0.0004		0.0045
R-squared	.3070	.0658	.1392	.0549
Hausman test-chi2		119.37		39.78
Prob>chi2		0.0000		0.0035

Notes: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level.
^(a) It is a road for motor vehicles for 1993 while a road for cars for 1998.

A look at tables 3.12A and 3.12B shows that regardless of whether one considers the tobit or OLS estimates, they appear to be delivering the same message. Given the relatively small sample size and the limited temporal variation in some of the characteristics it was difficult to obtain marginal effects based on a Tobit-FE model. Tobit-RE effects estimates are provided in Table 3.12A while fixed effects results are provided in Appendix 3.1. OLS RE and FE estimates are in Table 3.12B. While both sets of estimates are provided, a Hausman test supports the use of a fixed effects specification in the case of the determinants of farming and the use of a RE specification in the case of non-farming activities (see the bottom of the table). Since the two sets of estimates do not differ substantially, the discussion of results in this section is based on the OLS-FE estimates presented in Table 3.12B.⁹

Similar to the cross-sectional estimates the OLS-FE reveal that female-headed households are less likely to engage in farming activities. At the same time larger households and those with more workers, especially younger workers in the age range 15-18 are increasingly likely to spend time on non-farming activities. For instance, a unit increase in the number of household members in the 15-18 age group is associated with a reduction in farming activities of 5.2 percentage points and a corresponding increasing in non-farming wage employment of about 5 percentage points.

Table 3.12A
Determinants of the temporal income diversification, 2002/04/06
(Tobit model with random effects)

Variables	Farm self-employment		Non-farm wage employment	
	Coef.	Effect	Coef.	Effect
Household characteristics				
Female head = 1	-.275**	-.116**	.119	.032
	(.114)	(.047)	(.107)	(.030)
Ethnic minority = 1	-.368	-.153	-.284	-.063
	(.240)	(.097)	(.260)	(.047)
Household size	-.197**	-.083**	.072	.019
	(.098)	(.041)	(.086)	(.022)
Household size squared	.011	.005	-.002	-.000
	(.009)	(.004)	(.007)	(.002)
Household labour resource				
Number of male members	-.010	-.004	.111	.029
19-59 age group (A)	(.080)	(.034)	(.071)	(.018)
Number of female members	-.081	-.034	.069	.018
19-54 age group (B)	(.095)	(.040)	(.081)	(.021)
Number of members	-.099	-.042	.157***	.041***
15-18 age group (B)	(.063)	(.027)	(.060)	(.015)
Share of main labour force (A+B):	-.175	-.074	.112	.029
males with primary education	(.223)	(.094)	(.228)	(.059)
Share of main labour force (A+B):	-.291	-.122	.577**	.150**
females with primary education	(.253)	(.107)	(.251)	(.065)
Share of main labour force (A+B):	-.374	-.158	.471**	.122**
males with secondary education	(.241)	(.101)	(.238)	(.062)
Share of main labour force (A+B):	-.239	-.101	.394	.102
females with secondary education	(.260)	(.110)	(.251)	(.065)
Share of main labour force (A+B):	-.892***	-.376***	1.067***	.277***
males with tertiary education	(.267)	(.112)	(.257)	(.066)
Share of main labour force (A+B):	-1.145***	-.483***	1.446***	.376***
females with tertiary education	(.335)	(.140)	(.299)	(.078)
Household non-labour capitals				
Farm size (hectare)	1.263***	.532***	-.532***	-.138***
	(.109)	(.046)	(.098)	(.025)
Farm size squared	-.165***	-.070***	.062***	.016***
	(.019)	(.008)	(.019)	(.005)
Value of houses and real estate	-.001*	-.000*	.000	.000
(million VND)	(.000)	(.000)	(.000)	(.000)

Variables	Farm self-employment		Non-farm wage employment	
	Coef.	Effect	Coef.	Effect
Communal/provincial level variables				
Access to paved roads = 1	-.102 (.075)	-.043 (.032)	.059 (.069)	.015 (.018)
Own irrigation system = 1	.044 (.100)	.019 (.042)	-.097 (.100)	-.025 (.027)
Number of natural disasters over previous years within commune	-.071 (.046)	-.030 (.019)	.024 (.045)	.006 (.012)
Unit price of paddy (thousand VND/kg)	.144 (.224)	.061 (.095)	-.084 (.214)	-.022 (.056)
Time dummy variables				
T1 = 2004	.056 (.072)	.024 (.031)	.142** (.066)	.038** (.018)
T2 = 2006	.015 (.089)	.006 (.037)	.210** (.083)	.057** (.024)
Constant	.910* (.528)		-1.149** (.511)	
Number of groups		310		310
Number of observations		915		915
- <i>Left-censored (at zero)</i>		287		621
- <i>Uncensored</i>		283		252
- <i>Right-censored (at one)</i>		345		42
Wald chi2(22)		180.73		107.91
Prob > chi2		0.0000		0.0000
Log likelihood		-713.2647		-549.0334
Pr(0<S<1)		0.4217		0.2599

Note: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level.

Table 3.12B
Determinants of the temporal income diversification, 2002/04/06
(OLS model with random and fixed effects)

Variables	Farm self-employment		Non-farm wage employment	
	RE.	FE.	RE.	FE.
Household characteristics				
Female head = 1	-.097*** (.037)	-.008 (.072)	.032 (.031)	.004 (.060)
Ethnic minority = 1	-.126 (.077)	.000 (.000)	-.036 (.066)	.000 (.000)
Household size	-.072** (.030)	-.065* (.038)	-.003 (.025)	.012 (.031)
Household size squared	.005* (.003)	.003 (.003)	.002 (.002)	.000 (.003)
Household labour resource				
Number of male members	-.012 (.027)	-.043 (.034)	.037* (.022)	.039 (.028)
19-59 age group (A)				
Number of female members	-.027 (.030)	.007 (.039)	.004 (.025)	.013 (.032)
19-54 age group (B)				
Number of members	-.030 (.021)	-.052** (.026)	.024 (.017)	.050** (.022)
15-18 age group (B)				
Share of main labour force (A+B):				
males with primary education	-.065 (.072)	-.007 (.092)	.042 (.060)	.080 (.077)
Share of main labour force (A+B):				
females with primary education	-.099 (.080)	-.128 (.104)	.158** (.067)	.177** (.087)

Variables	Farm self-employment		Non-farm wage employment	
	RE.	FE.	RE.	FE.
Share of main labour force (A+B):				
males with secondary education	-.133*	-.170*	.100	.175**
females with secondary education	(.079)	(.101)	(.066)	(.085)
Share of main labour force (A+B):				
males with tertiary education	-.134	-.120	.103	.086
females with tertiary education	(.085)	(.108)	(.070)	(.090)
Share of main labour force (A+B):				
males with tertiary education	-.296***	-.232**	.248***	.224**
females with tertiary education	(.085)	(.114)	(.071)	(.095)
Share of main labour force (A+B):				
males with tertiary education	-.355***	-.305**	.486***	.553***
females with tertiary education	(.106)	(.142)	(.088)	(.118)
Household non-labour capitals				
Farm size (hectare)	.409***	.153***	-.130***	-.079*
Farm size squared	(.030)	(.049)	(.025)	(.041)
Value of houses and real estate (million VND)	-.054***	-.020***	.016***	.009
(million VND)	(.006)	(.008)	(.005)	(.006)
Value of houses and real estate (million VND)	-.000	-.000	.000	-.000
(million VND)	(.000)	(.000)	(.000)	(.000)
Communal/provincial level variables				
Access to paved roads = 1	-.018	-.001	.006	.007
(million VND)	(.025)	(.031)	(.021)	(.026)
Own irrigation system = 1	.026	.000	-.012	.000
(million VND)	(.033)	(.000)	(.029)	(.000)
Number of natural disasters over previous years within commune	-.022	.000	.007	.000
(million VND)	(.015)	(.000)	(.013)	(.000)
Unit price of paddy (thousand VND/kg)	.102	.067	-.041	-.041
(million VND)	(.075)	(.117)	(.063)	(.097)
Time dummy variables				
T1 = 2004	.021	.012	.042**	.045**
(million VND)	(.024)	(.027)	(.020)	(.022)
T2 = 2006	-.021	-.019	.065***	.071**
(million VND)	(.029)	(.037)	(.024)	(.031)
Constant	.529***	.681***	.083	-.018
(million VND)	(.173)	(.248)	(.145)	(.207)
Number of observations	915	915	915	915
Number of groups	310	310	310	310
Wald chi2	291.08		128.73	
Prob>chi2	.0000		.0000	
F		2.47		3.88
Prob>F		0.0005		0.0000
R-squared	.3840	.0741	.1487	.1117
Hausman test-chi2		75.81		9.68
Prob>chi2		0.0000		0.9605

Note: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level.

Consistent with the findings from the cross-sectional analyses, temporal income diversification, especially movement into non-farm wage employment, is strongly influenced by the quality of a household's main labour force. The estimates indicate that a 10 percentage point increase in the proportion of females (males) with tertiary education increases the share of time allocated to non-farming activities by more than 5 (2) percentage points while at the same time reducing farming activities by more than 3 (2) percentage points. Since this specification controls for unobserved attributes that do not change over time, the estimates sup-

port the idea that households with younger and more educated workers are driving the movement towards non-farming activities. The increasing supply of such workers interacting with increased job opportunities in this sector which in turn was likely to have been driven by various policy changes that supported the set up of such enterprises, seem to be the driving forces that move households away from agricultural related activities.

As has been seen over the various years, farm size continues to play a role in motivating time-allocation towards farming activities. The various meso-level variables such as price of paddy, number of natural disasters and access to infrastructure which capture the incentives to diversify appear to have limited effects on driving time-allocation patterns. It is likely that the incentive to diversify effect is captured by time dummies which indicate that over time in both 2004 and 2006 there is an increasing tendency to spend more time on non-farming activities. The year dummies reveal that in 2004, as compared to 2002, households spend an additional 4.5 percentage points of their time on non-farming wage employment while in 2006 this increases to 7.1 as compared to 2002. These estimates suggest that regardless of a household's labour, land and financial endowments, secular factors that influence all households (such as increasing labour market opportunities, changes in policy environment that make non-farming activities more attractive) are moving them towards non-farming activities.

3.7 Concluding remarks

This chapter used cross-section and panel data covering a thirteen year span to examine the factors that drive time-allocation patterns in rural parts of the MRD. The analysis was based on a framework that conceptualized diversification as a function of a household's capacity to diversify and incentives (both push and pull factors) to diversify.

The main points emerging from the analysis, regardless of whether one relies on the panel data estimates or on an assessment of the various cross-section estimates, is that income diversification is strongly influenced by household labour capacity. Both household labour quality and quantity play a substantial role in channeling households to non-farming wage activities. The panel data estimates suggest that the relationship between household labour capacity and increasing insertion in non-farming wage activities is not driven by unobserved time-invariant factors such as

household ability and motivation but is indeed driven by the higher labour capacity of households.

The steady increase in the importance of these capacity variables in driving time-allocation patterns despite the increase in the supply of educated labour suggests that over the period under scrutiny, labour demanded, across all education levels, by non-farming enterprises outstrips labour supply.

In terms of the other household capacity variables, the effect of farm size is much larger in terms of retaining households in traditional occupations as compared to pushing them towards non-farm wage employment. Other variables such as household access to financial capital do not play an important role.

While specific variables that were expected to capture the incentives to diversity such as rice prices, rural infrastructure, the risk of natural disasters do not seem to exert an effect on time-allocation patterns, the estimates shows that over time, regardless of household labour, land or financial capacity there is a secular tendency to move towards non-farming wage activities. This movement is probably driven by policy changes, in particular the enterprise law, which have led to the creation of a more conducive environment for setting up non-farming enterprises which affect all households equally.

Notes

¹ The supply-side response to an increase in prices of agricultural output discussed above is not a universal effect. For example, if there is an increase in rice prices then a surplus producer may not increase but decrease supply while a food deficit producer may be induced to increase supply. At the same time an increase in rice prices may reduce demand for rice (farmers as consumers) while triggering a supply response (farmers as producers). For a more complete discussion of farmer responses to changes in prices see Singh, Squire and Strauss (1986).

² For detailed information on sampling procedures, see World Bank (1994, updated 2000, 2001) for LSMS 1992/93 and 1997/98, and GSO (2004, 2006) for LSMS 2000s.

³ Criterion for education classification is the number of years individuals have spent in school. Accordingly, the primary, secondary and higher education level are ascribed to individuals who have spent 1-5, 6-10 and more than 10 years of schooling, respectively.

⁴ The proportion of household main labour force accounted for both males and females that have no education level attainment (zero-year of schooling) does not

appear to change over time (8 percent in 2002 and 7 percent in both years 2004 and 2006).

⁵ While current migrants are included as household members, permanent migrants are *not* considered household members. Over time there is a sharp drop in the number of current migrants. The reasons for this are not entirely clear. It may well be that better access to non-farm jobs worked towards reducing temporary migration. Furthermore, while it is possible that being a current migrant and working in non-farm wage employment are simultaneously determined there is by no means a one-for-one relationship between the two as current migrants are engaged in a range of farming and non-farming activities.

⁶ In 1993 and 1998, natural disasters are defined as the number of major disasters during the last 5 years preceding the survey while in 2004 and 2006 the time horizon is the last 3 years preceding the survey. Major disasters are droughts, typhoons, cyclones, and serious diseases.

⁷ Some surveys do not provide enough information and there are minor deviations from the proposed specification. The amount of landholding with the certificate of land-use rights is also excluded because of its high correlation (at least 80 percent) with the size of farms.

⁸ Statistical tests of farm size and its squared term support a quadratic relationship at, at least the 5 percent level for non-farm wage employment and at, at least the 1 percent for farm self-employment.

⁹ Due to the high correlation with farm size (87 percent) the amount of land with land-use rights certificate is not included in the specifications. Similarly, since information on the number of current migrants is not available for 2002 it is not included.

4

Household consumption, poverty, and income diversification

4.1 Introduction

The previous chapters examined time-allocation patterns and the factors that determine the allocation of household time to different activities. Broadly, this chapter focuses on the link between poverty and income diversification. The existing studies reveal a mixed picture of the link between diversification into non-farm activities and poverty (Ellis 2000, Lanjouw 2007). According to Lanjouw (2007), the association between a greater share of time allocated to non-farm activities and poverty levels is negative in some parts of the world while positive in others. For example, growth in the non-farm sector has been identified as a source of poverty reduction in China (de Janvry et al. 2005) while a higher share of non-farm income is associated with greater levels of poverty in Pakistan and Kenya (Lanjouw 2007). In Vietnam, based on an analysis of LSMS 1993 and 1998, van de Walle and Cratty (2004) conclude that the development of non-farm self-employment provides a route for moving out of poverty for some households but not for others. This chapter covers a longer time-period (1993 to 2006) and focuses on a one region of Vietnam to explore the links between poverty reduction and income diversification.

As discussed previously, over time households in the MRD have diversified their sources of income. In particular, there has been an increasing reliance on non-farm wage employment and between 1993 and 2006, the share of time spent on non-farm wage employment has almost tripled in this region, from 7.3 percent in 1993 to 19.8 percent in 2006. Whether the increasing share of time has also led to a reduction in poverty and increased household consumption is not known. This chapter is interested in identifying the effects of diversification on consumption and poverty.

We examine the relationship between consumption and diversification using two approaches—a direct and an indirect approach. In the direct approach we introduce a proxy for diversification (occupation of household head) in the poverty and consumption relationships and use cross-section and panel data to examine whether there is any link between diversification and consumption/poverty. However, it is likely that diversification and consumption are simultaneously determined and despite controlling for time-invariant unobserved attributes (through the use of panel data) it is possible that time-variant unobservables (shocks) play a role in influencing household consumption and time-allocation patterns. Given these concerns, the paper also adopts a reduced form or indirect approach to examine the relationship between diversification and consumption. Following van de Walle and Cratty (2004), I first identify factors that drive income diversification and then the factors that drive expenditure (or movement out of poverty) and based on an examination of these sets of estimates determine whether the same factors jointly determine both diversification and consumption (or escape out of poverty) and thereafter draw inferences on the link between diversification and consumption.

This chapter is organized as follows. Section 4.2 provides information on the overall picture of welfare and poverty in the rural MRD. Section 4.3 outlines the various empirical approaches used in the chapter. Section 4.4 presents empirical results on factors driving household expenditure and movement out of poverty in cross-section and panel-element samples. Section 4.5 provides a discussion of the relationship between diversification and expenditure and section 4.6 concludes the chapter and the thesis.

4.2 Expenditure, poverty, and inequality

This section uses data from five MRD samples 1993, 1998, 2002, 2004 and 2006 to describe trends in household per capita expenditure (PCE), poverty, and inequality. Total household expenditure is composed of (i) consumption expenditure on food and non-food (nondurable goods), (ii) value of home-product food consumed, (iii) value of goods in-kind received (such as food and housing) beside wages, (iv) estimated used value of durable goods owned by the household, and (v) rental value of the dwelling occupied by the household. Total household expenditure

and PCE both are measured at the January prices in each year of the study.

The poverty incidence (headcount ratio) used in the empirical analysis in this section and throughout this chapter is based on the formula proposed by James Foster, Joel Greer, and Erik Thorbecke (FGT) (Foster et al. 1984).¹ The chapter relies on general poverty lines defined by the Vietnam GSO to classify households into poor *versus* non-poor. These lines are derived from internationally accepted methodology and used by the GSO to estimate the poverty rate in association with LSMS datasets for Vietnam. A general poverty line refers to the level of expenditure needed to satisfy basic nutritional and other needs (2,100 calories plus some basic non-food items). Accordingly, the corresponding poverty line estimated for 1993, 1998, 2002, 2004, and 2006 is respectively 1,160, 1,790, 1,920, 2,100, and 2,400 thousand VND, measured in terms of real per capita expenditure per annum.²

Inequality in PCE is described by four measures: the expenditure gap between the richest and the poorest quintile, the Gini coefficient, the Theil T, and the Theil L.

4.2.1 Household expenditure per capita

Table 4.1 displays annual PCE conditional on selected household characteristics. The first point to note is the more than two fold increase in household per capita expenditure between 1993 and 2006. The PCE in 2006 is 2,929.1 thousand VND which is about 2.1 times higher than that in 1993. While there are variations across household groups and female headed households experience the lowest increase in expenditure (1.9 times), the notable aspect is that across all groups there is a almost a two-fold increase in expenditure.

In terms of ethnicity, while PCE in Kinh and Chinese households is 1.2 to 1.5 times higher than PCE in ethnic minority households, over time both sets of households experience similar increases in household per capita expenditure.³

As far as household size is concerned, it is well known that a lower average level of PCE is associated with larger household size (Deaton 1997). This is also visible in the case of rural MRD. As seen in Table 4.1, the PCE in small households (1-3 members) is 1.4-1.7 times higher than that in large households (more than 6 members) while that in the medium-sized households is somewhere in between small and large house-

holds. Nevertheless, individuals in large households appeared to experience the highest growth in PCE (2.4 times) between 1993 and 2006. Although this may be premature, if one considers the patterns discussed in the previous chapter where larger households (households with a greater quantity of labour) witnessed a greater re-allocation of time to non-farming wage enterprises, their greater than average increase in PCE should not be unexpected.

Table 4.1
Mean of PCE by selected characteristics, in thousand VND

Variables	1993	1998	2002	2004	2006	'06/'93
All	1,381.9	1,492.6	2,203.7	2,561.6	2,929.1	2.12
Ethnic group:						
Kinh & Chinese	1,428.6	1,520.2	2,260.8	2,594.6	3,003.2	2.10
Ethnic minorities	948.9	1,266.2	1,506.0	2,080.8	1,997.4	2.10
Household size:						
Small (<=3 members)	1,789.7	2,019.8	2,805.5	3,178.6	3,545.0	1.98
Medium (3-6 members)	1,415.0	1,569.8	2,237.6	2,535.2	2,811.6	1.99
Large (>=6 members)	1,066.0	1,230.5	1,752.0	2,130.3	2,598.4	2.44
Sex of head:						
Male	1,344.4	1,487.0	2,176.4	2,561.3	2,942.6	2.19
Female	1,504.6	1,518.1	2,312.6	2,562.8	2,874.4	1.91
Education of head:						
No schooling	1,138.3	1,320.5	1,797.7	2,136.4	2,272.6	2.00
Primary level	1,359.7	1,427.9	2,092.1	2,409.4	2,735.0	2.01
Secondary level	1,484.1	1,608.8	2,331.2	2,734.4	3,049.1	2.05
Tertiary level	1,585.8	1,984.6	3,287.9	3,496.6	4,219.4	2.66
Occupation of head:						
White-collar jobs	1,902.2	2,249.4	3,074.0	3,655.4	4,332.0	2.28
Sales/services	1,799.6	1,815.0	2,548.6	2,914.9	3,624.5	2.01
Farming work	1,326.9	1,436.0	2,066.2	2,430.5	2,813.2	2.12
Non-farm manual work	1,328.3	1,568.2	2,447.5	2,810.1	2,957.5	2.23
Not working	1,374.9	1,390.2	2,289.3	2,531.7	2,852.4	2.07
N	800	830	5,079	1,488	1,473	

Note: Consumption expenditure is measured in real January 1993 prices.

Source: Author's calculation from the LSMS 1993, 1998, 2002, 2004 and 2006.

In terms of educational patterns and consumption, as may be expected there is a positive association between education level of household head and PCE levels in every sample. Furthermore, though all education groups experience increases in PCE, the increase is highest for the group with the highest level of education (2.7 times). While this is not

surprising, the fact that even households where heads have no education or only primary education experience a double increase in consumption underscores the estimates presented in chapter 3, where regardless of education levels there was a movement away from farming to non-farming activities.

Occupation of household heads are divided into five categories—white-collar jobs, sales or services, non-farm manual work, agricultural work, and joblessness. Of these, the first three fall in the category of non-farming occupations. Across different occupational categories we see that households headed by an individual who has a white-collar (non-farming) job experienced the highest increase in PCE (2.3 times), followed by households headed by individuals in non-farm manual jobs (2.2 times). A closer look at the patterns shows that this advantage becomes discernible in recent years (2004 and 2006). Noticeably, PCE in households where heads were involved in farming—the traditional occupation in the region—experience consumption gains which are comparable to the sample average.

The main point emerging from this table in relation to the concern of this chapter is that between 1993 and 2006, while the PCE for each household group increases sharply, the growth in PCE for households headed by non-farm manual workers is higher than the average for the sample and indeed in the same range as that experienced by households headed by white-collar workers and higher than that experienced by households headed by individuals engaged in farming. This pattern of increasing growth in PCE for non-farming households begins emerging in 1998 and by 2006 their PCEs are higher than that of farming households.

4.2.2 Poverty reduction

The proportion of poor households conditional on selected household characteristics is displayed in Table 4.2 for the period 1993-2006. The first row of this table shows that rural MRD experienced a great decline in poverty over this 13-year period. The head count measure of poverty declined from 48.5 percent in 1993 to 15.3 percent in 2006. Poverty reduction was especially sharp in the period 1998 to 2006 (reduction in poverty of 26.7 percentage points). Between 1993 and 1998 the change in poverty incidence was a relatively modest decline of 6.6 percentage points. This is low as compared to the more recent period but also as

compared to poverty reduction in the rest of the country over this same period (see Justino and Litchfield 2003, for example).

The rest of Table 4.2 describes poverty distribution and reduction across groups of households with different socioeconomic attributes. Levels and changes in the poverty headcount rates vary significantly across ethnic groups. In the rural MRD, ethnic Chinese households accounts for less than one and a half percent of the population and are grouped with the majority (Kinh) and constitute about 90 percent of the population. While both majority and minority groups have experienced a reduction in poverty, it is clear that the majority were more likely to exit poverty as compared to the minority. As shown in the table, the change in poverty incidence was 71.3 percent for the former while it was 43.6 percent for the latter. Within the minority groups, the Khmer dominate and are 'the most economically and socially disadvantaged' group and their poverty is often characterized by either limited land to produce or limited capacity to access better and stable jobs (MDPA 2004).

Consistent with the figures in Table 4.1 and previous studies there is a strong positive relation between education and poverty reduction (see Glewwe et al. 2002, van de Walle and Cratty 2004, for example). This is clear from the consistent pattern across samples where the rate of poverty reduction is higher amongst households headed by individuals with higher education. For example, the headcount poverty index decreases from 62.6 in 1993 to 26.6 amongst households headed by an individuals with no schooling (a decline of 57.5 percent) while the poverty index declines from 30.4 to below five for households headed by those with the highest education level (a decline of 83.7 percent). While it is clear that households with better-educated heads have experienced larger gains as compared to other households, the sharp poverty reduction experienced even amongst those households who have far lower education level/no education is remarkable.

Poverty distribution and reduction also vary across households conditional on individual head's occupation. In Table 4.2, the proportion of poor households is frequently lowest in the group of households headed by someone who is either a white-collar worker or a sales/service worker (declining from 26-29 percent in 1993 to about 4-6 percent in 2006). However, these two types of households constitute a small share of the population and in the case of sales/service workers, a declining proportion of the population. The sharpest reduction in poverty emanates from

households headed by individuals who are manual workers in the non-farm sector. This occupation had the highest rate of poverty incidence in 1993 (57.4 percent) which drops sharply to 10.2 percent in 2006, that is an 82.3 percent reduction in poverty over a 13-year period. At the same time the share of the rural population headed by households working in this sector expanded by about three times (6.8 to 20.6 percent). The sharp decline in poverty associated with working in this sector while at the same time the increase in individuals involved in this occupation suggests that demand for workers in such occupations may have outstripped supply during the period under study. While not unimpressive, the share of poor farming households drops from 50.5 percent in 1993 to 18 percent in 2006, a decline of about 64.4 percent. Finally, people who lived in households headed by someone who did not work—for reasons such as illness, retirement, and doing housework, also experienced a reduction in poverty over the period.

These figures, and in particular the reduction in poverty amongst those households engaged in non-farm manual work points at the link between increasing engagement in such work and increases in consumption and consequently reductions in poverty. The sharper decline in poverty experienced by this group combined with the increasing share of non-farm manual work suggests that the returns to such activities are higher than returns from farm work and that the opportunities produced by such enterprises are not restricted to highly educated workers.

Table 4.2
Changes in poverty incidence by household characteristics in rural MRD

Variable	(a) Poverty incidence (P), %						(b) Change in poverty incidence, %						(c) Rural MRD population share, %							
	1993	1998	2002	2004	2006	2006	'93-'98	'98-'02	'02-'06	'93-'06	1993	1998	2002	2004	2006	100.00	100.00	100.00	100.00	100.00
All	48.50	41.95	26.60	18.76	15.25	15.25	-13.50	-36.60	-42.68	-68.56	90.25	89.15	92.42	93.58	92.64	100.00	100.00	100.00	100.00	100.00
Ethnic group:																				
Kinh & Chinese	45.71	39.71	24.18	17.40	13.13	13.13	-13.12	-39.10	-45.72	-71.28	90.25	89.15	92.42	93.58	92.64					
Ethnic minorities	74.36	60.38	56.10	38.65	41.92	41.92	-18.81	-7.08	-25.28	-43.63	9.75	10.85	7.58	6.42	7.36					
Household size:																				
Small (<=3 members)	33.33	14.83	11.85	10.93	8.99	8.99	-55.50	-20.11	-24.13	-73.03	18.75	9.05	14.13	15.60	20.24					
Medium (3-6 members)	44.07	35.90	24.38	18.24	15.93	15.93	-18.54	-32.08	-34.65	-63.84	51.63	56.20	62.36	66.12	65.20					
Large (>=6 members)	65.82	58.81	41.35	27.33	20.87	20.87	-10.65	-29.70	-49.52	-68.29	29.63	34.75	23.51	18.28	14.55					
Sex of head:																				
Male	49.10	42.64	26.97	18.16	14.14	14.14	-13.15	-36.75	-47.58	-71.21	76.63	82.03	80.01	80.13	80.21					
Female	46.52	38.80	25.11	21.21	19.74	19.74	-16.60	-35.29	-21.40	-57.58	23.38	17.97	19.99	19.87	19.79					
Education of head:																				
No schooling	62.59	56.26	40.06	36.81	26.60	26.60	-10.11	-28.79	-33.60	-57.50	17.38	12.10	12.85	11.67	11.27					
Primary level	50.45	43.14	28.74	20.66	17.41	17.41	-14.49	-33.38	-39.41	-65.48	55.75	60.95	56.48	55.42	52.08					
Secondary level	37.11	37.33	20.96	10.45	10.31	10.31	0.59	-43.85	-50.79	-72.20	19.88	19.18	22.72	22.80	25.45					
Tertiary level	30.36	23.07	5.75	6.27	4.95	4.95	-24.01	-75.08	-13.83	-83.68	7.00	7.78	7.95	10.11	11.20					

Table 4.2 (cont.)
Changes in poverty incidence by household characteristics in rural MRD

Variable	^(a) Poverty incidence (P), %					^(b) Change in poverty incidence, %					^(c) Rural MRD population share, %				
	1993	1998	2002	2004	2006	'93-'98	'98-'02	'02-'06	'93-'06	1993	1998	2002	2004	2006	
Occupation of head:															
White-collar job	25.93	14.90	7.11	5.95	5.91	-42.51	-52.27	-16.94	-77.21	3.38	3.21	2.80	3.89	4.54	
Sale/service work	28.85	20.74	17.37	14.16	4.47	-28.08	-16.27	-74.25	-84.49	6.50	6.65	0.95	1.25	1.45	
Farming work	50.51	44.86	30.35	20.48	17.99	-11.19	-32.35	-40.72	-64.39	73.50	74.00	62.06	62.12	59.39	
Non-farm manual work	57.41	36.80	19.66	11.14	10.19	-35.89	-46.59	-48.15	-82.25	6.75	7.09	17.95	16.91	20.58	
Not working	48.10	47.45	23.85	23.68	15.19	-1.35	-49.74	-36.32	-68.42	9.88	9.04	16.25	15.83	14.05	
N	800	830	5,079	1,488	1,473	-	-	-	-	-	-	-	-	-	

Notes: ^(a) Poverty incidence and share of population are weighted by household size.

^(b) Change in poverty incidence is defined by $[(Pt-Pt-1)*100/Pt]$.

Source: Author's calculation from the LSWS 1993, 1998, 2002, 2004 and 2006.

4.2.3 Inequality

While there has been a spectacular decline in poverty over the period of study, especially between 1998 and 2006, what about expenditure inequality? As shown in Table 4.3, the relatively small decline in poverty between 1993 and 1998 is accompanied by a reduction in expenditure inequality while the more significant decline in poverty in the period 1998 and 2006 is accompanied by an increase in inequality which is about the same magnitude as the decline in inequality between 1993 and 1998. Different measures in Table 4.3 capture the same picture. Over 1993-98, the ratio of the mean PCE between poorest and richest households falls from 4.3 to 3.3 while the Gini coefficient falls from 0.295 to 0.235. This result, that is poverty reduction and a reduction in inequality at the same time, is due to the greater growth in expenditure amongst the lowest quintiles and as discussed in the introductory chapter may be a result of the sharp increases in rice prices between 1993 and 1998 which led to a relative increase in the welfare of the poorest quintiles.

Table 4.3
PCE levels and measures of inequality

Quintiles	1993	1998	2002	2004	2006
Poorest	614.2	838.7	1,086.2	1,250.8	1,386.8
Poorer	902.2	1,153.5	1,536.6	1,795.8	2,032.2
Middle	1,180.0	1,432.9	1,961.3	2,293.3	2,641.2
Richer	1,546.6	1,820.4	2,595.9	3,050.9	3,479.0
Richest	2,666.2	2,735.8	4,311.1	5,052.5	5,777.7
<i>All</i>	<i>1,381.9</i>	<i>1,492.6</i>	<i>2,203.7</i>	<i>2,561.6</i>	<i>2,929.1</i>
Richest/Poorest (times)	4.341	3.262	3.969	4.039	4.166
Gini coefficient	0.295	0.235	0.276	0.281	0.284
Theil T	0.153	0.091	0.130	0.137	0.144
Theil L	0.142	0.089	0.122	0.128	0.131
N	800	830	5,079	1,488	1,473

Note: Consumption expenditure is measured in real January 1993 prices.

Source: Author's calculation from the LSMS 1993, 1998, 2002, 2004 and 2006.

While there has been an increase in inequality between 1998 and 2006, it is relatively modest and in 2006 expenditure inequality is at about the same level as it was in 1993. Thus, the main story emerging from this

analysis of poverty and inequality is that over this period there has been a sharp reduction in poverty which has not been accompanied by sharp increases in inequality. While all occupational groups have experienced increase in consumption, households engaged in non-farming occupations have experienced relatively higher gains in consumption and the largest reductions in poverty.

4.3 Determinants of consumption and poverty—Empirical framework

Having discussed the broad trends in consumption, poverty and inequality, I now turn to a more detailed analysis of the factors associated with household consumption and poverty.

Theoretically, agricultural household models (AHM) draw a distinction between factors that influence household consumption and household production. However, in the case of the rural MRD, given the high percentage of self-employment and the limited development of agricultural labour markets, it is unlikely that the separability assumption underlying AHM holds. Accordingly, variables that affect production and consumption decisions may be expected to influence household consumption patterns.

4.3.1 Static correlates of total household expenditure

To explore cross-section patterns in total household consumption expenditure, I propose to estimate the following equation.

$$\ln(y_i) = X_i\beta + u_i \quad (4.1)$$

where, $\ln(y_i)$ is the natural logarithm of total household expenditure in a given year as defined in section 4.2; X_i is a vector of observed characteristics; β is a vector of coefficients to be estimated; and u_i is an error term assumed to be $N(0, \sigma)$. The vector of observed characteristics consists of household characteristics, occupation of head, household labour resource, household land resources and communal/provincial variables.

The quantity and quality of household labour is captured by three labour-quantity variables and six labour-quality variables. Access to land is captured by the size of a household's landholdings. This variable is of course a part of a household's productive endowments but may also reflect access to capital. Beyond these variables which capture household

assets and capacity, consumption is treated as a function of ethnicity, sex of head of household. Since the dependent variable is household expenditure, household size and its square are also included in the specification.

A set of occupation dummies representing the main occupation of the household head is included to examine the link between sector of work and consumption. This is similar to the specification used by Glewwe et al. (2002). Based on information about the most time-consuming job in the past twelve months preceding the survey, household heads are allocated to one of five categories—white-collar jobs, sales or services, agricultural work, non-farm manual work, and joblessness. In the specifications, agricultural work is used as a reference variable. These occupational categories are often included in consumption functions but are clearly endogenous. We treat these dummy variables as proxies for diversification of household into non-farming occupations. Consistent with the discussion in chapter 3, where the main movement was the change from engaging in farming occupations to non-farming occupations, the occupational categories used here essentially capture household heads primarily engaged in farming and different categories of non-farming occupations.

The last variable included in this specification is a dummy for households living in communes where there are accessible to paved roads. This variable captures the overall infrastructure and development of the commune.

Equation (4.1) is estimated using OLS and estimates are provided for each of the years (1993, 1998, 2002, 2004, and 2006). Descriptive statistics for the samples are available in Appendix 4.1.

4.3.2 Examining changes in total household expenditure

After assessing the static correlates of consumption, the aim of this chapter is to identify the factors responsible for changes in total household consumption over time. Given the available datasets, the empirical analysis of this issue is based on two distinct approaches. First, using the various cross-sections, a decomposition method is used to analyze factors that are responsible for changes in mean expenditure. Second, the panel elements of the data set are exploited to identify factors responsible for changes in expenditure.

To execute the former approach, the study applies the well-known Oaxaca method (1973). This method has been widely used in different fields of study, including analysis of gender pay differentials (Adamchik and Bedi 2003), rural-urban difference in consumption (Wodon 1999), and temporal growth in consumption (Glewwe et al. 2002). At the mean, changes (growth) in consumption may be decomposed into a proportion that may be attributed to changes in observed characteristics (changes in the means of the explanatory variables—for example, changes in education, labour resources) and a proportion that may be attributed to changes in returns to characteristics (estimated parameters).

More formally, equation (4.1) is estimated upon the MRD cross-section samples collected at time t and $t+1$. Then, we can subtract the latter from the former to obtain

$$\begin{aligned}\overline{\ln(y^{t+1})} - \overline{\ln(y^t)} &= \overline{X^{t+1}}\hat{\beta}^{t+1} - \overline{X^t}\hat{\beta}^t \\ \overline{\ln(y^{t+1})} - \overline{\ln(y^t)} &= (\overline{X^{t+1}} - \overline{X^t})\hat{\beta}^{t+1} + \overline{X^t}(\hat{\beta}^{t+1} - \hat{\beta}^t)\end{aligned}\quad (4.2a)$$

or,

$$\overline{\ln(y^{t+1})} - \overline{\ln(y^t)} = (\overline{X^{t+1}} - \overline{X^t})\hat{\beta}^t + \overline{X^{t+1}}(\hat{\beta}^{t+1} - \hat{\beta}^t) \quad (4.2b)$$

where, $\overline{\ln(y^{t+1})}$ and $\overline{\ln(y^t)}$ are respectively the mean log of total household consumption expenditure at time $t+1$ and t ; $\overline{X^{t+1}}$ and $\overline{X^t}$ represent the means of observed characteristics; $\hat{\beta}^{t+1}$ and $\hat{\beta}^t$ are estimated parameters. The first component on the right-hand side of each equation, (4.2a) and (4.2b), captures the impact of changing characteristics between t and $t+1$ while the second component captures the impact of changing returns to characteristics. Typically, the estimates are sensitive to the set of means and characteristics used as the baseline (t or $t+1$) and accordingly, estimates based on both 4.2a and 4.2b are provided.

The available data are also used to construct three different two-year panel samples, 1993/98 (707 households), 2002/04 (703 households), 2004/06 (688 households), and one three-year panel sample, 2002/04/06 (313 households). The general model of consumption growth can be expressed as

$$\ln(y_{it}) = \alpha_i + X_{it}'\beta + u_{it} \quad (4.3)$$

where, $\ln(y_{it})$ is the natural logarithm of total consumption expenditure of the household i at time t ; X_{it} is a vector of observed characteristics for the household i at time t ; β is a vector of coefficients to be estimated; and u_{it} is an error term. The list of explanatory variables and their definitions remain same in both the empirical specifications (4.1) and (4.3). The advantage of using panel data is that it allows me to control for unobserved time-invariant heterogeneity and provide a more convincing estimate of the link between various characteristics and expenditure.

4.3.3 Modelling poverty dynamics in rural MRD

While the empirical approaches outlined above focus on changes in consumption, and indirectly on poverty, to provide a sharper look at the relation between diversification and poverty I propose to use the panel element of the data sets and examine factors that move individuals from one (poverty) state to another over time.

Specifically, comparing panel households over time, there are four possible outcomes—households may remain being poor in both years (always poor), poor in the initial year and non-poor in the end year (poverty exit), non-poor in both years (never poor), and non-poor in the initial year and poor in the end year (poverty entry). These transitions may be examined, provided there are enough observations, using a multinomial logit (MNL) model. Define $j=1$ for the “always poor” outcome, $j=2$ for the “poverty exit” outcome, $j=3$ for the “poverty entry” outcome, and $j=4$ for the “never poor” outcome. Then, the MNL model provides estimates of the probability that household i experiences outcome j , which is written as,

$$P_{ij} = \frac{\exp(\beta_j' x_i)}{\sum_{k=1}^4 \exp(\beta_k' x_i)}, \text{ for } j = 1, 2, 3, 4 \quad (4.4)$$

where, P_{ij} is the probability that household i is in the poverty outcome j , and x_i is a vector of observed characteristics. There is one set of β coefficients for each outcome j . To identify the model one set of the β coefficients is set to zero (the base category) and all other sets are defined in relation to this benchmark (Greene 2003). Since the attention is on escaping from poverty, it is useful to set the “always poor” outcome as the base category. In addition, a set of relative risk ratios, $\ln(P_{i2}/P_{i1})$, rather

than the β coefficients for $j=2$ are preferred for ease of interpretation.⁴ A relative risk ratio (RRR) of less than one means the particular variable increases the probability that a household belongs to the base category (always poor) whereas a RRR greater than one implies that the particular variable is associated with a movement out of poverty.

Two specifications of the MNL model are estimated. The first specification investigates how exit from poverty is explained by initial characteristics (that is, to what extent is the change in poverty status between year t and year $t+1$ driven by characteristics at time t). In the second specification, I examine the link between changes in poverty status between t and $t+1$ and changes in the values of characteristics between t and $t+1$.

4.4 Empirical results

4.4.1 Static correlates of total household expenditure

Table 4.4 displays estimates of the expenditure equation (equation 4.1) for the period 1993-2006. As discussed earlier, over the time period 1993-2006 there is a sharp increase in real expenditure per capita and between 1993 and 2006, the PCE experiences about a two-fold increase or an average growth rate of about 12 percent per annum.

Across all years, female-headed households and ethnic minority groups experience far lower levels of consumption. As far as female-headed households are concerned, their consumption levels are between 3.9 to 10 percent lower than male-headed households. Except for 1998, belonging to a minority group is associated with 14.4 to 24.2 percent less consumption as compared to the majority group. Controlling for other household attributes, there is evidence of economies of scale with regard to total household consumption expenditure, indicated by strongly significant coefficients on household size and household size squared in all sets of regression results. According to this, total household expenditure reaches its maximum at a household size of 8-10 members, which is more than the average size in each corresponding sample.⁵

Table 4.4
Results of regression on (log) total household expenditure (equation 4.1)

Variables	1993	1998	2002	2004	2006	
Mean log of household expenditure	8.692 (.588)	9.216 (.473)	9.378 (.545)	9.532 (.569)	9.775 (.597)	
Household characteristics						
Female head = 1	-.100** (.043)	-.068** (.032)	-.039** (.020)	-.049* (.028)	-.066** (.029)	
Ethnic minority = 1	-.242** (.096)	-.088 (.097)	-.207*** (.037)	-.144*** (.052)	-.214*** (.041)	
Household size	.223*** (.027)	.226*** (.024)	.208*** (.019)	.198*** (.028)	.254*** (.027)	
Household size squared	-.011*** (.002)	-.014*** (.002)	-.013*** (.002)	-.011*** (.003)	-.013*** (.003)	
Occupation of head						
White-collar job = 1	.250** (.100)	.294*** (.072)	.117*** (.041)	.187*** (.054)	.214*** (.059)	
Sales or services = 1	.310*** (.088)	.285*** (.039)	.116* (.062)	.111* (.087)	.256*** (.083)	
Non-farm manual work = 1	.077 (.075)	.142* (.079)	.163*** (.022)	.167*** (.032)	.130*** (.029)	
Not working = 1	.045 (.048)	.089** (.041)	.133*** (.024)	.084** (.034)	.059 (.037)	
Household labour resource						
Number of male members	.061** (.026)	.077*** (.023)	.090*** (.018)	.071*** (.024)	.090*** (.021)	
19-59 age group (A)	.007 (.027)	.032 (.027)	.099*** (.017)	.106*** (.026)	.029 (.022)	
Number of female members	.057* (.029)	.075*** (.018)	.082*** (.012)	.043** (.018)	.037** (.016)	
15-18 age group	.124 (.095)	-.000 (.085)	.086* (.047)	.123* (.070)	.017 (.064)	
Share of main labour force (A+B): males with primary education	.309*** (.094)	.142** (.065)	.048 (.047)	.073 (.066)	.094 (.066)	
Share of main labour force (A+B): females with primary education	.342*** (.099)	.171* (.099)	.222*** (.054)	.299*** (.078)	.138** (.066)	
Share of main labour force (A+B): males with secondary education	.450*** (.106)	.238** (.095)	.244*** (.055)	.315*** (.073)	.267*** (.076)	
Share of main labour force (A+B): females with secondary education	.284** (.115)	.320** (.119)	.536*** (.063)	.592*** (.096)	.393*** (.076)	
Share of main labour force (A+B): males with tertiary education	.532*** (.109)	.360*** (.088)	.694*** (.068)	.692*** (.101)	.811*** (.103)	
Share of main labour force (A+B): females with tertiary education	Household non-labour capitals					
Farm size (hectare)	.263*** (.037)	.199*** (.050)	.163*** (.016)	.233*** (.028)	.189*** (.022)	
Farm size squared	-.015*** (.004)	-.017* (.009)	-.009*** (.002)	-.021*** (.006)	-.012*** (.003)	
Communal level variables						
Having access to paved roads = 1 ^(a)	-.015 (.061)	.014 (.052)	.079*** (.024)	.118*** (.025)	.101*** (.027)	
Constant	7.323*** (.104)	7.998*** (.090)	8.128*** (.052)	8.236*** (.067)	8.472*** (.067)	
N	800	830	5,079	1,488	1,473	
PSU	25	26	500	496	491	
R²	.490	.515	.475	.502	.523	
F	45.97	23.23	112.07	60.75	70.73	
Prob>F	0.0002	0.0004	0.0000	0.0000	0.0000	

Notes: Expenditure is measured at the January prices in each corresponding year. Figures in parentheses are standard errors.

*, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level.

^(a) It is a road for motor vehicles for 1993 while a road for cars for 1998, 2002, 2004, and 2006.

The estimates display a clear link between the occupation of the household head and total household expenditure. The pattern of coefficients indicates that a household headed by someone who worked in a white-collar job enjoys a 12.4 to 34.2 percent advantage over a household headed by an individual mainly engaged in farming. There are no clear temporal patterns, but in recent years (2002 to 2006) there seems to be an increase in returns to such occupations. Similar patterns are observed for households headed by individuals working in sales and service jobs (premiums of between 11.7 to 36.3 percent). While these occupational premiums may be expected, the interesting element is the return for household heads mainly engaged in non-farm manual work. In 1993, there is no difference in consumption levels between households working primarily in non-farm manual occupation and in farming. However, in 1998 there is a clear difference and despite (as shown in chapters 2 and 3 and we have seen earlier) the increased movement of individuals to this occupational category, the consumption premiums enjoyed by such households remains at the same level as seen in 1998 (that is a 13.9-18.2 percent premium).

Turning now to the household labour resource variables, the results show a clear pattern of positive association between the number of males aged 19 to 59 years and the number of younger members in a household (aged 15 to 18). Having an additional male member in the 19-59 age-group is associated with a 6-9 percent increase in household expenditure. Similarly, the marginal effect of an additional person in the age range 15 to 18 translates into a 3-9 percent increase in total household expenditure. In contrast, the effect of an additional female worker is not always significant. Nevertheless, the main point is that after controlling for household size we see that additional labour resources in a household are associated with higher levels of household consumption. This is similar to the labour quantity effects noted in chapter 3, where additional labour resources are associated with a movement towards non-farming occupations.

In terms of labour-quality we see that, in general, more educated households enjoy higher levels of consumption. While this is expected, the patterns reveal that over time returns to secondary education tend to decline while returns to the highest levels of education tend to increase. In addition, a clear pattern is that returns to female education are substantially higher than returns to male education. In 1993, a 10 percentage

point increase in the share of female workers with secondary education is associated with an increase in consumption of 4.5 percent while in 2006 it declines to 2.7 percent. For males the corresponding figures are 3.4 and 1.4 in 1993 and 2006, respectively. With regard to tertiary education, a 10 percentage point increase in the share of female workers with tertiary levels of education is associated with an 8.1 percent increase in consumption while for males it is about 3.9 percent. The link between the quality of labour and consumption is not particularly different from the link between these variables and patterns of diversification discussed in chapter 3.

As may be expected, access to land tends to significantly increase total household expenditure. Regression results displayed in Table 4.4 indicate the existence of a quadratic relation with decreasing returns between total amount of land used for agricultural production and household expenditure. According to this relationship, an additional hectare of land increases consumption by between 15.4 and 24.8 percent. There are no clear patterns over time suggesting that returns to land are quite stable over the years. The commune-level variable shows that communes with better access to physical infrastructure (traffic paved roads) enjoy an 8-13 percent consumption premium, this effect is only noticeable since 2002.

While it is clear that characteristics such as a household's labour quantity and quality play a role in determining consumption, there is a sharp increase in the value of the constant over time. Taken literally, the constant is the average expenditure for male-headed households belonging to the ethnic majority, where the household head is mainly engaged in farming and where the commune does not have access to a paved road. The sharp increase in expenditure for this reference group suggests that while households with other factors such as access to a paved road and household heads working in white-collar jobs do enjoy an earnings premium over farmers, over time, all households regardless of their occupation or education, regardless of whether they belong to a majority or a minority, experience a sharp increase in consumption. Since these gains are universal it suggests that factors that affect all households such as policy changes that led to an increase in rice prices, changes in migration laws, changes in rules governing private enterprise and other similar reforms discussed in chapter 1 are likely to have been responsible for the bulk of the observed increase in consumption.

4.4.2 Decomposition of growth in household consumption expenditure

More formally, to attribute changes in consumption to changes in a household's characteristics and to changes in returns, this section provides results from an Oaxaca decomposition. Table 4.5 provides detailed results of the decomposition based on equations (4.2a) and (4.2b). For each period, column "C" represents the impact of changing characteristics on growth over a given period while column "R" reports the impact of changing returns to characteristics.

Regardless of the sub-period under consideration and regardless of whether we use 4.2a or 4.2b, the message emerging from the decomposition does not change. Overall, the decomposition results show that changes in characteristics play an extremely limited role in determining changes in consumption (at the mean). While most of the increase in growth maybe attributed to changes in returns, as discussed already and as now formally shown through the decomposition, most of the increase in consumption may be attributed to changes in the intercept.⁶

Focusing on the decomposition for 1993-2006 and the last two columns of the table we see that the difference in log overall household consumption expenditure is 1.083. Of this, increases in returns to non-manual work and the increasing participation of households in non-manual work account for about 2.2 (0.011+0.011) percent of the increase in consumption, increases in the share of males and females with tertiary education and higher returns to tertiary education for about 4.6 percent (0.010+0.009+0.017+0.010), while larger labour endowments and returns to labour account for a further 6.2 percent (0.034+0.004+0.024). Access to better infrastructure in the form of better roads is associated with a 5 percent increase in consumption. While these household and commune level variables account for some of the increase in consumption (about 18 percent), they pale in comparison with the overall macro-effect of policy changes as captured by changes in the intercept. Over this period the intercept increases by 1.149 or accounts for a 109 percent of the increase in consumption. In line with the interpretation provided earlier, this implies that all households regardless of their characteristics experience a sharp increase in consumption.

Table 4.5
Decomposition results of growth in total household consumption expenditure

Variables	1993-98			1998-2002			2002-2006			1993-2006						
	Eq. (4.2a)		Eq. (4.2b)													
	R	C	R	C	R	C	R	C	R	C	R	C				
HH characteristics	-.041	-.010	-.031	-.020	-.069	-.029	-.061	-.037	.193	-.056	.174	-.038	.115	-.127	.101	-.114
Female head = 1	.008	.000	.007	.001	.006	.000	.007	.000	-.006	-.000	-.006	-.000	.008	-.000	.008	-.000
Ethnic minority = 1	.015	-.000	.016	-.001	-.012	.007	-.008	.003	-.001	.000	-.001	.000	.003	.006	.002	.007
Household size	.017	-.073	.016	-.072	-.090	-.107	-.081	-.116	.209	-.114	.189	-.094	.169	-.327	.129	-.287
Household size squared	-.081	.064	-.070	.053	.026	.072	.022	.077	-.010	.058	-.008	.057	-.065	.194	-.038	.167
Occupation of head	.009	.003	.008	.003	-.014	.021	.004	.003	-.013	.007	-.010	.004	.000	.012	.011	.002
White-collar job= 1	.001	.001	.002	.001	-.006	.001	-.005	-.001	.003	.004	.005	.002	-.001	.003	-.002	.004
Sales/services work = 1	-.002	.003	-.002	.003	-.013	-.008	-.002	-.019	.001	.002	.002	.001	-.004	-.013	-.001	-.015
Non-farm manual work = 1	.004	.000	.005	.000	.001	.020	.004	.017	-.006	.002	-.007	.003	.004	.019	.011	.011
Not working = 1	.004	-.001	.004	-.000	.004	.009	.007	.006	-.011	-.001	-.010	-.002	.001	.002	.002	.002
(Farming work = 0)																
Household labour resource	-.070	.009	-.068	.008	.124	.014	.132	.006	-.122	.007	-.116	.001	-.068	.030	-.049	.011
Number of male members																
19-59 age group (A)	.018	.004	.019	.003	.014	.004	.015	.004	.001	-.004	.001	-.004	.032	.006	.034	.004
Number of female members																
19-54 age group (B)	.030	.001	.030	.000	.080	-.002	.079	-.001	-.083	-.002	-.078	-.007	.026	-.002	.024	-.000
Number of members																
15-18 age group	.010	.004	.011	.003	.004	-.009	.003	-.008	-.022	-.003	-.019	-.006	-.011	-.005	-.008	-.007
Share of main labour force (A+B):																
males with primary education	-.025	-.000	-.027	.002	.019	-.001	.017	.000	-.014	-.000	-.013	-.001	-.022	-.000	-.020	-.002
Share of main labour force (A+B):																
females with primary education	-.048	.001	-.049	.002	-.028	-.002	-.024	-.005	.012	-.004	.010	-.002	-.062	-.007	-.047	-.022
Share of main labour force (A+B):																
males with secondary education	-.026	-.001	-.025	-.002	.008	.003	.008	.002	-.014	.002	-.015	.002	-.031	.003	-.035	.006
Share of main labour force (A+B):																
females with secondary education	-.022	.001	-.023	.001	.001	.007	.001	.006	.003	-.000	.003	-.000	-.019	.008	-.024	.013

Table 4.5 (cont.)
Decomposition results of growth in total household consumption expenditure

Variables	1993-98			1998-2002			2002-2006			1993-2006						
	Eq. (4.2a)		Eq. (4.2b)													
	R	C	R	C	R	C	R	C	R	C	R	C				
Share of main labour force (A+B):	.002	.001	.002	.001	.013	.008	.016	.005	-.011	.006	-.013	.009	.006	.013	.010	.009
males with tertiary education																
Share of main labour force (A+B):	-.007	-.002	-.007	-.003	.013	.006	.016	.003	.005	.011	.007	.010	.012	.015	.017	.010
females with tertiary education																
Household non-labour capitals	-.059	-.003	-.058	-.004	-.018	-.017	-.013	-.021	.015	.004	.015	.003	-.060	-.019	-.053	-.026
Farm size (hectare)																
Farm size squared	-.056	-.003	-.055	-.004	-.031	-.016	-.028	-.020	.020	.005	.021	.005	-.065	-.016	-.058	-.023
Communal level variable	-.003	.000	-.003	.000	.013	.001	.014	-.001	-.005	-.002	-.005	-.001	.005	-.002	.006	-.003
Access to paved road = 1																
Constant	.012	-.001	.009	.001	.021	-.001	.020	-.000	.007	.013	.009	.010	.046	.003	.050	-.000
Constant	.675	.000	.675	.000	.131	.000	.131	.000	.344	.000	.344	.000	1.149	.000	1.149	.000
Total	.525	-.002	.535	-.012	.174	-.012	.211	-.049	.423	-.026	.416	-.019	1.183	-.101	1.210	-.128
Percentage in the difference, %	100.2	-0.3	102.0	-2.2	107.4	-7.2	130.2	-30.1	106.5	-6.6	104.8	-4.9	109.2	-9.3	111.7	-11.8
Difference in log expenditure			.524		.162		.397									

Note: C is the impact of changing characteristics over time; R is the impact of changing returns to characteristics.

4.4.3 Panel data analysis of household expenditure

To identify factors that influence changes in consumption over time, this sub-section uses panel data to estimate equation (4.4) for four different panel samples. These samples include 707, 703, 688 and 313, households respectively for the years 1993/98, 2002/04, 2004/06, and 2002/04/06. Appendix 4.2A and 4.2B contains descriptive statistics for the various samples. Household consumption expenditure in different cross-sectional datasets is adjusted to the January prices of the initial year in each of the panel samples.

Equation (4.4) is estimated using two specifications—a household fixed effects model and a random effects model. In each sample, Hausman tests reject the null hypothesis that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator (see Table 4.6), supporting the use of a fixed effects specification. All sets of coefficients are displayed in Table 4.6.

The discussion focuses on estimates based on the 1993/98 panel and the 2002/04/06 panel. Focusing on the first panel sample, we see that similar to the cross-section estimates, female-headed households experience lower levels of consumption. Returns to white-collar jobs and sales/services jobs are higher than returns from farming while earnings for non-farm manual workers are no different as compared to those in farming. Presence of an additional male member (19-59 years of age) is associated with an increase in consumption as is a greater share of workers who have primary education.

Table 4.6 (cont.)
Results of regression on (log) total household consumption

Variables	1993/98		2002/04		2004/06		2002/06		2002/04/06	
	RE	FE								
Share of main labour force (A+B): males with primary education	.061 (.063)	.055 (.091)	-.164** (.069)	-.126 (.105)	.040 (.068)	.069 (.093)	.117 (.098)	.083 (.149)	.048 (.081)	.027 (.103)
Share of main labour force (A+B): females with primary education	.225*** (.053)	.202** (.083)	.048 (.066)	.116 (.098)	.067 (.071)	.016 (.108)	-.010 (.107)	.203 (.166)	-.036 (.091)	.068 (.117)
Share of main labour force (A+B): males with secondary education	.258*** (.066)	.271*** (.099)	.338*** (.075)	.169 (.117)	.238*** (.072)	.127 (.110)	.310*** (.102)	.316** (.158)	.261*** (.088)	.169 (.113)
Share of main labour force (A+B): females with secondary education	.345*** (.067)	.215* (.111)	.215*** (.076)	.034 (.118)	.280*** (.075)	.184* (.110)	.226** (.115)	.239 (.168)	.126 (.095)	.121 (.119)
Share of main labour force (A+B): males with tertiary education	.252*** (.086)	.048 (.138)	.642*** (.087)	.218 (.148)	.335*** (.079)	.116 (.111)	.531*** (.109)	.461*** (.165)	.461*** (.095)	.303** (.123)
Share of main labour force (A+B): females with tertiary education	.425*** (.087)	.024 (.160)	.609*** (.095)	.220 (.147)	.701*** (.101)	.236 (.175)	.486*** (.143)	.219 (.222)	.360*** (.121)	.122 (.156)
Household non-labour capitals										
Farm size (hectare)	.200*** (.020)	.088*** (.033)	.203*** (.027)	.117** (.051)	.175*** (.019)	.083** (.033)	.229*** (.041)	.219*** (.075)	.243*** (.035)	.208*** (.054)
Farm size squared	-.011*** (.003)	-.001 (.004)	-.022*** (.005)	-.011 (.008)	-.011*** (.003)	-.005 (.004)	-.024*** (.007)	-.020* (.012)	-.024*** (.006)	-.019** (.009)
Communal level variable										
Having access to paved roads = 1 ^(a)	-.022 (.022)	-.062** (.031)	.050** (.023)	-.013 (.035)	.066*** (.023)	.013 (.032)	.009 (.035)	-.053 (.054)	-.006 (.028)	-.034 (.035)
Time dummy										
T1 = 1998 or 2004	.146*** (.017)	.144*** (.018)	.097*** (.016)	.114*** (.016)					.123*** (.024)	.130*** (.024)
T2 = 2006					.166*** (.015)	.172*** (.016)	.329*** (.027)	.350*** (.029)	.330*** (.025)	.346*** (.025)
Constant	7.446*** (.064)	7.504*** (.104)	8.134*** (.070)	8.295*** (.109)	8.399*** (.069)	8.524*** (.106)	8.269*** (.101)	8.285*** (.157)	8.288*** (.087)	8.346*** (.115)

Table 4.6 (cont.)
Results of regression on (log) total household consumption

Variables	1993/98		2002/04		2004/06		2002/06		2002/04/06	
	RE	FE	RE	FE	RE	FE	RE	FE	RE	FE
Observations	1,414	1,414	1,406	1,406	1,376	1,376	626	626	939	939
Number of groups	707	707	703	703	688	688	313	313	313	313
R-squared	.499	.312	.500	.260	.494	.324	.518	.499	.513	.403
F		15.61		12.02		15.99		14.56		19.44
Prob		0.0000		0.0000		0.0000		0.0000		0.0000
Wald chi2	1,173.81		1,057.60		1,031.81		618.93		773.33	
Prob>Wald chi2	0.0000		0.0000		0.0000		0.0000		0.0000	
Hausman test—chi2	45.51		69.85		58.69		26.37		37.98	
Prob>chi2	0.0009		0.0000		0.0000		0.1541		0.0130	

Notes: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level. Figures in parentheses are the standard errors.

^(b) It is a road for motor vehicles for 1993 while a road for cars for 1998, 2002, 2004, and 2006.

Turning to the second period we see that returns to white-collar positions and non-farm manual work are large and statistically significant, indicating a 34.7 percent return for the former and a 14.9 percent return for the latter. These large estimates are similar to the cross-section estimates for 2006 and support the notion that the higher returns to such occupations is not driven by unobserved characteristics of households that may drive them to such occupations. The other notable change as compared to the period 1993/98 is that only returns to the highest level of education are statistically discernible. Indeed as compared to the cross-section estimates (for 2006) which displayed higher returns to female education and statistically meaningful returns to other levels of education, the panel data estimates show that it is only the highest level of male education that is associated with higher consumption. These patterns suggest that a substantial proportion of the returns to education as seen in the cross-section estimates are not due to the effect of education, *per se*, but may be attributed to the correlation between unobserved ability and acquisition of higher levels of education. The time dummies are large and show that in 2006 all households consume about 41.3 percent more than households in 2002. The overall increase in consumption for these panel households over the period 2002-06 is about 30.4 percent.

To recap, while cross-section estimates of the link between proxies for diversification (occupation of household head) are contaminated by the presence of unobserved time-invariant ability, the panel data estimates provide a “cleaner” estimate. These estimates suggest that changes in household consumption over this period may be attributed to mainly two factors. First, the main household specific factor that plays a role in influencing consumption is a household head’s occupational status with a clear effect of non-farming work (manual or otherwise) on increasing consumption. Second, consistent with the cross-section estimates, the panel data estimates show that non-household specific attributes as captured by changes in the intercept account for the bulk of the increase in consumption.

4.4.4 Analysis of poverty dynamics

A final step in terms of using the panel data is to assess the effect of various characteristics on poverty transitions. The main focus of this section is on comparisons between households who escaped from poverty (poverty exit) and households who remained poor (always poor). Analy-

sis in this section is based on descriptive statistics and estimates from a MNL model. Given the smaller number of observations for the period 2002 to 2006 (313 observations in each year) and indeed the sharp movement out of poverty makes it impossible to provide MNL estimates for the more recent period. Accordingly, such estimates are provided only for the panel covering the period 1993 to 1998.

Probability of movement out of poverty

The first row in Appendix 4.3A refers to the proportion of households in each of the four categories.⁷ Between 1993 and 1998, about 27.9 percent of the households remain poor in both years while about 20.9 percent escape poverty, 9.1 percent enter poverty and 42.2 percent remain non-poor throughout the period. These figures imply a 11.8 percentage point reduction in the incidence of poverty in this five year period (1993-98). While we do not have panel data for the period 1998 to 2002, we see that between 2002 and 2006 (Appendix 4.3B) there is a further 8.1 percentage point reduction in poverty incidence while 75.4 percent of households are non-poor through out the period. The jump in the percentage of non-poor households from 42.2 percent in 1993-98 to 75.4 percent in 2002-06 is remarkable. Additionally, the stability in terms of being non-poor for a duration of about four to five years suggests that these are relatively permanent exits out of poverty.

MNL estimates are provided in Table 4.7.⁸ The table displays two sets of relative risk ratios (RRR). As explained in section 4.3.3, a RRR of less than one implies that a particular variable increases the probability that a household belongs to the base category (always poor) whereas an RRR of greater than one implies an increase in the probability of exiting poverty. In specification 1, changes in poverty status between 1993 and 1998 are treated as a function of characteristics in 1993 while in specification 2, changes in poverty status are treated as a function of changes in characteristics.

Specification 1 estimates show that there is no link between female-headed households and ethnic minority households in terms of influencing movements move out of poverty. The total effect of household size (accounting for the squared term) exerts a negative effect and indicates that large-size households are less likely to move out of poverty. At the mean household size, the RRR is 0.549, indicating that an increase in

household size by one unit reduces the chances of exiting poverty by 45.1 percentage points.

Table 4.7
*Relative risk ratio estimates from a multinomial logit model,
panel sample 1993/98*

Variables	Initial characteristics (Specification 1)	Changes in characteristics (Specification 2)
Household characteristics		
Female head = 1	.902 (.288)	
Ethnic minority = 1	.608 (.234)	
Household size	.533*** (.116)	
Household size squared	1.031* (.017)	
Occupation of head		
White-collar job = 1	1.368 (1.249)	
Sales or services = 1	1.900 (1.195)	
Non-farm manual work = 1	.698 (.318)	
Not working = 1	.759 (.307)	
Household labour resource		
Number of male members	1.250 (.303)	
19-59 age group (A)		
Number of female members	.964 (.238)	
19-54 age group (B)		
Number of members	1.594*** (.279)	
15-18 age group		
Share of main labour force (A+B):	1.196	
males with primary education	(.819)	
Share of main labour force (A+B):	2.453	
females with primary education	(1.364)	
Share of main labour force (A+B):	2.602	
males with secondary education	(2.008)	
Share of main labour force (A+B):	4.034*	
females with secondary education	(3.334)	
Share of main labour force (A+B):	2.480	
males with tertiary education	(2.730)	
Share of main labour force (A+B):	14.407*	
females with tertiary education	(21.189)	
Household non-labour capitals		
Farm size (hectare)	2.117* (.924)	
Farm size squared	.873 (.129)	

Variables	Initial characteristics (Specification 1)	Changes in characteristics (Specification 2)
Communal level variables		
Having access to paved roads = 1 ^(a)	1.759** (.489)	
Price of paddy (thousand VND/kg) (January 1993 constant price)	.214 (.277)	
Head's move out of farming work in 1998 (excluding not working)		2.864** (1.310)
Change in household size		.732*** (.064)
Change in number of male members 19-59 age group		1.132 (.209)
Change in number of female members 19-54 age group		1.149 (.194)
Change in number of male members 15-18 age group		1.055 (.135)
Change in male share of labour with primary education level attainment		.652 (.320)
Change in female share of labour with primary education level attainment		.840 (.372)
Change in male share of labour with higher education level attainment		.498 (.404)
Change in female share of labour with higher education level attainment		.291 (.275)
Change in farm size		1.197 (.181)
Change in commune-level paddy prices		7.423** (6.364)
Observations	707	707
Pseudo R²	.1952	.0387
Log likelihood	-719.773	-859.761

Notes: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level. Figures in parentheses are standard errors.

^(a) It is a road for motor vehicles for 1993 while a road for cars for 1998.

The occupational categories appear to have a weak bearing on moving out of poverty, supporting the idea that in 1993, individuals involved in non-farming work were not more likely to move out of poverty than those involved in farming.

The positive impact of initial level of household labour resources on lifting households out of poverty over 1993-98 is limited to some features of the labour force. These are the number of persons in the age range 15-18 years, the female proportion of household labour force which has completed secondary level of education, and the female proportion of the labour force with tertiary educational attainment.

A clearer picture of the factors driving movement out of poverty emerges from specification 2. These estimates show that there are primarily two factors associated with movements out of poverty during this time period. First, households where heads change their occupation from farming to non-farming are almost 3 times more likely to exit poverty. However, the largest and certainly more widespread effect emanates from changes in paddy prices. The change in prices had an impressive impact on the relative probability in favour of moving out of poverty. Literally, the estimates in Table 4.7 inform us that households that experience a one unit increase in the price of paddy are 7 times more likely to move out of poverty. Combining this information with the changes in paddy prices as shown in Chapter 3, Table 3.2 (the price of paddy almost doubled from 1.013 thousand VND/kg to 2.005 thousand VND/kg between 1993 and 1998) it is clear that the main factor driving reductions in poverty during this period was the sharp increase in paddy prices. These increases as discussed in chapter 1 were in turn driven by the freeing of internal and international trade in rice.

4.5 Effects of income diversification—Indirect approach

So far I have examined the effect of diversification on consumption using occupation of head of household as a proxy for diversification. While the use of panel data has allowed me to control for unobserved time-invariant attributes that may have an effect on consumption and on engaging in non-farming activities, it is possible that there are time-varying unobservables (weather shocks, death in household) that may push individuals into non-farming activities and have a bearing on consumption. In other words consumption and time-engaged in non-farming activities (occupation of household head) may be simultaneously determined (Ellis 1998, 2000, Haggblade et al. 2007, Hart 1994) and the estimates of occupation of head of household on consumption patterns may be biased.

While in principle the endogeneity issue may be tackled by using an instrumental variables approach it is difficult to think of variables that determine household time-allocation patterns but are unlikely to have a bearing on consumption. Instead of pursuing this approach, and to augment the work presented so far, this section adopts an indirect or reduced form approach to examine the links between diversification and consumption.

Following van de Walle and Cratty (2004), I estimate reduced form specifications of time-allocation patterns and consumption using a common-set of covariates and examine these estimates for “common causation” and “trade-off”. According to these authors, “common causation is identified by exogenous explanatory variables having the same sign in regressions for both escaping poverty and diversifying while the trade-off is indicated by opposing signs” (ibid.: 246). More specifically, my work searches for covariates that lead to an increase in time allocated to non-farming and total household consumption and thereby attempt to establish links between the two.

Although estimates of time-allocation patterns and consumption have already been presented, I re-estimate these models using a common set of regressors and present cross-section and panel data estimates. These are provided for each year in Tables 4.8 to 4.12 and for the panel samples in Tables 4.13 and 4.14.

Table 4.8
Household income diversity and expenditure, sample 1993

Variables	Time share of non-farm wage employment		Household consumption
	Coefficient	Effect	
Household characteristics			
Female head = 1	.012 (.063)	.002 (.013)	-.078** (.037)
Ethnic minority = 1	-.147 (.134)	-.025 (.018)	-.255** (.105)
Household size	.017 (.044)	.003 (.009)	.217*** (.028)
Household size squared	-.001 (.003)	-.000 (.001)	-.011*** (.002)
Household labour resource			
Number of male members	.071 (.060)	.014 (.012)	.062** (.026)
Number of female members	.062 (.047)	.012 (.010)	-.004 (.028)
Number of members	.048 (.045)	.009 (.009)	.052 (.031)
Share of main labour force (A+B):			
males with primary education	.166 (.257)	.033 (.051)	.112 (.097)
Share of main labour force (A+B):			
females with primary education	.116 (.137)	.023 (.027)	.355*** (.089)
Share of main labour force (A+B):			
males with secondary education	.294 (.213)	.058 (.043)	.350*** (.099)
Share of main labour force (A+B):			
females with secondary education	.057 (.187)	.011 (.037)	.475*** (.109)

Variables	Time share of non-farm wage employment		Household consumption
	Coefficient	Effect	
Share of main labour force (A+B): males with tertiary education	.575*** (.164)	.113*** (.033)	.311** (.114)
Share of main labour force (A+B): females with tertiary education	.873*** (.174)	.171*** (.037)	.609*** (.104)
Household non-labour capital			
Farm size (hectare)	-.104* (.058)	-.020* (.012)	.242*** (.037)
Farm size squared	.008 (.007)	.001 (.001)	-.012*** (.004)
Commune-level variables			
Having access to paved roads = 1	.152* (.075)	.031* (.017)	.013 (.066)
Constant	-.856*** (.173)		7.368*** (.108)
Number of observations		795	800
PSU		25	25
R²			0.4714
Pseudo R²		0.1013	
F		4.42	40.54
Prob>F		0.0145	0.0000

Notes: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level. Figures in parentheses are the standard errors.

Table 4.9
Household income diversity and expenditure, sample 1998

Variables	Time share of non-farm wage employment		Household consumption
	Coefficient	Effect	
Household characteristics			
Female head = 1	.080 (.052)	.019 (.013)	-.039 (.031)
Ethnic minority = 1	.233*** (.073)	.065** (.024)	-.086 (.096)
Household size	.052 (.068)	.012 (.015)	.230*** (.024)
Household size squared	-.007 (.005)	-.001 (.001)	-.014*** (.002)
Household labour resource			
Number of male members	.174*** (.043)	.039*** (.010)	.072*** (.025)
19-59 age group (A)			
Number of female members	.056 (.056)	.013 (.013)	.040 (.027)
19-54 age group (B)			
Number of members	.063* (.035)	.014 (.009)	.066*** (.018)
15-18 age group			
Share of main labour force (A+B): males with primary education	-.121 (.197)	-.027 (.045)	.014 (.085)

Variables	Time share of non-farm wage employment		Household consumption
	Coefficient	Effect	
Share of main labour force (A+B): females with primary education	.162 (.190)	.037 (.042)	.140** (.064)
Share of main labour force (A+B): males with secondary education	.134 (.181)	.030 (.041)	.218** (.099)
Share of main labour force (A+B): females with secondary education	.341 (.214)	.077 (.047)	.287*** (.089)
Share of main labour force (A+B): males with tertiary education	.352* (.198)	.079* (.044)	.419*** (.128)
Share of main labour force (A+B): females with tertiary education	.645*** (.222)	.145*** (.051)	.384*** (.092)
Household non-labour capital			
Farm size (hectare)	-.297*** (.073)	-.067*** (.016)	.154*** (.043)
Farm size squared	.040*** (.014)	.009*** (.003)	-.011 (.007)
Commune-level variables			
Having access to paved roads = 1	.257*** (.059)	.065*** (.013)	.036 (.056)
Constant	-.827*** (.213)		8.029*** (.093)
Number of observations		824	830
PSU		26	26
R²			0.4812
Pseudo R²		0.1280	
F		16.14	52.73
Prob>F		0.0000	0.0000

Notes: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level. Figures in parentheses are the standard errors.

Since similar estimates have been discussed in detail in chapters 3 and earlier on in this chapter, I focus on those variables that are relevant for the purpose at hand. As seen in Table 4.8, in 1993, while greater household labour resources (quantity) are associated with an increase in consumption, there is no impact of this variable on time-allocation decisions. While the labour quality variables work towards increasing both consumption and the time spent on non-farming activities it is only individuals with the highest levels of education that seem to be moving out of farming. The effect of household land resources increases consumption while at the same time reduces the chances of moving towards non-farming activities. In 1998, the basic picture is the same, however, the key difference is that now household labour resources (quantity) play a strong role in increasing consumption *and* moving households away from farm work. This change between 1993 and 1998 signals the availability of

additional employment activities which allow households with a greater number of workers to engage in potentially more lucrative earning opportunities.

Table 4.10
Household income diversity and expenditure, sample 2002

Variables	Time share of non-farm wage employment		Household consumption
	Coefficient	Effect	
Household characteristics			
Female head = 1	.055 (.048)	.012 (.011)	-.012 (.019)
Ethnic minority = 1	-.132 (.092)	-.026 (.017)	-.226*** (.037)
Household size	.011 (.047)	.002 (.010)	.213*** (.019)
Household size squared	-.002 (.004)	-.001 (.001)	-.013*** (.002)
Household labour resource			
Number of male members	.151*** (.040)	.033*** (.009)	.083*** (.017)
19-59 age group (A)			
Number of female members	.095** (.044)	.021** (.009)	.093*** (.017)
19-54 age group (B)			
Number of members	.097*** (.031)	.021*** (.007)	.073*** (.011)
15-18 age group			
Share of main labour force (A+B): males with primary education	.219 (.149)	.047 (.032)	.091* (.046)
Share of main labour force (A+B): females with primary education	.214 (.136)	.046 (.029)	.058 (.048)
Share of main labour force (A+B): males with secondary education	.471*** (.141)	.102*** (.030)	.256*** (.055)
Share of main labour force (A+B): females with secondary education	.328** (.157)	.071** (.034)	.265*** (.055)
Share of main labour force (A+B): males with tertiary education	.843*** (.161)	.182*** (.035)	.585*** (.062)
Share of main labour force (A+B): females with tertiary education	.904*** (.162)	.195*** (.035)	.746*** (.069)
Household non-labour capital			
Farm size (hectare)	-.409*** (.041)	-.088*** (.009)	.136*** (.015)
Farm size squared	.032*** (.005)	.007*** (.001)	-.007*** (.002)
Commune-level variables			
Having access to paved roads = 1	.136*** (.051)	.031** (.012)	.094*** (.024)
Constant	-1.024*** (.137)		8.170*** (.052)
Number of observations		5,014	5,079
PSU		500	500

Variables	Time share of non-farm wage employment		Household consumption
	Coefficient	Effect	
R ²			0.4600
Pseudo R ²	0.0770		
F	17.10		137.61
Prob>F	0.0000		0.0000

Notes: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level. Figures in parentheses are the standard errors.

Table 4.11
Household income diversity and expenditure, sample 2004

Variables	Time share of non-farm wage employment		Household consumption
	Coefficient	Effect	
Household characteristics			
Female head = 1	.131** (.054)	.041** (.018)	-.035 (.025)
Ethnic minority = 1	.038 (.120)	.011 (.037)	-.145*** (.053)
Household size	.044 (.061)	.013 (.018)	.193*** (.028)
Household size squared	-.003 (.006)	-.001 (.002)	-.011*** (.003)
Household labour resource			
Number of male members	.121*** (.038)	.036*** (.011)	.066*** (.024)
19-59 age group (A)			
Number of female members	.081* (.045)	.024* (.013)	.105*** (.026)
19-54 age group (B)			
Number of members	.041 (.039)	.012 (.012)	.036** (.018)
15-18 age group			
Share of main labour force (A+B):	.129 (.165)	.038 (.049)	.141** (.071)
males with primary education			
Share of main labour force (A+B):	.040 (.147)	.012 (.044)	.095 (.067)
females with primary education			
Share of main labour force (A+B):	.329** (.163)	.097** (.048)	.335*** (.079)
males with secondary education			
Share of main labour force (A+B):	.177 (.160)	.053 (.047)	.354*** (.074)
females with secondary education			
Share of main labour force (A+B):	.881*** (.162)	.261*** (.048)	.659*** (.093)
males with tertiary education			
Share of main labour force (A+B):	.802*** (.190)	.237*** (.056)	.759*** (.099)
females with tertiary education			
Household non-labour capital			
Farm size (hectare)	-.396*** (.048)	-.117*** (.014)	.199*** (.025)
Farm size squared	.039*** (.008)	.012*** (.002)	-.017*** (.005)

Variables	Time share of non-farm wage employment		Household consumption
	Coefficient	Effect	
Commune-level variables			
Having access to paved roads = 1	.016 (.049)	.005 (.015)	.122*** (.026)
Constant	-.741*** (.186)		8.289*** (.066)
Number of observations		1,459	1,488
PSU		496	496
R ²			0.4891
Pseudo R ²	0.1047		
F	11.78		73.46
Prob>F	0.0000		0.0000

Notes: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level. Figures in parentheses are the standard errors.

Table 4.12
Household income diversity and expenditure, sample 2006

Variables	Time share of non-farm wage employment		Household consumption
	Coefficient	Effect	
Household characteristics			
Female head = 1	.087 (.053)	.029 (.018)	-.065** (.027)
Ethnic minority = 1	-.041 (.109)	-.013 (.033)	-.212*** (.042)
Household size	.174*** (.060)	.056*** (.019)	.251*** (.028)
Household size squared	-.014*** (.005)	-.004*** (.002)	-.013*** (.003)
Household labour resource			
Number of male members	.129*** (.048)	.041*** (.015)	.087*** (.021)
19-59 age group (A)			.027
Number of female members	.124*** (.045)	.039*** (.014)	.027 (.022)
19-54 age group (B)			.035** (.016)
Number of members	.039 (.038)	.013 (.012)	.035** (.016)
15-18 age group			.022
Share of main labour force (A+B):	.259 (.169)	.083 (.054)	.022 (.065)
males with primary education			.129** (.065)
Share of main labour force (A+B):	-.047 (.139)	-.015 (.044)	.129** (.065)
females with primary education			.158** (.067)
Share of main labour force (A+B):	.381** (.160)	.122** (.051)	.158** (.067)
males with secondary education			.309*** (.075)
Share of main labour force (A+B):	.084 (.145)	.027 (.046)	.309*** (.075)
females with secondary education			.469*** (.073)
Share of main labour force (A+B):	.825*** (.170)	.263*** (.055)	.469*** (.073)
males with tertiary education			

Variables	Time share of non-farm wage employment		Household consumption
	Coefficient	Effect	
Share of main labour force (A+B): females with tertiary education	.744*** (.178)	.237*** (.057)	.896*** (.102)
Household non-labour capital			
Farm size (hectare)	-.370*** (.044)	-.118*** (.014)	.161*** (.020)
Farm size squared	.027*** (.006)	.008*** (.002)	-.009*** (.003)
Commune-level variables			
Having access to paved roads = 1	.049 (.049)	.016 (.016)	.103*** (.027)
Constant	-1.058*** (.158)		8.521*** (.068)
Number of observations		1,431	1,473
PSU		491	491
R²			0.5118
Pseudo R²		0.1164	
F		16.46	86.14
Prob>F		0.0000	0.0000

Notes: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level. Figures in parentheses are the standard errors.

Between 2002 to 2006 and for all three data rounds, qualitatively the estimates of the consumption function and the time-sharing relations are quite similar. The key difference over this period as compared to the period 1993-98 is that increasingly households with less than the highest level of education are found to be moving towards non-farming activities. For example, in 2002, households with greater quantity of labour as well as households with lower levels of labour quality (even at the level of primary education) experience an increase in the share of time spent on non-farming activities and an increase in consumption (see Table 4.10). The basic point is that over time it seems that all household groups, that is, those with a high proportion of educated labour as well as those with a greater proportion of workers educated at the primary and secondary levels start moving towards non-farming activities and also appear to be experiencing an increase in their consumption levels. While households with higher levels of education do experience larger movements out of farming and also appear to have higher consumption levels, it is also clear from the estimates that such gains are not restricted to those with the highest levels of education.

In terms of magnitude, based on the 2002 estimates we see that a 10 percentage point increase in the share of males with secondary education is associated with a 1 percentage point increase in time spent on non-farming activities and a 2.6 percent increase in consumption. The corresponding effect for males with tertiary education is about a 1.8 percent increase in time-spent in non-farm work and a 5.9 percent increase in consumption. The total amount of land used for agricultural production continues to exert a negative effect on the share of time allocated to non-farm wage employment and a positive effect on expenditure.

The overall flavour which emerges from a comparative analysis of these estimates is that some of the same characteristics such as increased quantities of household labour and increases in labour quality are associated both with an increase in movement out of farming and increases in consumption. While others such as land endowment while associated with higher levels of consumption dissuade households from moving out of farming.⁹

Finally, we present panel data estimates of the time-share and consumption specifications (Tables 4.13 and 4.14). Each table presents both random and fixed effects models for both outcomes. Hausman tests support the use of a fixed effects specification for consumption and time-sharing both based on the 1993/98 panel sample (see Table 4.13) while the use of a fixed effects specification for consumption and a random effects specification for time sharing based on the 2002/04/06 panel sample (see Table 4.14).

As seen in Table 4.13 and 4.14, the panel data estimates for the periods 1993/98 and 2002/04/06 are quite similar in terms of the picture they provide on the links between diversification and consumption and I base the discussion on the more recent panel data set.

Table 4.13
Household income diversification and expenditure, panel sample 1993/98

Variables	Time share of non-farm wage employment			Household consumption	
	Tobit (ME)	OLS (RE)	OLS (FE)	OLS (RE)	OLS (FE)
Household characteristics					
Female head = 1	.015 (.012)	.011 (.014)	-.045 (.028)	-.054* (.030)	-.118* (.061)
Ethnic minority = 1	.010 (.018)	-.010 (.019)	.000 (.000)	-.201*** (.042)	.000 (.000)
Household size	.009 (.008)	.007 (.010)	.019 (.015)	.222*** (.021)	.263*** (.032)
Household size squared	-.001 (.001)	-.001 (.001)	-.002 (.001)	-.012*** (.002)	-.014*** (.002)
Household labour resource					
Number of male members	.031*** (.008)	.036*** (.010)	.032** (.015)	.076*** (.022)	.064* (.033)
19-59 age group (A)	.007 (.008)	-.003 (.010)	.001 (.014)	.003 (.022)	-.015 (.031)
Number of female members	.011* (.006)	.006 (.007)	.006 (.009)	.047*** (.015)	.030 (.019)
15-18 age group	.011 (.028)	-.008 (.030)	-.010 (.042)	.054 (.065)	.042 (.092)
Share of main labour force (A+B): males with primary education	.033 (.023)	.024 (.025)	.024 (.038)	.249*** (.054)	.222*** (.084)
Share of main labour force (A+B): females with primary education	.051* (.027)	.026 (.031)	.051 (.045)	.276*** (.067)	.283*** (.099)
Share of main labour force (A+B): males with secondary education	.057** (.027)	.048 (.031)	.003 (.051)	.386*** (.068)	.245** (.112)
Share of main labour force (A+B): females with secondary education	.097*** (.033)	.099** (.040)	.126** (.063)	.296*** (.088)	.064 (.139)
Share of main labour force (A+B): males with tertiary education	.172*** (.032)	.277*** (.040)	.013 (.073)	.470*** (.088)	.073 (.161)
Share of main labour force (A+B): females with tertiary education	Household non-labour capital				
Farm size (hectare)	-.033*** (.008)	-.043*** (.009)	-.018 (.015)	.176*** (.020)	.083** (.034)
Farm size squared	.003** (.001)	.004** (.002)	.001 (.002)	-.009*** (.003)	-.001 (.004)
Commune-level variables					
Having access to paved roads = 1 ^(a)	.032*** (.009)	.039*** (.010)	.008 (.014)	-.009 (.022)	-.067 (.031)
T = 1993	.010 (.007)	.015* (.008)	.014* (.008)	.151*** (.017)	.147*** (.018)
Constant		.006 (.031)	-.009 (.049)	7.479*** (.065)	7.527*** (.104)
Number of observations	1,403	1,403	1,403	1,414	1,414
Number of groups (households)	704	704	704	707	707
Log likelihood	-633.23				
Wald chi2	115.08	153.98		1065.90	
Prob>chi2	0.0000	0.0000		0.0000	
R-squared		0.1315	0.0432	0.4754	0.2928
F			1.93		17.88
Prob>F			0.0158		0.0000
Hausman test—chi2		38.98		41.89	
Prob>chi2		0.0011		0.0004	

Notes: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level. Figures in parentheses are the standard errors.

ME: Marginal effect. RE: Random effect. FE: Fixed effect.

^(a) It is a road for motor vehicles for 1993 while a road for cars for 1998.

A comparative examination of the preferred specifications (OLS-RE for time-sharing and OLS-FE for consumption) shows that after controlling for household specific (fixed) effects households and consistent with the cross-section estimates, households with a larger number of male workers experience a movement out of farming and also experience higher levels of consumption over 2002-2006 (see Table 4.14). An additional male household member (aged 19-59) is associated with a 3.6 percentage point increase in non-farming work and a 7.9 percent increase in consumption. The effect of additional labour resources regardless of the educational level in influencing diversification and consumption is a common theme that emerges from both chapter 3 and 4.

Unlike the cross-section estimates which showed a clear link between higher levels of education and movement out of farming and consumption the picture is not so clear on the basis of the panel estimates. Except for males with tertiary education where a 10 percentage point increase is associated with a 2.5 percentage point increase in non-farming activities and a consumption increase of a little more than 3 percent (3.3), none of the educational variables work towards increasing consumption and time spent on non-farming activities. This suggests that a substantial proportion of the effects based on the cross-section data may be attributed to the ability of households and not *per se* to education.

A consistent effect emerging from both chapters 3 and 4 is that over time *all* households, as captured by the effect of the time dummies, witness a movement from farming to non-farming activities and an increase in consumption. The estimates show that in 2006, households spent an additional 6 percentage points of their time on non-farming activities and experienced consumption which was about 35.4 percent higher than in 2002. The main point is that while households with additional labour resources and more highly educated labour do experience higher gains in consumption and are more likely to move away from farming, the main driving force behind changes in time-allocation and consumption patterns appears to be non-household specific attributes.

Table 4.14
Household income diversification and expenditure, panel sample 2002/04/06

Variables	Time share of non-farm wage employment			Household consumption	
	Tobit (ME)	OLS (RE)	OLS (FE)	OLS (RE)	OLS (FE)
Household characteristics					
Female head = 1	.031 (.030)	.031 (.031)	.004 (.060)	-.029 (.043)	-.048 (.082)
Ethnic minority = 1	-.057 (.049)	-.030 (.065)	.000 (.000)	-.240*** (.091)	.000 (.000)
Household size	.020 (.022)	-.003 (.025)	.012 (.031)	.163*** (.034)	.182*** (.042)
Household size squared	-.000 (.002)	.002 (.002)	.000 (.003)	-.008*** (.003)	-.009** (.004)
Household labour resource					
Number of male members	.028 (.018)	.036* (.022)	.040 (.028)	.081*** (.031)	.079** (.039)
19-59 age group (A)					
Number of female members	.017 (.021)	.004 (.025)	.013 (.032)	.106*** (.035)	.054 (.044)
19-54 age group (B)					
Number of members	.040*** (.015)	.024 (.017)	.050** (.022)	.040* (.024)	.013 (.030)
15-18 age group					
Share of main labour force (A+B):	.027 (.059)	.039 (.060)	.080 (.077)	.067 (.082)	.024 (.104)
males with primary education					
Share of main labour force (A+B):	.147** (.065)	.154** (.067)	.176** (.087)	-.005 (.092)	.103 (.117)
females with primary education					
Share of main labour force (A+B):	.123** (.061)	.099 (.065)	.174** (.084)	.284*** (.089)	.150 (.114)
males with secondary education					
Share of main labour force (A+B):	.099 (.065)	.100 (.070)	.085 (.090)	.167* (.096)	.139 (.120)
females with secondary education					
Share of main labour force (A+B):	.274*** (.066)	.245*** (.070)	.224** (.095)	.538*** (.096)	.327*** (.124)
males with tertiary education					
Share of main labour force (A+B):	.375*** (.078)	.485*** (.088)	.551*** (.118)	.441*** (.121)	.160 (.157)
females with tertiary education					
Household non-labour capital					
Farm size (hectare)	-.139*** (.025)	-.130*** (.025)	-.080** (.041)	.205*** (.035)	.205*** (.054)
Farm size squared	.016*** (.005)	.016*** (.005)	.009 (.006)	-.019*** (.006)	-.018** (.009)
Commune-level variables					
Having access to paved roads = 1	.017 (.018)	.007 (.021)	.007 (.026)	-.005 (.029)	-.036 (.035)
T1 = 2004	.043*** (.016)	.049*** (.017)	.050*** (.017)	.127*** (.024)	.133*** (.024)
T2 = 2006	.054*** (.017)	.057*** (.018)	.060*** (.019)	.338*** (.025)	.354*** (.025)
Constant		.008 (.070)	-.098 (.091)	8.355*** (.087)	8.409*** (.115)
Number of observations	915	915	915	939	939
Number of groups (households)	310	310	310	313	313
Log likelihood	-549.99				
Wald chi2	106.87	127.97		720.96	
Prob>chi2	0.0000	0.0000		0.0000	
R-squared		0.1459	0.1114	0.4966	0.3849
F			4.34		22.41
Prob>F			0.0000		0.0000
Hausman test—chi2		12.56		38.40	
Prob>chi2		0.7653		0.0022	

Notes: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level. Figures in parentheses are the standard errors. ME: Marginal effect. RE: Random effect. FE: Fixed effect.

4.6 Concluding remarks

This chapter and indeed this thesis was motivated by a desire to understand the link between income diversification and changes in poverty and consumption in the rural areas of the Mekong River Delta. The analysis reported here was based on several cross-section and panel data samples covering a thirteen year period and drew on a framework that conceptualized diversification as a product of household capacity variables and “incentives to diversify”.

The thesis began by providing a brief outline of the major policy changes that have taken place over the thirteen year period and paid specific attention to changes in policies that altered agricultural land ownership status, international and internal trade policies that permitted trade in agricultural products, policies that permitted the movement of individuals and finally policies that provided a framework for the promotion of domestic and foreign non-farming enterprises. This introductory chapter was followed by chapter 2 which conceptualized diversification and then provided a description of the changes in sources of income and changes in time-allocation patterns of rural households between 1993 and 2006. Subsequently, in chapter 3 the thesis identified factors that drive diversification. Chapter 4 provided a description of changes in consumption, poverty and inequality and then identified factors associated with changes in consumption/poverty. Chapter 4 also examined the extent to which changes in poverty and consumption may be attributed to changes in time-allocation patterns (diversification) of rural households.

The empirical evidence put together in this thesis showed that over time there is a clear movement away from reliance on farming activities and a movement toward non-farming activities. In 1993, households allocated about 61.9 percent of their time to self-employment on their farms while by 2006 this had shrunk to 45.9 percent. At the same time, non-farming wage employment which accounted for about 7.3 percent of household time in 1993 rose to a 19.8 percent share (see Table 2.4). The empirical analysis further displayed that while households endowed with more educated labour as well as simply more labour regardless of education were more likely to move to non-farming activities, across all household groups there was clear movement to non-farming activities. The patterns of diversification suggested that while household capacity does play a role in influencing movement out of farming the bulk of the

change in time-allocation patterns may be attributed to changes in the price and incentive structure facing households (see Table 3.10B).

Chapter 4 began by displaying the spectacular (two-fold increase between 1993 and 2006) increase in consumption and corresponding decline in poverty (from 48.5 to 15.3 percent) which occurred without much change in inequality (Gini fell from 0.295 to 0.284 between 1993 and 2006). The descriptive analysis also showed that across various occupation group households whose heads were engaged in non-farming manual occupations experienced the sharpest decline in poverty (a fall from 57.4 to 10.2 percent). A consumption decomposition exercise showed that about 18 percent of the increase in consumption may be allocated to increases in household capacity (more education, more workers), while the remainder may be attributed to non-household specific attributes. To emphasize, that is, about 80 percent of the change in consumption is due to factors that are not particular to a household but influence the economic environment in which households operate (see Table 4.5). Panel data estimates of the factors that influence changes in poverty and consumption also delivered the same message. Of particular interest in terms of isolating an element of the change in the economic environment which may have played a role, the analysis showed that the increase in rice prices between 1993 and 1998—due to removal of internal and external restrictions—played a sharp role in reducing poverty between 1993 and 1998 (see Table 4.7).

Two approaches, a direct and indirect approach were used to analyze the links between consumption and diversification. Regardless of the approach the analysis showed that some of the same factors that drive diversification (household labour quantity and quality) also drive increases in consumption while household access to land increases consumption but prevents movement out of farming activities. However, the main story emerging from the analysis is that while household capacity does play a role in influencing both diversification and consumption it is largely changes in prices and economic incentives that have been the driving force behind both outcomes.

More broadly, the analysis reported in this thesis supports the idea that institutional and policy changes which have occurred in Vietnam in the last twenty years have provided the impetus for the spectacular growth and poverty reduction experienced in the MRD and in Vietnam. While identification of the particular policy measures that underlie

changes in the economic structure and environment are beyond the scope of this thesis, juxtaposing the microeconomic analysis with the institutional/structural changes over the period suggests that the combination of policies that promoted private ownership of land-use rights for agricultural land and freedom of trade were most important in the early period (1993 to 1998) while in the more recent period (2002-2006) the expansion of non-farming occupations is most likely to have been driven by changes in the enterprise law which permitted and promoted the set-up and expansion of domestic and foreign firms.

The kind of structural policy changes that have occurred in Vietnam since 1986 are by no means unique to the country. While the analysis reported in this thesis supports the idea that the changes have had positive effects these effects are by no means universal. It is quite possible and has indeed been recorded, that similar policy changes in another context may and have worsened poverty and inequality. Notwithstanding this cautionary note, this thesis has shown that in the MRD over the period 1993 and 2006 there has been a shift out of farming activities, a large increase in levels of household consumption and that the bulk of these changes maybe attributed to changes in the institutional environment facing households.

Notes

¹ James Foster, Joel Greer, and Erik Thorbecke proposed a general formula to calculate the family of poverty indices. The formula is expressed as

$$P_{\alpha} = (1/N) \sum_{i=1}^N \max \left[0, \left(\frac{Z - Y_i}{Z} \right)^{\alpha} \right]$$

where, Z is the poverty line; Y_i is the expenditure of individual i ; N is the total number of individuals in the data; and α is a parameter that if it is equal to 0 then this index is the headcount ratio, equal to 1 then the poverty depth, and equal to 2 then the poverty severity. The poverty line used for each corresponding year of study was already introduced in section 4.2.

² The poverty lines for 2002, 2004, and 2006 are those that are applied for rural areas in Vietnam because since 2002, the GSO estimates two different lines respectively for urban and rural areas.

³ The Chinese are an ethnic minority but as introduced in page 9 of chapter 1, their living standards and resource base is comparable to the Kinh majority and hence Chinese and Kinh are grouped into one ethnic group (the majority).

⁴ When all the β coefficients for the base outcome ($j=1$) are set to zero ($\beta_1=0$),

equation (4.4) can be separated into two equations $P_{ij} = \frac{\exp(\beta'_j x_i)}{1 + \sum_{k=2}^4 \exp(\beta'_k x_i)}$, for j

$= 2, 3, 4$, and $P_{i1} = \frac{1}{1 + \sum_{k=2}^4 \exp(\beta'_k x_i)}$. Then, the log-odds ratios or the relative

risk ratios can be normalized on the probability of being poor in both years and expressed as $\ln[P_{i2}/P_{i1}] = (\beta_2 - \beta_1)x'_2 = \beta_2 x'_2$ (with $k=1$) for the “poverty exit” outcome.

⁵ Descriptive statistics for the variables included in the specification are presented in Appendix 4.1.

⁶ Glewwe et al. (2002) use LSMS 1993 and 1998 and also report large changes in the intercepts.

⁷ Appendices 4.3A to 4.3D depict initial characteristics of households in each corresponding state while appendix 4.3E provides information on changes in characteristics and transition outcomes.

⁸ The inclusion of prices of paddy in these poverty probability specifications (as in Table 4.7) but *not* in the household expenditure specifications is to avoid the inclusion of paddy prices on both the right hand-side and left hand-side of the consumption specifications.

⁹ These findings parallel the work of van de Walle and Cratty (2004) who report that increases in non-farm self-employment and the probability of exiting poverty are both influenced by some common household specific attributes such as education.

Appendices

Appendix 1.1

Summary of major reforms implemented in Vietnam (1981-2006)

Year	Main reforms	Major developments and achievements
1981	The regime of contract N ^o 100 was applied to farming households	Farmers were given some autonomy with regard to agricultural decisions
1985	Monetary reform	Inflation galloped; the two-price mechanism and the regime of price fixing according to plan gradually lost its effect.
1986	The 6 th Congress of the Communist Party of Vietnam announced the Doi Moi (renovation) policy	Inflation galloped to 774%.
1987	-Foreign investment law and land law were issued; -The regime of market prices began to take effect	Inflation continued to gallop at more than 400% p.a..
1988	-Establishment of two-tier banking system -Resolution N ^o 10 on rights of farming households to use their agricultural land was promulgated.	-The first foreign joint venture was approved. -Exports reached a historical high of 1 billion USD.
1989	-The two-price system was removed -Goods limitations were discarded, except for 10 export items and 14 import items. -The exchange rate system was unified	-Vietnam became the world's third largest rice exporter. -High inflation was checked.
1990	-Foreign Investment Law (FDI) amended. -Ordinance on Central bank and State-owned commercial banks, credit organizations took effect. -Corporate law came into practice, creating foundations for limited liability companies and joint ventures.	-GDP growth stood at 8.3 percent. -Over 20 million tons of food were produced. -Over 2 million tons of crude oil were exported -FDI capital registered reached more than 1 billion USD.

Year	Main reforms	Major developments and achievements
1991	Private companies were allowed to directly handle import and export activities.	The industrial sector grew at 9 percent.
1992	-New Constitution was promulgated. Multi-sector economy was officially recognized by the Constitution. -Trade agreement with EU was signed. -Pilot equitization of enterprises was done.	-The total registered FDI stood at 5 billion USD. -The literacy rate of the population was over 86.6 percent. -The number of State-owned enterprises (SOEs) decreased; the number of private enterprises rose sharply.
1993	-Land law was amended. -Laws on bankruptcy and environment were promulgated. -The US embargo against Vietnam was removed. -Establishment of National Agricultural Extension system	-Relationship with international donors was established. -Poverty reduction: down to 58% (1993) from 70% (mid-1980s).
1994	-Labour law was issued. -Export licenses were removed for almost all types of export goods, except rice, wood, and crude oil.	Total registered FDI reaches 10 billion USD.
1995	-Law on SOEs came into effect. -The number of imported goods previously managed by quotas was reduced to 7 types.	-Vietnam joined the Association of Southeast Asian Nations (ASEAN) and the ASEAN Free Trade Area (AFTA). -GDP reached the highest ever peak of 9.54 percent. -The relations with the US was normalized. -Export reached new historical high of 5 billion USD.
1996	-Regulations on industrial property protection issued. -Large-scale equitization of SOEs was carried out.	-GDP grew at 9.34 percent. -Total registered FDI reaches 27 billion USD.
1997	-Agricultural Cooperative Law was enacted. -All domestic rice trade limitations were ridded. -Private economic sector was allowed to make direct rice export.	-3 million tons of rice were exported. -Exported crude oil stood at 10 million tons.
1998	-The supporting program was implemented to the most difficult communes -The Decree on Grassroots Democracy was approved.	-Annual population growth rate was below 2 percent. -Literacy rate was 89.4 percent. -Poverty reduction: down to 37% from 58% in 1993. -Vietnam joined the Asia-Pacific Economic Cooperation.
1999	-The Directive N ^o 37 came into prac-	-Rice export reached 4.5 million tons.

Year	Main reforms	Major developments and achievements
	tice, giving enterprises freedom to make import and export. -New Enterprise Law was approved.	-The growth rate was lowest in the 1990s (4.85 percent)
2000	-New Enterprise Law became into effect. -Resolution N ^o 3 on guidance of developing farm economy was issued by the Government. -Decree N ^o 132 on encouragement of agricultural diversification and rural jobs development was dated.	-The growth rate was restored to 6.75 percent. -Approximately 13,500 new private enterprises established, creating nearly 300,000 jobs. Literacy rate reached 94 percent.
2001	-The ten year socio-economic development strategy (2001-2010) was adopted by the 9th Communist Party Congress. -The SOE reform program was approved for the period of 2001-2005.	-IMF and WB resumed structural adjustment lending to Vietnam. -Economic growth rate was by 7.0 percent, the second highest position in the region. -Socio-political stability maintained.
2002	Resolution N ^o 12 on industrialization and modernization of agriculture and rural areas for the period 2001-2010 was released by the Party Central Committee.	-Negotiations to join the World Trade Organization were started. -Poverty incidence reduced to 29 percent.
2003	Updated Land Law was amended	Approximately 23,000 private enterprises established and 500,000 jobs created since the start of the Enterprise Law (2000).
2006	The Enterprise Law 2005 was in effect.	-Vietnam hosted the APEC CEO Summit. -Vietnam joined the WTO -Poverty incidence reduced to 15.5 percent.

Sources: Adapted and integrated based on information in UNEP (2003), Tang and Yue (2006), and De (2006).

Appendix 1.2 GDP of Vietnam and MRD, by economic sector (%)

Sector	1987	1990	1993	1996	1998	2000	2002	2004	2006
Vietnam									
Agriculture	40.6	38.7	29.9	27.8	25.8	24.5	23.0	21.8	20.4
Industry	28.4	22.7	28.9	29.7	32.5	36.7	38.5	40.2	41.5
Services	31.1	38.6	41.2	42.5	41.7	38.8	38.5	38.0	38.1
MRD									
Agriculture	na	na	na	58.9	na	52.8	na	48.1	43.2
Industry	na	na	na	15.0	na	18.0	na	21.5	24.5
Services	na	na	na	26.1	na	29.2	na	30.3	32.3

Note: na: Not available.

Source: GSO (1993, 1999, 2003, 2007c).

Appendix 1.3
Proportion of population aged 15 years old and above by highest certificates in 2006

Regions	Never went to school	None certificate	Primary	Lower secondary	Upper secondary	Technical worker	Vocational	College, university	Post-graduate	Other
Vietnam	8.1	14.5	24.0	28.7	12.6	3.3	4.3	4.4	0.1	0.0
RRD	4.4	7.2	14.9	39.9	15.8	5.3	5.9	6.2	0.3	0.0
NE	8.4	10.9	21.3	32.4	12.6	5.0	5.8	3.7	0.1	0.1
NW	20.7	14.1	25.0	23.2	7.2	2.2	4.8	2.8	0.0	0.0
NCC	7.2	8.2	19.4	39.1	15.7	2.6	4.4	3.4	0.1	0.0
SCC	7.1	15.3	27.3	26.0	12.5	2.7	4.0	5.0	0.1	0.1
CH	13.4	13.8	27.7	25.3	9.8	3.2	4.0	2.7	0.0	0.1
SE	6.7	15.4	27.1	21.5	15.5	3.1	3.9	6.8	0.1	0.0
MRD	10.6	27.1	33.2	16.7	6.7	1.5	2.1	2.1	0.0	0.0

Note: RRD: Red River Delta, NE: North East, NW: North West, NCC: North Central Coast, SCC: South Central Coast, CH: Central Highlands, SE: South East, and MRD: Mekong River Delta.

Source: GSO (2008).

Appendix 1.4
Sown areas and production of agricultural products

Category	Unit	1985	1990	1993	1998	1999	2002	2004	2006
Area									
Agricultural land	10 ⁶ ha	na	^a 2.46	^{ac} 2.65	na	^a 2.66	^{ad} 2.69	na	2.58
Sown area of cereals	10 ⁶ ha	2.26	2.59	3.01	3.78	4.00	3.86	3.85	3.80
- Paddy	10 ⁶ ha	2.25	2.58	2.99	3.76	3.98	3.84	3.82	3.77
Sown area cash crops	10 ³ ha	na	^b 92	108	128	127	115	104	103
Sown area fruit trees	10 ³ ha	na	^a 79	^{ac} 141	190	191	231	260	269
Aquaculture surface	10 ³ ha	na	149	158	342	349	570	659	691
Production									
Paddy	10 ⁶ ton	6.99	9.48	11.07	15.32	16.30	17.71	18.57	18.23
Farmed aquaculture	10 ⁶ ton	na	0.13	^{ac} 0.27	0.26	0.30	0.52	0.77	1.17
Buffalo	10 ³ hd	na	^b 251	^c 125	90	76	37	36	39
Cattle	10 ³ hd	na	^b 224	^c 150	164	184	278	420	680
Pig	10 ⁶ hd	na	^b 1.74	^c 2.38	2.59	2.80	3.15	3.71	3.98
Poultry	10 ⁶ hd	na	^a 18.17	^{ac} 34.05	na	^a 42.24	49.99	35.56	36.38

Notes: ^a: adapted from De (2006), ^b: data in 1991, ^c: data in 1995, ^d: data in 2001, na: Not available.

Source: GSO (1993, 1999, 2003, 2007c).

Appendix 2.1
Distribution of income sources among rural households (%)

Number of sources	1993	1998	2002	2004	2006
1	1.88	1.13	8.21	0.90	0.69
2	13.88	10.82	26.62	10.53	8.55
3	31.13	37.00	36.39	25.64	25.11
4	32.50	33.07	22.74	34.01	32.67
5	16.38	15.29	5.50	22.55	24.27
6	4.00	2.69	0.52	5.75	8.33
7	0.25	0.00	0.01	0.62	0.37
<i>Total</i>	<i>100.00</i>	<i>100.00</i>	<i>100.00</i>	<i>100.00</i>	<i>100.00</i>

Source: Author's calculation from the LSMS 1993, 1998, 2002, 2004 and 2006.

Appendix 2.2
Shares of private transfers by origins

Source	1993	1998	2002	2004	2006
Overseas transfers	.144	.079	.055	.051	.060
Domestic transfers	.856	.921	.945	.949	.940
- City	.125	.224	-	-	-
- Large towns	.081	.114	-	-	-
- Small towns	.054	.016	-	-	-
- Rural	.596	.567	-	-	-

Source: Author's calculation from the LSMS 1993, 1998, 2002, 2004 and 2006.

Appendix 3.1
Determinants of time-allocation patterns, 1993

Variables	Farm self-employment		Non-farm wage employment	
	Coef.	Effect	Coef.	Effect
Household characteristics				
Female head = 1	-.107*** (.034)	-.078*** (.026)	.013 (.063)	.003 (.013)
Ethnic minority = 1	-.094* (.054)	-.069* (.041)	-.116 (.121)	-.020 (.018)
Household size	-.030 (.030)	-.021 (.021)	.018 (.041)	.004 (.008)
Household size squared	.002 (.002)	.001 (.002)	-.001 (.003)	-.000 (.001)
Household labour resource				
Number of male members 19-59 age group (A)	-.026 (.026)	-.019 (.018)	.061 (.057)	.012 (.011)
Number of female members 19-54 age group (B)	-.038 (.025)	-.027 (.018)	.073 (.044)	.014 (.009)

Variables	Farm self-employment		Non-farm wage employment	
	Coef.	Effect	Coef.	Effect
Number of members 15-18 age group	-.029 (.026)	-.021 (.019)	.039 (.043)	.008 (.008)
Share of main labour force (A+B): males with primary education	-.009 (.116)	-.006 (.084)	.181 (.250)	.035 (.050)
Share of main labour force (A+B): females with primary education	-.030 (.084)	-.021 (.061)	.106 (.138)	.021 (.027)
Share of main labour force (A+B): males with secondary education	.019 (.119)	.013 (.086)	.279 (.206)	.055 (.042)
Share of main labour force (A+B): females with secondary education	-.038 (.114)	-.028 (.083)	-.003 (.190)	-.001 (.037)
Share of main labour force (A+B): males with tertiary education	-.022 (.135)	-.016 (.098)	.562*** (.156)	.110*** (.031)
Share of main labour force (A+B): females with tertiary education	-.298** (.107)	-.216*** (.077)	.790*** (.176)	.155*** (.037)
Household non-labour capitals				
Farm size (hectare)	.355*** (.062)	.258*** (.042)	-.125** (.060)	-.025* (.012)
Farm size squared	-.033*** (.011)	-.024*** (.008)	.009 (.007)	.002 (.001)
Value of houses and real estate (million VND)	.000 (.002)	.000 (.001)	.004*** (.001)	.001*** (.000)
Communal/provincial level variables				
Access to paved roads = 1	-.057 (.097)	-.041 (.070)	.093 (.078)	.019 (.016)
Number of natural disasters over previous years within commune	.016 (.016)	.011 (.012)	-.004 (.026)	-.001 (.005)
Unit price of paddy ('000 VND/kg)	.701 (.444)	.509 (.334)	-.388 (.317)	-.076 (.063)
Constant	-.079 (.468)		-.431 (.359)	
Number of PSUs		25		25
Number of observations		795		795
- Left-censored (at zero)		78		623
- Uncensored		528		165
- Right-censored (at one)		189		7
Pseudo R²		0.1679		0.1083
Log pseudolikelihood		-1,478,741.2		-973,083.7
Pr(0<S<1)		0.7261		0.1957

Note: *, **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level.

Appendix 3.2
Determinants of the temporal income diversification
(Tobit model with fixed effects)

Variables	Farm self-employment		Non-farm wage employment	
	Coef.	Effect	Coef.	Effect
Household characteristics				
Female head = 1	-.004 (.214)	-.003 (.)	-.033 (.160)	-.000 (.)
Ethnic minority = 1	3.064 (197.623)	.557 (.)	.020 (617.578)	.000 (.)
Household size	-.157 (.104)	-.117 (.)	.099 (.084)	.000 (.)
Household size squared	.005 (.009)	.004 (.)	-.007 (.007)	-.000 (.)
Household labour resource				
Number of male members 19-59 age group (A)	-.101 (.085)	-.075 (.)	.159** (.075)	.000 (.)
Number of female members 19-54 age group (B)	.104 (.110)	.078 (.)	.101 (.085)	.000 (.)
Number of members 15-18 age group	-.157** (.065)	-.117 (.)	.295*** (.064)	.001 (.)
Share of main labour force (A+B): males with primary education	-.030 (.230)	-.022 (.)	.251 (.234)	.001 (.)
Share of main labour force (A+B): females with primary education	-.483* (.282)	-.360 (.)	.808*** (.288)	.002 (.)
Share of main labour force (A+B): males with secondary education	-.544** (.257)	-.406 (.)	.776*** (.250)	.002 (.)
Share of main labour force (A+B): females with secondary education	-.309 (.282)	-.231 (.)	.483* (.270)	.001 (.)
Share of main labour force (A+B): males with tertiary education	-.910*** (.330)	-.679 (.)	1.275*** (.324)	.004 (.)
Share of main labour force (A+B): females with tertiary education	-1.311*** (.377)	-.978 (.)	1.543*** (.316)	.004 (.)
Household non-labour capitals				
Farm size (hectare)	.488*** (.129)	.364 (.)	-.302** (.129)	-.001 (.)
Farm size squared	-.065*** (.023)	-.048 (.)	.037 (.024)	.000 (.)
Value of houses and real estate (million VND)	-.000 (.000)	-.000 (.)	.000 (.000)	.000 (.)
Communal/provincial level variables				
Access to paved roads = 1	-.036 (.075)	-.027 (.)	.068 (.069)	.000 (.)
Own irrigation system = 1	-.211 (128.169)	-.155 (.)	-1.388 (565.432)	-.092 (.)
Number of natural disasters over previous years within commune	1.039 (49.406)	.776 (.)	-.084 (189.696)	-.000 (.)
Unit price of paddy (thousand VND/kg)	.183 (.292)	.137 (.)	-.318 (.264)	-.001 (.)
Time dummy variables				
T1 = 2004	.063 (.067)	.047 (.)	.121** (.059)	.000 (.)
T2 = 2006	-.022 (.091)	-.017 (.)	.320*** (.086)	.002 (.)
Constant	-3.268 (304.880)		-1.549 (836.654)	
Number of groups		310		310
Number of observations		915		915
- Left-censored (at zero)		287		621

Variables	Farm self-employment		Non-farm wage employment	
	Coef.	Effect	Coef.	Effect
- <i>Uncensored</i>		283		252
- <i>Right-censored (at one)</i>		345		42
Wald chi2(328)		369.76		337.40
Prob > chi2		0.0557		0.3485
Log likelihood		-348.1385		-225.0522
Pr(0<S <1)		--		--

Notes: * ** *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level. Coefficients of dummy variables for households are not listed out in the table.

Appendix 4.1 Descriptive statistics of variables used in Equation (4.1)

Variables	1993	1998	2002	2004	2006
Mean log of household expenditure	8.692	9.216	9.378	9.532	9.775
	(.588)	(.473)	(.545)	(.569)	(.597)
Household characteristics					
Female head = 1	.234	.227	.232	.235	.235
	(.423)	(.419)	(.422)	(.424)	(.424)
Ethnic minority = 1	.098	.103	.069	.058	.069
	(.297)	(.304)	(.253)	(.234)	(.254)
Household size	5.47	5.15	4.64	4.44	4.18
	(2.24)	(1.95)	(1.81)	(1.71)	(1.69)
Occupation of head					
White-collar job = 1	.034	.036	.031	.042	.049
	(.181)	(.186)	(.174)	(.200)	(.216)
Sales or services = 1	.065	.075	.010	.013	.016
	(.247)	(.264)	(.102)	(.113)	(.126)
Non-farm manual work = 1	.068	.071	.194	.165	.212
	(.251)	(.258)	(.396)	(.371)	(.409)
Not working = 1	.099	.091	.156	.188	.141
	(.299)	(.287)	(.363)	(.391)	(.348)
Household labour resource					
Number of male members	1.104	1.160	1.206	1.246	1.165
19-59 age group (A)	(.742)	(.724)	(.769)	(.801)	(.746)
Number of female members	1.174	1.204	1.186	1.150	1.120
19-54 age group (B)	(.701)	(.710)	(.710)	(.720)	(.743)
Number of members	.549	.604	.493	.451	.419
15-18 age group	(.756)	(.749)	(.716)	(.668)	(.642)
Share of main labour force (A+B):					
males with primary education	.202	.216	.201	.192	.185
	(.247)	(.255)	(.256)	(.253)	(.255)
Share of main labour force (A+B):					
females with primary education	.287	.293	.255	.231	.217
	(.282)	(.277)	(.268)	(.255)	(.251)
Share of main labour force (A+B):					
males with secondary education	.154	.148	.162	.172	.173
	(.243)	(.235)	(.237)	(.240)	(.250)
Share of main labour force (A+B):					
females with secondary education	.104	.107	.134	.131	.133
	(.215)	(.209)	(.226)	(.216)	(.225)
Share of main labour force (A+B):					
males with tertiary education	.059	.061	.076	.091	.092
	(.168)	(.155)	(.183)	(.196)	(.202)
Share of main labour force (A+B):					
females with tertiary education	.043	.038	.047	.052	.061
	(.154)	(.145)	(.150)	(.156)	(.167)
Household non-labour capitals					
Farm size (hectare)	.875	.859	.760	.789	.788
	(1.01)	(1.01)	(1.13)	(1.06)	(1.17)

Variables	1993	1998	2002	2004	2006
Communal level variables					
Having access to paved roads = 1 ^(a)	.400 (.490)	.316 (.465)	.304 (.460)	.383 (.486)	.431 (.495)
Number of observations	800	830	5,079	1,488	1,473
PSU	25	26	500	496	491

Notes: Expenditure is measured at the January prices in each corresponding year. Working ages refer to 19-59 for males and 19-54 for females.

^(a) It is a road for motor vehicles for 1993 while a road for cars for 1998, 2002, and 2006.

Appendix 4.2A
Descriptive statistics of variables used in Equation (4.3)

Variables	Panel sample 1993/98			Panel sample 2002/04/06			
	Full	1993 sample	1998 sample	Full	2002 sample	2004 sample	2006 sample
Mean log of household expenditure	8.767 (.533)	8.705 (.580)	8.830 (.475)	9.546 (.579)	9.410 (.532)	9.514 (.589)	9.714 (.574)
Household characteristics							
Female head = 1	.245 (.430)	.233 (.423)	.256 (.437)	.213 (.410)	.208 (.406)	.217 (.413)	.214 (.411)
Ethnic minority = 1	.100 (.301)	.100 (.301)	.100 (.301)	.051 (.220)	.051 (.221)	.051 (.221)	.051 (.221)
Household size	5.37 (2.13)	5.55 (2.24)	5.19 (2.00)	4.37 (1.73)	4.58 (1.79)	4.36 (1.72)	4.15 (1.65)
Occupation of head							
White-collar job = 1	.033 (.179)	.034 (.181)	.033 (.178)	.032 (.176)	.019 (.137)	.038 (.192)	.038 (.192)
Sales or services = 1	.071 (.256)	.064 (.244)	.078 (.268)	.007 (.086)	.000 (.080)	.006 (.080)	.016 (.126)
Non-farm manual work = 1	.068 (.252)	.066 (.249)	.069 (.254)	.185 (.389)	.192 (.394)	.166 (.373)	.198 (.399)
Not working = 1	.101 (.302)	.102 (.303)	.100 (.301)	.183 (.387)	.182 (.387)	.201 (.402)	.166 (.373)
Farming work = 1	.727 (.446)	.734 (.442)	.720 (.449)	.592 (.492)	.607 (.489)	.588 (.493)	.581 (.494)
Household labour resource							
Number of male members	1.134 (.741)	1.117 (.743)	1.150 (.740)	1.257 (.758)	1.265 (.736)	1.259 (.760)	1.246 (.780)
19-59 age group (A)							
Number of female members	1.198 (.720)	1.187 (.699)	1.209 (.740)	1.105 (.708)	1.163 (.722)	1.083 (.679)	1.070 (.722)
19-54 age group (B)							
Number of members	.598 (.757)	.569 (.762)	.627 (.752)	.431 (.653)	.482 (.734)	.447 (.649)	.364 (.562)
15-18 age group							
Share of main labour force (A+B):							
males with primary education	.212 (.254)	.204 (.247)	.220 (.260)	.200 (.263)	.212 (.267)	.215 (.276)	.171 (.242)
Share of main labour force (A+B):							
females with primary education	.291 (.278)	.290 (.278)	.292 (.279)	.209 (.241)	.241 (.252)	.198 (.234)	.188 (.234)
Share of main labour force (A+B):							
males with secondary education	.151 (.239)	.154 (.243)	.148 (.235)	.166 (.242)	.169 (.235)	.159 (.233)	.169 (.257)
Share of main labour force (A+B):							
females with secondary educ.	.104 (.212)	.101 (.214)	.107 (.209)	.125 (.218)	.119 (.214)	.133 (.220)	.124 (.221)
Share of main labour force (A+B):							
males with tertiary education	.057 (.157)	.058 (.167)	.055 (.148)	.111 (.224)	.099 (.214)	.107 (.218)	.126 (.240)
Share of main labour force (A+B):							
females with tertiary education	.042 (.152)	.044 (.155)	.039 (.148)	.060 (.161)	.054 (.154)	.059 (.160)	.067 (.167)

Variables	Panel sample 1993/98			Panel sample 2002/04/06			
	Full	1993 sample	1998 sample	Full	2002 sample	2004 sample	2006 sample
Household non-labour capitals							
Farm size (hectare)	.886 (1.01)	.912 (1.03)	.860 (.99)	.741 (1.00)	.764 (1.10)	.728 (.93)	.731 (.95)
Communal level variables							
Having access to paved roads=1 ^(a)	.371 (.483)	.409 (.492)	.332 (.471)	.411 (.492)	.339 (.474)	.383 (.487)	.511 (.501)
N	1,414	707	707	939	313	313	313

Notes: Real expenditure amounts are calculated at the January prices in each initial year of panel samples. Working ages refer to 19-59 for males and 19-54 for females.

^(a) It is a road for motor vehicles for 1993 while a road for cars for 1998, 2002, 2004, and 2006.

Appendix 4.2B

Descriptive statistics of variables used in Equation (4.3)

Variables	Panel sample 2002/04			Panel sample 2004/06		
	Full	2002 sample	2004 sample	Full	2004 sample	2006 sample
Mean log of household expenditure	9.427 (.560)	9.376 (.543)	9.479 (.572)	9.639 (.577)	9.555 (.564)	9.723 (.577)
Household characteristics						
Female head = 1	.224 (.417)	.220 (.415)	.228 (.420)	.224 (.417)	.221 (.415)	.227 (.419)
Ethnic minority = 1	.060 (.237)	.060 (.237)	.060 (.237)	.065 (.247)	.065 (.247)	.065 (.247)
Household size	4.55 (1.73)	4.60 (1.73)	4.49 (1.74)	4.29 (1.67)	4.36 (1.67)	4.22 (1.67)
Occupation of head						
White-collar job = 1	.031 (.172)	.023 (.149)	.038 (.192)	.039 (.194)	.041 (.198)	.038 (.191)
Sales or services = 1	.010 (.099)	.007 (.084)	.013 (.113)	.012 (.111)	.010 (.100)	.015 (.120)
Non-farm manual work = 1	.176 (.381)	.196 (.397)	.155 (.362)	.190 (.392)	.172 (.377)	.208 (.406)
Not working = 1	.185 (.388)	.176 (.381)	.193 (.395)	.172 (.377)	.188 (.391)	.156 (.363)
Farming work = 1	.599 (.490)	.597 (.491)	.600 (.490)	.587 (.493)	.590 (.492)	.584 (.493)
Household labour resource						
Number of male members	1.248 (.772)	1.233 (.751)	1.262 (.793)	1.224 (.764)	1.219 (.753)	1.228 (.776)
Number of female members	1.147 (.691)	1.158 (.675)	1.135 (.708)	1.129 (.709)	1.129 (.690)	1.129 (.727)
Number of members	.468 (.699)	.481 (.729)	.455 (.667)	.419 (.634)	.440 (.663)	.397 (.604)
Share of main labour force (A+B):						
males with primary education	.202 (.256)	.209 (.255)	.196 (.256)	.184 (.253)	.191 (.258)	.176 (.248)
Share of main labour force (A+B):						
females with primary education	.228 (.252)	.247 (.258)	.208 (.243)	.218 (.252)	.226 (.254)	.209 (.249)
Share of main labour force (A+B):						
males with secondary education	.163 (.235)	.160 (.233)	.165 (.237)	.179 (.247)	.177 (.243)	.181 (.251)

Variables	Panel sample 2002/04			Panel sample 2004/06		
	Full	2002 sample	2004 sample	Full	2004 sample	2006 sample
Share of main labour force (A+B):	.129	.124	.133	.139	.136	.143
females with secondary education	(.215)	(.215)	(.215)	(.229)	(.224)	(.233)
Share of main labour force (A+B):	.094	.088	.099	.099	.093	.105
males with tertiary education	(.201)	(.198)	(.204)	(.211)	(.205)	(.217)
Share of main labour force (A+B):	.055	.052	.057	.058	.056	.060
females with tertiary education	(.158)	(.157)	(.160)	(.163)	(.162)	(.164)
Household non-labour capitals						
Farm size (hectare)	.770	.758	.781	.828	.813	.843
	(1.04)	(1.08)	(.99)	(1.17)	(1.09)	(1.25)
Communal level variables						
Having access to paved roads= 1 ^(a)	.349	.314	.383	.428	.381	.475
	(.477)	(.465)	(.486)	(.495)	(.486)	(.500)
Number of observations	1,406	703	703	1,376	688	688

Notes: Real expenditure amounts are calculated at the January prices in each corresponding year.

Working ages refer to 19-59 for males and 19-54 for females.

^(a) It is a road for motor vehicles for 1993 while a road for cars for 1998, 2002, and 2006.

Appendix 4.3A

Initial characteristics and movements in and out of poverty (1993-1998)

Variables	Always poor	Poverty exit	Poverty entry	Never poor
Proportion of sample	.279	.209	.091	.422
Household and head characteristics				
Female head = 1	.208	.230	.219	.255
	(.407)	(.422)	(.417)	(.437)
Ethnic minority = 1	.188	.108	.047	.050
	(.392)	(.312)	(.213)	(.219)
Household size	6.2	5.9	5.6	4.9
	(2.1)	(2.4)	(2.2)	(2.0)
Age of head	43.6	48.1	51.0	48.9
	(14.6)	(14.4)	(13.9)	(14.4)
Education of head	3.1	3.9	4.2	4.8
	(2.7)	(3.1)	(3.1)	(3.4)
Occupation of head				
White-collar job = 1	.010	.027	.031	.054
	(.101)	(.163)	(.175)	(.226)
Sales or services = 1	.025	.054	.047	.097
	(.158)	(.227)	(.213)	(.297)
Non-farm manual work = 1	.091	.068	.047	.054
	(.289)	(.252)	(.213)	(.226)
Not working = 1	.112	.095	.094	.101
	(.316)	(.294)	(.294)	(.301)
Household labour resource				
Number of male members	1.137	1.162	1.219	1.060
19-59 age group (A)	(.628)	(.783)	(.766)	(.785)
Number of female members	1.208	1.243	1.328	1.114
19-54 age group (B)	(.608)	(.762)	(.944)	(.657)
Number of members	.548	.676	.641	.513
15-18 age group	(.665)	(.835)	(.843)	(.762)
Share of main labour force (A+B):	.076	.049	.036	.010
males without education level	(.170)	(.135)	(.118)	(.079)
Share of main labour force (A+B):	.139	.068	.063	.025
females without education level	(.227)	(.156)	(.182)	(.109)

Variables	Always poor	Poverty exit	Poverty entry	Never poor
Share of main labour force (A+B):	.269	.221	.172	.160
males with primary education	(.248)	(.244)	(.228)	(.243)
Share of main labour force (A+B):	.297	.318	.280	.273
females with primary education	(.259)	(.275)	(.267)	(.294)
Share of main labour force (A+B):	.099	.138	.242	.179
males with secondary education	(.194)	(.223)	(.323)	(.253)
Share of main labour force (A+B):	.056	.084	.107	.139
females with secondary education	(.164)	(.197)	(.223)	(.242)
Share of main labour force (A+B):	.023	.048	.058	.087
males with tertiary education	(.097)	(.163)	(.176)	(.196)
Share of main labour force (A+B):	.011	.034	.043	.070
females with tertiary education	(.063)	(.134)	(.122)	(.203)
Household non-labour capitals				
Farm size (hectare)	.606	.655	.895	1.244
	(.574)	(.615)	(.867)	(1.327)
Communal level variables				
Having access to paved roads = 1 ^(a)	.396	.507	.313	.389
	(.490)	(.502)	(.467)	(.488)
Unit price of paddy	1.020	.992	1.016	1.006
	(.106)	(.106)	(.093)	(.091)
Households per group	197	148	64	298
Households in full sample			707	

Notes: Figures in parentheses are standard deviations. Prices of paddy are adjusted to the January in each initial year of the corresponding periods.

^(a) It is a road for motor vehicles for 1993 while a road for cars for 1998, 2002, 2004, and 2006.

Appendix 4.3B

Initial characteristics and movements in and out of poverty (2002-2006)

Variables	Always poor	Poverty exit	Poverty entry	Never poor
Proportion of sample	.077	.125	.044	.754
Household and head characteristics				
Female head = 1	.250	.205	.071	.212
	(.442)	(.409)	(.267)	(.409)
Ethnic minority = 1	.167	.128	.143	.021
	(.381)	(.339)	(.363)	(.144)
Household size	5.542	5.128	4.429	4.403
	(1.978)	(1.838)	(1.453)	(1.744)
Age of head	44.708	46.667	49.786	50.517
	(13.110)	(15.192)	(18.162)	(15.158)
Education of head	3.250	3.359	5.071	4.919
	(3.124)	(2.300)	(1.817)	(3.654)
Occupation of head				
White-collar job = 1	.000	.000	.000	.025
	(.000)	(.000)	(.000)	(.158)
Sales or services = 1	.000	.000	.000	.000
	(.000)	(.000)	(.000)	(.000)
Non-farm manual work = 1	.125	.231	.286	.186
	(.338)	(.427)	(.469)	(.390)
Not working = 1	.250	.128	.286	.178
	(.442)	(.339)	(.469)	(.383)
Household labour resource				
Number of male members	1.208	1.128	1.143	1.301
19-59 age group (A)	(.658)	(.695)	(.535)	(.760)
Number of female members	1.250	1.103	1.071	1.169
19-54 age group (B)	(.737)	(.447)	(.475)	(.770)

Variables	Always poor	Poverty exit	Poverty entry	Never poor
Number of members	.542	.538	.571	.462
15-18 age group	(.833)	(.756)	(.938)	(.711)
Share of main labour force (A+B):				
males without education level	.115	.038	.000	.019
	(.255)	(.135)	(.000)	(.092)
Share of main labour force (A+B):				
females without education level	.152	.085	.036	.025
	(.263)	(.187)	(.134)	(.102)
Share of main labour force (A+B):				
males with primary education	.253	.300	.179	.196
	(.244)	(.246)	(.228)	(.273)
Share of main labour force (A+B):				
females with primary education	.297	.367	.363	.207
	(.277)	(.269)	(.288)	(.235)
Share of main labour force (A+B):				
males with secondary education	.090	.129	.310	.175
	(.184)	(.243)	(.297)	(.231)
Share of main labour force (A+B):				
females with secondary education	.073	.036	.089	.139
	(.173)	(.118)	(.186)	(.227)
Share of main labour force (A+B):				
males with tertiary education	.021	.006	.024	.126
	(.102)	(.040)	(.089)	(.236)
Share of main labour force (A+B):				
females with tertiary education	.000	.013	.000	.069
	(.000)	(.080)	(.000)	(.172)
Household non-labour capitals				
Farm size (hectare)	.181	.347	.837	.888
	(.274)	(.498)	(1.726)	(1.142)
Communal level variables				
Having access to paved roads = 1 ^(a)	.208	.256	.357	.364
	(.415)	(.442)	(.497)	(.482)
Unit price of paddy	1.939	1.973	1.952	1.977
	(.207)	(.210)	(.235)	(.205)
Number of enterprises	890.0	947.9	814.3	988.6
	(315.1)	(266.0)	(324.5)	(267.5)
Households per group	24	39	14	236
Households in full sample			313	

Notes: Figures in parentheses are the standard deviation of the attached mean of a variable. Prices of paddy are adjusted to the January in each initial year of the corresponding periods.

^(a) It is a road for motor vehicles for 1993 while a road for cars for 1998, 2002, 2004, and 2006.

Appendix 4.3C

Initial characteristics and movements in and out of poverty (2002-2004)

Variables	Always poor	Poverty exit	Poverty entry	Never poor
Proportion of sample	.120	.105	.058	.717
Household and head characteristics				
Female head = 1	.238	.189	.293	.216
	(.428)	(.394)	(.461)	(.412)
Ethnic minority = 1	.214	.027	.049	.040
	(.413)	(.163)	(.218)	(.195)
Household size	5.321	5.216	4.390	4.407
	(1.877)	(1.777)	(1.531)	(1.657)
Age of head	46.440	46.392	46.878	50.567
	(13.717)	(14.811)	(15.494)	(15.045)
Education of head	2.690	4.108	3.927	5.091
	(2.430)	(2.615)	(3.053)	(3.637)
Occupation of head				
White-collar job = 1	.000	.000	.000	.032
	(.000)	(.000)	(.000)	(.175)
Sales or services = 1	.000	.014	.000	.008
	(.000)	(.116)	(.000)	(.089)

Variables	Always poor	Poverty exit	Poverty entry	Never poor
Non-farm manual work = 1	.167 (.375)	.203 (.405)	.098 (.300)	.208 (.407)
Not working = 1	.190 (.395)	.108 (.313)	.171 (.381)	.185 (.388)
Household labour resource				
Number of male members	1.071	1.338	1.122	1.254
19-59 age group (A)	(.597)	(.896)	(.678)	(.753)
Number of female members	1.226	1.135	1.122	1.153
19-54 age group (B)	(.647)	(.557)	(.557)	(.704)
Number of members	.583	.500	.341	.472
15-18 age group	(.779)	(.763)	(.693)	(.718)
Share of main labour force (A+B):	.108	.021	.039	.017
males without education level	(.231)	(.094)	(.124)	(.085)
Share of main labour force (A+B):	.171	.037	.069	.024
females without education level	(.276)	(.122)	(.175)	(.103)
Share of main labour force (A+B):	.248	.268	.270	.188
males with primary education	(.228)	(.251)	(.292)	(.254)
Share of main labour force (A+B):	.307	.344	.341	.215
females with primary education	(.278)	(.246)	(.304)	(.246)
Share of main labour force (A+B):	.072	.182	.157	.172
males with secondary education	(.161)	(.249)	(.225)	(.238)
Share of main labour force (A+B):	.054	.077	.100	.145
females with secondary education	(.158)	(.161)	(.217)	(.226)
Share of main labour force (A+B):	.017	.023	.012	.116
males with tertiary education	(.083)	(.097)	(.078)	(.222)
Share of main labour force (A+B):	.000	.007	.012	.071
females with tertiary education	(.000)	(.058)	(.078)	(.180)
Household non-labour capitals				
Farm size (hectare)	.299 (.651)	.463 (.562)	.549 (1.075)	.895 (1.158)
Communal level variables				
Having access to paved roads = 1 ^(a)	.214 (.413)	.257 (.440)	.171 (.381)	.351 (.478)
Unit price of paddy	1.915 (.197)	1.980 (.199)	1.988 (.223)	1.980 (.197)
Number of enterprises	870.8 (300.2)	896.3 (264.6)	986.3 (330.9)	980.6 (277.3)
Households per group	84	74	41	504
Households in full sample	703			

Notes: Figures in parentheses are the standard deviation of the attached mean of a variable. Prices of paddy are adjusted to the January in each initial year of the corresponding periods.

^(a) It is a road for motor vehicles for 1993 while a road for cars for 1998, 2002, 2004, and 2006.

Appendix 4.3D

Initial characteristics and movements in and out of poverty (2004-2006)

Variables	Always poor	Poverty exit	Poverty entry	Never poor
Proportion of sample	.061	.087	.054	.798
Household and head characteristics				
Female head = 1	.381 (.492)	.167 (.376)	.270 (.450)	.211 (.409)
Ethnic minority = 1	.167 (.377)	.133 (.343)	.189 (.397)	.042 (.201)
Household size	4.810 (1.292)	5.317 (1.761)	4.568 (1.849)	4.200 (1.638)

Variables	Always poor	Poverty exit	Poverty entry	Never poor
Age of head	46.190 (11.758)	50.917 (16.290)	54.838 (17.181)	51.432 (14.677)
Education of head	2.690 (2.80)	3.333 (2.45)	3.486 (3.16)	5.260 (3.59)
Occupation of head				
White-collar job = 1	.048 (.216)	.000 (.000)	.000 (.000)	.047 (.213)
Sales or services = 1	.024 (.154)	.017 (.129)	.000 (.000)	.009 (.095)
Non-farm manual work = 1	.024 (.154)	.117 (.324)	.162 (.374)	.189 (.392)
Not working = 1	.190 (.397)	.283 (.454)	.297 (.463)	.169 (.375)
Household labour resource				
Number of male members	1.119 (.550)	1.333 (.681)	1.216 (.821)	1.215 (.770)
19-59 age group (A)				
Number of female members	1.095 (.532)	1.183 (.504)	1.054 (.621)	1.131 (.723)
19-54 age group (B)				
Number of members	.643 (.759)	.633 (.843)	.595 (.762)	.393 (.618)
15-18 age group				
Share of main labour force (A+B):	.091 (.184)	.048 (.132)	.068 (.213)	.017 (.091)
males without education level				
Share of main labour force (A+B):	.143 (.257)	.067 (.155)	.095 (.250)	.024 (.097)
females without education level				
Share of main labour force (A+B):	.282 (.281)	.284 (.232)	.240 (.306)	.171 (.252)
males with primary education				
Share of main labour force (A+B):	.280 (.264)	.316 (.261)	.223 (.280)	.213 (.248)
females with primary education				
Share of main labour force (A+B):	.107 (.235)	.142 (.224)	.149 (.244)	.189 (.245)
males with secondary education				
Share of main labour force (A+B):	.062 (.157)	.091 (.182)	.153 (.255)	.146 (.229)
females with secondary education				
Share of main labour force (A+B):	.012 (.077)	.039 (.120)	.047 (.154)	.108 (.219)
males with tertiary education				
Share of main labour force (A+B):	.000 (.000)	.013 (.072)	.000 (.000)	.068 (.177)
females with tertiary education				
Household non-labour capitals				
Farm size (hectare)	.290 (.447)	.427 (.543)	.604 (.684)	.909 (1.166)
Communal level variables				
Having access to paved roads = 1 ^(a)	.262 (.445)	.383 (.490)	.486 (.507)	.383 (.486)
Unit price of paddy	2.025 (.171)	2.032 (.183)	2.046 (.157)	2.063 (.176)
Number of enterprises	977.1 (397.1)	1,059.3 (417.4)	839.4 (391.9)	1,019.9 (370.5)
Households per group	42	60	37	549
Households in full sample	688			

Notes: Figures in parentheses are the standard deviation of the attached mean of a variable. Prices of paddy are adjusted to the January in each initial year of the corresponding periods.

^(a) It is a road for motor vehicles for 1993 while a road for cars for 1998, 2002, 2004, and 2006.

Appendix 4.3E
Changes in characteristics and movements in and out of poverty

Variables	1993/98		2002/06	
	Always poor	Poverty exit	Always poor	Poverty exit
Head's move out of farming work in the end year (excluding not working)	.041 (.198)	.108 (.312)	.167 (.381)	.051 (.223)
Change in household size	-.178 (1.72)	-.912 (2.09)	-.375 (1.408)	-.692 (1.360)
Change in number of male members 19-59 age group	.096 (.704)	-.020 (.892)	.208 (.588)	.026 (.843)
Change in number of female members 19-54 age group	.030 (.721)	-.054 (.946)	-.083 (.776)	-.077 (.623)
Change in number of male members 15-18 age group	.147 (.823)	.047 (.978)	-.167 (.702)	-.077 (.839)
Change in male share of labour with primary education level	.028 (.273)	.008 (.220)	-.037 (.279)	-.072 (.271)
Change in female share of labour with primary education level	.021 (.257)	.021 (.315)	.001 (.280)	-.104 (.226)
Change in male share of labour with tertiary education level	.000 (.075)	-.014 (.157)	.007 (.034)	.066 (.218)
Change in female share of labour with tertiary education level	.002 (.054)	-.014 (.079)	.014 (.068)	.018 (.143)
Change in farm size	-.019 (.441)	.016 (.623)	.085 (.447)	.147 (.431)
Change in commune-level paddy prices	.219 (.136)	.258 (.136)	.200 (.099)	.246 (.099)
N	197	148	24	39

Notes: Household main labour force consists of members whose age is 19-59 for males and 19-54 for females. Figures in parentheses are the standard deviation of the attached mean of a variable. Prices of paddy are adjusted to the January in each initial year of the corresponding periods.

Appendix 4.3E (cont.)
Changes in characteristics and movements in and out of poverty

Variables	2002/04		2004/06	
	Always poor	Poverty exit	Always poor	Poverty exit
Head's move out of farming work in the end year (excluding not working)	.012 (.109)	.054 (.228)	.119 (.328)	.033 (.181)
Change in household size	-.083 (1.346)	-.432 (1.386)	-.119 (.942)	-.750 (1.336)
Change in number of male members 19-59 age group	.071 (.617)	-.054 (.617)	.238 (.484)	-.033 (.637)
Change in number of female members 19-54 age group	-.048 (.579)	-.054 (.719)	-.024 (.468)	-.100 (.656)
Change in number of male members 15-18 age group	.214 (.660)	-.054 (.594)	-.190 (.773)	-.200 (.605)

Variables	2002/04		2004/06	
	Always poor	Poverty exit	Always poor	Poverty exit
Change in male share of labour with primary education level	.004 (.234)	.000 (.278)	-.036 (.241)	.001 (.215)
Change in female share of labour with primary education level	-.006 (.278)	-.109 (.281)	.004 (.212)	-.016 (.206)
Change in male share of labour with higher education level	.024 (.100)	.002 (.089)	.004 (.026)	.008 (.123)
Change in female share of labour with higher education level	.003 (.027)	.014 (.082)	.008 (.051)	-.002 (.078)
Change in farm size	.010 (.411)	.152 (.371)	-.048 (.280)	.146 (.566)
Change in commune-level paddy prices	-.122 (.141)	-.134 (.159)	.205 (.113)	.233 (.104)
N	84	74	42	60

Notes: Household main labour force consists of members whose age is 19-59 for males and 19-54 for females. Figures in parentheses are the standard deviation of the attached mean of a variable. Prices of paddy are adjusted to the January in each initial year of the corresponding periods.

Appendix 4.4

Results of regression on (log) total household consumption expenditure

Variables	1993	1998	2002	2004	2006
Mean log of household expenditure	8.692 (.588)	9.216 (.473)	9.378 (.545)	9.532 (.569)	9.775 (.597)
Household characteristics					
Female head = 1	-.097** (.042)	-.067** (.031)	-.039** (.020)	-.048* (.028)	-.065** (.029)
Ethnic minority = 1	-.199*** (.066)	-.107 (.096)	-.207*** (.037)	-.142*** (.052)	-.210*** (.042)
Household size	.223*** (.027)	.227*** (.024)	.208*** (.019)	.196*** (.028)	.254*** (.028)
Household size squared	-.012*** (.002)	-.014*** (.002)	-.013*** (.002)	-.011*** (.003)	-.013*** (.003)
Occupation of head					
White-collar job = 1	.241** (.100)	.294*** (.072)	.117*** (.041)	.187*** (.054)	.216*** (.058)
Sales or services = 1	.307*** (.086)	.285*** (.039)	.116* (.062)	.114 (.087)	.257*** (.083)
Non-farm manual work = 1	.073 (.075)	.149* (.079)	.163*** (.022)	.168*** (.032)	.133*** (.030)
Not working = 1	.046 (.050)	.093** (.041)	.133*** (.024)	.085** (.034)	.061 (.037)
Household labour resource					
Number of male members	.065** (.025)	.079*** (.022)	.090*** (.018)	.072*** (.024)	.089*** (.021)
Number of female members	.012 (.028)	.029 (.027)	.099*** (.017)	.106*** (.026)	.029 (.022)
Number of members	.059* (.029)	.070*** (.017)	.082*** (.012)	.044** (.018)	.037** (.016)
Share of main labour force (A+B): males with primary education	.134 (.096)	-.011 (.084)	.086* (.047)	.125* (.071)	.020 (.064)
Share of main labour force (A+B): females with primary education	.305*** (.099)	.141** (.064)	.048 (.047)	.074 (.066)	.094 (.066)

Variables	1993	1998	2002	2004	2006
Share of main labour force (A+B):	.356***	.155	.222***	.300***	.140**
males with secondary education	(.098)	(.096)	(.054)	(.078)	(.066)
Share of main labour force (A+B):	.442***	.226**	.244***	.317***	.271***
females with secondary education	(.112)	(.091)	(.055)	(.073)	(.076)
Share of main labour force (A+B):	.282**	.303**	.536***	.595***	.395***
males with tertiary education	(.116)	(.118)	(.063)	(.096)	(.076)
Share of main labour force (A+B):	.538***	.345***	.694***	.694***	.807***
females with tertiary education	(.103)	(.086)	(.068)	(.101)	(.103)
Household non-labour capitals					
Farm size (hectare)	.253***	.204***	.163***	.232***	.189***
	(.036)	(.046)	(.016)	(.028)	(.021)
Farm size squared	-.014***	-.017*	-.009***	-.021***	-.012***
	(.004)	(.008)	(.002)	(.006)	(.003)
Number of current migrants	-.017	-.015	-	-.011	.130
	(.028)	(.025)	-	(.021)	(.099)
Communal/provincial level variables					
Having access to paved roads = 1 ^(a)	.011	-.000	.079***	.116***	.102***
	(.065)	(.055)	(.024)	(.025)	(.027)
Having irrigation system = 1	-	-	-	-.010	-.008
	-	-	-	(.026)	(.029)
Number of natural disasters	-.023	-.006*	-	.004	.011
over previous years	(.016)	(.003)	-	(.011)	(.010)
Constant	7.382***	8.037***	8.128***	8.238***	8.457***
	(.106)	(.085)	(.052)	(.070)	(.069)
N	800	830	5079	1488	1473
PSU	25	26	500	496	491
R²	.495	.520	.475	.502	.524
F	60.14	15.00	112.07	52.85	61.00
Prob>F	0.0030	0.0087	0.0000	0.0000	0.0000

Notes: * **, *** respectively denote statistically significant at, at least the 10, 5, and 1 percent level. Figures in parentheses are standard errors.

^(a) It is a road for **motor vehicles** for 1993 while a road for **cars** for 1998, 2002, and 2006.



References

- Abdulai, A. and A. CroleRees (2001) 'Determinants of Income Diversification amongst Rural Households in Southern Mali', *Food Policy* 26(4): 437-452.
- Adamchik, V.A. and A.S. Bedi (2003) 'Gender Pay Differentials During the Transition in Poland', *Economics of transition* 11(4): 697-726.
- Alderman, H. and C.H. Paxson (1992) 'Do the Poor Insure? A Synthesis of the Literature on Risk and Consumption in Developing', *World Bank Policy Research Working Paper Countries WPS 1008*.
- Anh, H. (2007) Nuoi thuy san o DBSCL: Loay Hoay Phat Trien (Aquaculture in the Mekong River Delta: Development in a Trouble Context). *Viet Bao Viet Nam* Retrieved 23 July, 2007, from <http://vietbao.vn/Xa-hoi/Nuoi-thuy-san-o-DBSCL-Loay-hoay-phat-trien/40211823/157/>.
- Barrett, C.B. and T. Reardon (2001) 'Asset, Activity, and Income Diversification Among African Agriculturalists: Some Practical Issues', *Food Policy* 26(4): 315-331.
- Barrett, C.B., T. Reardon and P. Webb (2001) 'Nonfarm Income Diversification and Household Livelihood Strategies in Rural Africa: Concepts, Dynamics, and Policy Implications', *Food Policy* 26: 315-331.
- Benjamin, D. and L. Brandt (2002) 'Agriculture and Income Distribution in Rural Vietnam under Economic Reforms: A Tale of Two Regions', in P. Glewwe et al. (eds), *Economic growth, poverty, and household welfare in Vietnam* (pp. 133-186). Washington, DC: World Bank.
- Carletto, G., B. Davis, K. Stamoulis, K. Covarrubias, M. Krausova, P. Winters et al. (2007) 'Rural Income Generating Activities in Developing Countries: Re-Assessing the Evidence', *electronic Journal of Agricultural and Development Economics (eJADE)* 4(1): 146-193.
- Carney, D., M. Drinkwater, T. Rusinow, K. Neefjes, S. Wanmali and N. Singh (1999) 'Livelihoods Approaches Compared'. Paper presented at the Conference 'Natural Resources Advisers' Conference', UK Department for International Development (DFID). Available online.
- Davis, J.R. (2003) 'The Rural Non-farm Economy, Livelihoods and their Diversification: Issues and Options', *NRI Report to Department for International Development and World Bank no. 2753*.
- Davis, J.R. and D. Bezemer (2003) 'Key Emerging and Conceptual Issues in the Development of the RNFE in Developing Countries and Transition

- Economies', *NRI Report to Department for International Development and World Bank no. 2753*.
- Deaton, A. (1997) *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy*. Baltimore, Maryland: The Johns Hopkins University Press.
- Delgado, C.L. and A. Siamwalla (1997) 'Rural Economy and Farm Income Diversification in Developing Countries', *International Food Policy Discussion Paper no. 20*.
- Dercon, S. and P. Krishnan (1996) 'Income Portfolio in Rural Ethiopia and Tanzania: Choices and Constraints', *Journal of Development Studies* 32(6): 850-875.
- Dollar, D. and P. Glewwe (1998) 'Poverty and Inequality in the Early Reform Period', in D. Dollar et al. (eds), *Household welfare and Vietnam's transition* (pp. 29-60). Washington, D.C.: The World Bank.
- Dollar, D. and J. Litvack (1998) 'Macroeconomic Reform and Poverty Reduction in Vietnam', in D. Dollar et al. (eds), *Household welfare and Vietnam's transition* (pp. 1-26). Washington, D.C.: The World Bank.
- Dung, T. (2007) DBSCL: O At Dao Ao Nuoi Ca Tra (Mekong River Delta: A 'Storm' of Pond Digging for Pangasius Farming). *Thanh Nien* Retrieved 12 July, 2007, from <http://www1.thanhnien.com.vn/Kinhte/2007/7/11/200374.tno>.
- Dunn (1997) 'Diversification in the Household Economic Portfolio'. Washington, D.C.: Office of Microenterprise Development. USAID.
- Ellis, F. (1993) *Peasant economics: Farm households and Agrarian development*. Cambridge: Cambridge University Press.
- Ellis, F. (1998) 'Household Strategies and Rural Livelihood Diversification', *Journal of Development Studies* 35(1): 1-38.
- Ellis, F. (2000) *Rural Livelihoods and Diversity in Developing Countries*. New York: Oxford University Press.
- Ersado, L. (2006) 'Income Diversification in Zimbabwe: Welfare Implications from Urban and Rural Areas', *World Bank Policy Research Working Paper No. 3964*. <http://ssrn.com/abstract=923271>.
- Escobal, J. (2001) 'The Determinants of Non-farm Income Diversification in Rural Peru', *World Development* 29(3): 497-508.
- Foster, J., J. Greer and E. Thorbecke (1984) 'A Class of Decomposable Poverty Measures', *Econometrica* 52(3): 761-766.
- Glewwe, P. (2004) 'An Overview of Economic Growth and Household Welfare in Vietnam in the 1990s', in P. Glewwe et al. (eds), *Economic Growth, Poverty, and Household Welfare in Vietnam* (pp. 1-26). Washington D.C.: World Bank Regional and Sectoral Studies.
- Glewwe, P., N. Agrawal and D. Dollar (2004) *Economic Growth, Poverty, and Household Welfare in Vietnam*. Washington D.C.: World Bank Regional And Sectoral Studies.

- Greene, W.H. (2003) *Econometric Analysis* (Fifth ed.). New Jersey: Prentice Hall.
- GSO (2002) *Statistical Yearbook*. Hanoi: Statistical Publishing House.
- GSO (2004a) *Nien Giam Thong Ke 12 Tinh Dong Bang Song Cuu Long va Kinh Te Viet Nam Trong Nhung Nam Doi Moi 1999-2000 (Statistical Yearbooks of 12 Provinces in the Mekong Delta and Vietnam Economy in the Transition Period, 1991-2000)*. Hanoi: Statistical Publishing House.
- GSO (2004b) *Result of the Survey on Households Living Standards 2002*. Hanoi: Statistical Publishing House.
- GSO (2006a) *The 2004 Vietnam Migration Survey: Internal Migration and Related Life Course Events*. Hanoi: General Statistical Office.
- GSO (2006b) *Nien Giam Thong Ke Cac Tinh Dong Bang Song Cuu Long 2000-2005 (Statistical Yearbook on the Mekong Delta, Vietnam 2000-2005)*. Hanoi: Statistical Publishing House.
- GSO (2006c) So Tay Huong Dan Nghiep Vu (VHLSS 2006 Guidelines for Interviewers), *Khao Sat Muc Song Gia Dinh Ho 2006 (Vietnam Household Living Standards Survey 2006)*: General Statistics Office.
- GSO (2007) Result of the Survey on Households Living Standards 2004. from www.gso.gov.vn.
- GSO (2008) *Result of the Survey on Households Living Standards 2006*. Hanoi: Statistical Publishing House.
- GSO and UNFPA (2005a) *The 2004 Vietnam Migration Survey: Major Findings*. Hanoi: General Statistical Office.
- GSO and UNFPA (2005b) *Dieu Tra Di Cu Viet Nam nam 2004: Chat Luong Cuoc Song Cua Ngươi Di Cu o Viet Nam (The 2004 Vietnam Migration Survey: Quality of Life for Internal Migrants in Vietnam)*. Hanoi: General Statistical Office.
- Haggblade, S., P. Hazell and T. Reardon (2002) 'Strategies for Stimulating Poverty-Alleviating Growth in the Rural Non-farm Economy in developing Countries', *International Food Policy Research Paper*.
- Haggblade, S., P.B.R. Hazell and T. Reardon (2007) *Transforming the Rural Non-farm Economy: Opportunities and Threats in the Developing World*. Baltimore, Maryland: The Johns Hopkins University Press.
- Hart, G. (1994) 'The Dynamics of Diversification in an Asian Rice Region', in B. Koppel et al. (eds), *Development or Deterioration?: Work in Rural Asia* (pp. 47-71). Boulder, CO: Lynne Rienner.
- Haughton, J. (2001) 'Introduction: Extraordinary changes', in D. Haughton et al. (eds), *Living Standards During an Economic Boom: The case of Vietnam* (pp. 95-119). Hanoi: Statistical Publishing House.
- IFM, RIA, NACA, CTU and WWF (2006) 'Guidelines for Environmental Management of Aquaculture Investments in Vietnam'. Hanoi: Ministry of Fisheries, Viet Nam and World Bank.
- IMF (2009) Data and Statistics. World Economic Outlook (April 2009). Gross Domestic Product (GDP). Retrieved 2 August 2009, from IMF Data Map-

- per. International Monetary Fund: <http://www.imf.org/external/datamapper/index.php>.
- Janvry, A. de, E. Sadoulet and N. Zhu (2005) 'The Role of Non-Farm Incomes in Reducing Rural Poverty and Inequality in China', *Department of Agricultural & Resource Economics, UCB. CUDARE Working Paper 1001*. http://repositories.cdlib.org/are_ucb/1001.
- Joshi, P.K., A. Gulati, P.S. BIRTHAL and L. Twari (2003) 'Agricultural Diversification in South Asia: Patterns, Determinants, and Policy Implications'. Washington D.C.: International Food Policy Research Institute: Markets and Structural Studies Division.
- Justino, P. and J. Litchfield (2003) 'Poverty Dynamics in Rural Vietnam: Winners and Losers During Reform', *PRUS Working Paper 10 from Poverty Research Unit at Sussex, University of Sussex*.
- Lanjouw, P. (2006) 'Does the Rural Nonfarm Economy Contribute to Poverty Reduction?' in S. Haggblade et al. (eds), *Transforming the Rural Nonfarm Economy: Opportunities and Threats in the Developing World*. Baltimore: Johns Hopkins University Press.
- Lanjouw, P. (2007) 'Does the Rural Nonfarm Economy Contribute to Poverty Reduction?' in S. Haggblade et al. (eds), *Transforming the Rural Nonfarm Economy: Opportunities and Threats in the Developing World* (pp. 55-81). Baltimore: Johns Hopkins University Press.
- Lanjouw, P. and G. Feder (2001) 'Rural Non-farm Activities and Rural Development: From Experience Towards Strategy', *The World Bank Rural Development Strategy Background Paper no. 4*.
- MDPA (2004) 'Mekong Delta Poverty Analysis', *Final Report to UNDP and AusAID*.
http://www.ausaid.gov.au/research/pdf/mekong_poverty_report_04.pdf.
- Minh, N.T. (2008) Dao Tao Nghe o Dong Bang Song Cuu Long Nhin Tu Goc Do Xuat Khau Lao Dong (Training on Professions in the Mekong River Delta: A Perspective of Labour Export) Unpublished Staff research paper. Faculty of Political Education, Dong Thap University.
- Minot, N., M. Epprecht, T.T.T. Anh and L.Q. Trung (2006) 'Income Diversification and Poverty in the Northern Uplands of Vietnam'. Washington, DC: International Food Policy Research Institute.
- Minot, N. and F. Goletti (1998) 'Export Liberalization and Household Welfare: the Case of Rice in Vietnam', *American Journal of Agricultural Economics* November: 138-149.
- Phan, D. and I. Coxhead (2007) 'Inter-provincial Migration and Inequality During Vietnam's Transition', *University of Wisconsin-Madison: Department of agricultural and applied economics: Staff paper series 507*.

- Reardon, T. (1997) 'Using Evidence of Household Income Diversification to Inform Study of the Rural Nonfarm Labor Market in Africa', *World Development* 25(5): 735-747.
- Reardon, T., J. Berdegue, C.B. Barrett and K. Stamoulis (2007) 'Household Income Diversification into Rural Nonfarm Activities', in S. Haggblade et al. (eds), *Transforming the Rural Nonfarm Economy: Opportunities and Threats in the Developing World* (pp. 115-140). Baltimore: Johns Hopkins University Press.
- Reardon, T., J. Berdegue and G. Escobar (2001) 'Rural Nonfarm Employment and Incomes in Latin America: Overview and Policy Implications', *World Development* 29(3): 395-409.
- Reardon, T., K. Stamoulis, M.-E. Cruz, A. Balisacan, J. Berdegue and B. Banks (1998) 'Rural Nonfarm Income in Developing Countries', in R. Tucker (ed.), *The State of Food and Agriculture 1998*. Rome: Food and Agricultural Organization of the United Nations.
- Start, D. (2001) 'Transformation, Well-being and the State: Rural Livelihood Diversification in South Asia', *ODI Working*.
- Tang, L.H. and L.H. Yue (2006) *Economic Reform in Vietnam and in China: A Comparative Study* (Vol. English translation). Hanoi: The Gioi Publishers.
- Taussig, M., S. Falatik, L.T.D. Hai, P.D. Khoi and M. Papenroth (2003) 'Private Enterprises in the Mekong Delta: A Baseline Study of Vietnam's Most Dynamic Regions for Rural Entrepreneurship', *Discussion paper*.
- Trao, N.L. (2006) 'Opening Speech'. Paper presented at the conference 'Information on Labour Export', Can Tho City, Vietnam (7 March, 2006). Available online: <http://vietbao.vn/Xa-hoi/Xuat-khau-lao-dong-tai-DBSCL-Chinh-quyen-lam-thay-cong-viec-cua-ngan-hang/45186801/157/>.
- UNDP (2004) 'The Regional Poverty Assessment Mekong River Region'. Hanoi: UNDP.
- UNDP (2005) *MDGs and Viet Nam's Socio-Economic Development Plan 2006-2010*. UNDP. http://www.undp.org.vn/undpLive/digitalAssets/9/9935_mdgsedpe.pdf.
- UNEP (2003) 'Final Report on Integrated Assessment of Trade Liberalization in the Rice Sector of Vietnam'. Hanoi, Vietnam: UNEP Country project on Trade Liberalisation in the Agriculture Sector and the Environment.
- UNFPA (2007) *Hien Trang Di Cu Trong Nuoc o Viet Nam (Internal Migration in Vietnam)*. Hanoi: The United Nations Population Fund in Vietnam.
- Walle, D. van de (1998) 'Infrastructure and Poverty in Vietnam', in D. Dollar et al. (eds), *Household welfare and Vietnam's transition* (pp. 99-134). Washington, D.C.: The World Bank.
- Walle, D. van de and D. Cratty (2004) 'Is the Emerging Non-farm Market Economy the Route Out of Poverty in Vietnam?' *The Economics of Transition* 12(2): 237-274.

- Wodon, Q.T. (1999) 'Micro-determinants of Consumption, Poverty, Growth, and Inequality in Bangladesh', *Policy Research Working Paper no.2076*. Washington, D.C.: World Bank.
- World Bank (1995) 'Viet Nam Living Standards Survey (VLSS), 1992-93: Basic Information', *Research Development Group*, World Bank.
- World Bank (1999) 'Vietnam Development Report 2000: Attacking Poverty'. Washington DC.,: Poverty Reduction and Economic Management Unit, East Asia and Pacific Region.
- Xiaoping, S. (2007) 'Away from the Farm? The Impact of Off-farm Employment on Farm Production, Factor Market Development and Sustainable Land Use in Jiangxi Province, China'. Institute of Social Studies, The Hague.

Le Tan Nghiem

The above candidate was admitted to the doctoral programme in the Institute of Social Studies (now the International Institute of Social Studies of Erasmus University Rotterdam) in The Hague in September 2005 on the basis of:

Master of Arts,
Vietnam – Netherlands Project for M.A in Development Economics,
University of Economics, Ho Chi Minh City, Vietnam, 2003

This thesis has not been submitted to any university for a degree or any other award.

Mr Le Tan Nghiem

On 14th April 2010, Le Tan Nghiem is expected to defend his doctoral thesis at the International Institute of Social Studies (ISS) of Erasmus University, Rotterdam, The Netherlands. In the last four years he has been working on his thesis titled *“Activity and Income Diversification: Trends, Determinants and Effects on Poverty Reduction. The case of the Mekong River Delta”*.

Mr Nghiem was admitted to the Doctoral program in 2005 on the basis of a MA degree in Economics of Development (2003) from the University of Economics Ho Chi Minh City (UEH) which is a joint project between the ISS and the UEH. He also has a BA degree in Economics (1998) from Can Tho University in Can Tho City, Vietnam. In addition, he has attended various training courses on social economic research design and policy analysis for poverty reduction.

In 1999, Mr Nghiem joined the School of Economics and Business Administration (SEBA), Can Tho University, where he has taught macroeconomics, microeconomics, production economics and theories of economic development to graduate students. He has also been extensively involved in conducting research in the following main areas: Poverty Analysis, Migration, Intrahousehold Decision Making, and Productive Efficiency Analysis.

Among others, Mr Nghiem has also co-authored a chapter (2008) in a book titled “Economic Development of the Mekong Delta in Vietnam” based on research work conducted for the NPT/VNM project “enhancing the teaching and research capacity to assist small- and medium-sized enterprises and farm households in the Mekong Delta”. In addition, he is a co-author of a journal article on “Determinants of Investment Decisions by Private Firms in Vietnam” published in the Vietnam Review of Economic Studies in 2007.

Currently, he is part of a team that is working on an international collaborative project titled “Agricultural Growth and Poverty Pockets”— a project that involves his university, the Southern Fruit Research Institute (Vietnam) and the Institute of Food and Resource Economics at the University of Copenhagen (Denmark).

Contacts: School of Economics and Business Administration, Can Tho University, 211 30/4 Street, Can Tho City, Vietnam. Tel +84 710- 3838831, Fax + 84 710- 3839168, Cell +84 939 158158.