How to Grow Equitably:

Land Redistribution, Agricultural Growth, and Poverty Reduction in Vietnam

(1992-1998)

by

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Submitted to the Development Studies Institute,

London School of Economics and Political Science

in partial fulfilment of the requirements for the degree of

Doctor of Philosophy

at the

UNIVERSITY OF LONDON

September 2005

Abstract

This thesis explores how, in the wake of momentous agrarian reforms implemented during the 1980s and 1990s, Vietnam succeeded in generating both a strong increase in agricultural growth, and remarkable trends in poverty reduction. Three specific channels of transmission between agricultural growth and rural poverty reduction are explored and evaluated empirically using the Vietnamese Living Standard Survey.

Chapter 2 investigates the impact on agricultural investments of the strengthening in tenure security induced by Vietnam's 1993 Land Law, which set up a new land tenure system based on *de jure* private property rights. Idiosyncratic characteristics of Vietnam's land reform and the panel nature of the VLSS are taken advantage of to capture the exogenous changes in tenure security brought by the 1993 Land Law. By interpreting the results in the light of Vietnam's agrarian history, I shed light on the role of formal institutions during the process of establishing a new private property right system.

Chapter 3 explores the role of education in promoting agricultural growth and documents how, in the 1980s, Vietnam emerged from thirty years of war with literacy levels that are normally achieved by middle-income countries. The differential in educational attainment between North and South Vietnam is used to devise an instrumental variable strategy and to evaluate the contribution of Vietnam's high initial education levels to rice yields. The results confirm the importance of literacy and numeracy skills as pre-conditions for agricultural growth but highlight the importance of non-linearities in the impact of schooling, and of factoring in information on the quality in education in order to better understand the processes through which education affects economic efficiency.

Finally, Chapter 4 showed that growth in the agricultural sector had been remarkably pro-poor as it benefited even the poorest of the poor, probably because of favourable initial conditions for pro-poor agricultural growth.

Acknowledgements

This thesis would not have been completed without the support of many people. First and foremost, I owe my deepest gratitude to my supervisors, Dr. Markus Goldstein and Professor Michael Lipton, for their kind and untiring support. They not only provided with invaluable intellectual guidance and unerring feedback, but also offered moral support and encouragement in times of deep intellectual hardship. To them, I am forever indebted.

To Zaki Wahhaj, whose unwavering friendship has carried me through this thesis and other aspects of life, I cannot find enough words to express my gratitude.

Phung Duc Tung, Pham Manh Hung, Nguyen Bui Linh, Mr. Thang, anh Trong, Mr Xuan, Olivier Chabert and my family in Hanoi provided me with heart-warming friendship and support during my fieldwork in Vietnam.

Dominique van de Walle provided detailed comments on one chapter of this thesis. I thank her for this, for her friendship, and for all the kind advice she has never tired to provide since we met in Hanoi.

Very special thanks go to Diana Weinhold for her continued advice and support, even after I had unwisely resisted her advice.

Thank you very much, Marco Cavallari, Adam McLean, and Charles-Henri Reuter for listening to my endless worries and for tirelessly supporting me. Thank you so much, friends of DESTIN, Rachel Wrangham, Zoe Marriage, Bettina Woll, Ben Jones, Chris Dolan, Dieter Zinnbauer, Narayan Lakshman, Kavita Bali, Lauren Flejzor, Claire Smith, David Keen, Teddy Brett, Jean-Paul Faguet, James Putzel, Jo Beall, Robert Wade, Dennis Rodgers, and outside DESTIN, Bob Baulch, for having provided me with your support, at one point or another of the PhD. This thesis could not have been submitted without the invaluable support of Stephanie Davies, and the cheers of Dru Daley and Sue Redgrave.

Thank you, Dinah McKesey and Tim Joint, for being such wonderful flatmates and my best support in town.

Very special thanks go to Iffath Sharif and Claire Lahovary for their valued friendship, constant encouragements and admonitions during the writing process. Very special thoughts also go to Pieter Vanhuysse.

Thank you also, dear Jean-Sebastien, for your presence in the world.

Finally, thank you my parents and two sisters, for being there for me, always, in your own ways. This thesis is dedicated to my mother, in gratitude for her motherly love.

A research studentship from the Economic and Social Research Council and financial support from the LSE are gratefully acknowledged.

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Chapter 1 - Overview of the Thesis

1.0 Description and Contribution of the Thesis

Where land becomes increasingly scarce as a result of land erosion and high population growth, and where it is the main rural productive asset, poverty and access to land are strongly associated. In this context, economists have long debated the impact of land reforms on agricultural productivity and forceful theoretical and empirical arguments have been presented in favour of small-scale farming production. Some have argued that redistributive land reforms could be both productivity-enhancing and poverty-alleviating (Lipton 1993; Bardhan, Bowles and Gintis 1998; Banerjee 1999). This thesis is located in the context of this long-standing debate.

Exceptional historical events in the past twentieth-century allowed Vietnam to implement drastic changes in property relations and ownership patterns in a short historical time span. In less than half a decade, Vietnam saw its agrarian system transform itself from a colonial plantation system, to a centrally planned cooperative system, into a household-based farming system. Since the start of the agricultural decollectivisation process in the early 1980s, the productive environment of rural Vietnamese households changed dramatically, with the dismantling of agricultural cooperatives and the transfer of farm decision-making to individual households in the late 1980s; the gradual affirmation of individualised and exclusive land property rights following the enactment of the 1993 Land Law; and the embrace of a market economy as agricultural output, input and export markets were liberalised during the course of the 1990s. The focus of this thesis is on Vietnam's land decollectivisation process, which allegedly played a key role in promoting rapid agricultural growth and allowed many rural poor to lift themselves out of poverty during the 1980s and 1990s.

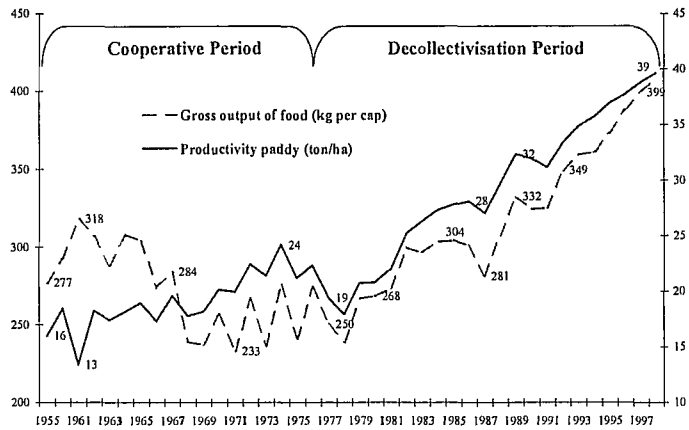
Since the implementation of these reforms, the growth performances of Vietnam's agricultural sector since the late 1980s have been remarkable. In the period immediately following the reunification of Vietnam in 1975, paddy output declined by about 10 percent. Agricultural productivity started to grow anew during the 1980s as agricultural cooperatives contracted land back to individual farmers. Vietnam experienced its last shortfall in paddy production in 1987, when it declined by 5.6 percent. In 1989, Vietnam had begun exporting rice and was to become the world's second largest rice exporter in 1998. Since 1988, Vietnam's agricultural sector has grown at an average annual rate of 4 percent with yields in paddy growing by 6 percent. These remarkable trends in agricultural growth are shown in Table 1-1 and Figure 1-1 below. Meanwhile, Vietnam's achievements in poverty reduction were no less impressive, with the incidence of poverty declining from 75 percent in 1984 to 58 percent in 1993, and to 37 percent in 1998 (Dollar, Glewwe, and Litvack 1998).

Table 1-1: Growth rates in paddy production

		1991	1992	1993	1994	1995	1996	1997	1998
Paddy output	(% growth rate)	2.1	10	5.8	3.0	6.1	5.7	4.3	5.9
Sown areas	(% growth rate)	4.6	2.7	1.3	0.6	2.5	3.5	1.4	3.7
Yield	(ton/ha)	3.1	3.3	3.5	3.6	3.7	3.8	3.9	4.0
Food output	(kg per capita)	323	346	364	364	373	387	400	408

Source: various issues of Vietnam's statistical yearbooks for agriculture and forestry

Figure 1-1: Agricultural Productivity Growth (1955-1998)[1]



[1] Source: various issues of Vietnam's statistical yearbooks for agriculture and forestry.

This thesis explores how, in the wake of momentous agrarian reforms implemented during the 1980s and 1990s, Vietnam succeeded in generating both the strong increase in agricultural growth, and the remarkable trends in poverty reduction noted above. The specific mechanisms through which growth contributes to poverty reduction have long been debated. In particular, a long-standing debate about the role of agriculture in the process of economic development and about its contribution to poverty reduction continues unabated. The thesis has been inspired by these debates, and by theories that emphasize the role of agriculture in the process of economic development and posit the existence of multiple linkages between agricultural growth and non-agricultural growth.

The thesis hopes to contribute to a better understanding of how the decollectivisation of agriculture in Vietnam succeeded in generating a remarkably pro-poor agricultural growth process. Three specific channels of transmission between agricultural growth and rural poverty reduction are explored and evaluated empirically using the Vietnamese Living Standard Survey (VLSS), a nationally representative household survey collected in 1992 and 1998. Overall, the thesis argues that the reduction in rural poverty achieved by Vietnam during the 1990s may be attributed to revolutionary circumstances that led to a notable egalitarian distribution of key resources, in particular, land and human capital.

As I hope to demonstrate in Chapter 2 and Chapter 3 of this thesis, it is possible to harness insights from history to devise an empirical strategy that allows one to test a particular causal relationship and circumvent endogeneity issues[2]. Indeed, in order to tackle important estimation issues, I devise empirical strategies which, to the extent possible, make use of quasi-experimental features of Vietnam's land reforms or Vietnam's history as well as relevant features the Vietnamese Living Standard Survey.

[2] Prominent examples include the works of Acemoglu and Johnson (2003), who exploit features of the European colonisation to identify the impact of institutions on subsequent growth performances. Similarly, Banerjee and Iyer (2002) make use of features of Britain's colonisation of India. For a critique of such work, see Bardhan (2005a).

The thesis is structured around three core chapters. Chapter 2 probes whether one major source for the resilience of Vietnam's agricultural growth performances over the past 20 years may be traced to Vietnam's land decollectivisation programme and the introduction of household farming. I investigate a precise channel of transmission through which the land reform may have had an impact: the impact on investment incentives of the strengthening in tenure security induced by the 1993 Land Law. I argue that the role of the 1993 Land Law was first and foremost to strengthen tenure security and stabilise expectations, and that it was largely successful in doing so in regions where tenure security had been most disrupted by the agricultural collectivisation process of the 1960s and 1970s. Therefore, a first contribution of this thesis is to affirm the importance of land tenure security as an investment incentive.

However, significant regional differences indicate a more complex working of land property relations in Vietnam. In particular, I argue that, by setting a new land tenure system based on *de jure* private property rights guaranteed by land titles, the 1993 Land Law signifies a momentous change in Vietnam's history of land tenure and as such, enables us to examine the very process of establishing a new private property rights system. Two distinct aspects of such a process are distinguished and tested separately: (i) the strengthening of tenure security through a body of public rules; (ii) the role of formal institutions in enforcing or protecting these rights. Land tenure data extracted from the Vietnamese Living Standard Survey capture the first of these two dimensions. Provincial cadastral land titling data graciously granted by the Central Cadastral Office in Hanoi are used to capture the institutional law enforcement aspect of Vietnam's land reform[3]. Quasi-experimental features of Vietnam's land reform and the panel nature of the VLSS are taken advantage of to capture the exogenous changes in tenure security brought by the 1993 Land Law.

The striking historical divergence in property right ideologies between North and South Vietnam is exploited in order to shed light on the role of *formal* institutions in the process of establishing a new property rights system. I argue

[3] I extend heartfelt thanks to the director of the Cadastral Office in Hanoi for providing me with the provincial land titling data, and for the insightful conversations we had on Vietnam's agrarian transition and the functioning of Vietnam's land property rights system.

that by making *exclusion* rights central to the definition of land rights, the 1993 Land Law represents a potent shift in the property rights paradigm that used to prevail in North Vietnam. In that context, law enforcement institutions could play an important role in promoting the new rules, thereby strengthening the perceived sense of tenure security. By contrast, an opposite institutional environment exists in South Vietnam, where local authorities have long been supportive of private property rights. These long-prevailing perceptions of land relations help explain why land titling (the variable used to capture the law enforcement aspect of Vietnam's 1993 Land Law) did not have a significant impact on investment incentives in South Vietnam.

Chapter 3 explores the role of education in promoting agricultural growth. It first sheds light on exceptional historical circumstances that allowed Vietnam to emerge from thirty years of war with literacy and numeracy levels normally attained by middle-income countries such as Thailand or Indonesia. Second, the difference in educational attainment between North and South Vietnam is traced back to the partition of Vietnam in 1954 and to the implementation of differential education policies between 1954 and 1975. This historical divergence in education is exploited to devise an instrumental variable strategy and evaluate the contribution of Vietnam's high initial levels of education (using various indicators of educational attainment extracted from the Vietnamese Living Standard Survey) to agricultural productivity during the 1990s.

Chapter 3 contributes to the literature on education by confirming the importance of literacy and numeracy skills as pre-conditions for agricultural growth. Moreover, primary[4] education and lower secondary education are found to have no impact, whilst upper secondary education was found to have a strong and significant impact, on rice productivity. These results add to the literature on education by highlighting the existence of non-linearities in the impact of schooling on productivity, and by underlining the importance of factoring in information on the quality of education in order to better understand the processes through which education affects economic efficiency.

[4] Results on primary education are subject to strong caveats since instrumental variables are found to be weak. Results for the other indicators of educational attainment, including years of education, lower secondary

Finally, Chapter 4 explores more directly the relationship between agricultural growth and rural poverty reduction, with a particular focus on the legacy of Vietnam's agrarian history. This chapter is inspired by a body of research, which highlights the role of access to productive assets such as land and human capital in mediating the impact of growth on poverty reduction. The argument in Chapter 4 is developed in three stages. First, using distribution-sensitive measures of poverty, I ascertain the extent to which economic growth during the 1990s had been pro-poor and find that Vietnam's poverty reduction was both, wide in that poverty was substantially reduced in absolute numbers, and deep in that agricultural growth benefited the *poorest* of the poor. Moreover, a sectoral decomposition of poverty reduction indicates that it is growth in the agricultural sector that contributed the most to rural poverty reduction, suggesting a strong link between agricultural growth and poverty reduction.

I then document how, at the start of the agricultural liberalisation period, Vietnam benefited from favourable initial conditions for pro-poor agricultural growth brought about by Vietnam's recent eventful agrarian history. These initial conditions included an agricultural growth process spurred by labour intensive wet-rice cultivation techniques, widespread access to land and to yield-raising technology, and high levels of literacy. The detailed story of how two of these pro-poor initial conditions came about is told in Chapter 2 for access to land, and in Chapter 3 for education.

Finally, the last section of Chapter 4 highlights a dilemma and a paradox: a dilemma in that the increase in food prices triggered by the liberalisation of agricultural markets may have favoured the rural poor as farm producers, but possibly harmed them as consumers; a paradox in that the deep trends in poverty reduction documented earlier in the chapter took place at the same as the rural poor experienced a large increase in food prices.

I explore the welfare consequences of the large increase in food prices experienced by Vietnamese households between 1992 and 1998. By doing so, I make use of, and find limitations in, first-order welfare analytical tools that

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education and upper secondary education, are not subject to such caveats. See Chapter 3 for more details on the strength of the instrumental variables used in the estimation strategy.

approximate the welfare impact of price changes by the net production status of households. Instead, I find a substantial disconnect between net production status and welfare changes.

To disentangle the ambiguous results obtained from first-order welfare impact methods, I then explore the relationship between rice self-sufficiency and welfare using non-parametric tools. Two possible motives are then discussed *in theory* to explain the changes in market participation and rice self-sufficiency previously highlighted. These two motives include (i) changes in transaction costs brought about by the lifting of internal trade barriers during the 1990s, and (ii) the desire to self-insure against price risks.

Nevertheless, as this chapter ultimately shows, despite the strong trends in agricultural growth and rural poverty reduction, and despite the existence of favourable initial conditions as shown in this section, the sheer multiplicity of effects at play makes it difficult to *causally* determine the precise mechanisms through which (agricultural) growth translated itself into poverty reduction. Avenues for future research in order to disentangle the food price dilemma/paradox are suggested in the Conclusion of this thesis, Chapter 5 – Contribution of the Thesis and Future Avenues for Research.

1.1 The 1992 and 1998 Vietnamese Living Standard Survey

The data used in this thesis come from the Vietnamese Living Standard Survey (VLSS), a nationally representative household-level survey collected by the General Statistical Office of Vietnam in cooperation with the World Bank. In fact, the VLSS closely follows the format of the World Bank's Living Standard Measurement Survey (LSMS)[5]. The VLSS gathered a wide range of information on households' activities, on individuals within a household, and on the communities in which households live. Information on the household was collected from the household head or the person identified as being the most

[5] So much so that one is surprised that the agricultural module of the VLSS 1992 did no collect plot-level data, despite the fact that extreme land fragmentation is a conspicuous feature in Vietnam's agricultural landscape. This important omission was corrected during the 1998 VLSS survey, which collected plot-level agricultural data.

knowledgeable to answer questions on farming activities, non-farm self-employment, food expenditures, and non-food expenditures.

This thesis makes use of the first two waves of the VLSS, which were collected in 1992/1993 and 1997/1998[6]. In the text, for ease of expression, I shall refer to each survey year as 1992 and 1998 respectively. The VLSS collected information on 4800 households in 1992 and 6000 households in 1998, together with information on their communities of residence. Most households from the VLSS 1992 were re-sampled for the 1998 survey, so that the two waves of VLSS form a panel household survey of 4305 households. The focus of this thesis in on households living in rural areas, so that I only make use of the rural panel sample composed of 3495 households.

Most of the VLSS data used in this thesis come from the agricultural production module (section 9 of the VLSS)[7], from the education module (section 2 of the VLSS), as well as from the VLSS expenditure file, which puts together relevant data from various sections of the VLSS including household food and non-food expenditures. Information on the household's commune of residence (e.g. infrastructure, schooling and health facilities) comes from the commune questionnaire.

While working with the VLSS, I have found the data to be of reasonable quality, although they did require screening for outliers and cleaning for obvious data entry mistakes or inconsistencies. To the extent possible, I have preferred to work with simple variables that require little data manipulation and have shun working with an aggregate measure such as income[8]. Expenditure data come from the expenditure file provided by the World Bank, which is said to be of good quality and has been used extensively in the micro-econometric literature on Vietnam.

The measure of welfare used in Chapter 4 of this thesis is real household expenditures per capita. Nominal expenditures for survey years 1992 and 1998

[6] The data was collected between the month of September and the month of October of the following year. Detailed information on the two Vietnamese Living Standard Surveys can be found in VLSS (1992); Dollar, Glewwe and Litvack (1998); Bales (2000); World Bank (2001); Dollar, Glewwe and Agrawal (2004)

[7] Mention of sections hereafter refers to sections found in the 1993 VLSS. Equivalent sections are found in the 1998 VLSS under different numbers.

are deflated regionally to allow for differentials in the cost-of-living across regions, adjusted for monthly variations in prices over the survey year, and expressed in real January 1998 prices for ease of comparison. Weights to make these adjustments were included in the VLSS datasets and instructions are provided in the basic information document provided by the World Bank (World Bank 2001).

Chapter 2 of this thesis makes use of the panel component of the VLSS, which raises concerns about potential attrition bias affecting the results. Alleviating these concerns, Falaris (2003) studied the issue of attrition bias in the VLSS and found that, although households that dropped from the survey were significantly different from those who stayed,

> "attrition, however, is not sufficiently severe so that the equations for stayers have the same slope coefficients by statistical criteria that would be obtained if there were no attrition. (Falaris 2003: 151)

The VLSS 1998 survey was both stratified and clustered so that expansion factors, provided with the VLSS datasets, need to be applied (World Bank 2001). The VLSS 1992 is self-weighted but clustered at the commune level. Estimation results have been corrected for clustering whenever appropriate.

1.2 Caveats to the Thesis

This thesis is an empirical exploration of how the decollectivisation of agriculture in Vietnam succeeded in generating a remarkably pro-poor agricultural growth process. A detailed literature review is presented in each of the three core chapters and several channels of transmission are explored theoretically in order to guide the empirical strategy. As mentioned earlier, I hope to demonstrate that 'accidents' of history can be exploited in order to devise an identification strategy that enables to circumvent endogeneity and reverse causality issues that routinely threaten the search for causal explanations in the social sciences.

[8] I found the data on non-farm self-employment (section 10 of the VLSS) particularly problematic.

During the course of writing this thesis, I have immensely benefited from the meticulous attention paid by applied econometricians to find appropriate identification strategies in the econometric analysis of causal explanations (Chay and Honore 1998; Card 1999; Heckman 1999; Heckman and Vytlacil 2000; Wooldridge 2002). Nevertheless, as in all empirical work, there is so much one can do to control for all sources of endogeneity. Indeed, for example, few empirical works would survive Heckman's unfailingly critical eyes (Heckman 1999; Bardhan 2005b).

Whilst I have done my best to tackle the issues of endogeneity and reverse causation in Chapter 2 and Chapter 3 of this thesis, which seek to identify particular causal relationships, I am also keenly aware of the pitfalls of such exercises (Heckman 1999; Heckman and Vytlacil 2000; Heckman, Lochner, and Todd 2003; Heckman and Vytlacil 2003). All the sources of endogeneity that could come to mind are discussed in detail in each chapter, and results are caveated accordingly. These caveats need to be borne in mind, in particular until more can be known about the significance of the remaining sources of endogeneity highlighted in Chapter 2 and 3.

Chapter 2 - Establishing Quasi-Private Property Rights: the Impact of Vietnam's 1993 Land Law on Investment Incentives

2.0 Introduction

Macroeconomic evidence since the start of Vietnam's land decollectivisation process in the early 80s indicates both a strong and lasting increase in agricultural productivity. As the decollectivisation of Vietnam's agriculture necessitated the break-up of large-scale collective farms, the associated changes in production relations and ownership pattern cannot be overstated. They modified the operational environment of Vietnamese farmers along three major dimensions: (i) the organisational changes brought about by the dismantling of agricultural cooperatives and the transfer of farm decision-making to individual households; (ii) the changes in operational scale resulting from the redistribution of cooperative land to individual households; (iii) the progressive individualisation of land rights and the gradual affirmation of exclusive land property rights following the enactment of the 1993 Land Law. In addition, the decollectivisation of agriculture also involved the reorganisation and the liberalisation of agricultural input and output markets as well as the construction of new rural infrastructures.

Agricultural growth and the improvement in rural welfare observed during the 1990s in Vietnam have been attributed to the changes brought about by the reorganisation of agriculture and the liberalisation of agricultural markets (Pingali and Xuan 1992; Ravallion and van de Walle 2003; Benjamin and Brandt 2004). Vietnam's large land redistribution programme seems to provide a stark example of an asset redistribution policy that contributed to foster economic growth by improving the efficiency of resource use. Yet, it is noteworthy that

these economic performances were also realised in the presence of imperfectly defined private property rights.

This chapter seeks to probe whether one major source for the resilience of Vietnam's agricultural growth performances over the past 20 years may be traced to Vietnam's land decollectivisation programme and the introduction of household farming. It investigates a precise channel of transmission through which the land reform may have achieved an increase in agricultural productivity: the impact on long-term investment incentives of the strengthening of tenure security following the enactment of the 1993 Land Law, which strengthened land tenure security and established a number of transfer rights (transfer, lease, mortgage and bequest rights). By setting a new land tenure system based on *de jure* (quasi) private property rights, guaranteed by land titles, the 1993 Land Law signifies a momentous change in Vietnam's land tenure history. Two distinct aspects of establishing a new private property rights system are distinguished and tested separately: (i) the strengthening of tenure security through a body of public rules; (ii) the formal institutions that enforce or protect these rights.

The impact of Vietnam's 1993 Land Law on investment incentives is evaluated using agricultural production data from the Vietnamese Living Standard Survey (VLSS), as well as provincial data on land titling. The main features of the methodology are two-fold: firstly, quasi-experimental features of Vietnam's land reforms are being taken advantage of to ensure that the land rights variable that is constructed using data from the VLSS captures the exogenous changes in tenure security brought about by the 1993 Land Law. Provincial cadastral land titling data are used to capture the institutional law enforcement aspect of Vietnam's land reform.

Secondly, the Vietnamese Living Standard Survey provides data collected for the same farm households before and after the enactment of the 1993 Land Law. It is therefore possible to use panel fixed-effects techniques in order to control for latent farm and household fixed-effects that maybe correlated with land tenure rights. A semi-parametric estimator has been chosen in order to deal with non-linearity problems. Additional control variables are included in order to deal with

time-variant heterogeneity. Endogeneity of the credit variable is handled with proxy variables. Finally, robustness checks are performed using alternative specifications.

The results affirm the importance of tenure security as an investment incentive. However, significant regional differences indicate a more complex working of land property relations in Vietnam. Vietnam's agrarian history provides a striking case of diverging property right ideologies between the North and the South of Vietnam. Analysing differences in the conception of land rights as they evolved in North and South Vietnam in recent history help explain why the strengthening in land tenure security had a positive and significant impact on long-term investment in North Vietnam but not in South Vietnam; the impact of land titling had a weak impact in North Vietnam but not in South Vietnam; both land tenure security and land titling variables are relevant and affect investment behaviour additively in North Vietnam.

Chapter 2 is organised as follows. Section 2.1 presents the changes brought about by the 1993 Land Law, which is the focus of this chapter. It also discusses the standard theory of private property rights, which provided the conceptual basis for the 1993 Land Law. Sections 2.2 and 2.3 explore the estimation issues and explain the identification strategy that exploits the quasi-experimental features of Vietnam's land reforms as well as the panel properties of the Vietnamese Living Standard Survey. Results are presented in a summary form and analysed in Section 2.4. The full sets of results are presented in Section 2.6 – Appendices, located at the end of this chapter.

2.1 Vietnam's 1993 Land Law

In the 1980s, barely 5 years after the end of the war and the reunification of the country in 1975, Vietnam started its agricultural decollectivisation process: the control of production was transferred from cooperatives to individual households. This transfer was gradual but eventually led to drastic organisational changes. One major component of Vietnam's land reform consists in the gradual affirmation of individual property rights, a process which took place during the

course of the 1980s. The 1993 Land Law marked an important step in the evolution of Vietnam's land tenure system by strengthening land tenure security and by enlarging individual farmers' bundle of land rights. These recent changes in Vietnam's land tenure system are reviewed in detail below.

2.1.1 From Decree 100 to the 1993 Land Law: the Progressive Individualisation of Land Rights

Since the start of the decollectivisation of agriculture in the 1980s, Vietnam's successive land reforms gradually enlarged the individual farmer's bundle of rights. In particular, the land laws successively established three broad sets of rights: management rights (Decree 100, enacted in 1981), residual income and tenure security rights (Resolution 10 enacted in 1988 and the 1993 Land Law), and transfer rights (the 1993 Land Law). The need to strengthen land tenure security came from the failure of Decree 100 to provide adequate production incentives for farmers. Indeed, although Decree 100 stipulated that land was to be allocated to individual households in order to be farmed independently (except for certain tasks which were organised by the cooperative and were to be performed collectively), cooperatives would still interfere in production decisions. Most importantly, land use-right tenure periods were very short (contracts between cooperatives and households were annual) and renewal was left at the discretion of cooperative authorities. High production quotas also prevailed, allegedly amounting to 80 percent of total output in some areas. The disincentives to work were such that households would return their allocated land back to the cooperative, or leave the harvest uncollected (White 1985; Fforde 1989; Hy V. Luong 1992; Yvon-Tran 1994; Jesus and Anh 1998; Hoang Viet 1999; Sikor 2001a).

As a result, Resolution 10 was enacted in 1988, sanctioning the complete transfer of decision-making in production from the cooperative to the individual farmer, granting the latter long-term use rights, and clearly laying down the farmer's right to retain the product of his farm. However, Resolution 10 left the length of tenure during which households could retain their land use-right unspecified: the

Resolution 10 stipulated a period *up to* 15 years, with no distinction between annual or perennial crop land; and except for the right to bequest land, land transactions were forbidden.

Building on Resolution 10, the 1993 Land Law set a framework for the establishment of *quasi*-private property rights and included three important new features:

(a) the legal recognition of household's land use rights for a lengthy period of time;

(b) the halt to further land redistribution which occurred in order to adjust landholdings to changes in household size; and

(c) the establishment of a land use-rights market.

The tenure period for long-term use-right was extended and fixed to 20 years for annual crops, and 50 years for perennial crops (starting from year 1993)[9]. The tenure period can be renewed on expiry. Also, tenure security was to be further strengthened through the granting of land use right certificates (the so-called red books) [10]. Most importantly also, the 1993 Land Law allowed the functioning of a land use rights market by giving farming households the right to rent (*thue*), mortgage (*the chep*), transfer (*chuyen nuong*) or bequest (*thua ke*) their land use-rights[11].

However, there remain a number of *legal* restrictions that formally weaken land tenure security and encumber land transactions as shown in Table 2-1 below, which distinguishes land rights along two dimensions: control and transfer rights. The new land tenure system still retains aspects of Vietnam's customary land tenure system: land is managed by a collective entity, which reallocates land among village members according to relatively egalitarian distribution rules.

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[9] See July 1993 Land Law, Article 20, which stipulates the period of tenure for each type of land allocated.

[10] See July 1993 Land Law, Article 2, which specifies that land-users will be given land-use rights certificates (*so do* or *giay chung nhan quyen su dung dat*). Article 3 underlines the effort to increase tenure security: "Land allocated to households and individuals under this Regulation shall be official and shall be accompanied by the issuance of a certificate of the right to stable and long-term use of the land".

[11] See Article 3 of the July 1993 Land Law. The establishment of land markets is authorised through Article 75, which allows for land transfer in the case where the household is moving to a new place, changing profession, is not able to work on the land. The authorised State body must approve the transfer. Article 76 stipulates the right to inherit the land use rights, article 77, the right to mortgage the land use rights.

This is because legally, private ownership of land is not recognised[12]: land belongs to the whole people and only use rights on land are allocated. Land users are entitled to the products grown on their land but cannot claim the land as their own. The collective entity in charge of the management of land is the State. In practice, this task is decentralised at the district and village level.

Management rights are still somewhat restricted: farmers do not have the right to change annual cropland (notably rice land) into perennial cropland without the permission of district or provincial authorities. This is because in order to preserve Vietnam's food security, a centralised system of land use planning has been put into place that gives each province (then each district) the right to change only a given proportion of land into perennial land. In reality, this restriction does not seem to be enforced or to impose a real constraint on production decisions.

Also, there are various limitations on transfer rights, including ceilings on landholdings[13] and a maximum land lease period of up to three years. Full private ownership is not recognised by law and land sales are not legally permitted. Instead, land transactions that are equivalent to land sales are referred to as land transfers (*chuyen nuong dat*). These land transfers are subject to the approval of the district's People's Committee.

Finally, although the insecurity in land tenure that prevailed under Resolution 10 was an important motivation for the enactment of the 1993 Land Law, all uncertainty regarding land tenure was not comprehensively dispelled. Although the 1993 Land Law put a halt to the periodic reallocation of land[14], the redistributive spirit of Vietnam's land reforms is apparent in several articles of the Land Law, which stipulate that *all* households should be provided with land for their survival (including those households left landless after distress sales)[15]. Also, the renewal of land use rights at the end of the legal tenure period (until

[12] It is not recognised in the 1993 Land Law nor in the recent 2004 Land Law.
[13] The law permits farmers to keep acreage in access of the ceiling if they pay additional taxation (cf. Article 14 of Decree 64 on the Regulation on allocation of land to households and individuals for stable and long-term use, 27/09/1993 and Decree 84 of 08/08/1994 for the additional tax).
[14] According to Article 14 of Decree 64 on the "Regulation on allocation of land to households and individuals for stable and long-term use" (27 September 1993): "The land reserved for the public demands of the communes shall not be used to accommodate the annual increase in population of the commune".
[15] See Decree 64 (27 September 1993), Article 11 and 12.

2013 and until 2043 for annual and perennial cropland respectively) is conditional upon administrative approval[16]. All this may create a general sense of uncertainty about what will happen after 2013 and 2043. However, it is noteworthy that concerns that land would be reallocated were not vindicated in the latest Land Law voted in November 2003.

Table 2-1: Land rights from Decree 100 to the 1993 Land Law

	Decree 100 (1981)	Resolution 10 (1988)	New Land Law (1993)
Control Rights			
Use	Yes	Yes	Yes
Management	No	Restricted	Restricted
Residual Income	Restricted	Yes	Yes
Tenure	No	Undefined	Restricted (land title)
Transfer Rights			
Sale	No	No	No
Transfer-exchange	No	No	Restricted
Lease	No	No	Restricted
Mortgage	No	No	Yes
Bequest	No	Yes	Yes

2.1.2 The 1993 Land Law in Theory

Clearly, the 1993 Land Law constitutes an important departure from Vietnam's traditional land tenure system where communal land played a significant role[17]. In fact, Vietnam is going a long way towards setting a land tenure system based on formalised private property rights. To understand why it is doing so, this section reviews the standard theory of private property rights, which provided the conceptual basis for the 1993 Land Law.

According to traditional private property right theorists, under conditions of resource scarcity and in the presence of transaction costs, *individualised*, *secure* and *transferable* property rights provide the greatest incentive for the efficient

[16] Land use is allocated provided the land is used as stipulated by the 1993 Land Law. According to Article 26 of the July 1993 Land Law, the State can recover the land if it is left unused for 12 consecutive months without permission from the State body which has the authority to allocate the land.

[17] According to Gourou (1965 (1936)), population pressure and increasing land scarcity contributed to the gradual erosion of communal land in the villages of the Red River Delta. Both Phan Huy Le (1993) and Wiesgerma (1988) document more ambiguous changes in the proportion of communal land over time.

use of resources[18]. Full-fledged property rights[19] are composed of a number of rights, amongst which two broad sets of rights can be distinguished: firstly, *control* rights, which are composed of (i) use rights (the right to access the resource), (ii) management rights (the right to make decisions affecting the resource), (iii) residual income rights (the right to the product generated by the land), and (iv) tenure rights (the length of time during which rights to land are awarded); secondly, *transfer* rights, which are composed of the rights to (i) sale, (ii) transfer or exchange, (iii) lease, (iv) mortgage and (v) bequest land.

This decomposition of property rights was used in Table 2-1 to present the bundles of rights legalised by the 1993 Land Law. Property rights theorists also argue that the more *complete* an individual's bundle of rights over an asset is, the greater will be the incentive to maximise the asset's value. In that respect, Vietnam's land property rights can still be considered *imperfectly defined.*

Land-titling programmes are an entire part of the logic delineated by the standard private property right theory. First, land titles aim at providing a legal foundation for the protection of land users' rights and at dispelling those concerns over tenure security that have an adverse affect on production decisions. Also, land users are able to capture the benefits of their investments both through higher income streams (land users have residual income rights), and through rental income or sale value when transfer rights are allowed. Secondly, by permitting the development of a land market, land titles are expected to allow typically credit-constrained landowners to use their land as collaterals, thereby enhancing their creditworthiness towards lenders. The functioning of a land market is also expected to allow the transfer of land to the most-skilled farmers and to remove inefficiencies associated with excessive land fragmentation.

The channels through which these various land rights operate in order to generate greater efficiency of land use have been well documented and

[18] The productive efficiency of assets is maximised when the control of assets is individualised and assigned to those who can most influence their returns. See Barzel (1989: 9): "The greater a party's inclination to affect the mean income an asset can generate, the greater is the share of the residual (ownership share) that party should have".

[19] See Alchian and Demsetz (1973) amongst many others. An insightful review of the private property rights literature is provided by Platteau (1998); ibid. (1999); ibid. (2000: Chapter 3). Table 2-1 above shows by how much Vietnam's current land rights system still differs from the full-fledged private property system.

passionately debated[20]. Until recently, in policy-making circles, customary land tenure systems were commonly criticised for imposing constraints on productivity by weakening tenure security and restraining transfer rights[21]. In turn, the proponents of the standard private property theory have been scolded for overlooking the socio-cultural setting in which land matters are embedded, and for underestimating the extent to which informal institutions are able to guarantee tenure security and allow transfer rights. Currently, the main point of contention in the literature rests on whether customary land tenure systems, despite their informal setting, can continue to work efficiently under condition of increasing population density and growing pressures on scarce resources, or whether, in the face of mounting land conflicts, formal rules are more desirable from an efficiency view point.

2.1.2.1 Lessons from Past Land Reforms: Review of the Evidence

The review of evidence that is presented below aims at taking stock of the body of evidence that has been accumulated since the pioneering study by Feder et al. (1988) on the impact of Thailand's land titling programme on investment and farm profitability. A new point of departure in the debate on land property rights has now been reached. Overall, the evidence does *not* decisively confirm the alleged inefficiency of customary land tenure system (Migot-Adholla et al. 1993; Platteau 1999; Brasselle, Gaspart, and Platteau 2002). Neither does it corroborate the alleged superiority of formalised private property rights over customary land tenure systems[22].

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[20] All papers that seek to empirically evaluate the effectiveness of land reform programmes are based on the private property rights theory and are inspired by the early conceptual and empirical work by Feder et al (1988). A formalisation of the different channels through which private property rights are expected to operate is found in Besley (1995). Platteau (1992, 1999 and 2000) provides a review of the empirical evidence that qualifies the relevance and the applicability of the standard private property rights theory in practice (notably with respect to land tenure systems in Africa). See also Berry (1993) for an analysis that takes into account the *non-economic* determinants of land rights and the continued "importance of social networks as channels of access to productive resources". (2003: 16). The latest World Bank paper on land reform (2003) provides an up-to-date literature review of all the arguments.

[21] Customary property rights regimes are commonly assessed by the extent to which they 'deviate' from private property rights, which are assumed to provide the 'correct' incentives. See Platteau (1992).

[22] See Feder, et al. (1988) for Thailand, Bruce and Migot-Adholla (1993), Otsuka and Quisumbing (2001), Migot-Adholla, et al. (1993), Carter, Wiebe and Blarel (1993), Besley (1995) for Africa, Carter and Olinto (2003)for Paraguay, Rozelle, Li and Brandt (2000) for China. Otsuka and Quisumbing (2001) also provide similar tests for Indonesia.

In line with theory, empirical studies have tried to assess the strength of the relationship between more individualised ownership rights on the one hand, and various measures of investment and productivity. Several lessons have been gleaned from these empirical studies and will inform this study of Vietnam's land reform.

One early econometric testing of the impact of land titling on agricultural investments and productivity in a developing country was performed by Feder et al. (1988) for Thailand. The authors tested the relationship between stronger land rights (the possession of a land title), and various measures of investment and productivity. The existence of two mutually exclusive groups, one of squatters living in forest reserve areas, and one composed of legally titled farmers living outside the reserve area, provided a useful way to neatly capture the effect of holding land titles. Controlling for farmer and plot characteristics, in most cases it was found that ownership of land titles had significant and positive effects on the propensity to engage in land improvements, on high-yielding input use and on farm productivity.

One common reading of the Feder et al. (1988) survey is that it confirms the general predictions of the traditional theory of property rights. In reality, the Feder et al. survey contributes to add a number of qualifications to the traditional property rights framework. For instance, although forest reserve squatters were deprived of land certificates, they nevertheless enjoyed *de facto* (albeit not *de jure*) tenure security. However, because they could not use their land as collaterals, they did not have access to formal sources of credit. Therefore, as readily underlined by the authors themselves, lower farm investments from squatters are the result of constrained access to formal credit[23] rather than due to weaker tenure security.

Also, most interestingly, in the survey, a number of squatters were also granted land titles (called STK certificates). However, because squatters already enjoyed *de facto* tenure security and were freely (although illegally) transacting land, the

[23] This is further evidenced by the vanishing of the significant and positive impact of owning land titles on input use where cropping activity is highly commercialised and non-titled farmers can circumvent their credit constraints through additional informal sources of credit provided by traders.

certificates introduced uncertainty over their future ownership[24]. Also, holding STK certificates imposed restrictions on the ability to sell, lease or give land as well as additional transactions costs (Feder et al. 1988 125-131). Consequently, instead of stimulating land transfers, land titles put into question squatters' ability to freely transfer land. Further, as STK titles did not include the right to mortgage land, newly titled squatters did not have any credit advantage over those without title. Overall, the Feder et al. survey presents a very interesting example of a land-titling programme that was counterproductive (it increased tenure *insecurity*), or which was at best ineffective because it failed to provide title-holders with the needed mortgage rights.

Subsequent studies of the impact of private property rights on investment have been conducted, predominantly in the African context, although growing research on land tenure reforms in Latin America and South East Asia is currently being produced[25]. An extensive review is provided in the latest World Bank report on land policies (World Bank 2003c). Overall, robust evidence of a significant and positive relationship remains elusive. In their study of indigenous land rights in Sub-Saharan Africa[26], Bruce and Migot-Adholla (1993) can only find a weak and non-systematic relationship between more individualised land rights on the one hand, and land improving investments, use of formal credit or farm productivity on the other. Similar ambiguous results were confirmed by Otsuka and Quisumbing (2001) in a recent study on the evolution of land rights in Ghana and Indonesia, as well as by Brasselle, Gaspart and Platteau (2002) for Burkina Faso[27].

A number of recent studies have found that the causality between land tenure security and investments could actually run in the opposite direction to that commonly predicted: that is, farmers engage into long-term land investments in order to enhance their rights over land, and not only after they receive security of

[24] According to Feder, et al. (1988: 125), although no end date for the expiry of the land use right was specified, they were granted "*temporary* occupation status". Moreover, STK certificates would cover only up to a certain amount of land, casting doubt of the status of excess land.

[25] Carter and Olinto (1996); Carter and Yao (1998) Deininger and Chamorro (2002); Deininger and Jin (2003)

[26] Case studies include Burkina Faso, Kenya, Ghana, Uganda, Somalia, Senegal and Rwanda.

[27] See also table 1 in Brasselle, Gaspart and Platteau (2002) for a review of other surveys showing that the effects of tenure security on investment in Sub-Saharan Africa are ambiguous.

tenure[28]. In fact, the failure to take into account the potential endogeneity of land tenure together with limitations in the measurement of land rights may account for the failure to find a relationship between land tenure security and investment.

The failure of land titling programmes to stimulate agricultural growth has also been attributed to the lack of complementary reforms that help create an environment that is conducive to investment: irrespective of the tenure regime, when factor and output markets are poorly functioning and physical rural infrastructures are underdeveloped[29], profitable investment opportunities will be few. Consequently, the benefits from land titling will also vary across space, depending on local economic endowments as well as production and exchange opportunities that determine the profitability of investments. Both Alston, Libecap and Mueller (1999) for Brazil, and Carter, Wiebe and Blarel (1993) for Kenya, argue that title contribution should be highest near market centres where factor and output markets are likely to be more developed and well-functioning[30]. Similarly, the benefits from land titling will vary across individuals, depending on their endowment in education, farming experience, social capital, or wealth.

The recent study of land tenure in Burkina Faso by Brasselle, Gaspart and Platteau (2002) highlights the importance of viewing property rights within the social context in which they are rooted[31]. For example, in Burkina Faso, it was found that rights on borrowed land are easily renewable among members of the same lineage and many users actually engage into long-term investments[32]. It so appears that customary property rights, which may at first sight appear weakly defined, are in reality nested within personalised networks of relationships (lineages or kinships), which strengthen the actual rights to which people are entitled.

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[28] The problem of reverse causality is most emphasised in the work of Besley (1995), and particularly in Brasselle, Gaspart and Platteau (2002).

[29] See de Janvry, et al. (1998), de Janvry, et al. (2001) Chapter 11, Bruce and Migot-Adholla (1993), Carter, Wiebe and Blarel (1993), Carter and Olinto (2003), Alston, Libecap and Mueller (1999).

[30] Because the acquisition of titles is costly, title ownership was correlated with market access, when access to market was controlled for, the positive correlation between title ownership and farm profitability that was found otherwise, disappeared. These two studies show how systematic disparities can be traced out to differences in natural resources, access to markets and rural infrastructure, as well as in initial physical and human endowments.

[31] See also Platteau (1992a), Platteau (1992b) and Feder and Feeny (1993).

[32] Brasselle, Gaspart and Platteau (2002: 35-38)

Data requirements for measuring land rights are therefore challenging. Confronted to the difficulties of finding appropriate data to identify tenure security, many empirical studies tended to equate the existence of formalised land rights with security of tenure. By implication, this contributed to overemphasize legal individual ownership as the preferred way to increase the security of land tenure. The emphasis on the formalisation of land rights both in policy formulations and in research methods can be doubly misleading: on the one hand, the lack of formal titles is not necessarily indicative of lack of tenure security; on the other hand, titling programmes may actually contribute to weaken secure customary tenure rights.

A more refined understanding of the complex functioning of land property rights and a better appreciation of the merits and disadvantages of privatising land rights is emerging, as illustrated in the latest World Bank report on land reform (World Bank 2003c)[33], which provides a cautious review of the classical property rights paradigm. By and large, a consensus seems to emerge around the need to take into account existing customary institutions and integrate them into land reform programmes[34]. A greater scepticism against the effectiveness of land titling also seems to prevail: it is now recognised that land titles do not necessarily improve tenure security where customary land tenure is already in place, and that the existence of land titles is neither a necessary nor a sufficient condition for a land market to operate[35]. It is accepted that land-titling programmes may best contribute to strengthen tenure security where there is an institutional void such as in resettlement or frontier areas[36].

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[33] See also the reassessment of the World Bank's land reform policies by Deininger and Binswanger (2001).

[34] Deininger and Binswanger (2001: 422), the two masterminds of land reform programmes at the World Bank, caution against land titling programmes which run the risk of undermining existing customary land tenure regimes. "In all of these cases, clear quantitative evidence on the inadequacy of current tenure arrangements should be made to justify such an intervention. Indicators to be used are the costs of disputes, the efficiency loss imposed by preventing cross-community transfers, or the productivity losses arising from investment disincentives"

[35] See Deininger and Binswanger (2001: 421): "Land titling is not the panacea. [...]. Lack of title is rarely a constraint on efficiency-enhancing land transactions. All over the world, but most clearly in the recent past in many Eastern European countries, land rental and even sales transactions emerged long before individuals were able to obtain formal land title. By contrast, in many countries, government regulations that limited the operation of rental and sales markets precluded the operation of an efficiency-enhancing land market, even in situations where individuals had formal titles to their land".

[36] See for example Alston, Libecap and Mueller (1999) for the Amazonian frontier. Even so, in Platteau (1999: 63), Jean-Philippe Platteau argues, "effective communities may be formed under the decentralized initiative of the migrant settlers themselves. In general, the local informal order embedded in the rural community guarantees basic land rights to all villagers (including migrants) and these are sufficient to induce investment.

To sum up, that tenure security is critical to elicit land-related investments is empirically confirmed. If anything, the fact that farmers engage in observable land-attached investments such as planting trees in order to obtain secure tenure over their land testifies of its importance[37]. However, whilst posited in theory, the superiority of *formal* property rights over customary ones has *not* been validated empirically. A number of important caveats have recently been raised as various land tenure reforms failed to produce the expected results, and as seemingly incomplete property rights regimes do not seem to be as inefficient as previously thought. Given these important caveats from the literature, how can Vietnam's land reform fare?

Undoubtedly, Vietnam's 1993 Land Law does not operate in a socio-cultural vacuum. To understand whether *a priori*, Vietnam's new land tenure system based on *de jure* private property rights may successfully contribute to greater efficiency of land use, it is important to distinguish between two components of the new Land Law: the strengthening of tenure security, and the land titling programme.

2.1.2.2 The 1993 Land Law – First and Foremost, Strengthening Tenure Security

Across centuries, Vietnam has developed a permanent and intensive system of irrigated wet-rice cultivation as a response to intense population pressure[38]. In such an agricultural system, long-term planning and investments of labour and capital in land improvement are required: terrace walls need to be built to prevent erosion, and manure needs to be composted and distributed to prevent the depletion of soil fertility. As cultivation was intensified, cultivation techniques were more complex and supervision became increasingly difficult

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There is then no need for the state to intervene through centralized procedures aimed at formalizing land rights. If, for one reason or another the village informal order is absent, had vanished, or is proving unable to regulate access to land, however, the state may be well-advised to substitute for the missing social structure"

[37] The importance of tenure security is emphatically asserted by the World Bank (2003c: 26) in its latest review of land reform: "Of all the attributes of land rights, the duration for which use may be enjoyed is one of the most important. [...] The length for which rights to land are awarded, and the mechanisms available for extending them, that is whether they are automatically renewed or whether extension depends on a discretionary process, will affect the incentive to invest in and manage land in a sustainable fashion."

[38] Gourou (1952); ibid. (1965 (1936)) documents the acute population pressure in the Red River Delta in the 1930s and across South-East Asia, and describes the labour intensive cultivation methods that were developed over time.

and costly. Netting (1993: 17) argues that intensive cultivation systems *require* secure and individualised land rights including tenure and transfer rights[39]:

> "if returns on the work of intensification and build-up of productive capital in the farmstead are threatened by insecure tenure, reallocation of the land to others, or denial of household members' right to future benefits, the incentive to intensify will decline. Intensive cultivation is therefore invariably associated with quasi-private property rights systems, although "permanent alienation by sale seldom occurs".

Vietnam's traditional land tenure system consisted in an intricate system of different types of landholdings, with a complex array of rights and obligations attached to them. Principally, private land coexisted alongside communal land, which was owned and managed by the village entity and could represent a substantial part of total agricultural land[40]. Over time, population pressure and increasing land scarcity contributed to the gradual erosion of communal land and Vietnam's customary land tenure system evolved to provide permanent and inheritable rights that approximated those of private ownership[41].

The collectivisation of agriculture during the 1960s and the 1970s represented a considerable disruption in land property relations. During the 1980s, as agriculture was being de-collectivised, tenure insecurity was rife and dampened work and investment incentives. As a counterpoint to that period, the 1993 Land Law was in effect confirming the return to the pre-colonial land tenure system where land could be farmed individually for a relatively long and secure period of time. In fact, the 1993 Land Law actually *restored key traditional land rights* that allow the intensive cultivation system to function: tenure security, and

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[39] See also Boserup (1965/1998); Bray (1986); Netting (1993) and Hayami and Kikuchi (1981); Bray (1986); Netting (1993); Hayami (2001); Otsuka and Quisumbing (2001); Platteau (2002)

[40] There were two types of communal land, *công diên* and *tu dan dien*, and private land (*tu diên*). See Scott (1976); Wiesgerma (1988); Phan Huy Le (1993); Scott (2001), Gourou (1965 (1936)). Under the stress of certain events, village authorities could decide to convert private land into communal land. Phan Huy Le (1993) gives the example of a village that had to be evacuated because warring factions fighting each other threatened it. Land was left fallow for a long period, and upon their return, the villagers realised that they would not be able to farm all their land on their own. The village authorities decided to pool and redistribute the village land equally, according to each family's labour endowment, for a period of three years. After three years, 70 percent of the land was returned to its former owners, but 30 percent was converted into communal land.

[41] Amongst rice-growing countries, Vietnam was no exception in that matter. For example, Bray (1986) explains that in China, as cultivation techniques became more complex and supervision became increasingly costly for landlords, tenants saw the terms of contracts evolve in their favour and were granted managerial independence. Secure tenure took the form of lifetime leases with transferable and negotiable cultivation rights. The landlord-based tenure system evolved into what Bray terms a two-owner system.

residual income rights. In that respect, the strengthening of tenure security and the stabilisation of expectations are the most important contributions of the 1993 Land Law.

2.1.2.3 The 1993 Land Law – Formalisation of Private Property Rights

Another important component of the 1993 Land Law is the issuance of land titles. By setting a new land tenure system based on *de jure* (*quasi*) private property rights, guaranteed by legal titles, the 1993 Land Law signifies a momentous change in Vietnam's history of land tenure. However, as was seen earlier, land titles do not necessarily contribute to increase tenure security. Also, land titles are neither necessary nor sufficient to stimulate the functioning of a land and credit market. To some extent, the effectiveness of Vietnam's land titling programme depends on whether or not the new *de jure* rights contravene existing community norms embedded in the socio-cultural system[42] and on the extent to which these norms can be overruled by the new formal land tenure system.

The land-titling programme represents the institutional, law enforcement aspect, of Vietnam's land reform. To understand how land titling works, two distinct aspects of establishing property rights need to be distinguished: (i) the body of public rules that enable individuals to exercise a number of rights (i.e. the land law); (ii) the formal institutions that enforce or protect these rights[43].

These two dimensions of a property rights system interact and can either support or undermine each other. When the public enforcement of law is defective either because of sheer administrative capacity constraint or because institutions have been subject to local capture, alternative institutional arrangements emerge. In an insightful article, Glaeser and Shleifer (2003) provide a theory of institutional choice and law enforcement that depends on whether law enforcing institutions

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[42] Nee (1998: 87) explains the divergence that can emerge between formal rules and informal norms: "To the extent that members of networks have interests and preferences independent of what rulers and entrepreneurs want, the respective contents of informal norms and formal organizational rules are likely to reflect opposing aims and values"

[43] Acemoglu and Johnson (2003) distinguish *contracting* institutions from *property rights* institutions. North (1990: 23) explains that institutions "[...]are composed of formal rules (statute law, common law, regulations), informal constraints (conventions, norms of behaviour and self-imposed codes of conduct), and the enforcement characteristics of both."

can be perverted by vested interests[44]. Another example comes from the current situation in Russia, where it is shown that when public rules could not be enforced because of a malfunctioning judicial system, public rules are *privately* enforced. Hay and Shleifer recount:

> "In some cases, these [public] rules are enforced by courts, though with significant efforts by private parties to simplify the courts' decision process. In other cases, these rules are enforced by private parties without any reliance on courts. In still other cases, the parties agree to a resolution in line with these rules without any help with enforcement, since they know which is going to be enforced. In all these ways, private enforcement of public rules can work reasonably efficiently even when public enforcement remains ineffective" (Hay and Shleifer 1998: 401).

The 1993 Land Law clearly included the two above-mentioned institutional dimensions of a property rights system. In particular, it created a set of formal institutions in charge of enforcing the new *de jure* rights and of managing the various tasks associated with the land tenure system (e.g. the issuance of land titles or the settlement of land disputes). These formal institutions represent the law enforcement capacity of the State.

Law enforcement institutions can influence the security of tenure as perceived by land users in two conflicting ways. On the one hand, local institutions that are supportive of the land reform in Vietnam can contribute to reduce uncertainty and can therefore play a significant role in promoting long-term investment and in encouraging land transactions. On the other hand, when institutions are subverted by the rich and powerful, they can contribute to weaken the rights of individual land users (Glaeser and Shleifer 2003).

The difficulties faced by Vietnam in establishing these new institutions for law enforcement were documented in a recent evaluation of Vietnam's public administrative system (ADB 2003a; ADB 2003b), which highlighted problems of capacity constraints (e.g. lack of required skills, training and resources) as well as "complicated procedures and abuse of power [...] by local officials in the

[44] Glaeser and Shleifer (2003) show that in the USA at the beginning of the 20th century, institutions in charge of protecting property rights were perverted in their task of enforcing property rights by vested interests. As a

case of residential permits, house registration, land allocation, and forestation" (ADB 2003a 6)[45]. As a response to these problems, the new Land Law, which was enacted in November 2003 and became effective in April 2004, puts the emphasis on strengthening the institutions in charge of protecting property rights. It also "gives people the right to complain about any official violating administrative procedure"[46].

All in all, the new land laws represent drastic changes in the institutional framework that governs land rights in Vietnam. Establishing institutions that are able to formally enforce land rights takes times and ultimately involves deep changes in the social structures and norms of a country[47]. The difficulties in establishing such institutions should not be underestimated. Fifty years into the enactment of Kenya's land titling programme (the Swinnerton Plan dating back to 1954), the titling and land transaction registration process remains incomplete and is criticised for being ineffective (Quan 2000). Therefore, in order to assess the impact of the 1993 Land Law on investment incentives, it is important to distinguish the effect of strengthening tenure security from the effects of the land-titling programme, which may take more time to materialise.

Sections 2.2 and 2.3 set out to examine the impact of the 1993 Land Law along these lines and seek to separately test the impact on investment incentives of (i) strengthening tenure security by enacting a new body of public rules, and (ii) establishing institutions that protect land tenure rights.

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consequence, the prevailing system of law enforcement based on *ex-post* private litigation could not be sustained and a system based on (*ex-ante*) regulation was eventually preferred.

[45] The need for administrative reform was formally recognised in the Prime Minister's decision 136/2001/QD-TTg (September 2001), which forms the basis for the Public Administration Reform plan (PAR) that was launched in several pilot provinces in 2003. See ADB (2003a) for an analysis of the PAR.

[46] Interview on Feb 03, 2004 with minister Mai Ai Truc, Minister of Natural Resources and Environment. "Revising Land Law", by Vietnam News. For example, the 2004 Land Law establishes a dedicated Land Office, and clarifies the decentralisation of responsibilities at provincial and district levels. People's Committees at the provincial level allocate or lease land to organisations, whilst People's Committees at district levels allocate or lease land to households and individuals.

[47] Shirley (2003: 17) points out that "secure property rights, for example, are outcomes, the result of a number of different institutions – norms of conduct, religious precepts, historical traditions, laws and courts, and rules that check the state's ability to expropriate".

2.2 Econometric Model and Estimation Issues

Research on the relationship between land tenure security and investment is fraught with empirical difficulties. Recent surveys that have been purposively set up in order to assess that relationship have fallen short of adequately measuring either land tenure security or investment. As pointed out by the authors of a most careful investigation of the relationship between land tenure security and investment incentives in Burkina Faso (Brasselle, Gaspart, and Platteau 2002: 402):

> "[...] the conventional way of measuring land tenure security is problematic. This is because the categories of rights used do not discriminate adequately between varying levels of security as actually experienced by people in societies pervaded by highly personalized networks of social relationships. [...] To improve on this situation, it is necessary to go beyond the veil of rather simple definitions of land rights to identify the social context in which they are embedded. This is bound to be a very arduous task involving the use of more complex methods than the standard household survey questionnaire commonly used by economists."

The impact of Vietnam's 1993 Land Law on investment incentives is evaluated using agricultural production data from the Vietnamese Living Standard Survey (VLSS). The VLSS is a panel survey of 3381 rural households who were interviewed in 1992, before the enactment of the 1993 Land Law, and in 1998, five years after the implementation of the Land Law. Provincial land titling data collected at the central Cadastral Office[48] in Hanoi will also be used.

The VLSS collected information on land tenure in a "conventional way". Straightforward questions on land tenure categories and length of tenure were asked with no reference to the legal enforcement of land rights or to the social context in which they operated. Clearly, given the caveats provided above, caution will be required when interpreting the results.

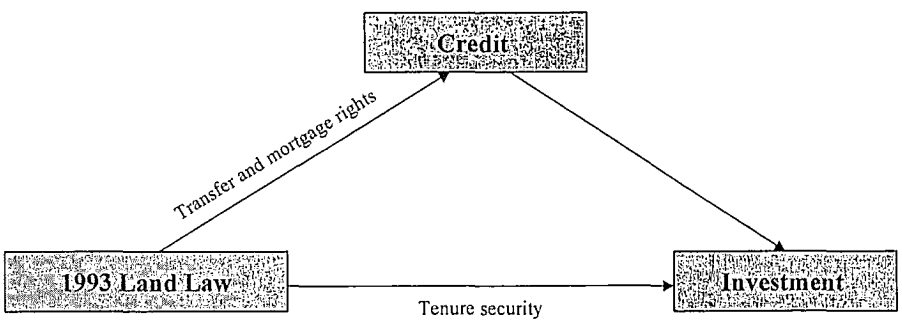
Nonetheless, it is possible to take advantage of idiosyncratic characteristics of Vietnam's land reform to ensure that the land rights variable that is constructed

[48] Tong Cuc Dia Chinh

using data from the VLSS captures the exogenous changes in tenure security brought about by the 1993 Land Law. Also, because the VLSS provides panel data before and after the enactment of the 1993 Land Law, it is possible to use panel fixed-effects techniques to control for unobserved farm and household fixed-effects that may be correlated with these changes in land tenure. It will also be argued that the provincial land titling data captures the institutional law enforcement aspect of Vietnam's land reform.

The estimation issues that needed to be solved in order to empirically test the impact of the 1993 Land Law are now reviewed in detail. According to the standard property rights theory, the relationship between land rights and long-term investment can be modelled into a triangular system as in Figure 2-1.

Figure 2-1: Land rights and Investment



In turn, the triangular relationship can be modelled into a system of two simultaneous equations:

Equation 2-1: $I_{it} = \alpha_0 + \alpha_1 R_{it} + \alpha_2 C_{it} + \alpha_3 X_{it} + a_i + \mu_{it}$

Equation 2-2: $C_{it} = \beta_0 + \beta_1 R_{it} + \beta_2 Z_{it} + b_i + \eta_{it}$

where

- I is a measure of long-term investment
- R is a measure of land rights
- C is the amount of formal credit
- X is a vector of exogenous determinants of I

- Z is a vector of exogenous determinants of C. X and Z can be overlapping.
- a_i and b_i are time-invariant unobserved variables
- μ_{it} and η_{it} are the mean-zero independent error terms
- $t = 1, 2$ and $i = 1,...,n$

Ideally, a measure of land rights would distinguish transfer rights from tenure security rights and it would be possible to estimate both equation (1) and equation (2). As will become clear later (see sections 2.3.2 and 2.3.3 below), the data do not allow us to make such distinctions in the composition of land rights at the household level. In particular, the VLSS does not provide household level data on land titling. As a result, it is not possible to directly evaluate whether ownership of a land title contributed to enhance a household's access to formal sources of credit. The chief aim of this chapter is to estimate Equation 2-1 and to test the impact on investment incentives of (i) strengthening tenure security by enacting a new body of public rules, and (ii) establishing institutions that protect land tenure rights.

Before presenting the variables used in the model (Section 2.3), three estimation issues are now analysed: the endogeneity of land rights or the issue of reverse causation; the household and plot heterogeneity bias or the issue of omitted variables; the endogeneity of credit. It is shown that it is possible to exploit the idiosyncratic characteristics of Vietnam's land reform together with the features of the VLSS to tackle these estimation issues.

2.2.1 Exogeneity of Land Rights

The issue of reverse causality (that is, the situation when farmers engage into long-term land investments in order to enhance their rights over land) has been a major concern in empirical research on the relationship between land rights and investments. Recent empirical works demonstrate that failing to control for such an endogeneity problem would lead to spurious results (Migot-Adholla et al. 1993; Besley 1995; Brasselle, Gaspart, and Platteau 2002).

The evidence from secondary literature that such a relationship is at play in Vietnam is sparse. A survey of three Black Thai villages in the northern mountains of Vietnam indicates the existence of the reverse causation for forest land: those who cleared and transformed the land into terraced rice fields in turn benefited from *de facto* ownership rights (Sikor 1999). However, although such land tenure practices may persist in Vietnam, this seems to have been reported only for indigenous communities living in the uplands.

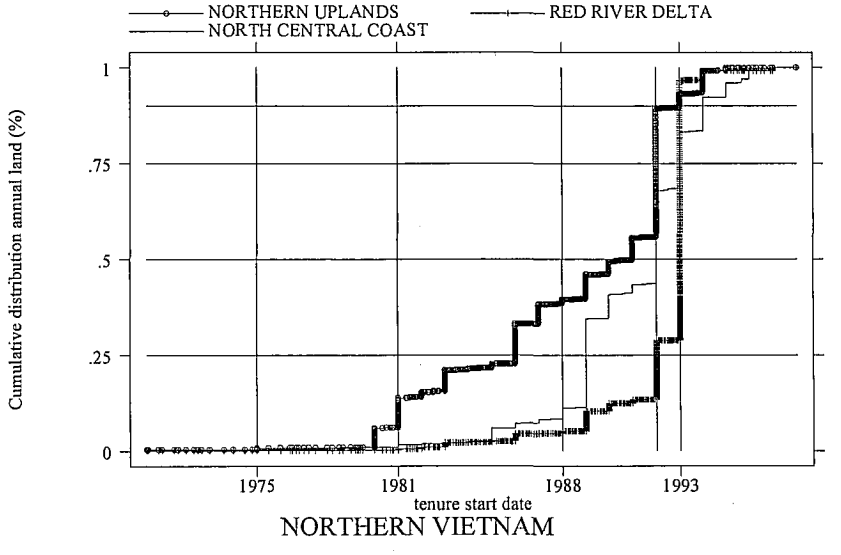
Moreover, when analysing data from the VLSS, several idiosyncratic features of Vietnam's land reforms emerge that seem to ensure that the strengthening in tenure rights can be considered exogenous to households' decisions. In 1998, the Vietnamese Living Standard survey collected data on the year in which a farmer *started* cultivating a plot of land. Annual land tenure data are used to graph the timing of land redistribution Vietnam in Figure 2-2 to Figure 2-4 below and show that most annual land (90 percent) was redistributed *prior to 1993*.

These data also reveal an important divide between the Northern and Southern regions of Vietnam. In the South East and Mekong River Delta, the two regions at the southern end of Vietnam, 90 percent of annual land was distributed before 1988, and 98 percent before 1993 (in Figure 2-3, see the two upper lines for the South East and Mekong River Delta regions). In Northern Vietnam, the 1993 Land Law had the largest impact in the Red River Delta where about 75 percent of annual land was redistributed between 1992 and 1993 (in Figure 2-2, see the lowest line, and notice the large peaks in 1992 and 1993). At the other end of the spectrum, in the Northern Uplands, one can see that the pattern of land redistribution was shaped to a greater extent by Decree 100 and Resolution 10 (in Figure 2-2, see the upper line and the gradual build-up of length of tenure between 1982-1988, and between 1988-1992).

Considering the whole of Vietnam, about *90 percent of annual land had been redistributed by 1993* (see Figure 2-4). Thus, although the new 1993 Land Law offered another opportunity to administratively redistribute land, it appears that the majority of village authorities decided to *not* reallocate land but to confirm the allocation that had been carried out earlier, under Resolution 10 (1988).

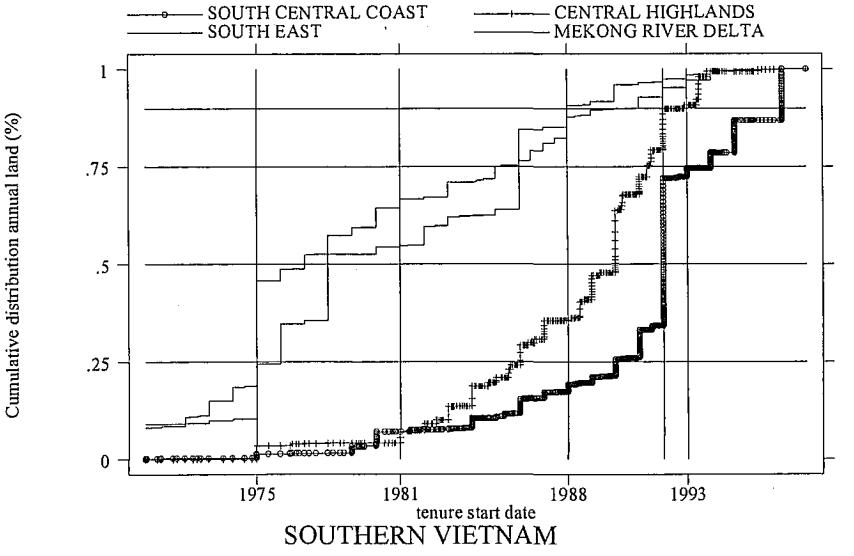
Overall, this means that the 1993 Land Law did not bring about a radically new distribution of land, but rather ***exogenously*** transferred *additional rights* to farming households on their *existing* land: first and foremost, the Land Law stabilised expectations by granting long-term use rights on the allocated land. This transfer of tenure rights can be considered largely exogenous to households' decisions.

Figure 2-2: Timing of Land Distribution in North Vietnam (annual land)



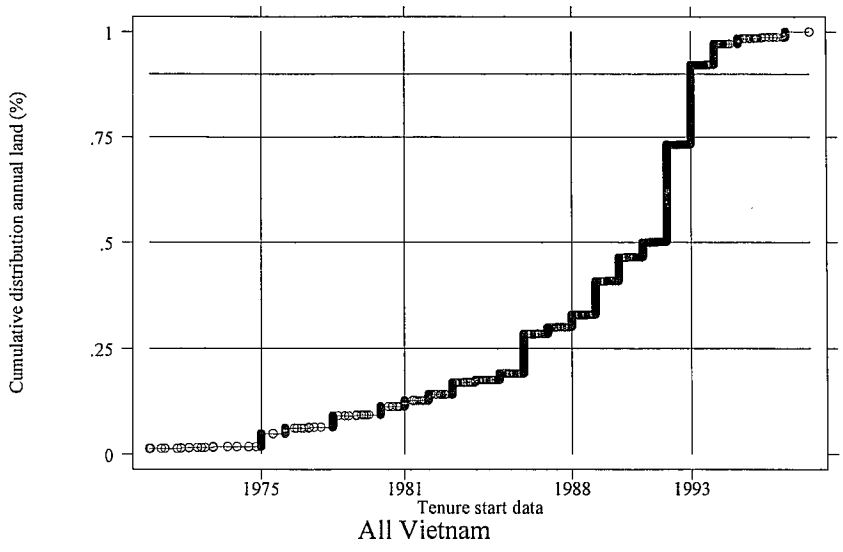
NORTHERN VIETNAM

Figure 2-3: Timing of Land Distribution - South Vietnam (annual land)



SOUTHERN VIETNAM

Figure 2-4: Timing of Land Distribution – All Vietnam (annual land)



Source: VLSS 1992 and VLSS 1998, rural households only, one outlier excluded.
NB: "In which year did your household begin farming this plot?" Average year over households' plots.

2.2.2 Regional and individual heterogeneity bias

Using data on land tenure types from the VLSS, it is possible to identify the strengthening in land tenure security that was induced by the 1993 Land Law. A close analysis of the data reveals that the change in tenure security was of a significant magnitude but also that its distribution across Vietnam was not random, but historically determined, closely following the historical North-South divide. This source of non-randomness points to the importance of controlling for factors that may be correlated with both tenure status and productivity characteristics. Omitting these factors from the analysis would lead to spurious results. Let us first ascertain the source of non-randomness in the distribution of land tenure rights.

2.2.2.1 Non Randomness of Land Rights

The VLSS gathered data on various land types, which are associated with different land tenure rights. It is this variation in land tenure type that will be exploited to identify the strengthening in tenure security induced by the 1993 Land Law. The distribution of each land tenure type in 1992 and in 1998 is

shown in Table 2-2 below (page 46). In 1992, at the time of the first VLSS survey, there were four main types of land tenure:

i. *Allocated land*[49] refers to land allocated to households by the cooperative under Decree 100. Households received the right to cultivate the land against the payment of a land tax and a share of the harvest contracted in advance with the cooperative. The length of tenure was also decided by the cooperative and before the enactment of Resolution 10 could be very short. At the end of the tenure period, the allocated plots of land were reintegrated into the collective farm or would be reallocated to another household. Allocated land is predominant in Northern Vietnam (e.g. it accounted for 72 percent of total agricultural land in the Red River Delta) where most agricultural land had been collectivised and was under the management of cooperatives. It is almost absent in the southernmost regions of Vietnam, where land could not be collectivised during the collectivisation push between 1975 and 1981 (Mekong River Delta and South East regions).

ii. *Long-term use (LTU) land* refers to the land that falls under Resolution 10. LTU land differs from allocated land in that long-term use rights were allocated for a tenure period that was left undefined by Resolution 10: the Resolution stipulated a period *up to* 15 years. As a result, the final tenure period could end up being much shorter. At the end of the tenure period, the land was returned to the collective in order to be reallocated. LTU land is notably predominant in South Vietnam (52 percent and 41 percent of total agricultural land in the Mekong River Delta and the South East respectively).

iii. *Private land* refers to the so-called '5-percent land' that was allocated in the 1960s by cooperatives for private production (garden land) in North Vietnam. Private land is unencumbered by any obligation towards the State: households have management, residual income, as well as bequest rights on their private land. Private land was famously productive during the collective period, whilst productivity on collective plots was languishing. Private land is most prevalent in South Vietnam where land

was not or only partially collectivised, and represented between 40 and 50 percent of total agricultural land.

iv. *Auctioned land* refers to land auctioned (*dau thau*) to households who can demonstrate greater productive abilities (greater labour or capital endowment) and who have the capability to pay the highest rental fees to the cooperative or village authorities. Tenure rights on auctioned land are decided by local authorities and are generally short-term (3-5 years). At the end of the tenure period, the land is returned to the village authorities to be re-auctioned.

v. *Other land* refers to land that is farmed by a household but does not fall into any of the above-mentioned category. It can consist in cleared land or hill bare land on which households expended labour and gained *de facto* ownership. Because other land falls outside of the jurisdiction of the land laws and is under the control of households, tenure rights may be considered as strong.

Following the enactment of the 1993 Land Law, only three main types of land remain:

i. *Long-term use (LTU) land* is the land that is governed by the 1993 Land Law. As detailed in section 2.1.1, usufruct right on land is allocated for a tenure period of 20 years for annual land, and for a period of 50 years for perennial land. LTU land is transferable and can be mortgaged. Farmers have to pay a fixed land tax and can retain the entirety of the residual. Land categorised under private land in 1992 is merged into the LTU land category in 1998.

ii. *Auctioned land* and *other land*: same as above.

iii. *Contract land*[50] refers to land that is contracted out by State farms to households, who receive usufruct rights for 'long-term and stable use'. The length of tenure is negotiated between the households and the State

[49] VLSS 1992's interviewer's handbook, p.40.

[50] Contract land refers to land that is contracted out by State farms to households, who receive usufruct rights for 'long-term and stable use'. The length of tenure is negotiated between the households and the State entity, but farmers are not provided with land titles and do not have any transfer rights. This type of contract is mostly found in the Central Highlands for the exploitation of the forest land that is still managed by State farms, and will not concern us as we focus exclusively on agricultural land.

entity, but farmers are not provided with land titles and do not have any transfer rights.

The strengthening in tenure rights was performed through the switch from *allocated* land into LTU land. Land categorised under LTU land and private land in 1992 are merged into LTU land in 1998, as shown graphically in Figure 2-5 below.

Figure 2-5: Changes in Land Tenure Contracts from Resolution 10 to the 1993 Land Law

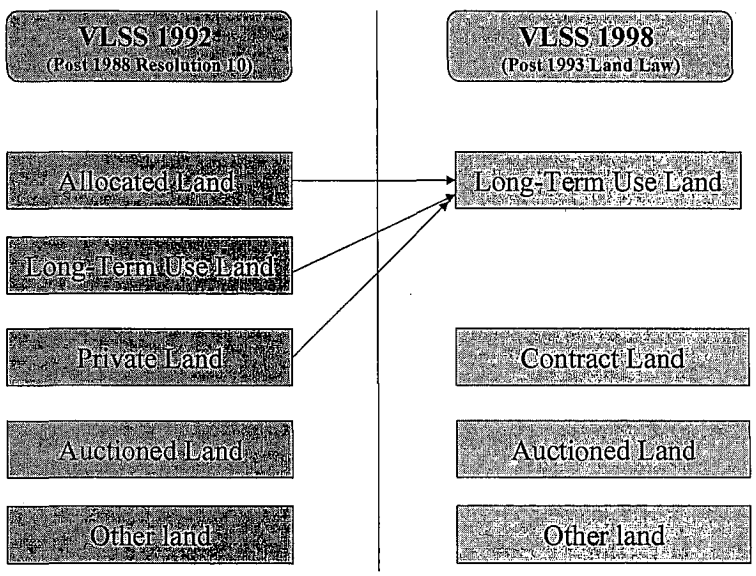


Table 2-2 below illustrates the magnitude of the shift in tenure security induced by the 1993 Land Law. Before 1993, land with short-term or insecure tenure was composed of *allocated* and *auctioned* land. Land with *de facto* secure tenure rights included *long-term use* and *private* land. The share of LTU land (that is, land with strong tenure rights) in North Vietnam increased from 3-11 percent to 80-90 percent of total agricultural land.

Table 2-2: Land Tenure Types (share of total agricultural land)

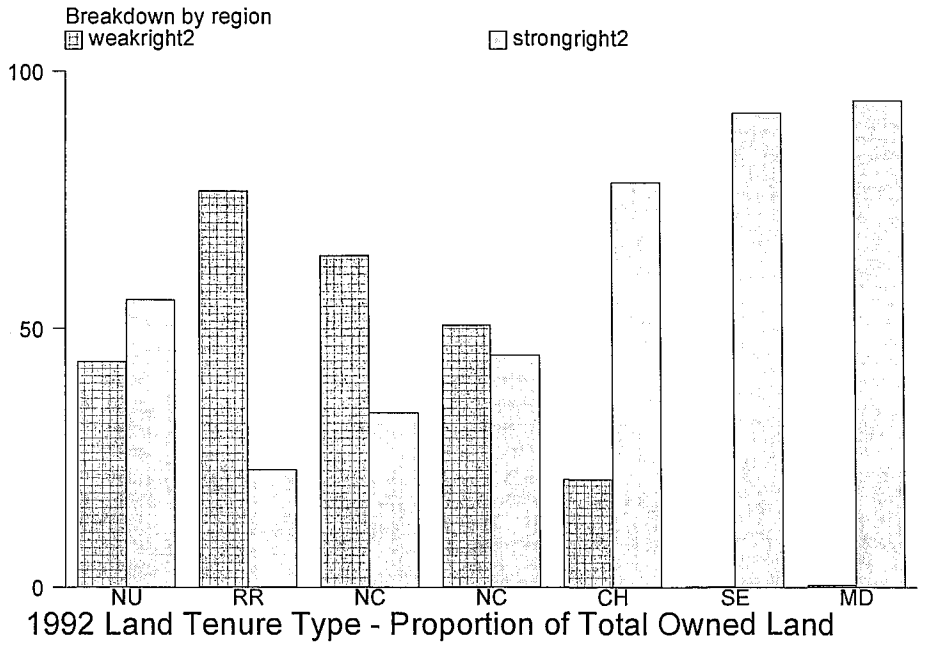
1992	Allocated	LTU	Private	Auctioned	All Other Type
Northern Uplands	39.45	10.29	26.42	4.03	19.81
Red River Delta	72.12	3.22	16.75	4.59	3.32
North Central Coast	61.05	11.28	18.51	3.02	6.14
South Central Coast	49.47	6.5	26.6	1.1	16.33
Central Highlands	20.76	2.9	49.45	0.0	26.89
South East	0.17	41.33	43.08	0.0	15.42
Mekong River Delta	0.42	51.75	41.75	0.0	6.08

1998	LTU	Contract	Auctioned	All Other Type
Northern Uplands	83.26	3.71	2.70	10.33
Red River Delta	90.06	0.72	4.65	4.57
North Central Coast	80.01	11.86	3.28	4.85
South Central Coast	91.13	0.37	1.09	7.41
Central Highlands	79.48	0.40	0.15	19.97
South East	94.36	0.00	0.00	5.64
Mekong River Delta	96.57	0.14	0.00	3.29

Source: VLSS 1992 – 1998

Table 2-2 also strongly indicates the existence of a significant North-South divide and suggests that the variation in tenure security across Vietnam is not random but historically determined. The North-South divide appears cogently in Figure 2-6 below, where allocated and auctioned land are subsumed into one group representing weak land tenure (*weakright2*), and the remaining tenure categories (LTU land, private land and other types of land) are aggregated into another group representing strong land tenure (*strongright2*). The share of land under weak tenure right is negligible in the South East region (SE) and the Mekong River Delta (MD) and remains limited in the Central Highlands (CH). In the South Central Coast, where the collectivisation drive was somewhat successful after 1975, the share of land under weak tenure is somewhat larger. In the Northern regions, land under weak tenure is predominant. Only in the Northern Uplands does one see a larger share of land with strong tenure right. This is due to the important presence of land under the category "other", i.e. land that does not fall under the collective authority such as forest land converted into agricultural land as illustrated in the survey of the Black Thai community by Sikor (1999).

Figure 2-6: Distribution of Tenure Security by Region



This North-South divide can be traced back to the history of Vietnam's land reform in the second half of the twentieth century. In Southern Vietnam (South East and Mekong River Delta regions), after the reunification of the whole country in 1975, the push for the collectivisation of agriculture was staunchly resisted and throughout the 1980s, agricultural land continued to be farmed by individual households. As a result, private and long-term use lands were predominant in 1992 and accounted for about 80-90 percent of total agricultural land. Also, households in South Vietnam report having farmed their land for a total period of time that is longer than in the North by 8 to 10 years. On the contrary in Northern Vietnam, most land had been collectivised in the course of the 60s and the 70s so that in 1992, as much as 50 to 75 percent of agricultural land was classified as allocated land (that is land under the control of cooperatives and allocated to individual households under Resolution 10), on which weak tenure rights prevailed.

The distribution of land tenure rights is therefore non-random and it becomes important to control for factors that may be correlated with both tenure status and productivity characteristics. There are two main sources of unobserved heterogeneity: regional and individual. Firstly, there may be systematic differences between the Northern and Southern regions of Vietnam in

characteristics that are correlated with investment or productivity characteristics (e.g. ecological conditions and soil conditions, infrastructure development). Similarly, variation in tenure may be correlated with individual characteristics that are linked to productivity (better farming ability, greater entrepreneurship, greater wealth).

The bias due to unobserved *individual* heterogeneity is likely to be moderate because, as was shown earlier, the changes in land tenure rights brought about by the 1993 Land Law were largely exogenous to households. However, as tenure rights differ systematically between North and South Vietnam, it is possible that household characteristics also differ systematically in a way that is correlated with land tenure status. For instance, household characteristics (education and family size) do differ systematically between North and South Vietnam.

Likewise, *regions* differ systematically in their infrastructure endowments such as roads and irrigation (Dollar and Glewwe 1998; Haughton, Haughton, and Phong 2001). The omission of two specific regional factors have been pointedly criticized by Carter, Wiebe and Blarel (1993), who show that where titling status is systematically correlated with market access, and by Alston et al. (1999) who show that returns to tenure status are correlated with distance to the road. Finally, plot heterogeneity can constitute an important source of bias if plot characteristics (e.g. land quality) are covariant with changes in land tenure security.

2.2.2.2 Fixed-Effects Estimator

The Vietnamese Living Standard Survey offers a considerable advantage to address the issue of unobserved heterogeneity. Its panel feature allows the use of first-differencing techniques in order to wipe away that part of the unobserved heterogeneity that is time-constant. To see how, it is useful to distinguish two kinds of omitted variables: those that vary with time and those that are time-invariant. Time-variant omitted variable are included in the error term.

Time-invariant omitted variables are modelled separately as a_i in Equation 2-1 (p. 38 above). They can be correlated with any of the other exogenous regressors,

including R_{it}. The VLSS collected data from the same household before and after the enactment of the 1993 Land Law. It is therefore possible to remove the heterogeneity bias due to *time-constant* factors through first-differencing or fixed-effects. A time dummy $d98$ that equals 0 for the year 1992 and 1 for 1998 is added in Equation 2-1. This allows the intercept to change over time and to capture secular changes in the independent variables that are not captured by the explanatory variables. Rewriting Equation 2-1, one obtains:

Equation 2-3: $I_{it} = \alpha_0 + \delta_0 d98 + \alpha_1 R_{it} + \alpha_2 C_{it} + \alpha_3 \mathrm{X}_{it} + a_i + \mu_{it}$

First-differencing between the two survey years sweeps away the unobserved fixed effects a_i:

Equation 2-4: $\Delta I_i = \delta_0 + \alpha_1 \Delta R_i + \alpha_2 \Delta C_i + \alpha_3 \Delta \mathrm{X}_i + \Delta \mu_i$

2.2.2.3 Time-Variant Control Variables

First-differencing leaves unresolved the issue of *time-varying* omitted variables that may be directly or indirectly correlated with the explanatory variables. This issue will be tackled by including a whole set of control variables from the large range of information collected by the VLSS at the household and community levels. Adding control variables removes the inconsistency and also improves the fit of the model and enhances the precision of the estimation

Even so, fixed effects are particularly robust to omitted variables. In a first-difference/fixed effects setting, a necessary condition for consistency is $E(\mu_{it} \mid R_{it,} C_{it,} X_{it}, a_i) = 0$: the fixed effects a_i are allowed to be correlated with any other independent variable ($E(a_i \mid R_{it,} C_{it,} X_{it})$ can be any function of the independent variables). A sufficient condition for consistency is $E(\Gamma_{it}' (\mu_{it} - \overline{\mu_i})) = 0$, with $\Gamma \equiv (R, C, X)$ the vector of all the independent variables in equation 2.1. This means that each element of Γ_{it}, and in particular the land rights variable R or the credit variables C, can be correlated with $\overline{\mu_i}$. Independent variables are allowed to be

"systematically related to the persistent component in the error. (...) It is for this reason that FE is often superior to pooled OLS or random effects for applications where participation in a program is determined by pre-program attributes that also affect y_{it}." (Wooldridge 2002:279)

Before presenting the set of control variables and the reasons for choosing them in section 2.3.4 (page 65 below), one last estimation issue needs to be addressed in detail. It is related to the omission of unobserved variable that are both correlated with the credit and the investment variables.

2.2.3 Endogeneity of Credit

From Equation 2-1 and Equation 2-2 (see p. 38) and Figure 2-1, one can see that the credit variable C is endogenous if $E(C\mu) \neq 0$, that is, if there is a variable included in Equation 2-2 (which models the determinants of credit) that is omitted in Equation 2-1 (which models the determinants of long-term land-attached investment), and which is correlated with both credit C and investment I albeit uncorrelated with tenure rights R in Equation 2-1. For example, there is evidence that formal credit markets in Vietnam are rationed and that wealthier households are both more likely to invest and to obtain credit (World Bank 1999; Pham and Izumida 2002)[51]. As a result, although in Vietnam wealth is not *a priori* related to tenure rights (the changes in tenure rights are exogenous to households), its omission may be an importance source of inconsistency for all the estimates.

The endogeneity of credit has been verified, using the test for the violation of the strict exogeneity condition for linear fixed effects panel data model indicated by Wooldridge (2002: 285). In the first-differenced Equation 2-4, neither c_{i1} or c_{i2} should be significant as additional explanatory variables. The test for the consistency of the FE/FD estimator is performed by adding c_{i2} and carrying out an F-test for significance of c_{i2}. Using the F-test, robust to heteroskedasticity,

[51] In Vietnam's credit constrained setting, other factors such as connections to mass party organisations or membership in the Communist Party may also influence one's access to credit. That these factors influenced access to credit seems confirmed by findings in Ravallion and van de Walle (2004) and Pham and Izumida (2002).

we *verify* the endogeneity of c_{it}[52]. It is therefore necessary to control for time-varying omitted factors that may be correlated with both access to formal sources of credit and the propensity to engage in long-term investment.

As mentioned above, fixed effects are particularly robust to omitted variable bias. Unfortunately, it does not seem possible to exploit the robustness of fixed effects with respect to the omission of wealth. Indeed, between 1992 and 1998, households experienced unprecedented fluctuations in well-being[53] in a very short period of time[54]. If omitted, the important changes in wealth that occurred between the two VLSS surveys are likely to bias the results.

Due to data limitation, it was not possible to use instrumental variable (IV) techniques to tackle the issue of the endogeneity of credit[55]. Nevertheless, given the wealth of data on households' characteristics in the VLSS, it is possible to find a proxy for wealth and include it as an independent variable in Equation 2-1.

2.2.3.1 Proxy for Wealth

Proxies for wealth[56] typically include a selection of variables including indicators of housing quality, nature of toilet facilities, ownership of certain durable assets, private access to water, also sources of lighting and cooking. Including proxy variables individually as control variables in the main regression

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[52] The Wald test for the exclusion of c_{i2} is 6.68 (prob=0.0098), so that the test for the exogeneity of credit is rejected.

[53] The changes in welfare are analysed in detail in Chapter 4 of this thesis.

[54] See for example Glewwe, Gragnolati and Zaman (2000); Haughton, et al. (2001); Haughton, Haughton and Phong (2001).

[55] This is because the IV for credit should be well correlated with credit, but uncorrelated with investment except via its effect on credit. The IV should also be uncorrelated with any other unobservable factors affecting investment. In theory, credit supply factors that are specific to Vietnam's credit market could provide such an instrument. For example, if one reason for not taking a loan is the absence of a nearby bank, the presence of bank could be used as an instrument. Unfortunately, the VLSS provides very little data on credit supply, and it is consequently very difficult to find a satisfactory IV for credit.

[56] Wooldridge (2003: 296) explains that a proxy for wealth should have two characteristics. It should be related to the unobserved variable that we would like to control for in the analysis (wealth) and be uncorrelated with the error term. In other words, since the proxy does not directly affect investment, it should be an irrelevant variable once all other exogenous variables including the omitted variable are included in the main equation. $E(I \mid R, C, X, w, p) = E(I \mid R, C, X, w)$, where w is the omitted variable wealth and p is a vector of proxies for wealth. Once the proxy is partialled out, the omitted variable has no correlation with the exogenous variables. $w=\delta_0+\delta_1+\gamma$. p is such that $E(w \mid R, C, X, p) = E(w \mid p) = \delta_0+\delta_1 p$. p is such that R, C, X and W are independent, conditional on p. These two properties ensure that when we include the proxies in the regression equation, partial effects can be consistently estimated as a function of the observable p instead of the unobserved w.

removes the inconsistency (Montgomery et al. 1999)[57]. Indicators that are available in both VLSS surveys and which can be thought of as proxies for wealth include (i) the amount of dowry paid, (ii) ownership of durable assets (number of cupboards, beds, tables, car, motorbike, bicycle), (iii) quality of dwelling material (floor material, roof material) and other housing characteristics (number of rooms, the sources of drinking water, toilet facilities)[58], (iv) data on value of livestock and farm equipment.

The correlation of these variables with wealth is verified by an estimation of the natural log of household consumption on the set of variables for both survey years. In 1992, using the variables that indicate whether the household owns a bicycle, the number of rooms, the value of dowry, the value of equipment, and the number of draft animals, all the covariates are significant at the 1% significance level[59] and the R^2 is equal to 0.20. In 1998, all the variables, including variables on lighting, are jointly significant. Using the variables that indicate whether the household owns a bicycle, the number of rooms, the value of dowry, the value of equipment and the number of draft animals, all the covariates are significant at the 1% significance level[60] and the R^2 is equal to 0.23.

[57] It is also possible to construct a composite proxy for economic status that combines in one index all the indicators of wealth indicated above, using principal component analysis to derive the weights as Filmer and Pritchett (1999) do using 21 asset variables. The assumption underlying their approach is that "household long-run wealth is what causes the most common variation in asset variables." Because the objective is to 'control' for wealth, which creates the inconsistency, and not to estimate the impact of wealth on investment per se, entering all asset variables individually in the multivariate regression equation will suffice.

[58] Indicators (i) to (iii) are similar to those used by Filmer and Pritchett (1999) in constructing their proxy to wealth using principal component factors (see the list of variables in table 1 of their paper).

[59] A Bonferroni adjustment is made to calculate the significance levels at 0.01.

[60] A Bonferroni adjustment is made to calculate the significance levels at 0.01.

2.3 Identification and Estimation Strategy

This section presents the main variables used in the model to identify the long-term investment variable and the two dimensions of land tenure rights that were discussed above (see Section 2.1.2.2 and 2.1.2.3). While presenting the identification strategy, caveats will be discussed and will inform the choice of control variables that will feed into the final econometric equation to be estimated.

2.3.1 The Long-Term Investment Variable

Different types of land-attached long-term investments have been considered in the literature on land rights and investment. Firstly, investments that enhance the quality of the land such as irrigation, drainage, bunding, etc. constitute an ideal direct measure of a farmer's propensity to engage in land attached long-term investment[61]. Unfortunately, the VLSS did not collect any data on this type of investment.

A second measure of a farmer's long-term time horizon that has been used in the literature is long-term soil fertility: it is argued that there is a relationship between insecure property rights in land and sub-optimal fertilising practices. When tenure is insecure, farmers would be reluctant to apply those fertilisers with longer-run effects on soil fertility. They would also be inclined to overuse inorganic fertilisers in order to maximise crop yields in the short-run, although this practice may reduce soil fertility in the long run. Organic and phosphate fertilisers are the two types of fertiliser that have the greatest long-term impact on soil fertility, whilst nitrogenous fertilisers are found to procure the best yields in each season.

The use of fertiliser data to capture farmers' propensity to engage into long-term investment is problematic for several reasons. Firstly, *optimal* fertiliser application requires the application of a mix of *both* organic and inorganic materials: nitrogen is the most important nutrient for crop growth and

productivity and the lack of both phosphate and potassium can inhibit nitrogen efficiency. Also, in some soils, more humus is a pre-condition for efficient absorption of inorganic N or even Phosphate by plants. In addition, fertiliser use is highly dependent on soil characteristics and water regimes. Although it is true that phosphate has more 'long-term' effects than nitrogen, it is nevertheless very difficult to empirically disentangle the use of one against the other, and attribute the use of nitrogen to the farmer's short time horizon, and the use of phosphate to having greater security of land tenure.

Moreover, the VLSS did not collect information on the exact type of fertilizers used by the farmers. Households were only asked to report the quantity of manure, NPK, nitrogen and phosphate and potassium bought or collected over the past 12 months. As a result, one can only speculate on the nutrient content of the particular fertilizer use chosen by a farmer. For example, the VLSS does not provide information on the nutrient content of the combined fertilizer NPK. According to Nguyen (2001), one can find two main types of nitrogen in Vietnam: Urea (46% N) and Ammonium Sulphate (21% N); three main sources of phosphates (single super phosphate: 22% P2O5 fast release; DAP: 18% N, 46% P2O5; and FMP Fused calcium magnesium phosphate: 20% P2O5, 12% MgO slow release) and two main types of potassium (MOP Muriate of Potash: 60% K2O; and 30%-50% K2O). The diversity in nutrient composition in the different fertilizers, compounded with the sheer complexity of nutrient use decision-making, makes the use of fertilizer to capture farmers' propensity to engage into long-term investment a hazardous enterprise. Finally, a close look at the data in the VLSS on organic fertilizers shows a wide distribution with a skewness of 3 and a kurtosis of 34 and the existence of a substantial number of large outliers. The data on fertilisers from the VLSS are therefore noisy, potentially ridden with inconsistencies and large measurement errors, and will not used[62].

[61] For example, see Feder, et al. (1988); Migot-Adholla, et al. (1993); Besley (1995); Brasselle, Gaspart and Platteau (2002).

[62] Information on fertiliser use comes from FAO (1991); European Fertilizer Manufacturers Association (1997); Kung and Cai (2000); Wichmann (2001); Agro Services International (2002); National Institute for Soils and fertilizers, Tran and Pham (2002).

The third measure of long-term investment used in the literature is the planting of crops whose returns are delayed in the future, notably perennial crops[63] and fruit trees (e.g. Alston et al. (1999) use the proportion of land planted with perennial crops[64]). However, as pointed out by Brasselle et al. (2002), investment is a flow, not a stock. I shall use the *change* in the amount of land planted to perennials and fruit trees between 1992 and 1998 because it is more directly related to the intrinsic nature of investment as a flow. Holding the amount of cultivated land constant, an increase in the total amount of perennial land would indicate that farming households diversified away from rice farming and invested in higher value-added perennial cropping. Such a move would involve the long-term transformation of rice land into non-rice land and requires a substantial amount of initial sunk costs: drainage in lowland areas, erosion control investment in the uplands. Pingali et al. (1997) explain:

> "even for lands that can be converted, substantial investments in land improvements need to be made to sustain long-term productivity and profitability of non-rice crop production. Investments in land improvements are likely to be made only where secure rights to land exist".

Therefore, the conversion of land away from rice farming would constitute a good indicator of long-term investment. Rice land can be converted in order to grow other annual crops (e.g. cash crops such as vegetables or other higher-value added annual industrial crops), whose returns materialise in the short-term. Although converting the land back to rice land would be costly for any crop, using perennials and fruit trees as indicators of long-term investments adheres more strictly to the definition of long-term investment of sunk investments with delayed returns. Consequently, the chosen measure of long-term investment is *the change in the amount of land planted to perennials and fruit trees*[65].

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[63] In 1998, 1.8 million hectares were planted with perennial crops, of which multi-year industrial crops accounted for 1.2 million hectares (or 73 percent of total perennial area). The area planted with multi-year industrial crop grew considerably faster than the area planted with fruit crops, with particularly dramatic expansion in coffee, tea and sugarcane plantations. Fruit crops represented 27 percent of total perennial crop area. See data from Tong Cuc Thong Ke (2000).

[64] e.g. Besley (1995); Brasselle, Gaspart and Platteau (2002)

[65] The last type of land use is water land. Farmers may convert their land into water land by digging a pond where they can raise fish or shrimps. This also requires a long-term conversion of agricultural land away from cropland and can involve substantial initial sunk costs. However, benefits from fish or shrimp raising can be generated within the same year as when the pond was prepared. Therefore, because returns are not necessarily delayed in time, the conversion of agricultural land into water land differs from the definition of long-term investment *stricto sensu* and is not included in the measure of long-term investment.

2.3.2 Land Tenure Security Variable Using Survey Data

The VLSS does not provide data on land titling at the household level, nor does it provide a breakdown of the various land rights that households are entitled to on their land. However, as seen earlier, the VLSS does provide a breakdown of land ownership by different categories of land tenure security for each household (see Figure 2-5, p. 45). In 1992, households experienced weaker tenure on both allocated and auctioned land as these two types land could be reclaimed by local authorities in order to be redistributed. On the contrary, households enjoyed *de facto* tenure security on long-term use land, private and other land. It is possible to exploit these different tenure categories in order to construct a variable for land tenure rights that captures the change in land tenure security.

2.3.2.1 Caveats in the Construction of the Land Tenure Variable

Before presenting the identification strategy for the land rights variable, one issue needs to be considered. There could be substantial inter-plot variations in investment depending on the quality of each plot and the land tenure rights attached to it. Indeed, land tenure types (auctioned, allocated or long-term use land) could be systematically correlated with some unobserved plot characteristics such as plot quality, which would in turn determine the choices of land use. Without controlling for the quality of land associated with each tenure type, in a cross-section setting, the results would suffer from omitted variable bias.

How serious is the potential bias due to omitting land quality? The VLSS does not provide *plot- by-plot* information on land quality for all types of land use in 1992, although it provides household-level data on the quality of *annual* land in both survey years. *A priori*, in a cross-section setting, without plot-by-plot data, it is not possible to estimate with accuracy the sign and size of the bias. However, it is possible to say that the magnitude of the potential bias will be limited for several reasons.

Firstly, as explained in detail in section 2.2.2.3 above, the chosen estimation strategy is robust to unobserved heterogeneity. Indeed, *in a fixed-effects setting*,

one only needs to consider those *changes* in land quality that are systematically associated with *changes* in land tenure security.

Moreover, following the enactment of the 1993 Land Law, land rights were exogenously and uniformly *strengthened across all plots*, in particular through the conversion of allocated land into long-term use land. The changes in tenure security that were brought about by the new Land Law were considerable. It can be safely argued that *changes* in land quality that would be (i) of a similar magnitude and (ii) correlated with the changes in tenure security, are improbable.

Also, the VLSS does provide household-level data on the quality of annual land in both survey years. The inclusion of this variable in the regression should allow to partly control for the impact of a potential correlation between changes in land quality and changes in land tenure.

2.3.2.2 Construction of the Land Tenure Security Variable

The land tenure security measure will be constructed as follows. For 1992, allocated land and auctioned land together constitute the category of land that embodies weak tenure security. Conversely, long-term use, private and other land, which are characterised by strong land tenure security, are subsumed into another category that embodies the strong tenure right category. Similarly in 1998, households have weaker land tenure security on contract land, whilst greater tenure security is associated with long-term use land and other land, which are included into the strong tenure right category.

Table 2-3: Constructing the land tenure variable using tenure categories from the VLSS

Land tenure variable	1992	1998
Weak tenure rights[66]	Allocated land Auctioned land	Contract land
Strong tenure rights	Long-term use land Private land Other land	Long-term use land Other land

[66] Rented land is also included in the weak tenure security category because in 1992, the VLSS questionnaire collected data on rented land separately from the other land tenure categories.

2.3.2.3 Change in Land Tenure Security Rights (Weak Right Category)

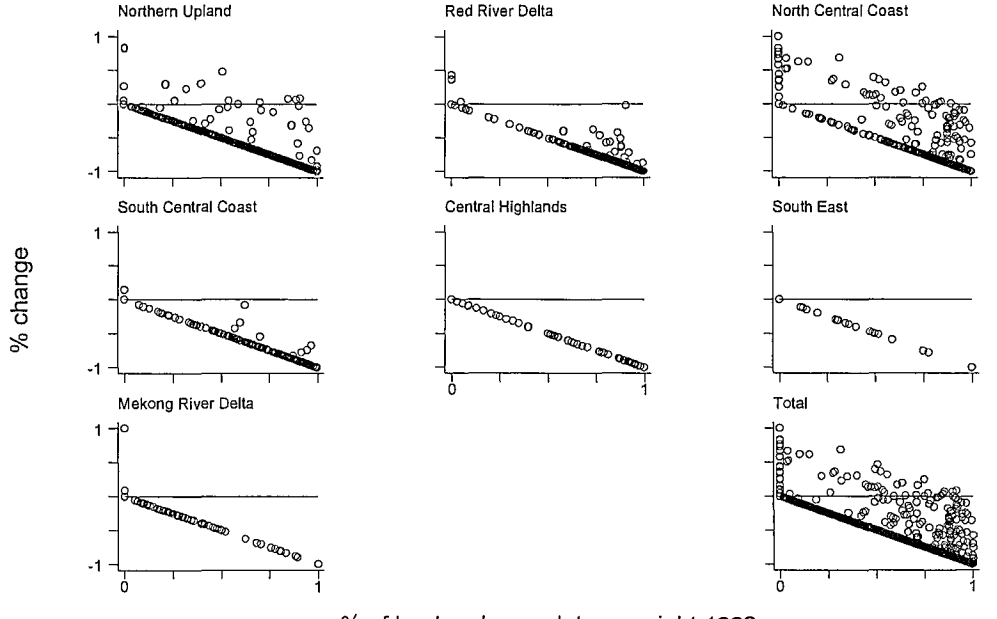
As shown in Table 2-4 and Figure 2-7 below, the 1993 Land Law converted allocated land into long-term use land. In Figure 2-7, the x-axis shows the proportion of land under weak tenure right in 1992 and the y-axis shows the change in weak tenure rights between 1992 and 1998. Households with weak tenure rights experienced an increase in tenure security that was proportional to their share of owned land under the weak tenure right category. A smaller number of households saw a decline in their security of tenure as indicated by the data point above the 0 line on the y-axis. Those households are concentrated in the North Central Coast and to a lesser extent in the Northern Uplands.

Table 2-4: Proportion of land under weak tenure security (mean, P50)

Weak Right Land	MEAN		MEDIAN	
	1992	1998	1992	1998
Northern Uplands	46.0 %	2.7 %	46.2 %	0.0 %
Red River Delta	79.4 %	0.7 %	86.5 %	0.0 %
North Central Coast	64.1 %	10.2 %	80.3 %	0.0 %
South Central Coast	51.4 %	0.5 %	63.5 %	0.0 %
Central Highlands	31.6 %	0.0 %	4.4 %	0.0 %
South East	5.2 %	0.0 %	0.0 %	0.0 %
Mekong River Delta	4.5 %	0.2 %	0.0 %	0.0 %

Source: VLSS, rural panel household only. N= 3381

Figure 2-7: Changes in tenure security by region



The breakdown of changes in land tenure rights across regions (Table 2-5 below) indicates that most of the variation took place in the northern regions, whilst in southern Vietnam, the greater part of households did not see any change in tenure rights except in the Central Highlands. In the northern regions, about 5 percent of households experienced a *weakening* in tenure security (i.e. an increase in weak rights).

Table 2-5: Change in the proportion of land under tenure right

Weak right	Increase in weak rights	No change	Decrease in weak rights
1. Northern Uplands	2 %	22 %	76 %
2. Red River Delta	0 %	5 %	94 %
3. North Central Coast	8 %	15 %	77 %
4. South Central Coast	0 %	33 %	67 %
5. Central Highlands	0 %	48 %	52 %
6. South East	0 %	90 %	10 %
7. Mekong River Delta	0 %	89 %	10 %

Source: VLSS, rural panel household only. N= 3381

As explained earlier (section 2.1.2.1), the difficulty to find a measure that captures the reality of land rights cannot be understated. In previous surveys on land rights, measures of land tenure security suffered from shortcoming as they failed to capture the social reality in which land rights were embedded (Platteau 1992a; Singer 2000; Brasselle, Gaspart, and Platteau 2002). Measures of land rights are therefore likely to either understate or overstate the security of tenure enjoyed by landholders.

> "As a matter of fact, what appears to the external observer as precarious rights may actually be rather long-term entitlements in the specific context of these societies" (Brasselle, Gaspart, and Platteau 2002: 401).

Due to data limitations, it has not been possible to create a variable that would capture a more sophisticated continuum of land rights. In particular, the weak and strong rights categories do not inform us on the extent to which rights are being *actually* exercised by individual households. A decomposition of land rights between the various transfer rights and tenure right is not available and issues of access and autonomy in exercising these rights that could be addressed

in other surveys of land rights[67] which made use of elaborate measures of land rights, cannot be addressed here. The chief aim here is therefore to estimate Equation 2-1: the impact of *tenure* security on long-term investment decisions.

2.3.3 Land titling variable (using provincial cadastral data)

In addition to the VLSS data on land tenure, *land titling data at the provincial level* were collected from the Cadastral Office in Hanoi[68]. By most accounts, the land use certificates (LUCs or the so-called Red Books) seem popular among the population and awareness of the rights attached to them seems high (CPLAR 1998; ADB 2003a; ADB 2003b). Indeed, in principle, the LUCs are a guarantee of tenure security and enable the exercise of the five transfer rights granted by the 1993 Land Law. They also enable farmers to resort to the People's Court in order to solve land disputes.

As discussed earlier, the possession of a land title can be equated with security of tenure only when enforcement institutions are in place and are functioning with impartiality. In fact, land titling represents the *institutional* aspect of land reform programmes. In Vietnam, the distribution of land titles took place at an uneven pace across Vietnam. As will be explained below, there is evidence that the variation in the speed of the issuance of land titles may be attributed to administrative gridlock. It could also be argued that the rate of issuance of land titles is indicative of the extent to which local authorities were supportive of the 1993 Land Law. In both cases, a high (low) speed of title issuance is indicative of existing formal enforcement institutions that are able (not able) or willing (not willing) to perform the tasks of enforcing and protecting property rights. Therefore, the provincial land titling data capture the progress in the development of local law enforcement institutions that support the implementation of the Land Laws.

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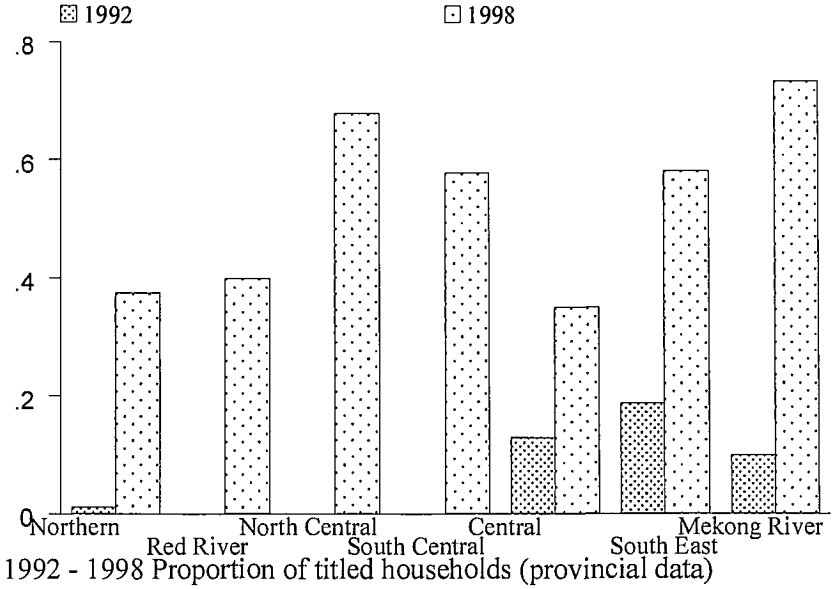
[67] Migot-Adholla, Place and Oluoch-Kosura (1993); Brasselle, Gaspart and Platteau (2002) ordered the various land rights in different bundles of rights. Besley (1995) counted the number of rights that households had at their disposal.

[68] Do and Iyer (2003) also explore the impact of the 1993 Land Law using provincial land titling data. They make use of a difference-in-differences estimation strategy that takes advantage of the variation across provinces in the issuance of land titles. Their research differs substantially from that conducted in this chapter both in terms of the concepts of property rights investigated and in the empirical strategy adopted to identify the impact of the 1993 land Law on investment incentives.

2.3.3.1 Progression in land registration

Figure 2-8 shows the proportion of households holding a land title in 1992 and in 1998, whilst Table 2-6 and Table 2-7 show the annual progression of titling between 1995 and 1999 by region. The distribution of the titling data indicates a different story than that told by the household data on land tenure. The North-South divide becomes almost non-apparent as very few households in each region had titles in 1992. Ten to twenty percent of households in the southern regions had received land certificates in 1992.

Figure 2-8: Proportion of rural households holding a land title (provincial data)



1992 - 1998 Proportion of titled households (provincial data)

Table 2-6: Agricultural households to whom land use certificates have been issued

	1995	1996	1997	1998	1999
			(% of households)		
Northern uplands	36 %	43 %	47 %	54 %	86 %
Red River Delta	20 %	28 %	51 %	65 %	81 %
North Central Coast	43 %	67 %	76 %	83 %	92 %
South Central Coast	26 %	55 %	66 %	74 %	90 %
Central Highlands	32 %	44 %	58 %	69 %	77 %
Southeast	20 %	36 %	69 %	68 %	87 %
Mekong River Delta	44 %	74 %	86 %	80 %	91 %
Vietnam	32 %	41 %	64 %	71 %	87 %

Source: General Department of Land Administration.

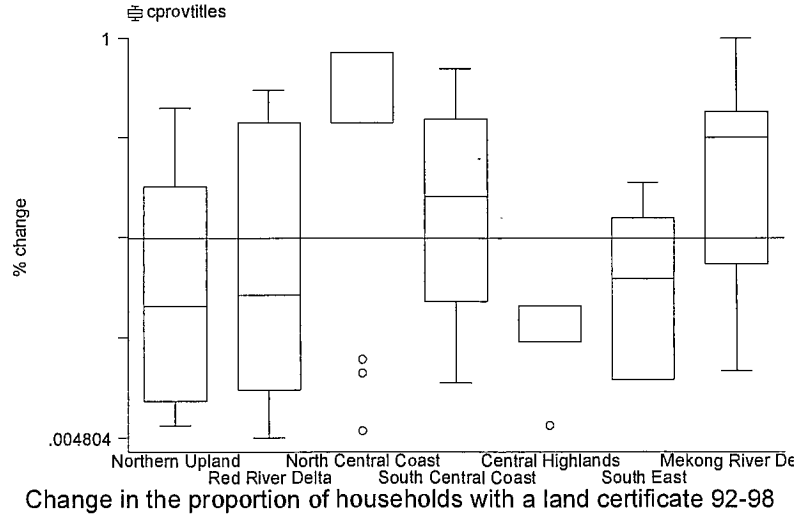
Table 2-7: Agricultural land for which land use certificates have been issued

	1995	1996	1997	1998	1999
			(% of agricultural land)		
Northern uplands	n.a.	n.a.	36 %	43 %	79 %
Red River Delta	19 %	24 %	41 %	63 %	76 %
North Central Coast	40 %	57 %	58 %	76 %	89 %
South Central Coast	34 %	n.a.	49 %	66 %	78 %
Central Highlands	23 %	24 %	25 %	41 %	45 %
Southeast	20 %	30 %	39 %	67 %	64 %
Mekong River Delta	50 %	61 %	73 %	82 %	90 %
Vietnam	n.a.	n.a.	52 %	67 %	78 %

Source: General Department of Land Administration.

The box-whisker plots in Figure 2-9 below shows the progress in land titling by region. The line in the middle of the box represents the median. The upper and lower limits of the box indicate the 25th to the 75th percentile of the data, whilst the whiskers indicate the upper and lower adjacent values. Progress in land titling following the 1993 Land Law was slowest in the Red River Delta, the Northern Uplands, and most particularly in the Central Highlands. The median percentage change in titling is highest in the three of the four Southern regions (South Central Coast, South East and Mekong River Delta). However, as indicated by the length of the boxes and whiskers, the spread in the titling data is larger in two of the three Northern regions.

Figure 2-9: Changes in land titling by region (using provincial data)



Change in the proportion of households with a land certificate 92-98

2.3.3.2 Exploiting the changes in the land titling variable between 1992 and 1998

As seen earlier (see Figure 2-4 above), by and large, the allocation of agricultural land was completed soon after the enactment of the 1993 Land Law. Together with the allocation of land, land users were informed of the main provisions of the Land Law. However, the issuance of land use certificates (LUCs or the so-called Red Books) took place at an uneven pace throughout Vietnam. Exploiting the variations in land titling intensity across provinces by combining provincial-level data with household-level data raises several issues.

Firstly, titling data are clustered at the provincial level, which is the highest administrative level in Vietnam. There are 61 provinces and the level of aggregation of the titling data is therefore sizeable. For that reason, one may obtain insignificant results that are more indicative of the lack of variation in titling data at the household level, than the result of an absence of impact of tenure security on investment behaviour. However, one advantage of using provincial data is that titling data can be taken more directly as exogenous at the household level and will therefore yield more robust results.

Notwithstanding the scale of the aggregation of the data at hand, the problem of omitted variable is likely to be serious if the allocation of land titles was not random but was correlated with the progression of other omitted programs at the provincial level, or was endogenous to households' decisions. Indeed, both demand and supply factors may explain the slow progress in the distribution of land titles. On the supply side, the procedures for the registration of land and the issuance of LUCs are lengthy and complex, involving several layers of administration at the provincial, district and communal levels. The procedures are as follows: farmers apply for LUCs; their applications are assessed by the Land Registration Council at the commune level and the decision to issue the land titles is taken by the People's Committee at the District or Provincial level. On the demand side, land registration procedures require that farmers apply for and contribute a fee to obtain the LUCs. The cost of land titling for individual farmers has been identified as one reason why some farmers were not interested

in receiving LUCs (CPLAR 1998)[69]. Anecdotal evidence[70] also suggests that leasing and land transactions are taking place without being duly registered both in North and South Vietnam. This reluctance to register land transactions has been attributed to high taxation on land transactions[71] and cumbersome administrative red tape. Hence, the speed in land registration may depend on both provincial characteristics and on household's wealth.

Evaluations of Vietnam's land administration and registration programme attribute the slow progress in land titling to administrative deadlock and the lack of adequate technology and funding (CPLAR 1998; Anzdec Limited 2000). Also, in 1998, the Government issued Directive 10 (1998/CT-TTg) in order to speed up the registration of land[72]. The 2004 Land Law stipulates a new deadline to finalise the distribution of LUCs. The progress in the distribution between 1993 and 1998 and the marked increase in the speed of issuance of LUCs at the provincial level that followed the enactment of Directive 10 seem to indicate that supply factors are chiefly responsible for the delays in land registration.

The robustness of the estimation strategy rests on whether adequate solutions are found in order to control for the potential endogeneity of both the land tenure and the land title variables. Indeed, if land rights (captured by either measure) were to be correlated with unobserved variables, coefficients would be biased. This problem could be more severe when using data on land titling as households with better endowments, better social capital, or better quality plots may put more effort and resources to obtain land titles.

[69] A survey by CPLAR (1998) indicates that costs for LUCs were considered high by land users in remote and mountainous areas (e.g. Lao Cai in the Northern Uplands).

[70] Personal communication with the Central Cadastral Office in Hanoi.

[71] Decree 04 and Decree 17 enacted in 1998 and 1999 regulate the implementation of the five land transfer rights. Among the amendments is a decrease from 10 percent to 2 percent in the tax on agricultural land transactions.

[72] According to the decree, the issuance of LUCs had to be finalised in 1998 for plain areas, and before the end of 1999 for other areas.

2.3.4 Control Variables

Fixed-effects techniques have been chosen because they are particularly robust to unobserved regional and individual heterogeneity bias. Time-invariant unobserved heterogeneity is taken care of through first-differencing, and only time-varying factors that are correlated with any of our two measures of land rights and with investment need to be controlled for.

The analysis of survey data on land tenure showed that the omitted variable bias is mitigated by the fact that the change in land tenure status in Vietnam was largely determined through an exogenous process. This is confirmed econometrically in a recent study by Ravallion and van de Walle (Ravallion and van de Walle 2004), who find no evidence that the recent land redistribution favoured wealthy or more powerful households. Hence, household-specific omitted variables should not be correlated with changes in tenure status and should leave the coefficient of interest unbiased. In any case, the first-differencing allows to control for a wide range of potential time-invariant omitted variables, including spatial (provincial) or household characteristics. Time-*variant* omitted variables such as household wealth, which may determine access to land titling, is controlled for through proxy variables. The list of other control variables follows.

Figure 2-2 and Figure 2-3 above show that a sizeable proportion of land in several regions (particularly in the Red River Delta) was redistributed after 1993. Anthropological accounts of the land reforms in Vietnam report that changes in household size were the main determining factors in the allocation rule during the decollectivisation period[73]. In turn, household size and the number of working members in a household are likely to also influence investment decisions. Hence, it is necessary to control for changes in *household size*. The ratio of adults to children within a household (the dependency ratio) was also introduced as a control variable but does not appear to be significant.

[73] 5pijkers (1984); Chu Van Lam (1992); Hy V. Luong (1992); Tran Duc (1992); Le and Rambo (1993); Phan and Nguyen (1994); Tran Duc (1994); Bergeret (1995); Nguyen 5inh Cuc (1995a); Pillot (1995); Institut National des Sciences Agronomiques du Vietnam and GRET - Programme Fleuve Rouge (1996); Le, et al. (1996); Tran Hoang Kim (1996); Hartingh (1997); Lam Quang Huyen (1997); Dào The Anh (1998); Jesus and Anh (1998);

Not all land can be converted out of rice production, and the choice to diversify away from rice into perennial cropping may be influenced by ecological constraints, differential access to reliable irrigation and availability of adequate technology. This would cause spurious results if those characteristics were also correlated with the variation in land tenure security captured by the main explanatory variable. Ecological constraints are largely time-invariant and will be swiped away through first-differencing. Time-varying regional characteristics that are controlled for comprise *distance to markets*, *agricultural investment programmes* (irrigation, roads), and *rice and perennial crop prices*. 53 percent and 38 percent of households live in communes where new roads and new irrigation infrastructure respectively were built or improved within the past 5 years. Distance to market, both by increasing operating costs and by making it more difficult to obtain timely access to market information will have an impact on investment decisions. Interpreting the impact of this variable on investment behaviour is complicated by the fact that distance to markets actually *lengthened* on average between 1992 and 1998. An increase in distance to markets between 1992 and 1998 may be a reflection of increased road access and transportation accessibility. A dummy for *natural disasters* that occurred within the past five years is also introduced, as disaster are likely to greatly influence investment decisions.

Systematic differences in the initial ecological conditions in which each household is situated will affect the magnitude of the effects that is being measured. Areas with ecological conditions that are more suitable for growing perennial crops will experience higher amounts of investment. Changes in the strengthening in land rights or land titling may be more prevalent in those regions where perennial crops are grown in greater quantity. If these regional characteristics were constant over time, the fixed effects would absorb this.

However, a spurious result would obtain if regional characteristics and opportunities to invest for farmers living in areas where land rights were strengthened had evolved differently than for the rest of the farming population. For example, this may be a particular concern in the Central Highlands, where

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Tran Thi Que (1998); Hoang Viet (1999); Sikor (1999); Truong (1999); Gironde (2001); Sikor (2001b); ibid.

the liberalisation of agricultural export markets and booming world coffee prices in 1995 triggered a substantial increase in the cultivation of coffee[74]. One would wish to control for this by using commune data on the proportion of land planted to perennial crops (this would also control for knowledge spillover effects at the commune level). Unfortunately, misreporting in the commune level data (in the VLSS commune questionnaire) does not allow this. I resort to aggregating household data and calculating the mean proportion of *perennial land at the commune level*[75].

Inter-households differences in investments may be associated with differences in household land endowments. *Total cultivated land size* can be included as a control variable on the right hand side of the final equation to be estimated. Alternatively, the investment measure can be scaled directly and become the proportion of land planted to perennials[76].

In either case, because plot-by-plot data is not available in 1992, it has not been possible to control for the acquisitions of new plots of land. The VLSS indicated a relatively low incidence of land acquisitions in 1998: about 6 percent of households are reported to have transferred land. However, anecdotal evidence from newspapers and my own discussion with the director of the cadastral office in Hanoi indicates that a substantial number of transactions may remain undeclared. This means that the amount of investment will be overstated if the investment is made on newly acquired land, and if other unobserved factors correlated with both the acquisition of new plots and land rights drive the decision to invest.

(2001a); Tanaka (2001); Sikor (2002)

[74] 90 percent of Vietnam's coffee area is concentrated in the Central Highlands. By 1999, coffee was the second largest export after rice and earned $592 million in export revenues (against $1 billion for rice exports).

[75] However, this variable may introduce what has been termed by Manski (1993) a 'reflection problem', caused by the simultaneity between an individual's decision to invest and aggregate investments by individuals at the commune level. By most account, the reflection problem is rather intractable as it is very difficult to find an instrumental variable that would affect aggregate decisions independently from individual ones. An alternative specification that would help control for the regional effects just described would be to introduce regional dummies interacted with the 1998 time dummy instead of the former variable. This alternative specification has the disadvantage to absorb variations in the impact of land policies across regions and would only exploit variations in land policies *within regions*. This could be particularly costly when estimating the impact of land titling using provincial land titling data. I am deeply grateful to Dr. Dominique Van de Walle and Professor Oliver Linton for pointing out and discussing this issue with me.

[76] Alston, Libecap and Mueller (1999) also use the proportion of the farm placed in improved pasture and permanent crops (cacao, pepper, citrus).

2.3.5 Choice of Estimator: Tobit Random Effects and Tobit Fixed Effects

The measure of long-term investment exhibits a high censoring probability at 0. About 32 percent of panel households in 1992 (13 percent in 1998) had not planted perennials or fruit trees Similarly, 14 percent and 8 percent of panel households in 1992 and 1998 had no non-rice land[77]. Tobit will therefore be the preferred estimation technique.

However, Tobit is particularly non robust to the violation of the assumption that the error term is normally distributed. In addition, when one adds fixed effects, Tobit maximum likelihood estimation methods (random effects) will be inconsistent even when the distribution of the error is correctly specified (Honore 1992; Chay and Powell 2001). Bo Honore devised a semi-parametric estimator for censored regression models with fixed effects that is robust to the violation of the normality of the error term and allows the use of fixed effects (Honore 1992)[78]. This estimator called Pantob estimates a Tobit Fixed-Effects for a two-year panel and, unlike OLS or Tobit, does not require distributional assumptions on the error term in order to obtain consistent and asymptotically normal estimators. Therefore, Pantob is our preferred estimator[79]. However, because Pantob does not make any assumption on the distribution of the error term, marginal effects cannot be estimated. The Pantob results are therefore only indicative of the sign and significance of the conditional effects.

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[77] That is, the nature of the data indicates a corner solution model. In the words of Wooldridge (2003: 516), the corner solution model is such that "y takes on the value of zero with positive probability but is a continuous random variable over strictly positive values". Using OLS would therefore be inappropriate as "E(y | X) is unlikely to be linear in X, partial effects are unlikely to be constant over the range of X values, and predictive values can be negative".

[78] Pantob is recommended by Baltagi (2001) and was used in recent papers by Bardhan and Mookherjee (2003) and Quisumbing and Otsuka (2001).

[79] Pantob provides estimates by minimising either the least squares or the least absolute deviation of the errors. Whilst the estimation procedure that minimises the least-absolute deviations of the error terms is robust to the influence of large values or outliers, convergence is often achieved only with large bandwidth. Therefore, least squares results only are reported.

2.3.6 Summary of the Estimation Strategy

Following Chay and Powell (2001), several estimators were computed in order to check for the sensitivity of the results to identifying assumptions, using casual comparisons of coefficient estimates and standard errors.

(i) OLS first-differences with commune clustering;
(ii) Tobit Random Effects with commune dummies in order to control for as many omitted factors as possible;
(iii) Pantob (Tobit Fixed Effects) using the quadratic loss function.

Three sets of regression are presented.

(A) Set A includes the land tenure variable using survey data (the proportion of cultivated land under the weak right category);
(B) Set B includes the land tenure variable using provincial titling data (the proportion of households with a land title at the provincial level); and
(C) Set C includes both variables.

Results using two measures of investment as the dependent variable are also reported:

(I) Panel (I) uses the *amount* of land planted with perennial crops;
(II) Panel (II) uses the *proportion* of cultivated land that is grown with perennial crops.

As Pantob only allows for left-hand side censoring at 0, it will not be possible to use Pantob when using measure (II) which is censored at both 0 and 1. The analysis of the land tenure survey data signalled the importance of a North-South divide in the implementation of Vietnam's land reform. As a result, results are reported for three samples[80]:

(a) the full sample of panel households;
(b) the sample of panel households living in northern Vietnam (i.e. households living in the Northern Uplands, the Red River Delta and North Central Coast); and

[80] The analysis was also conducted for each region. However, the sample size drops for which the sample size was large enough to yield significant results: the three regions in North Vietnam (the Northern Uplands, the Red River Delta and the North Central Coast), and two regions in South Vietnam (the South Central Coast and the Mekong River Delta).

(c) the sample of panel households living in southern Vietnam (South Central Coast, Central Uplands, South East and Mekong River Delta).

2.4 Establishing Quasi-Private Property Rights: Results and Interpretation

The definition of, and descriptive statistics for all the variables used in the final specification are provided in Appendices (Section 2.6.1 and Section 2.6.2). Table 2-8 below reports the main results for Vietnam and for North and South Vietnam (the full set of tables can be found in the Appendices, Section 2.6.3, on page 81). Large differences in point estimates between the three different estimations do not come as a surprise. Firstly, OLS does not take into account the censoring of the data and hence yields downward-biased coefficients. Moreover, it is verified that the Gauss-Markov assumptions are violated (heteroskedasticity and non normality of the errors). Secondly, substantial differences between the maximum likelihood and the semi-parametric results (Pantob) suggest that non-normal errors are a non-negligible source of bias in the Tobit maximum likelihood estimator[81].

Therefore, the results obtained by using the Pantob estimator will be the preferred ones and will provide the main basis for the discussion of the results. OLS results are not reported as the bias and inconsistency in the estimates appear so substantial as to make the results uninformative.

Table 2-8 reports the main results for Vietnam and for North and South Vietnam. Estimates that are significant at the 5% or 10% significance level are highlighted in bold characters. Line A reports the estimates for the variable which captures the change in tenure security experienced by households after the enactment of the 1993 Land Law. The variable, labelled 'Weak right' is the share of total agricultural land under weak tenure rights (see the description and the analysis of that variable in section 2.3.2) and captures the change in tenure security induced by the 1993 Land Law. Line B reports the estimates for the provincial land titling

[81] The assumption on which Pantob rests is that the error terms are distributed independently and identically, although not necessarily symmetrically: the error variances must be stationary over time for the estimator to

variable. The variable, labelled 'Provincial titling' is the proportion of households in the province who received a land use certificate. The change in the land titling variable captures the extent to which local law enforcement institutions are supportive (either because of administrative or ideological reasons) of the 1993 Land Law (see section 2.3.3). Line C reports the results when the two variables are included in the model additively. If the two estimates were jointly significant, this would confirm the fact that the variables capture two different aspects of land property rights.

A number of results stand out. Firstly, the strengthening in land tenure security had a positive and significant impact on long-term investment in North Vietnam. In South Vietnam, the estimate is of the expected sign and of a significant magnitude but it is not significant at the 10% level. Secondly, looking at the coefficients on the provincial land titling variable, no impact is found for the full sample. When disaggregating the results by region, large and positive estimates are obtained in North Vietnam, albeit only significant at the 10% level. Land titling have no impact in South Vietnam. Thirdly, both variables are jointly significant in North Vietnam.

Despite the emphasis on individual entitlement to land and the abandonment of collective control that were decided with the 1993 Land Law, these results indicate a more complex working of land property relations in North and South Vietnam. Differences in the conception of land property rights as they evolved between North and South Vietnam may explain several of the outputs obtained here. These findings are now reviewed in detail.

be consistent. This would not be the case if the impact of individual effects were not constant over time for a given household.

Table 2-8: Effect of tenure security and land titling on investment in perennials

I. Amount of perennial crop land (m2)		Full Panel Sample			Panel North			Panel South		
		coef.	s.e.	t	coef.	s.e.	t	coef.	s.e.	t
TOBIT RANDOM EFFECTS*										
A	Weak right (% of total land)	-1654	225	-7.35	-1155	199	-5.81	-2151	536	-4.01
B	Provincial titling (%)	602	336	1.79	1154	269	4.29	-377	716	-0.53
C	Weak right (% of total land)	-1717	232	-7.40	-1139	208	-5.46	-2277	546	-4.17
	Provincial titling (%)	752	337	2.23	1146	269	4.26	-629	717	-0.88
TOBIT FIXED-EFFECTS (PANTOB)										
Quadratic Loss Function										
A	Weak right (% of total land)	-1161	437	-2.66	-1341	771	-1.74	-1562	1136	-1.38
B	Provincial titling (%)	687	480	1.43	2273	1259	1.81	-171	905	-0.19
C	Weak right (% of total land)	-1252	418	-3.00	-1475	647	-2.28	-1694	1147	-1.48
	Provincial titling (%)	863	545	1.58	2479	1456	1.70	-102	916	-0.11

* with commune dummies

II. Proportion of perennial crop land (%)		Full Panel Sample			Panel North			Panel South		
		coef.	s.e.	t	coef.	s.e.	t	coef.	s.e.	t
TOBIT RANDOM EFFECTS*										
A	Weak right (% of total land)	-0.30	0.02	-15.49	-0.25	0.02	-12.52	-0.41	0.05	-8.33
B	Provincial titling (%)	0.09	0.03	3.42	0.09	0.02	3.73	0.04	0.07	0.50
C	Weak right (% of total land)	-0.28	0.02	-14.64	-0.23	0.02	-11.70	-0.37	0.05	-7.49
	Provincial titling (%)	0.12	0.03	4.30	0.08	0.02	3.53	0.01	0.07	0.13

* with commune dummies

2.4.1 Results

2.4.1.1 Weak Rights (See line A)

For North Vietnam, the coefficient of interest is unambiguously large and of the expected sign. However, it is significant only at the 8% level (the t-statistic is 1.74). In the model with both variables (line C), the estimate becomes significant at the 3% level (the t-statistic is 2.28).

Looking at the panel for South Vietnam, it is remarkable to obtain a coefficient that is both large and strongly significant when using Tobit Random Effects. Indeed, given limited variation in land tenure status in South Vietnam between 1992 and 1998, one would have expected only negligible effects. This may signify that in the Central Highlands and the South Central Coast where prior to

the 1993 Land Law a significant proportion of land was under weak tenure, removing tenure insecurity may have had a particularly strong impact. However, controlling for fixed-effects with Pantob, although the point estimate remains large, it is not significant anymore at the 10% level.

Although the result that strengthening land tenure had a positive impact on investment in South Vietnam is not robust to Pantob specification, it is somewhat confirmed by the last set of regressions, which uses the *proportion* of land planted with perennial crops as a measure of investment (see Table II above). Being a proportion, this measure is more robust to measurement errors and to the influence of large values. However, the model is not robust to time-variant unobserved heterogeneity bias. Looking at the results using Tobit RE, all coefficients are unambiguously large and significantly negative for the Weak right variable. Also, the coefficient for North Vietnam (-0.25) is much smaller in magnitude than for South Vietnam (-0.41).

Therefore, two results seem to find confirmation here: (i) the strengthening in land tenure security had a positive and significant impact in North Vietnam; (ii) the large and positive impact in South Vietnam loses significance when controlling for fixed effects; (iii) comparing point estimates between North and South Vietnam (although that for South Vietnam is not robust to controlling for fixed effects), the impact of tenure security seems to be more muted in North Vietnam than in South Vietnam.

2.4.1.2 Provincial Land Titling (See line B)

Turning to the other measure of land rights, the proportion of households in the province who received land titles, one would expect insignificant results due to the aggregation of the land titling data and indeed, no impact is found for the full sample and in South Vietnam. When disaggregating the results by region, large and positive estimates are obtained in North Vietnam, although they are significant only at the 7% level (the t-statistic is 1.81). The positive impact of land titling in North Vietnam find support in the last set of regressions using the proportion of land planted with perennial crops as the dependent variable (see Table II).

The absence of impact in South Vietnam may be caused by the lack of variability in titling data at the household level. However, the impact in North Vietnam is remarkable since for the very same reason the estimation is bound to suffer from a downward bias.

2.4.1.3 With Both Measures of Land Rights (See line C)

When both measures of land rights are included in the Pantob model, only the tenure security variable is significant at the 5% level for the full sample and for the North Vietnam sample. Interestingly, at the 10% level, both land rights variables are *separately and jointly* significant in North Vietnam. This could indicate that the model with only one of the variables (set A or set B) is under-specified and that the coefficients could suffer from an omitted variable bias. However, when the two variables are included, the coefficients are very similar to those obtained in the simpler models, indicating that the two variables (in first-differences) are uncorrelated. That these two variables (in first-differences) are weakly correlated is verified by a correlation coefficient of 0.022 and a rank spearman correlation coefficient of 0.026.

2.4.1.4 Contribution of Other Factors

Looking at the contribution of other factors in South Vietnam (see full tables in the appendices, section 2.6.2), it seems that the decision to engage in perennial cropping was negatively correlated with the availability of good quality annual land and with the construction of new irrigation infrastructure. This may reflect the fact that for those households who are endowed with good quality annual land and with access to irrigation, rice farming becomes a most profitable commercial endeavour. This is confirmed by findings by Brandt et al. (2002) of greater specialisation in rice farming in South Vietnam following the implementation of the 1986 Doi Moi economic reforms, which saw rice quota as well as export and trade restrictions lifted. Small size households are more prone to invest in perennial cropping, as indicated by the convex relationship between perennial investment and household size. Also, holding other factors constant, perennial investments are positively correlated with the construction of new roads and changes in prices.

Most control variables in the Pantob for North Vietnam are not significant, after controlling for the proportion of land in the commune planted to perennial crops. This control variable captures idiosyncratic conditions at the commune level that are strong determinants of perennial cropping investments.

2.4.2 Changing the Prevailing Property Rights Paradigm

Vietnam's agrarian history provides a striking case of diverging property right ideologies between the North and the South of Vietnam. The significant impact of both tenure security and land titling in North Vietnam and the absence of such an impact in South Vietnam, may be interpreted as evidence that both individuals and institutions used to differ substantially with respect to their attitudes to land property relations. Analysing differences in the conception of land rights as they evolved in North and South Vietnam in recent history helps explain the four findings obtained here:

1. The strengthening in land tenure security had a positive and significant impact on long-term investment in North Vietnam.
2. In South Vietnam, the impact is of the expected sign but not significant at the 10% level.
3. The impact of land titling has a weak impact in North Vietnam but no impact in South Vietnam.
4. Both land rights variables are jointly significant in North Vietnam.

2.4.2.1 Finding 1: positive and significant impact of tenure security in North Vietnam

By putting exclusion rights at the centre of the definition of property rights, the 1993 Land Law represents a potent shift in the property rights paradigm prevalent in North Vietnam. In the period preceding the French colonisation, North Vietnam had a long history of communal ownership. Village members were entitled to a share of village land that guaranteed basic subsistence requirements. To warrant access to land, households had to bestow a share of their output to the village community and had to perform a number of duties (e.g. payment of collective fees, labour contribution). In North Vietnam, tenure

security was therefore historically equated to the right to *access* land (rather than to the exclusive right to a specific plot of land), and to the right to claim a share of the product. As seen in Section 2.1, following two decades of collectivisation, the de-collectivisation of agriculture in the 1980s allowed a return to land relations as they traditionally existed in North Vietnam. Resolution 10 in 1988 restored use and management rights to village communities and generally abided by a definition of land rights based on access to land rather than on exclusion rights. This gradual comeback to traditional property relationships in the 1980s can help explain the egalitarian redistribution of land that was documented in various case studies of North Vietnamese villages.

Over the past 50 years, North Vietnam experienced momentous changes in its land tenure system. In 1993, the new Land Law aimed at establishing *de jure*, *quasi-* private property rights. The halt to the periodic reallocation of land and the stabilisation of expectations are amongst its most important contributions. The impact of the 1993 Land Law is therefore expected to be strongest in North Vietnam. Finding 1 confirms that the uncertainty on tenure security left unresolved under Resolution 10 negatively impacted investment incentives[82].

2.4.2.2 Finding 2: Positive impact of tenure security but only significant at the 10% level in South Vietnam

By contrast, property rights relations in South Vietnam were critically shaped by the experience of the French colonialisation and evolved in a radically different way compared to North Vietnam (Rambo 1973). During the French colonisation, additional irrigation and drainage investment allowed the expansion of cultivated land and the establishment of a plantation system that transformed South Vietnam into an exporting agricultural area. The system of periodic allocation of communal land did not exist in South Vietnam and land rights were centred on exclusive private property rights. This was reinforced by Diem's land reform in 1966, which redistributed land to smallholders. When the land collectivisation drive was launched after Vietnam's reunification in 1975, fierce resistance,

[82] This result is obtained despite the fact that the 1993 Land Law did not entirely dispel all uncertainty and continued to maintain limitations on the exercise of transfer rights. It is to be noted that the empirical test conducted here does not address the issue of the impact of transfer rights on investment incentives.

condoned by local authorities, was encountered in the South East and the Mekong River Delta regions (Kolko 1985). Therefore, for a long time in South Vietnam, the land tenure system has been based on exclusive private ownership rights and local institutions have been favourable to private property rights.

This situation is well illustrated in Table 2-5, which shows that the greater part of households in South Vietnam did not see any change in tenure rights, and in Figure 2-3, which shows that South Vietnamese households received their plots of land well before the 1993 Land Law was enacted. Therefore, the absence of impact of the 1993 Land Law in South Vietnam does not come as a surprise. By and large, tenure security was unlikely to be of great concern. On the other hand, in those regions of South Vietnam where part of the land was collectivised (the South Central Coast and the Central Highlands), tenure concerns may have been greater and may help explain why the point estimate is large.

2.4.2.3 Finding 3 and 4: Private Property Right Friendly Institutions

Section 2.1.2.3 explained how formal land institutions (cadastral offices at the local level, District or Provincial authorities, People's courts), which represent the law enforcement capacity of the State, could influence security of tenure. Vietnam is still struggling to put into place functioning institutions and is currently making important strides to accelerate the process as evidenced by the enactment of the new 2004 Land Law. In section 2.3.3, it was argued that the provincial land titling data capture the progress (or lack thereof) in the development of local law enforcement institutions that support the implementation of the new Land Laws. The history of land property relations in Vietnam may lend itself to this 'institutional-private-property rights-friendliness' perspective. Indeed, as was just mentioned, Vietnam's agrarian history is marked by diverging property right ideologies between North and South Vietnam. By making exclusion rights central to the new definition of land rights, the 1993 Land Law represents a potent shift in the property rights paradigm that used to prevail in North Vietnam. In that context, law enforcement institutions could play an important role in further strengthening the perceived sense of tenure security. This may explain why land titling has a positive effect on investment

incentive, and why both land tenure security and land titling are relevant and affect investment behaviour *additively*.

An opposite institutional environment is found in South Vietnam, where perceptions of land rights were historically centred on exclusive property rights, and where local authorities have long been supportive of private property rights. As a result, formal institutions are unlikely to contribute to strengthen South Vietnamese perceived sense of tenure security *per se*, although they are likely to play an important role in facilitating land transaction, decreasing foreclosure costs and facilitating land mortgage activities. These long-prevailing perceptions of land relations help explain why land titling did not have a significant impact on investment incentives in South Vietnam.

2.5 Conclusion

The contributions of this chapter are two-fold. First, this chapter probed the effects on long-term investment incentives of the strengthening in tenure security induced by the 1993 Land Law, and found them to be positive and significant in North Vietnam, whilst they were only weakly significant in South Vietnam. Second, and more importantly may be, this analysis of the 1993 Land Law allowed us to examine the very process of establishing a new property rights system. Two distinct aspects of establishing property rights were distinguished and tested separately using land tenure data and provincial land titling data respectively: (i) the body of public rules that enable individuals to exercise rights; (ii) the formal institutions that enforce or protect these rights. Significant regional differences in our results indicated a more complex working of land relations and were analysed in the light of Vietnam's agrarian history, which provides a striking case of diverging property rights ideologies between North and South Vietnam. On the whole, this chapter shed light on the role of formal institutions in the process of establishing property rights and argued that land laws do not operate in a social vacuum but rather need to take into account pre-existing attitudes towards land property relations (Sikor 2001b). Further discussions on the contribution of this chapter and suggestions for future avenues of research are provided in the conclusion of this thesis (Chapter 5).

2.6 Appendices

2.6.1 Definition of Variables

Variables	1992	1998
Weak Right (%)	Share of owned land under land tenure category "allocated land" and "auctioned land"	Share of owned land under land tenure category "contract land".
Provincial Titling	Share of households with titles in the province	
Strong Right (%)	Share of owned land under the land tenure categories "long-term use land"; "private land" (including 5 percent garden land); "swidden" and "other land"	Share of owned land under the land tenure categories: "long-term use land"; "other land"
Perennial land	Amount of owned land planted with perennials and fruit trees (m^2)	
Perennial share	Proportion of owned land planted with perennials and fruit trees (percent)	
Formal loan	Amount of loan from formal sources (bank, cooperatives) ('000 Dong)	
Land cultivated	Total amount of cultivated land (m^2)	
Annual good quality land	Share of annual land of good quality (level 1 and 2 quality)	
Household size	Household size	
Draft animals (#)	Number of draft animals in the farm at the start of the year (buffalo, cow)	
Owns a bike (0/1)	Dummy variable identifying households who own a bicycle	
Owns a cupboard	Dummy variable identifying households who own at least one cupboard in the house	
Dowry	Amount of expenses for dowry (VND[83])	
Value of farm equipment	Value of farm equipment at the start of the year	
Fruit price	Price of fruit in the commune (from commune questionnaire) (VND)	
Rice price	Price of rice in the commune (from commune questionnaire) (VND)	
N price	Price of Nitrogen in the commune (from commune questionnaire) (VND)	
Distance to market	Distance to nearest market (km)	
Commune perennial land	Share of perennial land at the commune level (aggregated from household survey data - mean proportion at the commune level)	
New Irrigation	0/1 dummy which indicates whether new irrigation infrastructures were constructed or not (commune questionnaire)	
New road	0/1 dummy which indicates whether a new road constructed or not (commune questionnaire)	

[83] VND: Vietnamese Dong.

2.6.2 Panel Sample Descriptive Statistics

Table 2-9: VLSS Panel Descriptive Statistics

	1992					1998				
	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Perennial land (m2)	3366	1031	3145	0	70200	3366	1845	5765	0	134200
Perennial land (%)	3235	0.15	0.24	0	1	3191	0.27	0.30	0	1
Title (% hh in province)	3203	0.04	0.11	0	0.52	3203	0.54	0.30	0	1
Weak right (% total land)	3366	0.46	0.41	0	1	3366	0.02	0.12	0	1
Land cultivated (m2)	3366	5699	7391	0	143108	3366	6002	8640	0	134200
Land total owned (m2)	3366	5503	7208	0	143108	3366	5845	8443	0	134200
Annual land (m2)	3366	4388	5487	0	97150	3366	3927	5789	0	122000
Good quality (% annual land)	3366	0.24	0.36	0	1	3366	0.28	0.39	0	1
Perennial land (% commune land)	3366	0.11	0.16	0	0.92	3366	0.12	0.18	0	0.94
Loan total (D)	3366	935	2721	0	79671	3366	2310	6144	0	200404
Formal loan (D)	3366	293	1392	0	54707	3366	1319	3544	0	49645
Informal loan (D)	3366	642	2287	0	79671	3366	992	4758	0	200404
HH size	3366	5.10	2.12	1	25	3366	4.85	1.93	1	14
Dependent ratio	3366	1.16	1.06	0	8	3366	1.23	1.22	0	8
Education Head HH (years)	3366	5.91	4.04	0	21	3366	6.57	4.12	0	18
Draft animals (#)	3366	0.55	1.23	0	30	3366	0.67	1.50	0	19
Owns a bike (0/1)	3366	0.63	0.48	0	1	3366	0.72	0.45	0	1
Owns a cupboard (0/1)	3366	0.51	0.50	0	1	3366	0.65	0.48	0	1
Rooms in house (#)	3366	2.07	0.92	1	9	3366	2.33	1.04	1	8
Dowry (D)	3366	179	889	0	15267	3366	284	1362	0	18909
Fruit price (D)	3245	3342	2179	626	17640	3336	5466	2507	861	12083
Nitrogen price (D)	3317	2892	461	1865	3902	3366	2111	406	240	3340
Rice price (D)	3366	2732	379	1831	3575	3366	3019	359	1738	4118
Distance to market	3366	1.43	2.55	0	14	3366	2.32	4.24	0	37
New irrigation (0/1)	3366	0.00	0.00	0	0	3366	0.38	0.49	0	1
New road (0/1)	3366	0.00	0.00	0	0	3366	0.53	0.50	0	1

2.6.3 Results

2.6.3.1 Pantob – Weak right

	Pantob Tobit FE VIETNAM Quadratic loss function Powell's Optimization pantobweak01			Pantob Tobit FE NORTH Quadratic loss function Powell's pantobweaknorth01			Pantob Tobit FE SOUTH Quadratic loss function Powell's pantobweaksouth01		
perennial	Coef.	sd	t	Coef.	sd	t	Coef.	sd	t
1998 dummy	995	572	1.74	849	751	1.13	-36	597	-0.06
formal loan (th. D)	0.06	0.08	0.72	-0.05	0.20	-0.24	0.06	0.09	0.74
Weak right (% of total land)	-1161	437	-2.66	-1341	771	-1.74	-1562	1136	-1.38
Cultivated land (m2)	0.78	0.08	10.09	0.65	0.19	3.46	0.82	0.07	12.62
Good quality land (% annual land)	31	468	0.07	697	436	1.60	-1137	636	-1.79
Commune perennial land (%)	8396	1891	4.44	7694	3712	2.07	11150	3028	3.68
Household size	-350	158	-2.22	580	604	0.96	-541	174	-3.12
Household size square	10	8.58	1.17	-81	60	-1.35	21	7	3.09
Value of equipment (th. D)	0.1915	0.11	1.72	0.32	0.65	0.49	0.17	0.11	1.54
Draft animals (#)	266	177	1.50	62	88	0.70	422	225	1.87
Househol owns bike (0/1)	-869	277	-3.13	-318	292	-1.09	-1225	450	-2.72
Household owns cupboard (0/1)	531	580	0.92	950	727	1.31	-101	562	-0.18
Number of rooms	-27	150	-0.18	-361	242	-1.49	68	215	0.31
Dowry (th. D)	0.31	0.36	0.87	2.40	2.98	0.80	0.00	0.10	0.01
Fruit price (D)	0.02	0.06	0.32	0.07	0.09	0.79	0.15	0.07	2.12
Rice price (D)	0.12	0.49	0.24	-0.04	0.51	-0.07	0.78	0.46	1.70
Nitrogen (N) price	-0.03	0.38	-0.07	-0.96	0.52	-1.86	0.00	0.59	0.26
Distance to market	10	63	0.15	-18	84	-0.22	139	80	1.74
New irrigation investment (0/1)	-614	291	-2.11	-456	581	-0.79	-768	444	-1.73
New road invesment (0/1)	-18	316	-0.06	-1563	631	-2.48	1152	446	2.58
Disaster 93 (0/1)	-967	328	-2.95	-879	728	-1.21	-1448	476	-3.04
Disaster 98 (0/1)	532	297	1.79	476	693	0.69	445	574	0.77
obs	3226			1851			1375		
F-test	481			76			490		
Function Value:	1.18E+10			4.67E+09			6.03E+09		

2.6.3.2 Pantob – Provincial Titling

	Pantob Tobit FE VIETNAM Quadratic loss function Powell's pantobtitle01			Pantob Tobit FE NORTH Quadratic loss function Powell's pantobtitlenorth01			Pantob Tobit FE SOUTH Quadratic loss function Powell's pantobtitlesouth01		
perennial land (m2)	Coef.	sd	t	Coef.	sd	t	Coef.	sd	t
1998 dummy	826	605	1.37	933	679	1.37	164	867	0.19
Formal loan (th. D)	0.06	0.08	0.7205	-0.05	0.17	-0.30	0.07	0.08	0.79
Provincial titling (%)	687	480	1.43	**2273**	**1259**	**1.81**	-171	905	-0.19
Cultivated land (m2)	0.78	0.08	10.14	0.65	0.19	3.51	0.82	0.07	12.63
Good quality land (% annual land)	58	427	0.14	**814**	**382**	**2.13**	**-1120**	**579**	**-1.94**
Commune perennial land (%)	**8936**	**1943**	**4.60**	**10530**	**4914**	**2.14**	**12140**	**2679**	**4.53**
Household size	**-363**	**149**	**-2.44**	456	424	1.08	**-514**	**171**	**-3.01**
Household size square	11	8	1.32	-74	47	-1.59	**19.91**	**7.02**	**2.84**
Value of equipment (th. D)	**0.1978**	**0.11**	**1.83**	0.31	0.61	0.50	0.17	0.10	1.64
Draft animals (#)	251	196	1.28	34	85	0.41	**468**	**226**	**2.07**
Househol owns bike (0/1)	**-870**	**318**	**-2.73**	-232	273	-0.85	**-1279**	**422**	**-3.03**
Household owns cupboard (0/1)	562	594	0.95	1053	746	1.41	-148	616	-0.24
Number of rooms	0	139	0.00	-199	211	-0.94	73	204	0.36
Dowry (th. D)	0.31	0.35	0.89	2.46	3.10	0.79	0.00	0.10	-0.02
Fruit price (D)	0.06	0.05	1.12	0.04	0.07	0.53	**0.17**	**0.07**	**2.39**
Rice price (D)	0.05	0.53	0.08	-0.37	0.54	-0.69	**0.82**	**0.48**	**1.70**
Nitrogen (N) price	-0.11	0.40	-0.27	-0.40	0.44	-0.91	0.22	0.57	0.38
Distance to market	-7	59	-0.12	-41	65	-0.63	128	84	1.52
New irrigation investment (0/1)	**-596**	**270**	**-2.21**	-304	482	-0.63	-631	464	-1.36
New road invesment (0/1)	71	309	0.23	**-1347**	**538**	**-2.50**	**1116**	**440**	**2.54**
Disaster 93 (0/1)	-799	**337**	**-2.37**	-1022	646	-1.58	**-1523**	**454**	**-3.35**
Disaster 98 (0/1)	331	301	1.10	444	473	0.94	474	492	0.96
obs	3063			1713			1350		
F-test	501			115			477		
Function value	1.E+10			5.E+09			6.E+09		

2.6.3.3 Pantob – Weak Right and Provincial Titling

	Pantob Tobit FE VIETNAM Quadratic loss function Powell's pantob01			Pantob Tobit FE NORTH Quadratic loss function Powell's pantobnorth01			Pantob Tobit FE SOUTH Quadratic loss function Powell's pantobsouth01		
perennial	Coef.	sd	t	Coef.	sd	t	Coef.	sd	t
1998 dummy	539	663	0.81	-160	993	-0.16	151	901	0.17
Formal loan (th. D)	0.06	0.08	0.72	-0.04	0.13	-0.28	0.06	0.09	0.74
Weak right (% of total land)	-1252	417.80	-3.00	-1475	647	-2.28	-1694	1147	-1.48
Provincial titling (%)	863	545	1.58	2479	1456	1.70	-102	916	-0.11
Cultivated land (m2)	0.78	0.08	10.12	0.64	0.19	3.37	0.82	0.07	12.62
Good quality land (% annual land)	-1.05	474	0.00	841	396	2.12	-1134	632	-1.79
Commune perennial land (%)	8879	1961	4.53	11710	4941	2.37	10910	3090	3.53
Household size	-350	159	-2.21	584	576	1.01	-541	176	-3.08
Household size square	10	9	1.16	-81	56	-1.44	21	7	3.05
Value of equipment (th. D)	0.19	0.11	1.75	0.34	0.41	0.82	0.17	0.11	1.54
Draft animals (#)	259	174	1.49	56	147	0.38	421	223	1.89
Househol owns bike (0/1)	-915	299	-3.06	-241	288	-0.84	-1232	453	-2.72
Household owns cupboard (0/1)	574	597	0.96	1215	779	1.56	-73	609	-0.12
Number of rooms	-20	149	-0.13	-321	237	-1.36	77	219	0.35
Dowry (th. D)	0.33	0.36	0.90	2.51	3.03	0.83	0.00	0.10	0.00
Fruit price (D)	0.04	0.06	0.75	*0.05*	*0.13*	*0.39*	0.15	0.07	2.20
Rice price (D)	0.15	0.51	0.30	*-0.12*	*0.50*	*-0.24*	0.83	0.47	1.76
Nitrogen (N) price	-0.05	0.40	-0.13	-0.80	0.48	-1.68	0.14	0.61	0.23
Distance to market	19.86	63.51	0.31	-7.58	71.19	-0.11	138	86	1.62
New irrigation investment (0/1)	-631	290	-2.18	-221	349	-0.63	-847	479	-1.77
New road invesment (0/1)	30	325	0.09	-1571	637	-2.47	1122	441	2.54
Disaster 93 (0/1)	-943	332	-2.84	-971	739	-1.31	-1426	476	-3.00
Disaster 98 (0/1)	370	338	1.09	461	615	0.75	207	570	0.36
Number of observations	3063			1713			1350		
F-test	482			105			503		
Function Value:	1.E+10			5.E+09			6.E+09		

2.6.3.4 Tobit RE – Share of perennial land - Weak Right

	TOBIT RE VIETNAM with commune dummies			TOBIT RE NORTH with commune dummies			TOBIT RE SOUTH with commune dummies		
perennial	Coef.	se	z	Coef.	se	z	Coef.	se	z
1998 dummy	0.093	0.027	3.46	-0.036	0.029	-1.21	0.232	0.057	4.10
Formal loan (th. D)	0.000	0.000	2.27	0.000	0.000	2.11	0.000	0.000	1.30
Weak right (%)	-0.296	0.019	-15.49	-0.254	0.020	-12.52	-0.413	0.050	-8.33
Good quality land (% annual land)	-0.285	0.016	-17.63	-0.196	0.016	-12.56	-0.427	0.034	-12.57
Commune perennial land (%)	0.469	0.090	5.20	0.240	0.098	2.45	0.629	0.185	3.41
Household size	-0.055	0.006	-8.99	-0.079	0.008	-9.47	-0.057	0.011	-5.02
Household size square	0.003	0.000	6.39	0.006	0.001	7.60	0.003	0.001	3.55
Value of equipment (th. D)	0.000	0.000	-3.46	0.000	0.000	-1.83	0.000	0.000	-2.37
Draft animals (#)	-0.013	0.004	-3.52	-0.012	0.004	-3.34	-0.017	0.008	-2.07
Househol owns bike (0/1)	-0.036	0.011	-3.17	-0.022	0.010	-2.15	-0.053	0.026	-2.04
Household owns cupboard (0/1)	0.027	0.010	2.68	0.034	0.009	3.88	0.008	0.026	0.30
Number of rooms	0.013	0.005	2.61	0.009	0.005	1.79	0.013	0.011	1.23
Dowry (th. D)	0.000	0.000	0.39	0.000	0.000	2.96	0.000	0.000	-1.56
Fruit price (D)	0.000	0.000	1.45	0.000	0.000	1.15	0.000	0.000	3.24
Rice price (D)	0.000	0.000	4.15	0.000	0.000	4.38	0.000	0.000	2.57
Nitrogen (N) price	0.000	0.000	0.15	0.000	0.000	-4.78	0.000	0.000	2.33
Distance to market	0.017	0.003	5.26	0.013	0.003	4.24	0.023	0.007	3.17
New irrigation investment (0/1)	-0.046	0.017	-2.69	-0.012	0.016	-0.76	-0.183	0.040	-4.59
New road invesment (0/1)	-0.027	0.018	-1.54	-0.078	0.016	-5.05	0.035	0.042	0.83
Disaster 93 (0/1)	-0.042	0.017	-2.44	0.003	0.017	0.19	-0.166	0.041	-4.02
Disaster 98 (0/1)	0.014	0.017	0.79	0.053	0.016	3.23	-0.064	0.040	-1.62
constant	0.189	0.085	2.22	0.578	0.080	7.26	0.781	0.209	3.75
/sigma_u	0.073			0.081	0.008	9.71	0.097		
/sigma_e	0.303	0.004	82.42		0.004	50.21	0.424	0.009	48.32
rho	0.055			0.135	0.027		0.050		
obs	6562			3793			2769		
F-test	4254			2655			1428		
Log likelihood	-2877			-459			-1889		
uncensored obs.	4377			2776			1601		
left-censored obs.	1533			861			672		
right-censored obs.	652			156			496		

2.6.3.5 Tobit RE – Share of perennial land – Provincial Titling

	TOBIT RE VIETNAM with commune dummies			TOBIT RE NORTH with commune dummies			TOBIT RE SOUTH with commune dummies		
perenns	Coef.	se	z	Coef.	se	z	Coef.	se	z
1998 dummy	0.120	0.030	4.02	0.098	0.026	3.74	0.220	0.072	3.05
Formal loan (th. D)	0.000	0.000	1.57	0.000	0.000	2.18	0.000	0.000	0.97
Provincial titling (%)	0.095	0.028	3.42	0.087	0.023	3.73	0.035	0.070	0.50
Good quality land (% annual land)	-0.268	0.017	-16.20	-0.162	0.016	-10.13	-0.413	0.034	-12.31
Commune perennial land (%)	0.480	0.091	5.30	0.413	0.094	4.40	0.801	0.185	4.33
Household size	-0.061	0.006	-9.96	-0.084	0.008	-10.04	-0.063	0.011	-5.63
Household size square	0.004	0.000	7.41	0.006	0.001	8.08	0.003	0.001	4.16
Value of equipment (th. D)	0.000	0.000	-3.69	0.000	0.000	-2.74	0.000	0.000	-2.30
Draft animals (#)	-0.014	0.004	-3.81	-0.014	0.003	-4.04	-0.016	0.008	-1.92
Househol owns bike (0/1)	-0.036	0.011	-3.17	-0.019	0.010	-1.86	-0.059	0.026	-2.31
Household owns cupboard (0/1)	0.033	0.010	3.21	0.037	0.009	4.23	0.003	0.026	0.13
Number of rooms	0.015	0.005	3.07	0.015	0.005	3.23	0.014	0.011	1.30
Dowry (th. D)	0.000	0.000	-0.60	0.000	0.000	1.80	0.000	0.000	-1.79
Fruit price (D)	0.000	0.000	4.61	0.000	0.000	1.50	0.000	0.000	4.20
Rice price (D)	0.000	0.000	1.76	0.000	0.000	3.91	0.000	0.000	2.51
Nitrogen (N) price	0.000	0.000	-0.77	0.000	0.000	-3.86	0.000	0.000	1.91
Distance to market	0.009	0.003	2.97	0.008	0.003	2.82	0.015	0.007	2.14
New irrigation investment (0/1)	-0.038	0.017	-2.21	0.013	0.015	0.88	-0.176	0.040	-4.44
New road invesment (0/1)	0.021	0.017	1.19	-0.042	0.014	-2.88	0.062	0.042	1.48
Disaster 93 (0/1)	-0.021	0.017	-1.18	-0.029	0.017	-1.76	-0.190	0.042	-4.57
Disaster 98 (0/1)	0.005	0.017	0.30	0.025	0.015	1.60	0.014	0.038	0.36
constant	1.032	0.117	8.84	0.198	0.078	2.55	0.005	0.242	0.02
/sigma_u	0.078			0.095	0.007	14.47	0.101		
/sigma_e	0.297	0.004	80.36	0.190	0.004	50.08	0.417	0.009	48.07
rho	0.064			0.199	0.026		0.055		
obs	6236			3517			2719		
F-test	3963			2474			1395		
Log likelihood	-2685			-287			-1837		
uncensored obs.	4243			2647			1596		
left-censored obs.	1383			740			643		
right-censored obs.	610			130			480		

2.6.3.6 Tobit RE – Share of perennial land – Weak Right and Provincial Titling

	TOBIT RE VIETNAM with commune dummies			TOBIT RE NORTH with commune dummies			TOBIT RE SOUTH with commune dummies		
perennial	Coef.	se	z	Coef.	se	z	Coef.	se	z
1998 dummy	0.041	0.030	1.38	-0.046	0.029	-1.56	0.226	0.072	3.16
Formal loan (th. D)	0.000	0.000	2.37	0.000	0.000	2.37	0.000	0.000	1.31
Weak right (% of total land)	-0.279	0.019	-14.64	-0.231	0.020	-11.70	-0.370	0.049	-7.49
Provincial titling (%)	0.119	0.028	4.30	0.084	0.024	3.53	0.009	0.069	0.13
Good quality land (% annual land)	-0.267	0.016	-16.36	-0.156	0.016	-9.89	-0.418	0.033	-12.58
Commune perennial land (%)	0.517	0.090	5.77	0.318	0.096	3.33	0.641	0.184	3.48
Household size	-0.056	0.006	-9.28	-0.079	0.008	-9.63	-0.060	0.011	-5.40
Household size square	0.003	0.000	6.68	0.006	0.001	7.73	0.003	0.001	3.87
Value of equipment (th. D)	0.000	0.000	-3.48	0.000	0.000	-1.77	0.000	0.000	-2.33
Draft animals (#)	-0.013	0.004	-3.43	-0.012	0.003	-3.49	-0.015	0.008	-1.90
Househol owns bike (0/1)	-0.034	0.011	-3.06	-0.019	0.010	-1.91	-0.056	0.025	-2.21
Household owns cupboard (0/1)	0.028	0.010	2.69	0.036	0.009	4.18	0.004	0.025	0.15
Number of rooms	0.014	0.005	2.81	0.011	0.005	2.41	0.011	0.011	1.09
Dowry (th. D)	0.000	0.000	-0.43	0.000	0.000	1.82	0.000	0.000	-1.59
Fruit price (D)	0.000	0.000	2.01	0.000	0.000	1.08	0.000	0.000	3.27
Rice price (D)	0.000	0.000	3.18	0.000	0.000	3.62	0.000	0.000	2.53
Nitrogen (N) price	0.000	0.000	0.03	0.000	0.000	-4.31	0.000	0.000	2.27
Distance to market	0.018	0.003	5.65	0.016	0.003	5.24	0.022	0.007	3.13
New irrigation investment (0/1)	-0.053	0.017	-3.10	-0.015	0.015	-1.00	-0.180	0.039	-4.58
New road invesment (0/1)	-0.027	0.017	-1.56	-0.080	0.015	-5.27	0.036	0.041	0.88
Disaster 93 (0/1)	-0.044	0.017	-2.54	-0.014	0.017	-0.83	-0.166	0.041	-4.03
Disaster 98 (0/1)	0.020	0.017	1.14	0.064	0.016	3.95	-0.055	0.039	-1.42
constant	0.974	0.115	8.45	0.267	0.078	3.41	0.168	0.239	0.70
/sigma_u	0.073			0.076	0.008	9.48	0.099		
/sigma_e	0.294	0.004	81.17	0.193	0.004	49.09	0.412	0.009	48.20
rho	0.058			0.135	0.028		0.054		
obs	6236			3517			2719		
F-test	4224			2646			1459		
Log likelihood	-2580			-215			-1809		
uncensored obs.	4243			2647			1596		
left-censored obs.	1383			740			643		
right-censored obs.	610			130			480		

Chapter 3 - Education and Agricultural Productivity in Vietnam

3.0 Introduction

Between 1947 and 1975, Vietnam fought two wars, against France between 1947 and 1954, and against America between 1960 and 1975, which cost the lives of about 2.8 million soldiers and civilians and saw the destruction of hundreds of villages and the displacement of thousands of people. Nevertheless, the legacy of 20 years of war was not only one of destruction and suffering, but also one of important socio-economic changes. In particular, in the midst of tremendous economic hardship and political turmoil, Vietnam succeeded in dramatically increasing its overall literacy and numeracy levels. As a result, at the start of its agricultural liberalisation period in the late 1980s, Vietnam benefited from a labour force that was largely literate.

The 1990s represent a period of very rapid economic changes for Vietnam. Agricultural markets were gradually liberalised, import quotas for agricultural inputs were lifted and new agricultural technologies became available to farmers (Goletti and Minot 1997a; Goletti and Minot 1997b; Goletti, Minot, and Berry 1997). In turn, Vietnam's unprecedented agricultural growth rates during the 1990s were largely obtained through greater adoption of yield-increasing technology (fertilisers) and more intensive application of labour (Pingali and Xuan 1992; Wiens 1998; Benjamin and Brandt 2004).

The role of education in the process of economic development remains little understood. Nevertheless, literacy and numeracy are understood to be important pre-conditions for agricultural growth and poverty reduction (Ravallion and Datt 2002). What role did education play in promoting agricultural growth and poverty reduction in Vietnam? In Section 3.1, I examine the channels through which education is thought to enhance agricultural productivity and explore whether Vietnam's high levels of educational attainment at the start of its

agricultural liberalisation period constituted the pre-conditions to attain the remarkably high agricultural growth rates it achieved during the 1990s (Goletti and Minot 1997b; World Bank 1999).

The contribution of this chapter is two-fold. First, it sheds light on the circumstances that allowed Vietnam to emerge from thirty years of war with literacy and numeracy levels that are normally achieved by middle-income countries such as Thailand or Indonesia. Secondly, it makes use of exogenous variations in education between North and South Vietnam to devise an instrumental variable strategy, which controls for the endogeneity of education, and estimates the effect of various indicators of educational attainment on rice productivity.

The results found here confirm the importance of literacy and numeracy skills as pre-conditions for agricultural growth. Higher levels of skills also matter significantly with literacy and holding upper secondary degrees increasing rice yields by 38 percent and 31 percent respectively.

The chapter is organised as follows. Section 3.2 explains how the goal of achieving universal literacy, announced by Ho Chi Minh in 1945 after Vietnam's declaration of independence in 1945, became an integral part of the guerrilla tactics put into place by the Viet Minh during the war. I document how in midst of tremendous hardship, Vietnam succeeded in bringing about quasi-universal literacy in North Vietnam and greater parity in male and female primary education levels. The gap in educational attainment between North and South Vietnam can be traced back to Vietnam's partition in 1954 and to the implementation of differential educational policies between 1954 and 1975. In Section 3.3, exogenous variations in various indicators of educational attainment due to the partition of Vietnam between North and South Vietnam are exploited in order to empirically assess the effect of education on agricultural productivity. Results are presented and discussed in Section 3.4. Section 3.5 concludes.

3.1 Education and Rural Development

At the start of its agricultural reform period in the early 1980s, Vietnam benefited from a rural labour force that was largely literate. The existence of a causal relationship flowing from human capital to economic growth remains intensely debated both theoretically and empirically (Topel 1999), and despite "fifty years of Mincer earnings regressions" (Heckman, Lochner, and Todd 2003), how schooling contributes to increase earnings remains little understood. Nevertheless, there are several channels through which education is thought to enhance agricultural productivity, and may have played an important role in generating the increase in agricultural productivity that led Vietnam to become the world's third largest rice exporter by 1996 (Goletti, Minot, and Berry 1997).

Theoretically, macroeconomic models of endogenous growth postulate that human capital, together with physical capital and technical progress, are components of economic growth[84], with human capital[85] emerging as a key factor in economic development more recently (Lucas 1988), prompting some to take the view that "differences in per capita incomes across countries reflect differences in the ability to apply technologies that are, in a general sense, already broadly known" (Topel 1999). Recent studies of the determinants of growth for eight East Asian countries, which experimented unprecedented spells of economic growth during the 1960s and the 1970s[86], show that most of the growth came from the accumulation of physical and human capital, of which growth in (primary) educational attainment was the largest contributor (Young 1995; Ray 1998: 121). Importantly also, others argued that it is the stock rather than the change in human capital that determines growth (Nelson and Phelps 1966). Hence, initial levels of education condition subsequent patterns of growth.

At the micro level, education may contribute to efficiency through a variety of channels. First, education may have a direct impact on individuals' labour productivity, ability for innovation and propensity to adopt new technologies

[84] See the review of growth models presented by Klenow and Rodriguez-Clare (1997).
[85] Cross-country studies show that higher initial levels of education are associated with higher subsequent growth rates of per capital GDP. See table 1 in Bils and Klenow (2000).
[86] Japan, Taiwan, South Korea, Thailand, Malaysia, Taiwan, Hong Kong, Indonesia

(Foster and Rosenzweig 1996a; Knight, Weir, and Woldehanna 2003). Secondly, education may also have an indirect impact through positive externalities generated through imitation or through the exchange of ideas (Lucas 1988; Lucas 1993). It is the first effect that is going to interest us in this chapter.

Specifically, in agriculture, education is expected to enhance growth in several ways: (i) by improving technical and allocative efficiency in farming (Fafchamps and Quisumbing 1998; Weir 1999; Schultz 2003b and the literature cited therein), (ii) by increasing the ability to become early adopters of technology (Weir and Knight 2004); (iii) by raising the ability to make better use of technology, once technology is adopted[87]. In the latter case, it is primary schooling rather than higher levels education that has been found to raise the returns to technology (Jamison and Moock 1984; Foster and Rosenzweig 1996b; Weir 1999; Weir and Knight 2004). Farm returns to education are also generally higher in the presence of technical progress (Jamison and Lau 1982). Likewise, education may also impact an individual's choice of economic activities as well as the incomes generated by the chosen activities (Taylor and Yunez-Naude 2000).

Evidence on the causal impact of education on farm productivity as compiled by Lockheed, Jamison and Lau (1980) is mixed with important variations across countries and across regions. However, by and large, education seems to have had a positive impact on farm productivity in Asia, although the empirical evidence is less conclusive in other regions (Africa and Latin America)[88].

Empirically, attempts at measuring the impact of education and earnings span an enormous empirical literature[89] and have been fraught with methodological difficulties[90]. The foremost estimation issue has been the failure to control for the correlation between education and omitted factors such as individual ability,

[87] Also, education generates positive externalities with less educated individuals imitating (more educated) first adopters. The existence of positive externalities from human capital as described by Ray (1998); Topel (1999) is contested by Heckman and Klenow (1997).

[88] All these results need to be assessed in the light of estimation problems discussed by Heckman and Vytlacil (2000) and Angrist and Krueger (1999).

[89] See the extensive review provided by Heckman, Lochner and Todd (2003) called "Fifty Years of Mincer Earnings Regressions", who review and critique the extensive body of empirical work on the wage returns of human capital using standard Mincerian models that regress the logarithm of wages on years of schooling. See also Harmon, Oosterbeek and Walker (2003).

family or class background, which themselves affect earnings, generating biased estimates of the impact of education on earnings (Card 1999). The endogeneity of education is likely to be a particularly salient problem in developing countries, where individuals face considerable liquidity and other institutional constraints that influence both their levels of schooling and dependent variables such as earnings or productivity. These estimation issues are discussed in detail in the empirical part of this chapter, in Section 3.3.

The main findings from a world-wide compilation of Mincerian returns to education by Psacharopoulos (1994; 2002) over recent decades are that the returns of education on earnings are sizeable (about 6-10 percent), larger in developing countries compared to industrialised countries, and that they are larger at lower levels of education. In addition, in socialist and formerly socialist countries (China and Vietnam, the former USSR), returns are found to be considerably lower than in other countries at less than 5 percent, according to (Moock, Patrinos, and Venkataraman 2003; de Brauw and Rozelle 2004; Gallup 2004).

In Section 3.2, I show that at the start of its agricultural transition period in the early 1980s, Vietnam's agricultural labour force was already largely literate. Large variations in several indicators of educational attainment across Vietnam can be traced back to different education policies put into place between 1945 and 1975 in North and South Vietnam. To circumvent the above-mentioned endogeneity problems, I exploit Vietnam's historical variations in educational attainment to tackle a number of econometric issues and test the impact of education on efficiency by estimating the impact of various indicators of education achievement on rice productivity, measured as rice yields per hectare of land owned.

The focus on rice cultivation is justified by its sheer importance in Vietnam's agricultural sector. Rice is the largest agricultural sub-sector, accounting for about 65 percent of agricultural land area and 70 percent of total annual land, and in 1992 was grown by 84 percent of farmers (Goletti, Minot, and Berry 1997).

[90] See Heckman and Vytlacil (2000); Card (2001); Heckman, Lochner and Todd (2003); Heckman and Vytlacil (2003). See Angrist and Krueger (1999) for an alternative view.

Over centuries, Vietnam has developed a permanent and intensive system of irrigated wet-rice cultivation that is able to support one of the highest population densities in the world[91] (Gourou 1965 (1936); Bray 1986; Nguyen Sinh Cuc 1995b; Le Ba Thao 1998). Bray (1986: 25) explains:

> "Although [...] it is hard to grow, generally requiring more labour than other crops, it [rice] is also the highest yielding of all cereals after maize, but has superior nutritional value. It is highly adaptable, can be grown under any conditions, does not necessarily require fertilisers (although it responds well to their use) and will produce as many as three crops a year if there is sufficient water, without exhausting the fertility of the paddy field. [...] If quick-ripening varieties are used, as many as three crops of rice a year can be grown even by farmers who do not have access to chemical fertilisers, for the water supply provides nutrients naturally. This means that once rice cultivation is established in a region, it will sustain population growth almost indefinitely".

In all regions, most farms are family farms, traditionally organised around the production of rice using wet-rice farming techniques. The cycle of works for rice cultivation using wet-rice technology includes: the selection of seeds to be planted in specially prepared seedbeds; the transplantation of seedlings in ploughed and flooded fields; during the maturation period other tasks comprise the weeding of fields, the application of fertiliser and spraying of pesticide, the monitoring of water levels, and finally the harvesting, threshing and drying of rice grains. When carefully executed, all these tasks can make a decisive contribution to enhance yields. Overall farm productivity is critically dependent on complex decisions regarding the timing of operations and the application of the correct type and quantity of fertilisers and pesticides, taking into account the variations in soil quality, temperature and water control availability.

The need for a skilled and experienced labour force together with the importance of agricultural technology in the cultivation of rice allows us to examine whether Vietnam's high initial levels of education at the start of its agricultural

[91] Gourou (1952); ibid. (1965 (1936)) documents the acute population pressure in the Red River Delta in the 1930s and across South-East Asia, and describes the labour intensive cultivation methods that were developed over time.

liberalisation period played a part in generating the remarkably high agricultural growth rates of the 1990s.

The data on education and agricultural production come from the Vietnamese Living Standard Survey (VLSS). The agricultural unit in Vietnam is the farm household and agricultural decisions are generally taken by household heads (who are mostly men). In the VLSS, data on agricultural productivity are collected at the household level. Education being a fixed factor for the household head, I only make use of the 1992 dataset. Therefore, this chapter focuses on the educational attainment of *household heads* and unless otherwise indicated, all data on education presented below pertain to the head of the household.

In the next section, I explain how the goal of achieving universal literacy declared by Ho Chi Minh in 1945 after the declaration of Vietnam's independence in 1945 became an integral part of the guerrilla tactics put into place by the Viet Minh between 1946 and 1975. I document how in the midst of tremendous hardship, Vietnam succeeded in bringing about quasi-universal literacy in North Vietnam and greater parity in male and female primary education levels. The gap in educational attainment between North and South Vietnam can be traced back to Vietnam's partition in 1954 and to the implementation of differential educational policies between 1954 and 1975.

3.2 Vietnam's Education Policies in Times of War (1945-1975)

During the twentieth century, Vietnam went through a series of enormous political transformations. A year after Vietnam declared its independence from French colonial rule in September 1945, war broke out between Vietnam and France, with the Viet Minh fighting the war from the high hills of North Vietnam where it had taken refuge. The French war was to last until September 1954, when the Geneva peace accords decided the partitioning of Vietnam between the Democratic Republic of Vietnam (DRV) in the North and the Republic of Vietnam (RVN) in the South. National elections to reunify Vietnam were to be

held in 1956 but were eventually called off after the RVN refused to hold elections which were likely to favour the Viet Minh (Duiker 1996).

A period of guerrilla warfare ensued between the National Liberation Front, supported by the DRV, and the RVN, which received increasing support from the US. Open warfare was launched by America in 1964 following the Bay of Tonkin incident, when it was alleged that North Vietnamese patrols had attacked US destroyers[92]. The bombing of North Vietnam started in 1964 and continued until late 1968, when peace talks between the United States and Hanoi began[93]. US air strikes were resumed in early 1970, peaking during 1972 and inflicting enormous damage. Warfare continued until 1975 when, after a major offensive, the North Vietnamese entered Saigon. Vietnam was officially reunited in June 1976.

Vietnam's eventful twentieth-century history can be divided into four defining 'Periods': the French colonial period until Vietnam's declaration of independence in September 1945 (Period I); the period of the war against France between 1946 and 1954 (Period II); the period of the partition between North and South Vietnam and the war against America between 1954 and 1975 (Period III); the reunification of Vietnam under the Communist Party rule since 1975 (Period IV).

Table 3-1: Vietnam's four defining historical periods

Period I	Before 1945
Period II	1945-1954
Period III	1954-1975
Period IV	After 1975

Most remarkably, analysis of the VLSS data shows that Vietnam's success in bringing about quasi-universal literacy in North Vietnam and greater parity in male and female primary education levels was achieved during Period II and Period III. Below, I tell the story of Vietnam's progresses in educational

[92] To this day, the reality of the attack on the US destroyers could not be verified and it is likely to have been the results of false information. See the account of the Bay of Tonkin Incident by Secretary of Defense Robert McNamara (1995) himself, and by Daniel Ellsberg (2002) who worked for the Pentagon at the time when reports of the Maddox attack were transmitted to the US government and had first hand account of the incident.

[93] American troops, whose numbers peaked at 550,000 in 1969, started to be withdrawn.

attainments backward. Section 3.2.1 first presents Vietnam's educational attainments in 1992, in the early stage of Vietnam's reform period. Section 3.2.2 uses the historical periodisation presented above to analyse data from the Vietnamese Living Standard Survey on education, and examines the changes in education attainments over time. Finally, Section 3.2.3 traces the differentiation in educational attainment between North and South Vietnam back to Vietnam's 1954 partition and the educational policies put into place by the DRV.

3.2.1 Educational Achievements (1992)

This section documents Vietnam's educational attainments in 1992, at the start of the agricultural liberalisation period. Data on educational attainments used in this chapter include the number of years spent in education, the level of education attained (primary education, lower secondary education, and upper secondary and higher education), and the numeracy and literacy levels of the household head, and except for the latter two variables, are mostly derived from the 1992 Vietnamese Living Standard Survey. Data on literacy and numeracy were only collected in 1998 and are therefore extracted from the 1998 VLSS. Numeracy and literacy levels were not self-assessed but externally tested using writing and numeracy tests and can therefore be considered good quality data.

By 1992, rural households heads had received on average six years of education (see Table 3-2 below), and literacy and numeracy levels[94] were high at 78 percent and 70 percent respectively (Table 3-3). Although 40 percent of household heads did not receive any degree, 25 percent had completed primary school and another 24 percent had completed lower secondary schools. The remaining 12 percent had either completed upper secondary school or had received technical or vocational high school education (Table 3-4). Hence, overall, about 60 percent had at least completed primary education.

[94] Numeracy and literacy levels were not self-assessed but externally tested using writing and numeracy tests during the 1998 VLSS survey and can therefore be considered to be of good quality.

Vietnam being a patriarchal society, the education level of the male head of household is likely to be the highest in the household[95]. Nevertheless, women also benefited from the expansion in education with an average of 5 years of education, split between 5 to 7 years in North Vietnam and 2 to 4 in South Vietnam (see Table 3-5).

Already, it is clear that Vietnam's educational attainments in 1992 were remarkable by international standards. Indeed, they were comparable to those attained by middle-income countries such as Malaysia or Thailand (HDRO 2002; Unicef 2004, Table 5). How could Vietnam achieve such an outcome, when shortly after declaring its independence from French domination in September 1945, it had to fight two wars that lasted nearly 30 years? Sections 3.2.2 and 3.2.3 tell a story of forceful educational policies implemented by the DRV, and which one can trace by analysing educational trends between North and South Vietnam, and by mapping changes in educational attainments using the history of different cohorts having received their education during distinct historical periods.

3.2.2 The North-South Educational Gap (1992)

As evident from the tables below, despite high averages, educational attainments vary considerably across regions[96]. In particular, there seems to be a marked division in educational attainments between North[97] and South[98] Vietnam. One can see this clearly by contrasting the cases of Vietnam's two major rice growing regions[99]: the Red River Delta in North Vietnam, and the Mekong River Delta in South Vietnam[100].

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[95] In the traditional Vietnamese society, women who have higher levels of education than their husbands are frown upon. The Communist Party's universal education policies enabled greater parity in literacy between men and women.

[96] Looking beyond regional averages, a breakdown of literacy levels by provinces provided by UNDP Vietnam (2001) shows greater local variations in educational attainments. Whether in North or South Vietnam, the highest levels of illiteracy are to be found in several provinces located in the highlands, where there is a high proportion of ethnic minorities.

[97] North Vietnam includes three regions: the Northern Uplands, the Red River Delta and the North Central Coast.

[98] South Vietnam include four regions: the South Central Coast, the Central Highlands, the South East region and the Mekong River Delta.

[99] Data are for rural areas only.

[100] Both regions experienced very fast agricultural growth rates during the 1990s.

The average number of years of education was 7.4 in the Red River Delta against 4.2 years in the Mekong River Delta (Table 3-2). Similarly, the numeracy (literacy) rate was 82 percent (85 percent) in the Red River Delta against 51 percent (68 percent) only in the Mekong River Delta (Table 3-3). Finally, as shown in Table 3-4, as many as 60 percent of household heads in the Mekong River Delta did not hold any degree, against 23 percent of household heads in the Red River Delta. The Red River Delta can also boast the highest proportion of household heads with a lower secondary degree (38 percent).

Aggregating regions together (Table 3-6 below), the average number of years of schooling was 7.0 in North Vietnam against 4.3 years in South Vietnam. Average literacy rate in North Vietnam was 83 percent in the North against 68 percent in the South. The gap in numeracy levels was even larger (80 percent in North Vietnam and 54 percent in South Vietnam).

Table 3-2: Educational attainments by region and expenditure quintile (1992 – rural Vietnam)

Years of education of household head	Rural VN	Northern Uplands	Red River Delta	North Central Coast	South Central Coast	Central Highlands	South East	Mekong River Delta
Exp. Quintile 1	5.13	5.64	**6.61**	6.46	2.32	1.77	2.77	**3.11**
Exp. Quintile 2	5.87	6.57	**7.22**	6.88	4.33	4.52	3.79	**3.31**
Exp. Quintile 3	6.31	7.56	**7.45**	7.16	4.25	4.93	5.57	**4.08**
Exp. Quintile 4	6.19	6.87	**7.68**	8.18	5.70	3.95	4.72	**4.56**
Exp. Quintile 5	6.51	6.57	**8.98**	8.64	6.39	6.14	6.30	**5.04**
All	**5.96**	**6.51**	**7.40**	**7.17**	**4.64**	**4.05**	**4.95**	**4.18**

Table 3-3: Numeracy and literacy levels of household heads by region (1998)

Numeracy and Literacy of Household Heads	Rural VN		Urban VN	
(%)	Counting	Reading	Counting	Reading
Northern Uplands	81%	83%	88%	91%
Red River Delta	82%	85%	89%	89%
North Central Coast	78%	83%	87%	89%
South Central Coast	58%	68%	76%	83%
Central Highlands	64%	72%		
South East	64%	77%	76%	84%
Mekong River Delta	51%	68%	71%	80%
Vietnam	70%	78%	80%	85%

Table 3-4: Completed levels of education by region (1992 – rural Vietnam)

Rural VN	No degree	primary	low secondary	upper secondary	technical	vocational high school	undergrad	under-doctorate	
Northern Uplands	31	26	29	5	5	3	1	0	100
Red River Delta	23	20	38	5	6	6	1	0	100
North Central Coast	25	26	29	7	6	6	1	0	100
South Central Coast	54	26	12	4	2	2	1	0	100
Central Uplands	54	26	13	2	2	2	1	0	100
South East	49	30	15	4	0	2	1	0	100
Mekong River Delta	60	25	10	2	2	1	0	0	100
Rural VN	39	25	24	4	4	4	1	0	100

Table 3-5: Years of education of female spouse by region (1992 – rural/urban)

Education of female spouse (# years)	Rural	Urban
Northern Uplands	5.48	8.12
Red River Delta	6.72	9.26
North Central Coast	6.51	8.88
South Central Coast	3.66	6.60
Central Highlands	2.34	
South East	4.11	6.20
Mekong River Delta	3.05	5.00
Vietnam	**5.06**	**7.13**

Table 3-6: North-South Educational Gap (1992 – Rural Vietnam)

Rural Vietnam	Years Educ			Counting		Reading		
	mean	s.d.	median	mean	s.d.	mean	s.d.	# obs.
North	7.05	3.92	8	80%	0.40	83%	0.37	2002
South	4.32	3.67	4	54%	0.50	68%	0.47	1496

NB: VLSS 1992 - households heads

3.2.3 The 1945 Mass Literacy Campaign and the 1954 Partition of Vietnam

Whilst Vietnam's GDP per capita in 1992 positioned it among the poorest countries in the world, Vietnam's educational attainments are comparable to those of middle-income countries such as Thailand or Indonesia (International Literacy Institute 2000). Historical account and the data on education extracted from the VLSS indicate that educational attainment during the French colonial period was very low, so that most of the advances in education documented above must have taken place after Vietnam gained its independence from France in 1945.

In this section, I examine how, in the midst of enormous hardship and political turmoil, Vietnam succeeded in raising average literacy and numeracy skills to the remarkable levels indicated earlier, and trace the origins of the educational gap between North and South Vietnam to the 1954 partition of Vietnam. In fact, most of the progresses in educational attainment were achieved between 1945 and 1975, that is, during Period II and Period III of Vietnam's history[101].

In order to relate changes in educational attainment to specific educational policies, I make use of the history of different cohorts of individuals having received their education during distinct historical periods. Individuals interviewed in the VLSS are therefore classified according to their year of birth and according to whether they received their education during one of the four historical periods presented earlier. This classification is made possible by the fact that individuals were asked to report in what year they stopped attending school[102], and to state the number of years spent in school.

Table 3-7 presents how household heads distributed themselves across age groups and Table 3-8 indicates the year in which on average individuals in each age group completed their education. Eighty-five percent of household heads were 30 years old or older and on average completed their education before 1975. In addition, excluding those who on average completed their education before 1945, as many as three quarters of household heads completed their education between 1945 and 1975.

It is important to note that the sample size for each cohort may not be representative of each cohort in particular. The older cohorts in particular may have been under-sampled and a survivor bias may have been introduced as some may have died due to ill-health, or have been casualties of war. One relevant worry would be that there were differential survival rates in North and South Vietnam by education levels. Whilst the existence of a survivor bias can never be categorically dispelled, the analysis conducted in the next section and in Section 3.3, which discusses the instrumental variable strategy adopted for this chapter, does not reveal any such bias.

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[101] For a reminder of Vietnam's four defining historical periods, see Table 3-1 on page 94.
[102] "When did you stop attending school?" in Section 2, question 15, of the VLSS 1992.

The story of Vietnam's educational policies and how they helped bring about the notable levels of educational attainment documented above is told in the two following sections.

Table 3-7: Distribution of households across age group (1992 – rural Vietnam)

	Distribution of household heads across age group					
Age group	20-30	30-40	40-50	50-60	60-70	>70
North Vietnam	18	31	17	15	13	6
South Vietnam	11	27	22	17	15	8
Rural Vietnam	15	29	19	16	14	7

Table 3-8: Mean final year of schooling by age group (1992 – rural Vietnam)

		Mean final year of schooling for household heads by age group					
Age group		20-30	30-40	40-50	50-60	60-70	>70
North Vietnam	mean	1982	1975	1967	1959	1953	1948
	s.d.	3	4	6	8	9	11
South Vietnam	mean	1981	1974	1965	1954	1947	1936
	s.d.	4	5	6	6	9	10
Rural Vietnam	mean	1982	1975	1966	1957	1950	1943
	s.d.	4	5	6	8	9	12

3.2.3.1 Changes in Educational Attainments Over Time

In order to appreciate how educational attainments changed over time, and how these changes can be related to Vietnam's historical turning points, the educational attainment of household heads is graphed against the year in which they declared having finished their studies. The three vertical lines in each graph mark three key moments in Vietnam's history presented in Section 3.2 above: 1945, when Vietnam conquered its independence from France; 1954, which marks the end of the war against France and the partition of Vietnam between North and South Vietnam; and 1975 which marks the end of the war and the reunification of Vietnam.

Figure 3-1 maps the changes in the proportion of household heads having completed primary and lower secondary school in the Red River Delta and the Mekong River Delta. Figure 3-2 compares the changes in various indicators of educational attainment in North and South Vietnam. In all graphs, the upper lines either represent the Red River Delta (in) or North Vietnam (in Figure 3-2). In

Table 3-9, I verify that the differences in mean educational attainments between North and South Vietnam are statistically significant. Differences in means are presented for Vietnam's four historical periods. Results are shown for the number of years spent in education and the level of education attained, i.e. primary education, lower secondary education, and upper secondary and higher education.

Overall, the percentage of adults with primary education increased from 34 percent for the cohort born and raised during French colonial times, to about 70 percent for those educated during the time of Vietnam's partition, in North Vietnam. By 1975, the year of the reunification of North and South Vietnam, the average adult literacy rate had reached 80 percent[103].

Examining Figure 3-1 and Figure 3-2 together with Table 3-9 in detail reveals several patterns:

(i) the gaps in educational attainments between North and South Vietnam are insignificant in Period I, i.e. during the French colonial period;

(ii) they become significant in Period II (i.e. between 1945 and 1954);

(iii) they significantly widen during Period III (i.e. between 1954 and 1975);

(iv) that some catching up between North and South Vietnam occurs during Period IV (i.e. after the reunification of Vietnam in 1975) is evidenced by the narrowing gap between the two lines in each of the four panels (see in particular Panel 2 and Panel 3 in Figure 3-2).

[103] By way of comparison, average adult literacy rate was 69 percent in China and 43 percent in India in 1988. See Dreze and Sen (1989).

Figure 3-1: Educational attainments in primary and lower secondary schooling (Red River Delta vs Mekong River Delta)

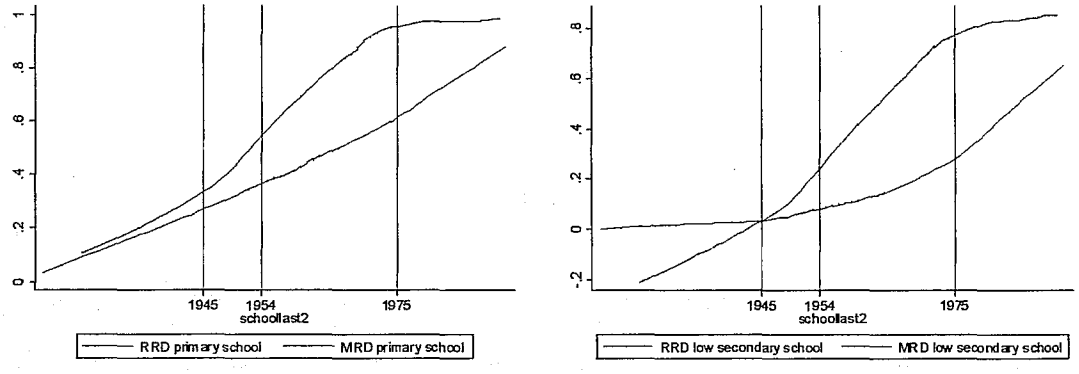
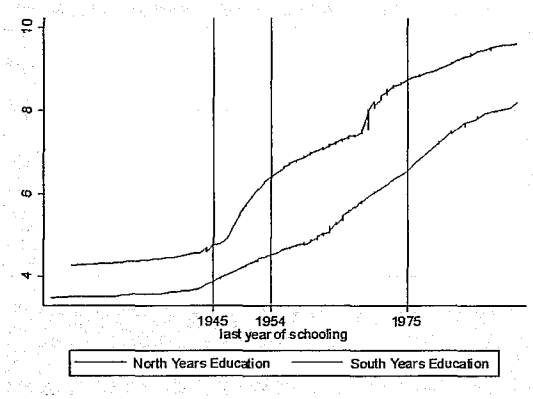
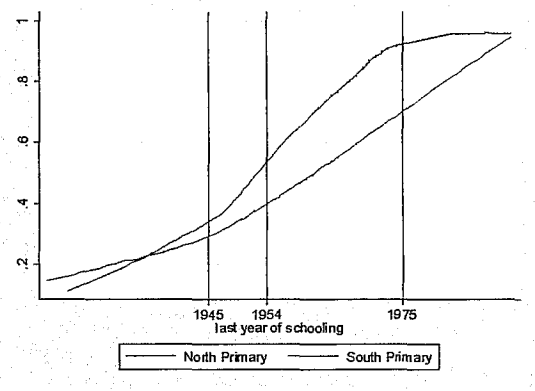


Figure 3-2: Educational attainments (North Vietnam vs South Vietnam)

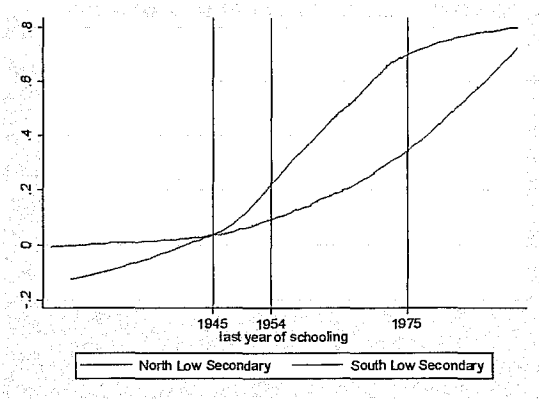
Panel 1: Years of Education



Panel 2: Primary Education



Panel 3: Lower Secondary Education



Panel 4: Upper Secondary Education

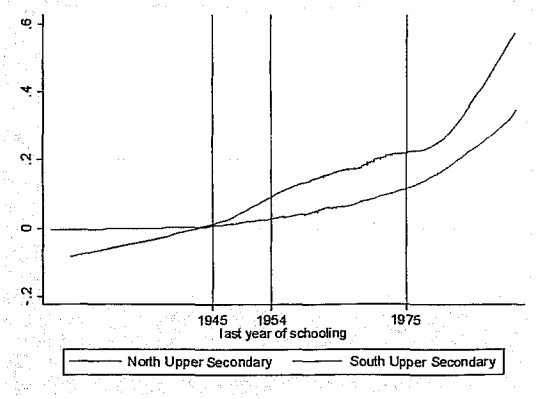


Figure 3-3: Years of Education – Male vs Female/ North vs South Vietnam

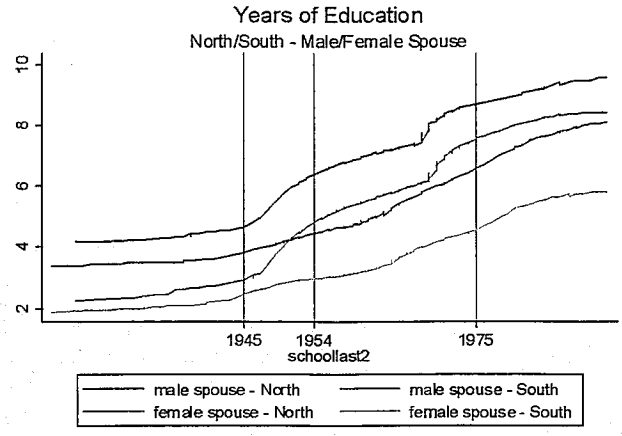


Table 3-9: North-South Gaps in Educational Attainments by Historical Period (p-value)[104]

Panel 1: Mean Years of Education

Rural Vietnam	Mean Years of Education							
	Period I	p-value*	Period II	p-value*	Period III	p-value*	Period IV	p-value*
North Vietnam	3.76	0.247	4.09	0.06	6.91	0.00	9.20	0.00
South Vietnam	3.48		3.69		4.91		7.78	

* p-value of difference in means between North and South Vietnam

Panel 2: Primary Education

Rural Vietnam	Primary Education							
	Period I	p-value*	Period II	p-value*	Period III	p-value*	Period IV	p-value*
North Vietnam	34%	0.235	41%	0.04	73%	0.00	95%	0.00
South Vietnam	27%		31%		49%		78%	

* p-value of difference in means between North and South Vietnam

Panel 3: Lower Secondary Education

Rural Vietnam	Lower Secondary Education							
	Period I	p-value*	Period II	p-value*	Period III	p-value*	Period IV	p-value*
North Vietnam	4%	0.69	8%	0.04	45%	0.00	75%	0.00
South Vietnam	3%		3%		16%		45%	

* p-value of difference in means between North and South Vietnam

Panel 4: Upper Secondary Education

Rural Vietnam	Upper Secondary Education							
	Period I	p-value*	Period II	p-value*	Period III	p-value*	Period IV	p-value*
North Vietnam	1%	0.18	3%	0.28	16%	0.00	26%	0.00
South Vietnam	0%		1%		5%		16%	

* p-value of difference in means between North and South Vietnam

[104] As a historical pointer, the reader is reminded that Period I refers to the period prior to 1945 (the French colonial period), Period II refers to 1945-1954 (the French War), Period III refers to 1954-1975 (the American War), and Period IV refers to the post-1975 period (after the reunification of Vietnam).

3.2.3.2 Mass Literacy Campaign and Guerilla Warfare Tactics (1945-1975)

On September 2, 1945, upon declaring Vietnam's independence from French colonial, rule, Ho Chi Minh (1945) famously stated that the French had "built more prisons than schools". Indeed, historians not only recount that investments in education during the French colonial period were negligible[105], they also explain that education policies during colonial times were devised to tame the influence of Vietnamese scholars and to disrupt a Vietnamese traditional education system that may have bred resistance against the French occupation. The colonial education system was only meant to provide the Vietnamese with

> " a simple education, reduced to essentials, permitting the child to learn all that will be useful for him to know in his humble career of farmer or artisan to ameliorate the natural and social conditions of his existence" (Kelly 1978: 100).

As a result, the curriculum taught in the French education system was purposefully limited to avoid imparting scientific knowledge or even a greater knowledge of Europe's history and culture to the Vietnamese (US Library of Congress; Kelly 1978; Woodside 1983).

Bringing about universal literacy and numeracy had been a priority for the Viet Minh government from the very beginning. A few weeks before it successfully seized power and declared the foundation of the Democratic Republic of Vietnam (DRV) in September 1945, the Viet Minh had adopted a 10-point programme, which stated that one top priority was,

> "to develop a national education system: to struggle against illiteracy and introduce compulsory elementary education" (Nguyen Khac Vien 1981: 108 - see point 9; Woodside 1983: 404-405)[106].

[105] Hick (1982: 110) reports (dubious) figures from Unesco stating that 80-85 percent of the population was literate in the middle of the 19th century, before the arrival of the French, and that the literacy rate had fallen to 15-20 percent when the French left in 1954.

[106] Woodside (1983: 404) writes "the Vietnamese communists' dedication to mass education is still one of the central missionary themes of their revolution. The recollections of Tran Phu and others have made it clear that, a early as 1927-1928, when he was in Siam, Ho Chi Minh was planning an independent national school system for Vietnam, as a means of escape from a colonial culture which 'kept the people stupid'".

Ho Chi Minh himself made a nation-wide appeal to "destroy illiteracy as an enemy" and a mass education decree was enacted on September 8, 1945, setting up the target of achieving universal literacy within a year and decreeing that evening classes be set up in all villages and towns within six months.

In order to achieve such an ambitious target in such a short period of time, a guerilla model of education was put into place: night classes were organized in makeshift facilities and voluntary teachers were enlisted to teach basic literacy and numeracy skills to the mass of illiterate people.

The mass literacy campaign was an integral part of the political and armed struggle in which the Viet Minh was engaged (Nguyen Khac Vien 1981)[107]. After the war against France started, given the imbalance in firepower to which it was confronted, the Viet Minh launched the so-called People's war, a guerilla warfare strategy whose success depended on the support of the population. To entice the local population to participate in the war effort, the Viet Minh promoted the messages of national salvation and social revolution. Ho Chi Minh's call for resistance against French occupation found a particular echo among the common people, which had been particularly ill-treated by the colonial administration and during the French military operations. Whilst calls for resistance against French oppression appealed to the richer classes, redistributive socio-economic policies (lower taxes, pro-poor spending, and land redistribution) were used as incentives to recruit the rural masses. Duiker (1995: 148) reprinted the following testimony from a villager in Central Vietnam:

> "The Liberation had answers for all the most important problems that we all knew. They had an answer about land reform, which was they would give land to the poor people. They had an answer about high taxes. They said that the Liberation would spend the taxes only for the people, and would collect them without corruption. They also said that they would help the poor, and this was something else that made them popular, because many people in the village were very poor."

The guerrilla tactics required that each village under the control of the Viet Minh be organised in order to be able to provide for a long war effort. Effort was made

to support agricultural production by building new irrigation and drainage infrastructures and improving roads[108]. During the war against France, the Viet Minh's educational policy held sway thanks to its remarkable ability to mobilise and organise the population at the village level[109]. In an enthusiastic account of the achievements of the Viet Minh during the early years of war, Vietnam's foremost historian, Nguyen Khac Vien (1981: 115 and 208) details how, following the government's call to fight illiteracy:

> "Almost 100,000 people came forth to serve as benevolent teachers and over 70,000 classes were opened in pagodas, communal houses, temples, factories, hospitals, beneath shady banyan trees, in market places, and next to rice fields" [... to achieve] "the complete liquidation of illiteracy and the rapid popularization of education. From 1958, all adults in North Vietnam could read and write and after 1960, even during the US bombings, one out of three North Vietnamese was studying."

Practically, at the village level, village organisations[110] were called upon to persuade the rural masses to participate in the literacy program. In his fascinating account of village life in Son-Duong village (in North Vietnam) between 1925 and 1988, Hy Van Luong (1992) explains how various means of persuasion were used to entice villagers to join the mass literacy campaign, including nationalistic exhortations ("it is patriotic to become literate"), and social pressures (examples mentioned include beating drums to invite a specific household to participate in the literacy campaign or conducting literacy tests at the village gate to embarrass villagers)[111]. When the Franco-Viet Minh war against France started in 1946, the

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[107] Nguyen Khac Vien (1981) write that even during war times, the Viet Minh's party line was that "in spite of the war, education was to be developed to help the war effort, but also to meet the need of the future".

[108] As narrated by Kolko (1985) and Duiker (1995), the need to mobilise the peasantry in the context of war was the main thrust behind the various land reforms implemented between 1953 and 1975. In the earlier phase of the war effort, the Viet Minh held back from proposing more radical land reforms for fear of alienating the wealthier classes from the war effort. The policy was to reduce taxes and interest rates, or to distribute grains during times of famine. The final push to win the support of the rural poor was made in 1953, when the revolutionary land reforms were implemented: land was confiscated from families classified as landlords and redistributed to landless and poor farmers.

[109] Duiker (1996: 142) recounts: "In areas where the Viet Minh rule held sway, a revolutionary administration began to appear. For convenience, all administrative, united front, and military functions were combined into a single Committee of Resistance and Administration (CRA). The ability of the Viet Minh to expand their rule at the village level was undoubtedly a testimony to the general effectiveness of the Party's rural program, as well as to its strategic and organizational abilities."

[110] The *cuu quoc* (national salvation) organisations.

[111] According to Hy V. Luong (1992: 173), within a year, the mass literacy campaign succeeded in setting up 50 classes enrolling 1250 students including women and the elderly by 1958-1959, the village school offered lower

inexpensive and flexible guerilla model of education was particularly suited to war conditions and allowed schools to continue to function in areas controlled by the Viet Minh and even to operate clandestinely in areas under French control[112]-[113].

During the American war, confronted with an infinitely larger military power, North Vietnam was preparing itself for a long war and organised the life of the population accordingly (Van Dyke 1972). School buildings were particularly vulnerable to the heavy US bombing campaign between 1965 and 1968, and in 1972, the Vietnamese historian Nguyen Khac Vien explains that:

> "schools and colleges in the cities had to disperse to forests and villages, and village schools had to break up into small units. Each evacuated or dispersed school had to build new premises, shelters and trenches, house teachers and pupils, and set up libraries and laboratories either in people's houses or in temporary compounds." (Nguyen Khac Vien 1981: 210)

William Duiker (1995: 200) also reports that,

> "During his visit to North Vietnam in 1966, journalist Harrison Salisbury visited one school near Hanoi attended by children of the party and government elite. Students moved from building to building by means of a trench network dug in the schoolyard. The entrances to classrooms were buttressed by shoulder-high mud walls reinforced by bamboo. Under each school desk was a foxhole for the student, who was provided with a plaited straw helmet in case of an air attack." (Duiker 1995: 200)

Whether the school mentioned by Duiker was typical of the majority of schools in peri-urban or rural areas or not, this testimony is nevertheless indicative of the enormous amount of organisational effort that was put into place in order to sustain the education effort despite the difficulties of war.

After the partition of Vietnam in 1954, the Viet Minh continued its policy to expand access to education in North Vietnam (the Democratic Republic of

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secondary education. By 1987, it offered 12 grades to 1001 male and female students. This is in contrast with the situation in 1945, when the school offered only three grades, mostly to male students.

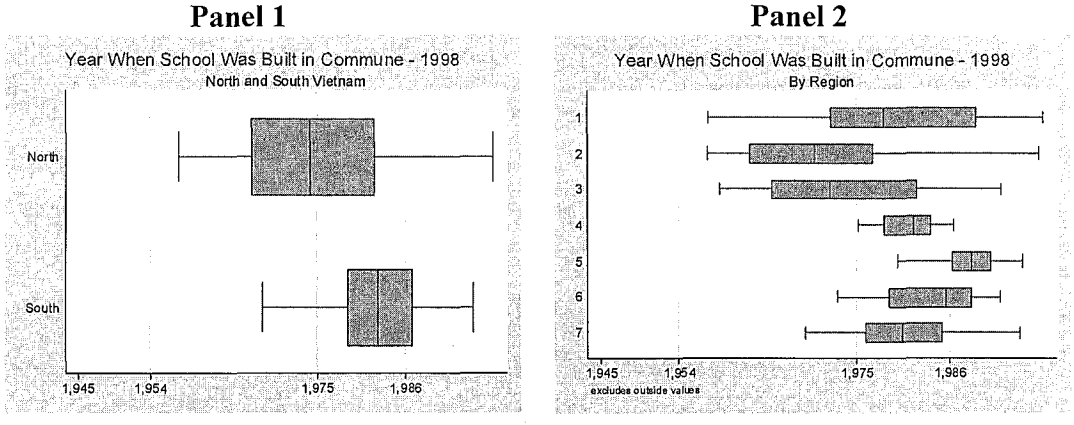
[112] Hick (1982: 112) explains: "popular education was seen as an expression of patriotic nationalism, and each class became in its way a cell of resistance to the French colonial aspirations, and every teacher a propagandist for the cause".

[113] Similar accounts of how schools had been rebuilt are also found in Van Dyke (1972: 134-142).

Vietnam – DRV), unifying the schooling system around a 10-grade system and aiming at building primary schools in each village and a senior high school in each district (Nguyen Khac Vien 1981: 209). By 1964, a complete education system, from kindergartens to universities had been established in the DRV.

The effort that was made since 1954 to build a new schooling infrastructure across Vietnam can actually be traced using data from the Vietnamese Living Standard Survey questionnaire on schooling infrastructure. Commune authorities were asked to report the year in which the communal schools had been built. This means that schools constructed before the year indicated for each commune but subsequently destroyed during the war would not be recorded. However, historical records indicate that very few schools were built under the colonial period. Moreover, as evidenced in Figure 3-4, almost all schools were built after 1954. In North Vietnam, about 50 percent of (existing) schools were built between 1954 and 1975 whilst in South Vietnam the bulk of schools was constructed after 1975 (see the two box plots of Panel 1 in Figure 3-4[114]; Panel 2 provides a breakdown by region)[115].

Figure 3-4: Year of Construction of Communal Schools



Access to education also expanded in South Vietnam between 1954 and 1975. The Government of South Vietnam can be credited for expanding educational opportunities for the masses "despite the shortage of teachers, textbooks,

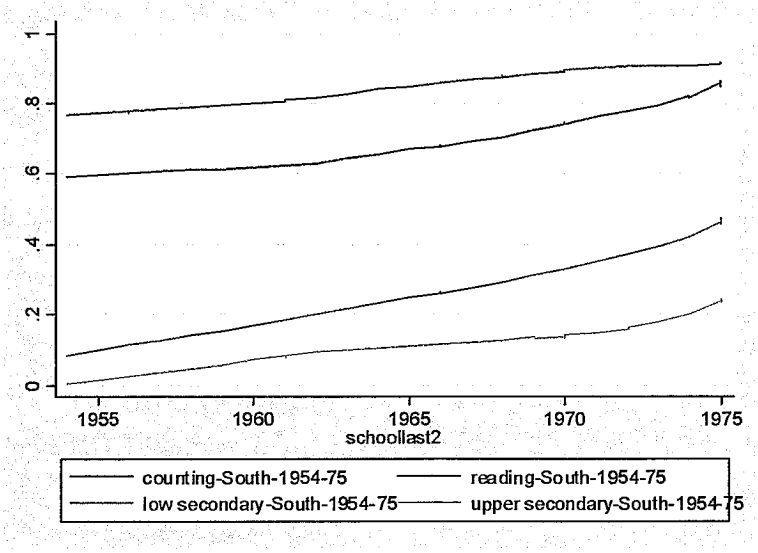
[114] The line in the middle of the box indicates the median. The left-hand (right-and) side of the box represents the 25th (75th) percentile. The extremities represent the upper and lower adjacent values.

equipment, and classrooms and despite the disruptions of war in the 1960s and early 1970s" (US Library of Congress), as evidenced in the steady upward trend in Figure 3-2 above and Figure 3-5 below.

The alleged success of mass literacy campaign (Nguyen Khac Vien 1981; Woodside 1983)[116] finds confirmation in the data presented here[117]. Most of the increase in educational attainments for the adult population was achieved during Period II and III, and the difference between North and South Vietnam in several indicators of educational attainments accentuated itself during Period III, i.e. during the partition of Vietnam, when North and South Vietnam were administered by two different governments[118].

Nevertheless, steady efforts at expanding education were also under way in South Vietnam during Vietnam's partition. As a result, the gap in literacy and numeracy between North and South Vietnam are much less accentuated, as evidenced in Figure 3-6 below.

Figure 3-5: Changes in education attainments in South Vietnam (1954-1975)



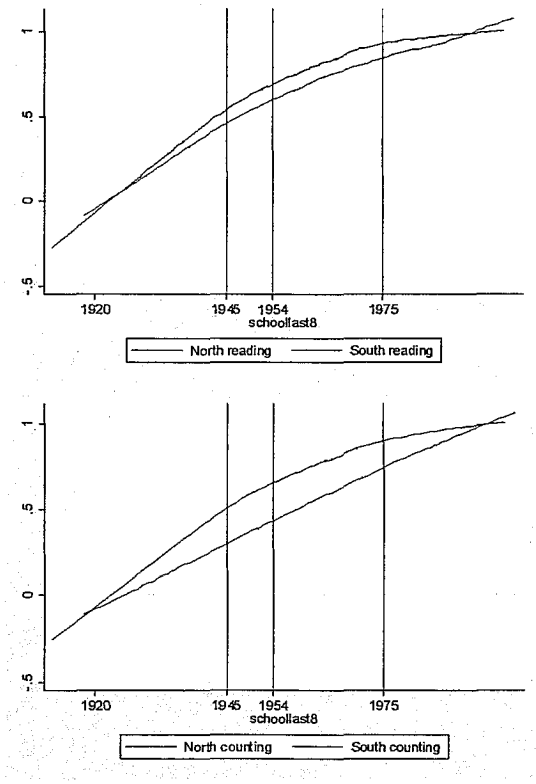
[115] In Panel 2, the digits on the y-axis correspond to region 1 (Northern Uplands), region 2 (Red River Delta), region 3 (North Central Coast), region 4 (South Central Coast), region 5 (Central Highlands), region 6 (South East), and region 7 (Mekong River Delta)

[116] Woodside is suspicious of the standard "claim that 95 percent of all people between the ages of eight and fifty were illiterate in 1945". This analysis of education data from the VLSS by cohorts provides some corroboration to this standard claim.

[117] See also a similar corroboration in the longitudinal analysis of educational attainments performed by the Viet Nam General Statistics Office (1996), using the Vietnam's 1994 Inter-Censal Demographic Survey.

[118] Woodside (1983) also points at a discrepancy in educational attainment between North and South Vietnam. In 1980, 90 percent of 6-year old children in North Vietnam were enrolled into schools against 70 percent in South Vietnam.

Figure 3-6: North-South Gap in Literacy and Numeracy



It has to be noted that although basic literacy could be expanded relatively inexpensively in ethnically homogeneous and densely populated regions, the guerilla model of education did not meet with equal success in more ethnically and linguistically diverse regions, and where the population was geographically dispersed such as in the remote areas of the Mekong River Delta and in mountainous regions (Woodside 1983: 407). This inequality in the supply of education is reflected in the lower rates of educational attainments in the Northern Uplands, the Central Highlands, and the Mekong River Delta in Table 3-2 to Table 3-5 (see above page 97).

Despite the setbacks encountered during the implementation of the literacy campaign[119], by international standards, Vietnam's overall achievements in terms of basic literacy and numeracy have been truly remarkable. By comparison, in Bangladesh, whose GDP per capita was comparable to that of Vietnam in the early 1990s, the male adult literacy rate had reached only 44

[119] After 1950, schools were constructed and teachers started to be paid, as opposed to using volunteer teachers and makeshift facilities.

percent. Vietnam's educational achievements are comparable to those attained by middle-income countries such as Malaysia (87 percent) or Thailand (90 percent) (HDRO 2002; Unicef 2004, Table 5). In 2002, the average Education Index for middle-income countries calculated by the Human Development Report Office of the United Nations was 0.84. The average Education Index for low-income countries was 0.59. Vietnam's 2002 Education Index was 0.82[120].

3.3 Econometric model and estimation strategy

The previous section showed how large variations in educational attainment could be attributed to education policies put into place between 1945 and 1975 in North and South Vietnam. In this section, I argue that it is possible to exploit Vietnam's historical variations in educational attainment to devise an instrumental variable (IV) strategy and deal with the endogeneity problem that has plagued most studies of the returns to education. Using the IV estimation strategy, one specific channel through which education could have contributed to agricultural growth is tested. The model presented here estimates the impact of various indicators of educational attainment on rice productivity, measured as rice yields per hectare of land owned[121].

The agricultural unit in Vietnam is the farm household and agricultural decisions are generally taken by household heads (who are mostly men). In the VLSS, data on agriculture are collected at the household level. Therefore, this analysis focuses on the educational attainment of household heads and looks at the impact of the education of the household head on the outcomes described above. Most household heads were born before 1975 and educated during the three historical periods presented earlier.

[120] The Education Index is based on the adult literacy rate and the combined gross enrolment ratio for primary, secondary, and tertiary schools. Vietnam's high Education Index reflects both high literacy rates and high school enrolment rates. See data from HDRO (2002).

[121] As Michael Lipton remarked (personal communication), since it is likely that education encouraged shifts of land out of rice, estimating the impact of educational attainment on rice yields gives a lower-bound estimate of its impact on agricultural (and total) net income. However, land shifted out of rice may not be typical in its rice yields, which is likely to complicate inferences.

The standard model used to evaluate the returns to education is the OLS Mincerian model, which typically regresses an outcome on years of schooling, as modelled in Equation 3-1:

Equation 3-1: $\ln y_i = \alpha_i + \beta S_i + \alpha X_i + \varepsilon_i$

with y_i measuring the outcome of interest , and S_i measuring *the number of years spent in education* by individual *i*. This model assumes homogeneous returns across individuals (there is no subscript to the coefficient β) and uses an aggregate measure of human capital (number of years of education). To measure the causal effect of S on y consistently, it is assumed that S_i is exogenous (i.e. $\text{cov}(S_i, \varepsilon_i) = 0$).

Moreover, there are six levels of education in the Vietnamese education system, which can be grouped under three sub-categories: (1) primary education, (2) lower secondary education, and (3) upper secondary and higher education. The model in Equation 3-1 can be expanded to include heterogeneity across different levels of education as follows:

Equation 3-2: $\ln y_i = \alpha_i + \beta_1 S_{1i} + \beta_2 S_{2i} + \beta_3 S_{3i} + \alpha X_i + \varepsilon_i$

with S_{il} being a binary variable indicating *whether individual i has successfully achieved education level (1) primary education, (2) lower secondary education, and (3) upper secondary and higher education.*

The estimation of the impact of education on earnings has been fraught with methodological difficulties[122]. The failure to control for the correlation between education and omitted factors such as individual ability, family or class background, which themselves affect earnings (i.e. $\text{cov}(\varepsilon_i, S_i) \neq 0$), generated biased estimates of the economic returns of education (Card 1999). The problem of omitted variables has been commonly addressed by introducing proxy variables, such as test scores prior to entering education, in order to control for unobserved ability (Bowles, Gintis, and Osborne 2000). The endogeneity of education is likely to be particularly important in the context of rural Vietnam,

where individuals face liquidity and other constraints that influence both their levels of schooling and dependent variables such farm productivity. The size and importance of the unobserved ability bias remains disputed (Heckman, Lochner, and Todd 2003). However, it is found to be important by Carneiro, Heckman and Vytlacil (2003), according to whom "most of the standard instrumental variables used to estimate returns to schooling are not valid if ability is not properly accounted for". Other constraints that may also influence both education levels and agricultural productivity are community characteristics (e.g. state of rural infrastructure development).

An alternative estimation strategy that allows one to control for the endogeneity of education has been to find instrumental variables that determine education but have no independent effect on the dependent variable. Let us call Z the set of IVs, and let us define the instrumentation strategy as follows:

Equation 3-3: $S_i = Z_i'\pi + \upsilon_i$

where $E(\upsilon_i \mid Z_i) = 0$, with $Cov(Z,u) = 0$ and $Cov(Z,S) \neq 0$. A consistent estimate of π can be obtained using OLS. Note that homogeneity across individuals is still assumed.

Other estimation biases are caused by the existence of heterogeneous returns to education across individuals (i.e. in Equation 3-1 the β are allowed to vary across individuals - β_i) and by selection bias. In recent years most particularly, estimation methods used to measure the existence and the magnitude of the returns to education have come under increased scrutiny from many[123] and considerable criticism by some[124], although the bulk of evidence seems to indicate that education has a positive impact on productivity and earnings (Schultz 2003b). In fact, what a comparison of OLS results with other estimation methods reveal is that although the non-OLS coefficients are generally larger, they are not significantly different from each other, which according to Card

[122] See Heckman and Vytlacil (2000); Card (2001); Heckman, Lochner and Todd (2003); Heckman and Vytlacil (2003). See Angrist and Krueger (1999) for an alternative view.
[123] See Psacharopoulos (1994); Card (1999); Topel (1999); Acemoglu and Angrist (2000); Blundell, Dearden and Sianesi (2001); Card (2001); Psacharopoulos and Patrinos (2002); Harmon, Oosterbeek and Walker (2003); Schultz (2003a); Denny, Harmon and O'Sullivan (2004); Heckman and Li (2004); Machin (2004).
[124] See in particular Heckman, Lochner and Todd (2003); Heckman and Li (2004).

(2001) indicates that the various biases balance themselves off. On the other hand, particularly strong critiques have come recently from Heckman (e.g. Heckman and Vytlacil 2003), who argues that substantial estimation problems remain when using IV methods. IV estimation is inconsistent in the presence of heterogeneity in returns and self-selection into schooling (Heckman and Li 2004)[125].

In the following sections, I explain what instrumental variables will be used in the model. I then address a number of specification issues that arise from the choice of instrumental variables.

3.3.1 Finding an IV: Exploiting Vietnam's North-South 1954 Partition

As shown earlier, the partition of Vietnam between 1954 and 1975 effectively created two states that implemented different educational policies and caused the educational gap between North and South Vietnam to widen. The North-South gap in educational attainment starts narrowing down as a result of a universal literacy programme implemented in South Vietnam between 1975 and 1978 (see Figure 3-6 above). Nevertheless, the education gap persists for several measures of educational attainment such as years of schooling completed and levels of education attained (recall the trends in Figure 3-2 above).

I exploit this historical divide between North and South Vietnam and build an identification strategy that rests on whether an individual

(i) lived in regions of Vietnam that were under the control of the Viet Minh (i.e. North Vietnam), and

(ii) was of education age during one of the key historical periods described in Section 3.2. The instrument variables consist in the *interactions* of two variables.

The first variable uses data in the Vietnamese Living Standard Survey that specify the region in which each individual was born. A dummy variable is created indicating whether the individual was born in North Vietnam (*birthN*). The second variable uses the historical periodisation presented under Section 3.1

[125] Heckman and Li (2004) present an estimation strategy that identifies the heterogeneous return to education

in Table 3-1 (see page 94) to categorise individuals depending on the historical periods during which they received their education.

Seven *'Education Phases'* are identified. Education Phase 1 includes individuals who were of education age during the colonial period, i.e. during Period 1 of Vietnam's recent history. Similarly, Phase 2, Phase 3 and Phase 4 identifies individuals of education age during Period 2 (i.e. between 1945 and 1954), Period 3 (i.e. between 1954 and 1975) and Period 4 (i.e. after 1975) respectively. Individuals whose education spanned two Periods are classified under the remaining categories as is self-explanatory in Table 3-10 below.

Table 3-10: The 7 Education Phases

Historical Period	Starting school during Period:	Finishing school during Period:	percent of household heads
Phase 1	I	I	18
Phase 2	II	II	5
Phase 3	III	III	36
Phase 4	IV	IV	4
Phase 5	I	II	9
Phase 6	II	III	12
Phase 7	III	IV	16

Allocating individuals to each Education Phase is problematic. As shown in Table 3-11 below, the age at which children start going to school in Vietnam varies considerably, particularly for older cohorts of children who started school at a relatively late age. Only the cohorts educated in the post-1975 period started school at the average age of 7. To avoid endogeneity problems due to different starting school age across cohorts, education age is fixed between the age of 8 and 15[126]. This allocation results in household heads being distributed across the seven Education Phases as shown in the third column of Table 3-10 above.

Each of the seven dummies (*Phase_1* to *Phase_7*), representing the Education Phase in which the individual was of education age, are interacted with the *birth_north* dummy, providing us with a set of instrumental variables for (various indicators of) education.

with marginal treatment effects (rather than average treatment effect) - local IV method.

[126] An additional motivation to fix education age between the age of 8 and 15 is to limit the endogeneity bias due to migration. See the following section for a detailed explanation.

In the next sub-section, I discuss how defining children's education age between the age of 8 and 15 allows to control for one potential source of bias: the self-selection bias originating from soldiers who joined the army at an early age (at 16 and 17 year-old), and who may have benefited from preferential education treatment during and after their conscription duty.

Table 3-11: Age of starting and finishing schools (VLSS 1992)

Rural VN		Age in 1992							
	Median Age	<20	20-30	30-40	40-50	50-60	60-70	70+	All ages
Northern Uplands	Starting school	6	8	9	10	14	18	24	10
	s.d.	3	2	4	5	6	7	11	6
	Finishing school	15	16	17	18	19	24	30	17
	s.d.	1	3	4	5	7	8	11	6
Red River Delta	Starting school	9	7	8	9	14	17	28	9
	s.d.	2	2	3	5	6	9	10	7
	Finishing school	14	16	17	18	21	21	28	17
	s.d.	1	3	3	6	8	9	10	6
North Central Coast									
	Starting school	7	8	9	10	12	20	27	10
	s.d.		2	4	4	7	9	11	7
	Finishing school	14	17	17	18	17	24	31	18
	s.d.		3	4	5	9	10	12	8
South Central Coast	Starting school		9	9	10	12	16	16	11
	s.d.		3	4	5	6	6	8	6
	Finishing school		17	18	17	17	20	21	17
	s.d.		4	5	5	6	7	9	6
Central Uplands	Starting school		8	9	10	12	13		9
	s.d.		2	3	2	3	3		3
	Finishing school		17	16	16	16	17		16
	s.d.		3	2	4	3	4		3
South East	Starting school		8	8	9	11	10	11	9
	s.d.		2	3	5	5	8	8	5
	Finishing school		14	16	16	15	14	14	15
	s.d.		3	4	6	6	8	8	5
Mekong River Delta	Starting school	9	9	10	10	11	12	12	10
	s.d.	3	3	4	5	4	9	8	5
	Finishing school	15	16	15	16	15	16	15	15
	s.d.	1	4	4	5	5	10	8	6
Rural VN	Starting school	7	8	9	10	12	16	17	
	s.d.	2	3	3	5	6	8	11	
	Finishing school	15	16	17	17	17	19	21	
	s.d.	1	3	4	5	7	9	11	

3.3.2 The Endogeneity of Migration

During its turbulent history, Vietnam experienced important movements of migration. Data from the VLSS[127] allow us to capture the magnitude of migration that affected the generations which lived through and survived the two wars[128]. On average, as many as 36 percent of the households interviewed in rural areas had migrated at some point in their lives (see Table 3-12). As a result, there may be concern that endogenous migration may bias the effect of education upward.

Table 3-12: Migration from birth place (% of household heads – VLSS 1992)

Migration from birth place	Rural	Urban
Northern Uplands	38	17
Red River Delta	57	29
North Central Coast	46	28
South Central Coast	27	16
Central Uplands	2	
South East	5	5
Mekong River Delta	25	15
Total	36	17

This may be the case for example if families migrated to a particular region so that their children could benefit from better access to education. Although the Viet Minh government ordered compulsory draft in 1949[129], material inducements were also used to entice men to join the army. In particular, literacy classes were offered to soldiers, who also received promises of access to education after their times as soldiers. As a veteran soldier of Son-Duong village remembered, after joining the Viet Minh army in 1948,

> "despite the occasional confrontation with French troops, I managed to take literacy classes during my four years as a soldier, finishing the equivalent of three grades and learning how to do calculations." (Hy V. Luong 1992: 153)

[127] See section 5 "Migration" in the VLSS questionnaire. Question s5q03 asks "in what province were you born?" Question s5q05 "how old were you when you left your place of birth for the first time to live somewhere else?" Question s5q06 "for what reason did you leave you place of birth?" Question s5q08 "what was the main reason you came to your present residence?"

[128] There is obviously a survivor bias here.

[129] According to Van Dyke (1972), registration for conscription started at the age of 18. The first draft into the army lasted for a period of two years within the next 1.5 years unless it was specially deferred. The draft was limited to people aged between 18 and 25 year-old and was later expanded to those aged 16-45 year-old.

Another one recalled,

> "I joined the People's Army in 1949, when the Viet Minh came to our class and urge us to make our contributions [to the cause of anti-colonial resistance]. Teachers and students, we all went." (Hy V. Luong 1992: 154)

Similarly, a Rand corporation study of Communist revolutionary warfare in Vietnam also found that the army provided basic schooling to many illiterate recruits and that conversely, as many as half the recruits of the Viet Minh army were already literate and had decided to join out of patriotism or communist beliefs[130] (Tanham 1961: 57)[131].

This latter anecdote finds some confirmation in the VLSS data, which collected data on the reason why individuals decided to leave their place of birth[132]. Answers are presented in Table 3-13[133] and show that the two most important reasons for migration were enrolment in the army and war displacements, together accounting for 70 percent of migration[134].

The percentage of household heads who joined the army during the French and the American war respectively is shown in Table 3-14 below. A relatively large proportion of individuals actually received their education *after* joining the army (44 percent and 34 percent on average for the French and the American war respectively). Conversely, the proportion of educated, literate individuals joining the army was equally large, at about 56 percent and 66 percent respectively.

---

[130] Tanham (1961) reports that some surveys of the social composition of Viet Minh forces showed that 46 percent of the army were composed of peasants and labourers, and 48 percent were composed of so-called "petty officials".

[131] Van Dyke (1972) also explains that joining the army often meant receiving a regular income and other benefits such as free medical care and veteran allowances, additional quantities of rationed goods, as well as promises of further education.

[132] Question s5q06 in the VLSS 1992 questionnaire asked, "for what reason did you leave your place of birth?"

[133] Note that a survivor bias may be impacting the picture presented in the tables below.

[134] Results for the Central Highlands region should be viewed with caution, as the sample size is very small.

Table 3-13: Reasons for migrating from birth place (VLSS 1992)

Reasons for migration	Rural VN	Northern Uplands	Red River Delta	North Central Coast	South Central Coast	Central Uplands	South East	Mekong River Delta	All Rural VN
family	1	2	2	2	4	0	0	3	2
work	12	6	15	15	8	0	6	9	9
marriage	0	0	1	1	0	0	0	2	1
school	12	7	8	8	9	50	6	10	9
army	67	72	65	65	34	50	29	31	61
NEZ	1	2	1	1	4	0	0	0	2
relocation	0	0	0	0	1	0	0	1	0
war	3	1	5	5	26	0	41	33	9
disaster	0	1	0	0	0	0	0	0	0
chance	0	0	0	0	0	0	0	1	0
famprob	0	0	0	0	0	0	0	0	0
newjob	1	7	2	2	9	0	12	11	6
no habit	0	0	0	0	0	0	0	0	0
other	0	1	2	2	5	0	6	2	1
Army + war	70	73	69	69	61	50	71	64	70

NB: main reason to migrate from birth place

Table 3-14: Education and the Army

	Vietnam - French War			Vietnam - American War		
	% joined army	educated before joining army	educated after joining army	% joined army	educated before joining army	educated after joining army
Northern Uplands	13	64	36	29	61	39
Red River Delta	21	52	48	45	63	37
North Central Coast	23	61	39	30	77	23
South Central Coast	4	33	67	12	67	33
Central Uplands	0	0	0	2	100	0
South East	0	0	0	2	100	0
Mekong River Delta	6	63	38	9	71	29

Table 3-15, Table 3-16 and Table 3-17 show the breakdown of educational attainments for three categories of individuals: (i) soldiers who received their education before joining the army (Table 3-15); (ii) soldiers who received their education after joining the army (Table 3-16); (iii) individuals who did not join the army (Table 3-17).

Most strikingly, and in contrast to the experience of a number of European countries during World War II (Ichino and Winter-Ebmer 1999), those who joined the army were not worse off in terms of educational attainments. On the contrary, a large proportion of soldiers had already completed their education before joining the army and was relatively well educated and literate. During the Franco-Viet Minh war, those soldiers had received an average of 4 to 8 years of schooling and many of them had completed primary education (see the top panel in Table 3-15). During the American war, they had attended school for an

average period of 5 to 11 years and a very large percentage had even completed secondary schooling. These statistics provide some evidence that the mobilisation strategies adopted by the Viet Minh were successful in enlisting the educated elite, who also played a key role in the success of the mass literacy programme launched by the Viet Minh in 1945.

Also, the large proportion of soldiers who were educated *after* the war were not worse off. As shown in Table 3-16, they started schooling at a later age (18-30 year old during the French War, and 15-19 year-old during the American War) with a majority of them eventually completing primary or secondary education. These educational attainments should not be emphasized however, since it is known that the promise of a degree[135] was part of the incentives used by the Viet Minh to persuade people to join the army. Nevertheless, the level of literacy and numeracy among those soldiers is high (see columns (4) and (5) in Table 3-16)[136] and is evidence that the education they received did provide them with basic literacy and numeracy skills. Finally, those who did *not* join the army were not more educated than their counterparts (Table 3-17).

How does soldiers' preferential access to education affect our identification strategy? Individuals who joined the army before the age of 18 (the conscription age) represent about 10 percent of the VLSS sample of veteran soldiers, of which 7.5 percent joined at age 17, 2.1 percent joined at age 16, and 0.6 percent before the age of 16 (see Table 3-18). Education age is therefore defined, for identification purpose, as taking place between the ages of 8 and 15. Curtailing education age at age 15 for the construction of our IV helps minimise the likelihood of self-selection bias stemming from individuals who may have joined the army in order to obtain education.

[135] In Vietnam, obtaining a degree bestows a considerable amount of prestige on the degree-holder.
[136] Recall that the ratios for literacy and numeracy were externally assessed through tests rather than self-assessed.

Table 3-15: Educational attainments of soldiers educated *before* joining the army (during the French war and the American war)

Rural Vietnam	% joined army	Educated before joining the army (French War)							
		# years education (1)	mean age starting school (2)	mean age finishing school (3)	reading (4)	counting (5)	mean primary school (6)	mean low second school	mean upper second school
Northern Uplands	13	3.7	12	16	86%	86%	43%	0%	0%
Red River Delta	21	6.3	13	20	93%	93%	75%	25%	6%
North Central Coast	23	4.6	12	16	55%	55%	73%	9%	9%
South Central Coast	4	4.0	9	13	100%	100%	0%	0%	0%
Central Uplands	0								
South East	0								
Mekong River Delta	6	4.6	9	14	75%	50%	20%	20%	20%
Total	12								

Rural Vietnam	% joined army	Educated before joining the army (American War)							
		# years education (1)	mean age starting school (2)	mean age finishing school (3)	reading (4)	counting (5)	mean primary school (6)	mean low second school (7)	mean upper second school (8)
Northern Uplands	29	7.2	9.2	16.4	97%	97%	81%	51%	3%
Red River Delta	45	8.0	8.7	16.7	95%	91%	92%	66%	12%
North Central Coast	30	7.3	9.6	16.9	96%	92%	88%	46%	8%
South Central Coast	12	5.5	9.3	14.8	92%	69%	77%	15%	0%
Central Uplands	2	2.0	12.0	14.0	0%	0%	0%	0%	0%
South East	2	6.3	9.3	9.3	100%	67%	33%	33%	0%
Mekong River Delta	9	4.7	10.0	14.7	85%	60%	48%	13%	9%

Table 3-16: Educational attainments of soldiers educated *after* joining the army (during the French war and the American war)

Rural Vietnam	Educated after joining the army (French War)							
	# years education (1)	mean age starting school (2)	mean age finishing school (3)	reading (4)	counting (5)	mean primary school (6)	mean low second school (7)	mean upper second school (8)
Northern Uplands	7.8	18	26	75%	75%	100%	50%	0%
Red River Delta	4.7	22	28	83%	83%	53%	20%	0%
North Central Coast	8.3	22	30	86%	86%	86%	71%	57%
South Central Coast	4.5	23	32	100%	50%	50%	50%	0%
Central Uplands								
South East								
Mekong River Delta	2.7	30	34	50%	50%	0%	0%	0%

Rural Vietnam	Educated after joining the army (American War)							
	# years education (1)	mean age starting school (2)	mean age finishing school (3)	reading (4)	counting (5)	mean primary school (6)	mean low second school (7)	mean upper second school (8)
Northern Uplands	7.5	16.3	25.0	83%	83%	79%	54%	29%
Red River Delta	10.9	14.7	25.6	97%	95%	100%	91%	57%
North Central Coast	9.3	15.9	25.1	100%	100%	100%	81%	38%
South Central Coast	5.8	17.0	25.8	67%	50%	50%	50%	17%
Central Uplands								
South East								
Mekong River Delta	5.4	19.1	24.5	89%	67%	60%	10%	0%

Table 3-17: Education of men who did not join the army (during the French war and the American war)

Rural Vietnam	Did not join the army (French War)								
	% did not join army	# years education (1)	mean age starting school (2)	mean age finishing school (3)	reading (4)	counting (5)	mean primary school (6)	mean low second school (7)	mean upper second school (8)
Northern Uplands	87	3.4	18	22	57%	59%	30%	5%	4%
Red River Delta	79	3.9	17	23	56%	50%	35%	18%	10%
North Central Coast	78	5.5	16	22	68%	65%	53%	24%	16%
South Central Coast	96	2.5	16	19	55%	45%	19%	4%	1%
Central Uplands	100	1.5	12	16	58%	42%	21%	7%	7%
South East	100	2.9	13	17	60%	44%	30%	4%	0%
Mekong River Delta	94	2.4	13	17	49%	41%	19%	4%	2%
Total	88								

Rural Vietnam	% did not join army (American War)								
	% did not join army	# years education (1)	mean age starting school (2)	mean age finishing school (3)	reading (4)	counting (5)	mean primary school (6)	mean low second school (7)	mean upper second school (8)
Northern Uplands	71	6.9	11.7	19.3	83%	80%	69%	42%	24%
Red River Delta	55	7.8	11.2	19.4	84%	81%	80%	57%	28%
North Central Coast	70	7.8	10.8	19.0	85%	79%	80%	55%	25%
South Central Coast	88	5.1	11.1	17.2	71%	59%	49%	22%	13%
Central Uplands	98	3.8	10.6	16.3	63%	49%	46%	12%	6%
South East	98	5.5	10.3	16.7	77%	59%	56%	29%	9%
Mekong River Delta	91	4.5	11.3	16.4	70%	51%	43%	16%	4%

Table 3-18: Age of joining the army (VLSS 1992)

Age of migration when reason is to join the army			
Percentiles		Smallest	Largest
1%	16	10	36
5%	17	14	38
10%	17	14	38
25%	18	15	43
50%	19	Mean	20
75%	21	Std. Dev.	3
90%	24	Variance	11
95%	26	Skewness	2
99%	34	Kurtosis	11

3.3.3 Specification Issues: Interpretation of IV Results and Control Variables

In Section 3.3.1, I have presented what will be used as the instrumental variable for education: the interaction between (a) the historical phase during which an individual reached education age, and (b) a dummy variable indicating whether the individual was born (and was therefore implicitly educated) in North

Vietnam. The endogeneity bias due to migration was discussed in Section 3.3.2. By construction, the IV strategy should allow for arbitrary cohort effects and relies on exogenous variations in educational attainment between North and South Vietnam to identify the returns to education.

Recalling the formulation of the basic model, Equation 3-1 to Equation 3-3 (see page 112 and 113), three key conditions need to be met for the IV estimation strategy to yield consistent results: (1) the IVs need to be correlated with educational attainments ($Cov(Z,S) \neq 0$); (2) the IVs need to be *un*correlated with latent characteristics that may impact individuals' productivity or earnings ($Cov(Z,u) = 0$); (3) the returns to education are homogenous across individuals.

Condition (1) is tested directly by regressing the set of IVs on various indicators of educational attainment. Tests for the validity of instruments are systematically provided in Section 3.4. Conditions (2) would not be met if systematic variations between North and South Vietnam in the outcome of interest (e.g. agricultural productivity) were linked to investment (e.g. the construction of irrigation and drainage infrastructure) coinciding with one of the key Education Phases during which a high number of schools were also constructed (Nguyen Khac Vien 1981).

In North Vietnam, large-scale irrigation projects were initiated in the 1960s and 1970s, bringing 500,000 ha of land under irrigation. In our model, which estimates the impact of education on agricultural productivity, three variables are added in order to control for systematic differences between North and South Vietnam in access to irrigation and soil quality: (a) *the proportion of good quality annual land*, (b) *the proportion of bad quality annual land*, and (c) *the proportion of annual land under irrigation.*

Condition (2) would also be violated if there existed systematic differences in preferences for education and in abilities between Northern and Southern Vietnamese, or if individuals purposefully migrated in order to seek education. This would bias the effect of education upward. As Table 3-13 above shows, schooling represented about 9 percent of total migration movements (to compare with 70 percent for migration caused by war displacement or having to join the

army). Curtailing education age at age 15 for the construction of the IV as explained earlier does not address either source of endogeneity bias. Unfortunately, it has not been possible to tackle these last two redoubts of endogeneity conclusively. However, both the magnitude of the divergence in education between North and South Vietnam brought about by differential educational policies, and the modest proportion of migration motivated by schooling, should help mitigate this endogeneity bias.

Lastly, condition (3) would be violated if the returns to education were to vary across individuals. Consequently, the IV strategy would not estimate the average marginal return to education in the population, but rather a weighted average of the marginal returns of the *subset* of individuals, whose education choices were affected by the instrument – or what has been labelled the local average treatment effect (Angrist, Imbens, and Rubin 1996; Ichino and Winter-Ebmer 1999; Angrist and Krueger 2001; Card 2001; Heckman and Vytlacil 2003)[137]-[138].

3.3.4 Summary of the Econometric Specification

This chapter aims at measuring the effect of education on rice productivity measured as rice yields per hectare of rice land owned. Four indicators of educational attainment are used: (i) the number of years of schooling; a dummy variable indicating whether the individual attained a high level of (ii) literacy and (iii) numeracy; and (iv) three dummy variables indicating the level of education attained (primary, lower secondary and upper secondary levels).

The first-stage reduced form equation for education (Equation 3-4) is estimated by OLS:

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[137] Two main criticisms have been leveled at Angrist and Krueger, who exploited compulsory schooling rules and quarters of birth as IVs. One is the use of weak IVs, and the other is that quarter of birth may be correlated with unobserved ability differences (correlation with family background). According to Angrist, Imbens and Rubin (1996), the estimates of the returns to schooling are *sensitive to the choice of instruments* and the estimated parameters are defined only for the subset of the population that has been affected by the instrument (in their own terminology, the 'compliers').

[138] Given the scale of the population affected by the education policies and the scale of the changes in educational attainments during the historical phases identified above, the population of "defiers" and the differences between always-takers and the compliers small is likely to be small (Angrist, Imbens and Rubin (1996)).

Equation 3-4: $S_i = Z_i'\pi + \upsilon_i$

with $Z_i = \sum_{j=2}^{7} Phase\_j_i \cdot birth\_north_i$

Equation 3-1 (see page 112) is estimated using OLS and two-stage least square (IV) estimators. In order to ensure that the exclusion restrictions for the IVs are met, the specification includes a set of control variables described in section 3.3.3. The control variables include: region of birth (i.e. North or South), the working experience of the household head (calculated as the number of years worked since completing school)[139] and its square, the size of annual land owned (in hectares)[140], the proportion of good and bad annual land (the omitted category is medium quality land), and the percentage of annual land under irrigation.

Commune dummies are introduced in the OLS estimation in order to control for as many omitted variables as possible. Robust standard errors are computed for both OLS (corrected for commune level clustering) and IV regressions. Both OLS and two-stage least square (IV) estimands are reported in order to assess the sensitivity of the results to the specification issues discussed earlier.

3.4 Education and Agricultural Productivity: Results and Interpretation

With the liberalisation of agricultural markets in the early 1990s, Vietnamese farmers were suddenly confronted with considerable changes in farming environment: quotas on input and output markets were gradually lifted, prices were liberalised and agricultural technology became more affordable (Benjamin and Brandt 2004). In times of rapid economic changes, mere literacy and numeracy skills may not be sufficient and one may expect higher levels of formal education to have a substantial impact on farming efficiency[141]. Special effort has therefore been made to distinguish primary schooling with higher

[139] In keeping with Mincer regression, experience of the household head as a rice farmer and the square of that variable are also included as control variables.

[140] As demonstrated in Chapter 2 of this thesis, annual land size in 1992 can be considered as largely exogenous to households' decisions.

[141] For example, there is abundant evidence of overuse of chemical fertilisers (in particular of Nitrogen), with deleterious long-term consequences on soil quality and on farmers' health.

levels of education (lower secondary and upper secondary education), particularly since access to primary education in Vietnam is relatively widespread (see Table 3-4 above and the descriptive statistics in Table 3-19 below).

Given the scale and speed of economic transformations occurring in Vietnam, most of the mechanisms connecting education to agricultural productivity described in Section 3.1 may have been at play. Empirical evidence on returns to education in Vietnam remains sparse. Studies that tried to estimate labour market outcomes using standard Mincerian regression models (Moock, Patrinos, and Venkataraman 2003; Nguyen Nguyet Nga 2004) have found relatively low returns to education (below 5 percent, to compare with wage returns of 8-10 percent in other developing countries). This result is in keeping with returns to education in other socialist or ex-socialist countries such as rural China (Psacharopoulos and Patrinos 2002; de Brauw and Rozelle 2004). However, revised estimates provided by de Brauw and Rozelle (2004) show that estimates for China were systematically underestimated because nonlinearities in returns to education as well as selection and measurement error bias had not been accounted for.

The impact of education on agricultural productivity was studied by Dominique van de Walle (2003). Three major results come out of her study of irrigation and agricultural productivity in Vietnam: (i) firstly, education of the household head and other family members makes a significant contribution to farm profitability; (ii) additionally, there also seems to exist important complementarities between education and irrigation, thereby giving some indication that education does help Vietnamese farmers make better use of agricultural technology[142]; (iii) finally, primary education, but not higher levels of education, have a significant impact on farm profitability.

Descriptive statistics are presented in the Appendices of this Chapter, Section 3.6. Table 3-19 shows that at the mean, there is little variation in the proportion

[142] Irrigation decisions are made at the communal level. This would concern only the use of private irrigation devices.

of household heads with primary education. A greater contrast between North and South Vietnam persists with respect to secondary education.

Table 3-19: Rice productivity and educational attainment – a comparison by region (1992)

Rural Vietnam	rice yield	years of schooling	% Prim. School	% low secondary school	% upper secondary school
Northern Uplands	2.70	6.61	0.27	0.28	0.15
Red River Delta	3.79	7.31	0.20	0.40	0.17
North Central Coast	3.00	7.14	0.25	0.30	0.20
South Central Coast	2.84	4.58	0.25	0.11	0.09
Central Uplands	3.04	3.96	0.25	0.13	0.07
South East	2.58	4.72	0.29	0.14	0.05
Mekong River Delta	3.13	4.09	0.25	0.10	0.04
Total	3.13	5.88	0.25	0.24	0.12

Table 3-20 below reports the results for all four measures of educational attainment. Panel A presents the results for years of schooling, Panel B and C present the results for numeracy and literacy levels, and Panel D shows the results for differing levels of educational attainment. In each panel, OLS results are shown in columns 1 and 2 and IV results are reported in column 3. Estimates that are significant at the 5 percent level are highlighted in bold characters. The instrument variable strategy should allow us to control for the potential correlation between educational attainments on the one hand, and innate abilities or family background on the other hand, and should therefore yield most robust results.

The over-identification test (the Sargan/Hansen statistics) is passed in all cases. The Staiger and Stock test of weak instruments is examined with the Shea partial R-square and the associated F-test (an F-test above 10 is routinely recommended (Baum, Shaffer, and Stillman 2003) for robustness) and fails in one instance: the F-test of the instruments for primary education is below 5 (see Panel B). The results in each Panel are now analysed in turn.

3.4.1 Years of schooling

Similarly to Van de Walle (2003), years of schooling are found to have a significant impact on rice productivity, albeit it is a small one. One additional year of education yields an increase in rice yields of 1.3 percent (Panel A).

However, as indicated in subsequent panels, this result may be due to misspecification issues, as non-linearities in years of schooling are not accounted for. Research on education shows that completion of 6 to 10 years of primary education is needed for basic competencies to be acquired (Birdsall, Ibrahim, and Gupta 2004). The fact that numeracy and literacy skills have a large impact on rice yields (see below) suggests that the low 1.3 percent return to one more year of schooling is indeed due to mis-specifying linearities.

3.4.2 Literacy and numeracy skills

Panel B and C confirm the importance of literacy and numeracy in agriculture. Interestingly, the IV estimates are considerably larger than the OLS results (similar gaps between OLS and IV estimates are also found by Ichino and Winter-Ebmer 1999). There are two important sources of bias: measurement errors that bias the OLS estimates downward and omitted abilities that cause an upward bias in the OLS estimates. In addition, this result may be an artefact of the IV estimates retrieving the weighted average returns for individuals whose education choice was affected by the instrument and whose returns to education were larger than the average marginal returns in the population. Card (2001) confirms that to date, the IV literature for education generally found that IV estimates were larger than OLS estimates.

Data on numeracy and literacy skills are generally subject to considerable measurement errors. In this case, numeracy and literacy levels were not self-assessed but evaluated externally through simple writing and numeracy tests. However, Panel B and C show that OLS estimates are considerably smaller than IV estimates. With the caveat that the IV estimates may capture local average treatment effects rather than population average returns, these results also indicate that, even though the method of data collection should have helped minimise measurement errors, the latter still constitute the most important source of bias. As a result, OLS considerably underestimate the contribution of basic literacy and numeracy skills to agricultural productivity: the IV returns to

literacy and numeracy are 38 percent and 27 percent respectively[143], instead of 7.6 percent and 6.4 percent using OLS.

3.4.3 Levels of education

Panel D, which shows the returns to three levels of educational attainment, i.e. primary education, lower secondary education, and upper secondary and higher education, yields the most provoking results.

OLS estimates for all three levels of education are relatively large and significant, at around 5-7 percent. Looking at Column 3 in Panel D, IV estimates for *primary and lower secondary levels of education lose significance* whilst the returns to *upper secondary education remain statistically significant* at the 5 % level and increase substantially from 5 percent to 31 percent[144].

As noted earlier, following Staiger and Stock's test of weak instrument, the IVs for primary education are weak (F-test of 5). Therefore, one should be careful in drawing inference from the IV results on primary education. Moreover, at the mean, North and South Vietnam differ least in terms of primary education and most in terms of upper secondary and higher education. Therefore, the absence of impact of primary education once it is instrumented (and the fact that the instrument is found to be weak) does not come as a surprise.

Nevertheless, the IVs for both lower secondary education and upper secondary education pass the tests for instruments. The discussion here will focus on the latter variables. Changes between OLS and IV estimates seem to indicate that (1) the most important problem in estimating the returns to *lower secondary education* using OLS comes from the inability to control for innate abilities, causing an upward bias; (2) the OLS returns to *upper secondary and higher education* are substantially underestimated because of large measurement errors.

What is it that pertains to different levels of schooling, which allows one to obtain higher returns from education? That higher levels of education matter more than lower ones has been found in cross-country analysis, which show a

[143] Calculated as exp(β)-1.

strong association between *female secondary education* and lower fertility and mortality. Wage returns to education also vary by levels of schooling, and by gender: returns to primary education are higher for men than for women, and women have higher returns to secondary education than men have (Card 2001; Psacharopoulos and Patrinos 2002; Birdsall, Ibrahim, and Gupta 2004: 18).

Research suggests that completion of 6 to 10 years of primary education may constitute critical thresholds for basic competencies such as literacy and numeracy to be acquired on a permanent basis. Moreover, once mastered, these skills may not be sustained over time if they are not required in one's daily environment (Birdsall, Ibrahim, and Gupta 2004).

In the context of Vietnam, no information is available on the knowledge content imparted at different levels of education. Moreover, the exceptional conditions during which Vietnam's mass education policies were implemented, i.e. during times of war, with education being used as a tool to mobilise the population in political and armed struggles (for the older cohorts of individuals) complicate matters further.

On the one hand, the absence of impact of lower secondary education (vis-à-vis no education), together with the strong impact of upper secondary education (vis-à-vis no education) on rice yields, raise questions as to whether lower secondary education did come with any appreciable learning, or whether there are skills specific to upper secondary education that matter for farming efficiency.

On the other hand, the fact that literacy and numeracy levels have a strong impact on rice yields indicates that basic education skills do matter for efficiency. Recall that literacy and numeracy levels documented in this chapter were externally assessed, using reading, writing and numeracy tests, so that there is no denying that Vietnam's mass education policies did achieve their objectives to impart basic cognitive skills.

Research on agriculture shows that returns to schooling are greater where technological progress is present (Lipton and Longhurst 1989; Foster and

[144] Calculated as exp(β)-1.

Rosenzweig 1996b; Birdsall, Ibrahim, and Gupta 2004). The 1990s represent a period of very rapid economic changes for Vietnam., with Vietnam's unprecedented growth rates in rice yields obtained through greater adoption of yield-increasing technology (Benjamin and Brandt 2004). Moreover, as explained earlier, wet-rice farming techniques are particularly responsive to the skilful application of labour. In such a new and rapidly changing environment, there may be a particular premium to be gained from having completed upper secondary education.

Table 3-20: Impact of Education on Rice Productivity

Panel A: Years of Schooling

ln(rice yields)	OLS			OLS			IV		
A- YEARS OF SCHOOLING	*1*			*2*			*3*		
	Coef	s.e.	t	Coef	s.e.	t	Coef	s.e.	t
Education (years)	0.015	0.004	3.55	0.007	0.003	2.46	0.013	0.005	2.61
Control variables*	YES			YES			YES		
Region dummies	YES						YES		
Communies dummies				YES					
No. Obs	2820			2820			2820		
R-Square	0.31			0.54			0.31		
F-Test	15.42								
OVERID Test									
Sargan/Hansen J stat							10.01		
Chi-sq/P-value							0.53		
Shea Partial R-square							0.43		
F-test							176.17		

* Control variables include (a) annual land size, (b) the proportion of good quality annual land, (c) the proportion of bad quality annual land, and (d) the proportion of annual land under irrigation, (e) experience of the household head as a farmer, (e) experience squared

Panel B: Numeracy

ln(rice yields)	OLS			OLS			IV		
C- NUMERACY	*1*			*2*			*3*		
	Coef	s.e.	t	Coef	s.e.	t	Coef	s.e.	t
Counting (0/1)	0.114	0.031	3.7	0.062	0.017	3.57	0.241	0.070	3.44
Control variables*	YES			YES			YES		
Region dummies	YES						YES		
Communies dummies				YES					
No. Obs	2820			2820			2820		
R-Square	0.31			0.54			0.30		
F-Test	16.39			25.81					
OVERID Test									
Sargan/Hansen J stat							9.49		
Chi-sq/P-value							0.58		
Shea Partial R-square							0.08		
F-test							20.59		

* Control variables include (a) annual land size, (b) the proportion of good quality annual land, (c) the proportion of bad quality annual land, and (d) the proportion of annual land under irrigation, (e) experience of the household head as a farmer, (e) experience squared

Panel C: Literacy

ln(rice yields)	OLS			OLS			IV		
D- LITERACY	*1*			*2*			*3*		
	Coef	s.e.	t	Coef	s.e.	t	Coef	s.e.	t
Reading (0/1)	0.107	0.030	3.59	0.074	0.019	3.96	0.323	0.088	3.69
Control variables*	YES			YES			YES		
Region dummies	YES						YES		
Communies dummies				YES					
No. Obs	2820			2820			2820		
R-Square	0.31			0.54			0.28		
F-Test	17.11			25.86					
OVERID Test									
Sargan/Hansen J stat							7.52		
Chi-sq/P-value							0.76		
Shea Partial R-square							0.06		
F-test							15.11		

* Control variables include (a) annual land size, (b) the proportion of good quality annual land, (c) the proportion of bad quality annual land, and (d) the proportion of annual land under irrigation, (e) experience of the household head as a farmer, (e) experience squared

Panel D: Levels of Education

ln(rice yields)	OLS			OLS			IV		
B- LEVELS OF EDUCATION	*1*			*2*			*3*		
	Coef	s.e.	t	Coef	s.e.	t	Coef	s.e.	t
Primary Education only	0.101	0.033	3.06	0.065	0.019	3.40	0.013	0.192	0.07
Lower Secondary Education only	0.142	0.037	3.78	0.073	0.024	3.11	-0.057	0.175	-0.33
Upper Secondary Education only	0.127	0.041	3.12	0.051	0.027	1.87	0.269	0.102	2.63
Control variables*	YES			YES			YES		
Region dummies	YES						YES		
Communies dummies				YES					
No. Obs	2820			2820			2820		
R-Square	0.31			0.54			0.27		
F-Test	13.79			25.39					
OVERID Test									
Sargan/Hansen J stat							7.85		
Chi-sq/P-value							0.55		
							Shea Partial R-sq.		F-Test
						primary education	0.02		4.94
						lower secondary education	0.02		10.48
						upper secondary education	0.10		41.46

* Control variables include (a) annual land size, (b) the proportion of good quality annual land, (c) the proportion of bad quality annual land, and (d) the proportion of annual land under irrigation, (e) experience of the household head as a farmer, (e) experience squared

3.5 Conclusion

The contribution of this chapter is two-fold. First, it sheds light on the circumstances that allowed Vietnam to emerge from thirty years of war with literacy and numeracy levels that are normally achieved by middle-income countries such as Thailand or Indonesia. It explained how the goal of achieving universal literacy, announced by Ho Chi Minh upon declaring Vietnam's independence from French rule in 1945, became an integral part of the Viet Minh's guerrilla warfare tactics that were put into place during the war against France between 1946-1954. Finally, the gap in educational attainment between North and South Vietnam was traced back to the 1954 partition of Vietnam and to the differential implementation of education policies between 1954 and 1975.

The second contribution of this chapter pertains to the literature on education and economic growth. When land was redistributed and agricultural markets were liberalised at the end of the 1980s and in the early 1990s, Vietnamese farmers were faced with a new and rapidly changing environment. Meanwhile, the agricultural sector grew at unprecedented rates during the 1990s, transforming Vietnam into a major player in world agricultural export markets. This chapter examined the contribution of Vietnam's high initial levels of educational attainment to agricultural growth.

I have used exogenous variations in education brought about by the partition of Vietnam in 1954 and the implementation of differential education policies between North and South Vietnam to devise an instrumental variable strategy that controls for the endogeneity of education and estimate the effect of various indicators of educational attainment on rice productivity. A word of caution is necessary since, as explained in section 3.3.3, two redoubts of endogeneity (i.e. systematic differences in preferences for education and in abilities between North and South Vietnam, and purposeful migration in order to seek education) remain. However, both the magnitude of the historical divergence in education between North and South Vietnam brought about by differential educational

policies, and the modest proportion of migration motivated by schooling, should help mitigate this endogeneity bias.

Whilst the role of education in the process of economic development remains much of a black box, the results found here confirm the importance of literacy and numeracy skills as pre-conditions for agricultural growth. Higher levels of skills also matter significantly. The returns to literacy and to holding upper secondary degrees on rice yields are 38 percent and 31 percent respectively. In many instances, IV estimates were found to be considerably larger than OLS estimates, indicating that measurement error may be more of a problem than omitting to control for innate abilities.

In keeping with the literature, years of schooling are also found to have a significant impact on rice productivity, with one additional year of education yielding an increase in rice yields of 1.3 percent. Since basic literacy and numeracy skills, which can only be acquired after completing several years of education, have a large and significant impact on farm efficiency, these low returns to years of schooling are probably due to mis-specifying linearity.

In contrast with findings in the empirical literature, primary education is found to have no effect on rice yields. However, care is required in drawing any inference from the IV results on primary education because of weak instrumentation.

More provoking are findings that, after instrumentation, lower secondary education has no impact on rice yields, whilst large and significant impacts are found for upper secondary and higher education. This latter result combined with the fact that numeracy and literacy levels also have a large impact on rice yields, suggest that the specific circumstances in which Vietnam found itself at the end of the 1980s, when it liberalised its agriculture, provided a particular advantage to those with basic competencies and higher skills. However, all in all, in order to determine the impact of different levels of schooling on productivity, one would need to ascertain the specific knowledge or cognitive content attached to a particular schooling level.

In its endeavour to build a labour force that can respond to the new challenges of industrialisation and urbanisation, Vietnam can also probably look to the experience of Taiwan, which engaged in a purposeful accumulation of human capital. Since the 1960s, Taiwan's educational expansion has been guided by a specially designed plan, based on economic projections of occupational requirements for various levels of education levels. Emphasis was given to *vocational* education as opposed to general education, with a ratio of vocational to senior high school education of 52/48 in 1972 and targeted at 70/30. According to Yunez-Naude and Taylor,

> "this policy was designed specifically to meet the greater economic demand for semiskilled labor. It was a deliberate and carefully planned effort to match educational output with economic need." (Yunez-Naude and Taylor 2001: 1033)

The exceptional circumstances that allowed Vietnam to attain the high levels of literacy and numeracy documented here under severe resource constraints were tied to Vietnam's eventful twentieth-century history. As Vietnam develops further, it faces the challenge of accumulating further human capital as demand for higher-skilled labour force increases. Vietnam has recently renewed its pledge to further universal literacy and higher education levels with the enactment of a new Education Law on December 2, 1998, with a particular focus on its higher education system. Educational programmes include universal literacy, obligatory primary education, support for education in remote and mountainous areas, and school building. The target for obligatory secondary education is set for 2010 and 2020, whilst the target to build a sufficient number of schools is set to 2010[145].

Studies of the growth experience of South East Asian countries that grew to become industrialised nations very fast show that considerable investments in primary schooling might have been key determinants of subsequent growth. Mingat (1998) explains that providing literacy and numeracy skills allows individuals to function and adapt better to changing circumstances.

[145] Areas where access to school was identified as difficult are also specifically targeted such as remote areas of the Mekong River Delta, coastal areas, and newly occupied regions of the Central Highlands.

> "This is true in spite of the specialized nature of these occupations and the apparent weak relationship between what is learned in school and what is used by those earning their livings from activities in the informal sector. This points to the general usefulness of basic knowledge in making people more able to adapt to their environment efficiently." (Mingat 1998: 701)

In that respect, Vietnam did emerge from 30 years of war with favourable conditions both for economic growth, and as will be argued in the next Chapter, for pro-poor agricultural growth.

Further discussions on the contribution of this chapter and suggestions for future avenues of research are provided in the conclusion of this thesis (Chapter 5).

3.6 Appendices

3.6.1 Sample Descriptive Statistics

Table 3-21: Mean statistics

1992	Obs	Mean	s.d	Min	Max
ln(rice yields)	2977	1.05	0.51	-4	3
Education (years)	2977	5.89	3.93	0	21
Birth in North	2977	0.64	0.48	0	1
Experience	2977	29.03	16.81	0	82
Experience Sq.	2977	1125.32	1145.04	0	6724
annual land	2977	0.48	0.56	0	10
Good annual land (%)	2880	0.28	0.37	0	1
Bad annual land (%)	2880	0.19	0.34	0	1
Irrigated annual land (%)	2914	0.61	0.44	0	1
Phase 2	2977	0.05	0.22	0	1
Phase 3	2977	0.36	0.48	0	1
Phase 4	2977	0.04	0.19	0	1
Phase 5	2977	0.09	0.29	0	1
Phase 6	2977	0.12	0.32	0	1
Phase 7	2977	0.17	0.38	0	1
Phase 2 * Born in North	2977	0.03	0.18	0	1
Phase 3 * Born in North	2977	0.23	0.42	0	1
Phase 4 * Born in North	2977	0.03	0.17	0	1
Phase 5 * Born in North	2977	0.05	0.22	0	1
Phase 6 * Born in North	2977	0.07	0.25	0	1
Phase 7 * Born in North	2977	0.13	0.34	0	1

3.6.2 Results (Complete Tables)

3.6.2.1 Rice Yields / Years of schooling (OLS vs. 2SLS-IV)

ln(rice yield 1992)	Coef	s.e.	t	Coef	s.e.	t	Coef	s.e.	t
		2			3			5	
	OLS (robust s.e.)			*OLS (robust s.e.)*			*2SLS IV*		
Education (years)	**0.015**	**0.004**	**3.55**	**0.007**	**0.003**	**2.46**	**0.013**	**0.005**	**2.57**
Birth in North							-0.05	0.05	-1.03
Experience	-0.00	0.00	-1.08	-0.00	0.00	-1.26	-0.00	0.00	-1.19
Experience Sq.	0.00	0.00	1.42	0.00	0.00	0.95	0.00	0.00	1.42
annual land	-0.04	0.03	-1.42	0.01	0.02	0.39	-0.03	0.03	-1.16
Good annual land (%)	0.20	0.04	5.28	0.12	0.03	4.52	0.22	0.04	5.44
Bad annual land (%)	-0.38	0.08	-5.09	-0.10	0.04	-2.42	-0.40	0.08	-5.36
Irrigated annual land (%)	0.25	0.06	4.31	0.09	0.04	2.63	0.25	0.06	4.49
Constant	0.81	0.07	11.29	0.04	0.13	0.31	0.91	0.07	12.78
Regional dummies	YES			NO					
Commune dummies	NO			YES					
Obs	2820			2820			2820		
Centered R-Square	0.31			0.54			0.30		
Uncentered R-Square							0.87		
F-test	15.42								
P-value									
Endogenous variable: Education (years)									
Shea Partial R-square							0.43		
F-test							176.67		
OVERID test of all IVs									
Sargan/Hansen J stat							10.60		
Chi-sq/P-value							0.48		
1-st stage regression									
education (years)									
Phase 2							-4.29	0.39	-11.09
Phase 3							-11.14	0.35	-31.43
Phase 4							-20.40	0.65	-31.51
Phase 5							-3.28	0.29	-11.21
Phase 6							-6.56	0.33	-20.04
Phase 7							-16.35	0.45	-36.34
Phase 2 * Born in North							0.90	0.43	2.08
Phase 3 * Born in North							0.70	0.25	2.79
Phase 4 * Born in North							0.74	0.57	1.30
Phase 5 * Born in North							0.90	0.34	2.63
Phase 6 * Born in North							1.89	0.32	5.97
Phase 7 * Born in North							0.54	0.31	1.71

3.6.2.2 Rice Yields / Levels of schooling attained (OLS vs. 2SLS-IV)

ln(rice yield 1992)	Coef	s.e.	t	Coef	s.e.	t	Coef	s.e.	t
		9			10			12	
		OLS			*OLS*			*2SLS IV*	
Primary Education (0/1)	0.10	0.03	3.06	0.07	0.02	3.40	0.00	0.20	-0.02
Lower Secondary Education (01/)	0.14	0.04	3.78	0.07	0.02	3.11	-0.08	0.18	-0.43
Upper Secondary Education (0/1)	0.13	0.04	3.12	0.05	0.03	1.87	0.28	0.11	2.61
Birth in North							-0.03	0.03	-1.04
Experience	0.00	0.00	-1.27	0.00	0.00	-1.29	0.00	0.00	-1.31
Experience Sq.	0.00	0.00	1.48	0.00	0.00	1.10	0.00	0.00	0.97
annual land	-0.04	0.03	-1.44	0.01	0.01	0.38	-0.03	0.02	-1.48
Good annual land (%)	0.20	0.04	5.25	0.11	0.03	3.84	0.24	0.03	8.96
Bad annual land (%)	-0.38	0.08	-5.04	-0.10	0.03	-3.13	-0.42	0.04	-10.68
Irrigated annual land (%)	0.25	0.06	4.26	0.09	0.03	3.20	0.24	0.03	8.72
Constant	0.83	0.07	12.16	0.04	0.08	0.54	1.01	0.11	9.25
Regional dummies	YES								
Commune dummies				YES					
Obs	2820			2820			2820		
Centered R-Square	0.31			0.54			0.25		
Uncentered R-Square							0.86		
F-test	13.79			25.39					
P-value	0			0			0		
							Shea Partial R-square	*F-test*	
Primary Education							0.016	4.84	
Lower Secondary Education							0.022	10.51	
Upper Secondary Education							0.092	41.59	
OVERID test of all IVs									
Sargan/Hansen J stat							8.81		
Chi-sq/P-value							0.45		
1-st stage regression									
Primary Education									
Phase 2							-0.01	0.07	-0.15
Phase 3							-0.05	0.07	-0.71
Phase 4							0.27	0.13	2.13
Phase 5							-0.13	0.06	-2.36
Phase 6							-0.03	0.06	-0.53
Phase 7							0.15	0.09	1.72
Phase 2 * Born in North							-0.09	0.08	-1.13
Phase 3 * Born in North							-0.05	0.05	-0.99
Phase 4 * Born in North							-0.08	0.11	-0.7
Phase 5 * Born in North							0.02	0.07	0.37
Phase 6 * Born in North							-0.16	0.06	-2.6
Phase 7 * Born in North							-0.15	0.06	-2.5
Lower Secondary Education									
Phase 2							-0.15	0.07	-2.27
Phase 3							-0.38	0.06	-6.39
Phase 4							-0.79	0.11	-7.18
Phase 5							-0.10	0.05	-1.99
Phase 6							-0.26	0.06	-4.62
Phase 7							-0.64	0.08	-8.35
Phase 2 * Born in North							0.08	0.07	1.06
Phase 3 * Born in North							0.20	0.04	4.59
Phase 4 * Born in North							0.23	0.10	2.41
Phase 5 * Born in North							0.04	0.06	0.77
Phase 6 * Born in North							0.17	0.05	3.22
Phase 7 * Born in North							0.26	0.05	4.91
Upper Secondary Education									
Phase 2							-0.21	0.05	-4.24
Phase 3							-0.58	0.05	-12.67
Phase 4							-1.20	0.08	-14.27
Phase 5							-0.13	0.04	-3.32
Phase 6							-0.31	0.04	-7.4
Phase 7							-0.90	0.06	-15.39
Phase 2 * Born in North							0.11	0.06	1.95
Phase 3 * Born in North							0.01	0.03	0.27
Phase 4 * Born in North							0.02	0.07	0.27
Phase 5 * Born in North							0.04	0.04	1
Phase 6 * Born in North							0.16	0.04	3.79
Phase 7 * Born in North							-0.01	0.04	-0.31

3.6.2.3 Rice Yields / Numeracy (OLS vs. 2SLS-IV)

ln(rice yield 1992)	Coef	s.e.	t	Coef	s.e.	t	Coef	s.e.	t
		15			16			17	
		OLS			*OLS*			*2SLS IV*	
Counting (0/1)	**0.11**	**0.03**	**3.70**	**0.06**	**0.02**	**3.57**	**0.24**	**0.07**	**3.44**
Birth in North							-0.01	0.08	-0.11
Experience	-0.00	0.00	-1.73	-0.00	0.00	-1.38	-0.00	0.00	-0.76
Experience Sq.	0.00	0.00	1.52	0.00	0.00	0.90	0.00	0.00	1.25
annual land	-0.04	0.03	-1.60	0.00	0.02	0.24	-0.05	0.02	-2.43
Good annual land (%)	0.20	0.04	5.25	0.12	0.03	4.06	0.19	0.02	9.45
Bad annual land (%)	-0.38	0.08	-4.96	-0.10	0.03	-3.22	-0.38	0.04	-9.31
Irrigated annual land (%)	0.24	0.06	4.21	0.09	0.03	3.15	0.23	0.03	8.74
Constant	0.85	0.07	11.78	0.05	0.08	0.64			
Regional dummies	YES						YES		
Commune dummies				YES					
Obs	2820			2820			2820		
Centered R-Square	0.31			0.54			0.30		
Uncentered R-Square							0.87		
F-test	16.39			25.81					
P-value	0			0					
Endogenous variable: Education									
Shea Partial R-square							0.08		
F-test							20.59		
OVERID test of all IVs									
Sargan/Hansen J stat							9.49		
Chi-sq/P-value							0.58		
1-st stage regression									
education									
Phase 2							-0.30	0.07	-4.33
Phase 3							-0.63	0.06	-10.03
Phase 4							-1.20	0.11	-10.41
Phase 5							-0.21	0.05	-4.05
Phase 6							-0.44	0.06	-7.58
Phase 7							-0.96	0.08	-12.01
Phase 2 * Born in North							0.08	0.08	1.02
Phase 3 * Born in North							0.03	0.04	0.78
Phase 4 * Born in North							0.02	0.10	0.18
Phase 5 * Born in North							0.07	0.06	1.17
Phase 6 * Born in North							0.20	0.06	3.53
Phase 7 * Born in North							0.03	0.06	0.51

3.6.2.4 Rice Yields / Literacy (OLS vs. 2SLS-IV)

ln(rice yield 1992)	Coef.	Std. Err.	t	Coef.	Std. Err.	t	Coef.	Std. Err.	t
		19			20			21	
		OLS			*OLS*			*2SLS IV*	
Reading (0/1)	**0.11**	**0.03**	**3.59**	**0.07**	**0.02**	**3.96**	**0.32**	**0.09**	**3.69**
Birth in North	-0.00	0.00	-2.01				-0.03	0.08	-0.41
Experience	0.00	0.00	1.79	-0.00	0.00	-1.50	-0.00	0.00	-1.06
Experience Sq.	-0.04	0.03	-1.56	0.00	0.00	1.09	0.00	0.00	1.94
annual land	0.20	0.04	5.26	0.00	0.02	0.26	-0.05	0.02	-2.56
Good annual land (%)	-0.38	0.08	-4.96	0.12	0.03	4.03	0.19	0.02	9.25
Bad annual land (%)	0.25	0.06	4.20	-0.10	0.03	-3.16	-0.35	0.04	-8.31
Irrigated annual land (%)				0.09	0.03	3.13	0.23	0.03	8.70
Constant	0.86	0.07	12.21	0.05	0.08	0.61	0.68	0.11	5.96
Regional dummies	YES						YES		
Commune dummies				YES					
Obs	2820			2820			2820		
Centered R-Square	0.31			0.54			0.28		
Uncentered R-Square							0.87		
F-test	17.11			25.86					
P-value									
Endogenous variable: Education									
Shea Partial R-square									
F-test									
OVERID test of all IVs									
Sargan/Hansen J stat							7.52		
Chi-sq/P-value							0.76		
1-st stage regression									
education									
Phase 2							-0.15	0.06	-2.32
Phase 3							-0.47	0.06	-7.96
Phase 4							-1.01	0.11	-9.38
Phase 5							-0.22	0.05	-4.62
Phase 6							-0.24	0.05	-4.38
Phase 7							-0.76	0.07	-10.14
Phase 2 * Born in North							0.00	0.07	-0.05
Phase 3 * Born in North							0.03	0.04	0.61
Phase 4 * Born in North							0.11	0.09	1.17
Phase 5 * Born in North							0.10	0.06	1.82
Phase 6 * Born in North							0.06	0.05	1.11
Phase 7 * Born in North							0.05	0.05	0.91

Chapter 4 - Access to Land, Market Participation and Poverty Reduction in Vietnam (1992-1998)

4.0 Introduction

In the 1980s, Vietnam introduced a set of agricultural reforms, which vastly modified the productive environment of Vietnamese farmers. Collective farms were dismantled, land was redistributed to individual farmers, a new land tenure system based on *de jure* private property rights has been put into place, whilst prices trade and export markets were being liberalised[146]. Following the implementation of these reforms, Vietnam's agricultural sector grew steadily over the course of the 1990s at an average annual rate of 4 percent with one oft-cited economic achievement being Vietnam's transformation from net importer of rice before 1989 to the world's second largest rice exporter in 1998. Meanwhile, Vietnam's achievements in poverty reduction were no less remarkable, with the incidence of poverty declining from 75 percent in 1984 to 58 percent in 1993, and to 37 percent in 1998[147].

Whilst it is generally acknowledged that growth contributes to poverty reduction (Ravallion 2001; Rodrik 2002), the specific mechanisms through which this relationship operates are less well understood. In particular, a long-standing debate about the role of agriculture in the process of economic development and about its contribution to poverty reduction continues unabated. The sheer importance of agriculture in the livelihoods of the poor in low-income countries helps explain why agricultural growth can be an important contributor to poverty reduction. Theories that emphasize the role of agriculture in the process of economic development and posit the existence of multiple linkages between

[146] These reforms form part of the *Doi Moi* reforms, launched in 1986. See Dollar (1993); Dollar, Glewwe and Litvack (1998) and the vast literature on Vietnam's economic liberalisation reforms cited therein.
[147] These statistics on poverty are from the World Bank (2003d). Overall trends in poverty reduction in Vietnam are revisited in Section 4.1.1 below.

agricultural growth and non-agricultural growth are long-standing[148]. They have, to some extent, been empirically validated by a large body of cross-country and country case studies, as well as, more recently, micro-econometric work using long time series of household surveys such as those available for India and Indonesia[149].

This chapter is inspired by a body of research, which highlights the role of access to productive assets such as land and human capital in mediating the impact of growth on poverty reduction. For example, in Latin America, where one can find the highest levels of land inequality, agricultural growth tended to be exclusionary (de Janvry 1981; Carter 2000; de Janvry and Sadoulet 2000). By contrast, in South-East and East Asia, egalitarian access to land and employment-intensive, smallholder-based agricultural growth provided important pre-conditions for subsequent industrialisation and mass poverty reduction (Francks, Boestel, and Kim 1999; Lipton 2001; Thorbecke and Wan 2004).

At first sight, the potential for agricultural growth to reduce poverty in Vietnam is large. In the early 1980s, agriculture employed 70 percent of total labour force and contributed 40 percent of Gross Domestic Product (Tong Cuc Thong Ke 2000). Ninety percent of the poor lived in rural areas, with about 80 percent of them engaged in farm activities that contributed 45 percent of total income (Benjamin and Brandt 2004).

This chapter explores the relationship between agricultural growth and rural poverty reduction with a particular focus on the legacy of Vietnam's agrarian history. Throughout this chapter, the focus will be on rice, Vietnam's most important food staple, which accounted on average for 42 percent of total food expenditures and provided 75 percent of total calories in 1998. Data on rice production and consumption come from the Vietnamese Living Standard Survey (VLSS).

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[148] See Johnston and Mellor (1961); Mellor (1966); Lipton (1977); Mellor (1986); Lipton and Longhurst (1989); Mellor (1999).

[149] Hayami, Ruttan and Southworth (1979); Francks (1984); Ravallion and Huppi (1991); Lipton and Ravallion (1995); Ravallion and Datt (1996); Timmer (1997); Datt and Ravallion (1998); Francks, Boestel and Kim (1999); Mellor (1999); Dorward and Morrisson (2000)

The argument in this chapter is developed in three stages. First, Section 4.1 ascertains the extent to which economic growth during the 1990s was pro-poor, and shows that the general improvement in welfare in Vietnam was indeed widely shared: poverty was not only substantially reduced in absolute numbers, but the living standard of those who remained poor also improved significantly. Section 4.2 argues that Vietnam's agrarian history bequeathed extremely favourable structural initial conditions that allowed the gains from growth to be widely shared. These favourable initial conditions include an agricultural growth process spurred by labour intensive and smallholder-friendly wet-rice cultivation techniques; *quasi*-universal access to land in North Vietnam and limited incidence of landlessness in South Vietnam; widespread diffusion of yield-raising technology; and relatively high levels of, and egalitarian access to, rural infrastructure and education.

Although the liberalisation of agriculture generated substantial improvements in agricultural terms of trade, it also triggered a large increase in food prices. Section 4.3 explores the welfare consequences of such a large increase in food prices. The difficulty in disentangling the effects of higher food prices on welfare stems from the multiplicity of mechanisms at play, with food prices affecting rural households both as consumers and as income earners. Section 4.3.1 revisits the net benefit ratio method, which approximates first-order welfare impacts by the net production status of a household, and shows evidence of a substantial decoupling between net production status and welfare changes.

To disentangle the ambiguous results obtained from first-order welfare impact methods, Section 4.3.2 explores the relationship between rice self-sufficiency and poverty reduction. Two plausible motivations for participation in rice markets are explored in theory, (i) changes in transaction costs and (ii) self-insurance against price risks. Section 4.4 concludes.

As Foster and Rosenzweig (2004) explain, research on the relationship between agricultural growth and poverty reduction has been hindered by the sheer complexity of the mechanisms at play and data requirements:

> "Empirical evidence on the relative efficacy of farm and non-farm growth as sources of reduction in rural poverty and inequality has been limited and inconclusive despite the fact that a large share of the world's poor reside in rural areas. One key limitation has been the absence of appropriate data. A data set for examining these effects must be *of sufficiently long duration to capture significant sectoral transformation, of sufficient spatial variation to contain different patterns of growth, and sufficiently disaggregated to permit examination of income by sector at the household level.* This literature has also lacked a theoretical framework that is both rich enough to capture heterogeneity in the nature of non-farm sector and tractable enough to generate falsifiable predictions. As a result, empirical researchers frequently present contrasting results that are not readily resolved." (Foster and Rosenzweig 2004, my emphasis)

The Vietnamese Living Standard Survey does not provide the type of data described in the quote above. As forewarned by Foster and Rosenzweig (2004), it has not been possible to explicitly identify the factors that allowed rural households to benefit from agricultural growth without suffering from the increase in food prices. Nor was it possible to conclusively distinguish between the two potential motivations for market participation identified in Section 4.3.3. This chapter illustrates the limitation of partial equilibrium and first-order welfare impact analysis. On the other hand, allowing for general equilibrium effects would require estimating own price, cross-price demand elasticities as well as wage-price elasticities (Porto 2003), and probably also estimating a structural model (e.g. de Janvry, Fafchamps, and Sadoulet 1991; Kurosaki and Fafchamps 2002). This endeavour is extremely data intensive and has been infrequently undertaken because of insufficient data.

For countries that experience important shocks or implement wide-ranging economic reforms like Vietnam, this chapter shows that assessing the welfare impact of price changes through budget shares and income shares without integrating the impact on employment and earnings may yield deceptive results[150]. However, in the end, the paradox highlighted in this chapter remains to be further investigated: higher rice prices did not have negative effects on

[150] Caution is also provided by Barrett and Dorosh (1996) and Deaton (1997a).

poverty. In order to truly make sense of Vietnam's strong trends in agricultural growth and rural poverty reduction, more data need to be assembled to disentangle the multiple effects at play, and to account for the diversity of experiences across households and across regions, which differ in terms of their abilities to capture the gains from growth. Indeed, findings that rates of poverty reduction across countries varied from 0.6 percent to 3.0 percent per one percent growth (Ravallion 2001) indicates that the positive association between growth and poverty reduction is not automatic. Indeed, although the studies mentioned above are all suggestive of the significance and strength of the linkages between agricultural growth, non-farm growth, and poverty reduction, they also highlight the fact that these mechanisms are complex, multifarious, and require a large amount of data to be identified conclusively[151]. I provide thoughts about future avenues of research in the last section.

4.1 Agricultural Growth and Rural Poverty Reduction

Vietnam's poverty reduction trends during the 1990s have been documented in many studies of poverty[152]. Section 4.1.1 pushes the analysis further by making use of distribution-sensitive measures of poverty and finds that economic growth in Vietnam was remarkably broad-based: rural consumption growth considerably reduced poverty in absolute numbers, but also reached *the poorest of the poor*, whilst the average living standards of those remaining below the poverty line improved substantially. Section 4.1.2 quantifies the contribution of agricultural growth to poverty reduction and shows that intra-sectoral gains in the agricultural sector contributed to two-third of total poverty reduction.

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[151] The difficulty in ascertaining the role of agricultural growth in the process of economic development and as a source of poverty reduction is not limited to the experience of low-income countries. In Britain for example, whether the agricultural revolution preceded or concurred with the advent of the industrial revolution remains intensely debated. Echoing the findings for low-income countries referred to above, the so-called 'revisionists' (e.g. Allen (1999)) argue that in Great Britain, the industrial revolution was the result of a prior phase of agricultural expansion. In turn, slow economic growth in the early phases of the industrial revolution was the result of stagnation in the agricultural sector in the second half of the eighteen-century.

[152] See Dollar, Glewwe and Litvack (1998); GSO (2000); Haughton, Haughton and Phong (2001); Glewwe, Gragnolati and Zaman (2002); World Bank (2002); Justino and Litchfield (2003); World Bank (2003d); Dollar, Glewwe and Agrawal (2004).

4.1.1 Patterns of Poverty Reduction in Rural Vietnam (1992 - 1998)

Measures of poverty that capture changes at the bottom of the income distribution are used to study Vietnam's patterns of poverty reduction. How the gains from growth were distributed is directly assessed by using the Growth Incidence Curve (GIC) method developed by Ravallion and Chen (2003). From the GIC, the mean growth rates for the poor can be derived to measure *the gains to the poor* from economic growth. Throughout this chapter, annual household expenditure per capita is the preferred measure of welfare.

4.1.1.1 Wide and Deep Poverty Reduction Trends

The Forster-Greer-Thorbecke measures have become standards in the study of poverty and are defined as follows: $FGT_\alpha = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{(z - y_i \cdot I(y_i \le z))}{z}\right)^\alpha$, where z is the poverty line, y is the welfare measure[153], N is the total population number, and $\alpha > 0$ determines the weight given to the welfare of the poorest of the poor. Four measures of poverty are used: the three standard Forster-Greer-Thorbecke (FGT) measures, i.e. (i) the poverty headcount, (ii) the poverty gap, (iii) and the square poverty gap; and (iv) the Sen-Shorrocks-Thon (SST) index.

The *poverty headcount* (*FGT0* with $\alpha = 0$)[154] measures the number of poor people as a percentage of the total population. However, because it is insensitive to changes below the poverty line, most of the analysis presented in this section focuses instead on higher-order FGT measures such as the poverty gap ($\alpha = 1$) and the severity of poverty index ($\alpha = 2$). The chief motivation for using distribution-sensitive poverty measures is to determine whether Vietnam's economic growth was not merely pro-poor (the headcount index would suffice for such a purpose and there is already ample evidence of this) but also reached the poorest of the poor and favoured those who remained poor.

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[153] The welfare measure chosen throughout this thesis is expenditure per capita.

[154] The poverty headcount is also referred throughout this chapter as poverty. Higher-order FGT poverty measures are referred to by their full names (i.e. poverty gap or square poverty gap).

The *poverty gap* (*FGT1* with $\alpha = 1$, also referred to as the depth of poverty) measures the mean expenditure by which the poor fall short of the poverty line and expresses it as a percentage of the poverty line. Changes in the poverty gap capture the extent to which the living standards of those who remained poor improved over time. To complete the analysis, I use the square poverty gap index (FGT2 with $\alpha = 2$, also referred to as the severity of poverty), or the weighted sum of the *squared* poverty gaps, which gives greater weight to the welfare of the poorest among the poor and thus allows one to capture changes in *inequality among the poor*[155].

The fourth measure used in this section is the Sen-Shorrocks-Thon (SST) index (Xu and Osberg 2002; World Bank 2003a). The SST index is defined as follows: $SST = FGT0 \cdot FGT1 \cdot (1+G)$, with G being the Gini coefficient of the poverty gap ratios of the population: $G = (1-FGT0) + FGT0 \cdot G_p$, i.e.

> "the sum of the Gini index of the average poverty gap ratios between the non-poor and the poor sub-population, $1-FGT0$, and the poverty-rate-weighted Gini index of the poverty gap ratio of the poor $FGT0 \cdot G_p$" (Xu and Osberg 2002: 12).

The SST index increases when the welfare of a poor person declines (i.e. when the poverty gap augments), or when a pure transfer is made from a poor to a less poor person (Shorrocks 1995)[156]. Most importantly for our purpose, the SST index can be decomposed into the three sources of changes in poverty that are of particular interest for this chapter, (i) the changes in the headcount index, (ii) in the average poverty gap, and (iii) in the inequality among the poor, i.e. $\Delta \ln SST = \Delta \ln FGT0 + \Delta \ln FGT1 + \Delta \ln(1+G)$.

Using only one poverty measure (most often, the poverty headcount) may produce deceptive patterns. For example, the number of poor people may have declined, making growth 'pro-poor', whilst the average welfare and the inequality among those who remained poor may have worsened. Conversely, the

[155] Other values of α greater than 1 may have been chosen. I follow the convention in the literature to use α=2. It has to be noted that because the FGT2 lacks intuitive appeal and is therefore less easy to interpret, it has been the least used of the FGT measures in the poverty literature.

poverty headcount may have increased, but the depth of poverty may have become shallower and inequality among the poor may have declined. Using these four measures of poverty together allows different patterns of poverty reduction to emerge and provides a better understanding of the poverty-reducing impact of growth in Vietnam.

Two poverty lines are used[157]. First, the *food poverty line* is defined as the cost of procuring 2,100 calories per person per day[158]. The basket of food consumed by the third quintile of the population, which provided a total of 2052 calories, was used as the basis for the food poverty line in 1992/1993. The quantities of each food item were scaled up to yield a total of 2,100 calories per person per day and priced using regional and monthly price indices to give a food poverty line of 749,722 Vietnamese Dong (VND) per person per year in January 1993 prices. Second, the *general poverty line* adds non-food expenditures to the food poverty line, using the average non-food expenditures consumed by the third quintile adjusted by regional and monthly prices. Average non-food expenditures amounted to VND 410,690, yielding a general poverty line of VND 1,160,000 in January 1993 prices. To obtain the value of the food poverty line in 1997-1998, the 1992-1993 food basket was directly re-valued in January 1998 prices at VND 1,287,000 using regional and monthly prices. The general poverty line was re-valued at VND 1,790,000 in January 1998 by inflating the 1992/1993 non-food expenditures by the official consumer price index and adding the new value to the 1998 food poverty line. For ease of exposition, results for FGT1 and FGT2 are presented using the general poverty line (results are similar when using the food poverty line).

A detailed analysis of the changes in poverty between 1992 and 1998 in rural Vietnam is now presented. Results are shown in Table 4-1 (see page 152 below) and are divided in three panels. Panel 1 presents the poverty headcount using the food and the general poverty line. Panel 2 presents the higher-order FGT measures of poverty (the poverty gap and the square poverty gap calculated

[156] That is, the SST index meets all the poverty axioms defined in Sen (1976), including the monotonocity and the transfer axioms.

[157] See Dollar, Glewwe and Litvack (1998) for a detailed description of these two poverty lines determined by the World Bank and used in all studies of poverty that make use of the VLSS. Note that the Vietnamese government uses a lower poverty line.

using the general poverty line), and the Gini coefficient of the poverty gap ratios. All three measures are used for the calculation of the SST index shown in Panel 3.

Panel 1 confirms the dramatic reduction in the incidence of poverty that has already been largely documented in the literature[159]. Overall, the incidence in rural poverty[160] dropped by 21 percentage points from 66 percent to 45 percent of the rural population. This pattern is confirmed across all regions and, as shown by Justino and Litchfield (2003: 15), is robust to the choice of poverty lines.

The most striking outcome from this analysis of poverty is the fact that poverty was reduced *across all three dimensions of poverty* discussed above, that is, the depth (measured by the poverty gap or FGT1) and the severity of poverty (measured by the square poverty gap or FGT2) declined as fast, if not faster, than the poverty headcount.

This result is already apparent when one compares changes in general poverty and food poverty rates presented in Panel 1. In four regions (the Red River Delta, North Central Coast, South East and Mekong River Delta regions), the decline in *food* poverty actually *exceeded* the drop in general poverty, suggesting that a large (sometimes a larger) proportion of the *poorest* of the poor (compared to the less poor) also benefited from the general increase in welfare.

This result is further confirmed by looking at the distribution-sensitive measures of poverty reported in Panel 2. Declines in the poverty gap (42 percent) and in the square poverty gap (49 percent) were actually *greater* than for the poverty headcount (29 percent). Key regional trends are as follows[161].

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[158] The food poverty line is close to the World Bank one-dollar-day (PPP) poverty line.

[159] According to Vietnam Inter-Ministerial Working Group (2003), the overall (i.e. urban and rural areas together) poverty headcount calculated using the World Bank one-dollar-day (PPP) poverty line, declined from 39.3 percent in 1993 to 16.4 percent in 1998 and 13.6 percent in 2002. Using the two-dollar-day (PPP) poverty line, the poverty headcount declined from 80.5 percent in 1993 to 65.4 percent in 1998 and 58.2 percent in 2002.

[160] In the text, the term "poverty" refers to the poverty measure using the *general* poverty line. The term food poverty is used in reference with the food poverty line.

[161] Whilst trends in poverty reduction across regions are generally unambiguous, it is important to note that there are considerable variations in poverty trends *within* regions. For example, Minot and Baulch (2002), who used census data to obtain poverty estimates across provinces, show that even in the South East region, where

The strongest improvements in the depth and severity of poverty are found in the Red River Delta (initially a rather poor region) and the South East region (initially the least poor region), which also experienced the fastest decline in the incidence of poverty (50 percent and 70 percent respectively). In the South East region, food poverty was nearly eradicated (it dropped by 78 percent and stood at 3 percent in 1998), and the depth (FGT1) and severity (FGT2) of poverty decreased by 81 percent and 87 percent respectively. The trends in the Red River Delta were no less spectacular with the poverty gap and the square poverty gap dropping by 66 percent and 73 percent respectively.

Declines of similar magnitude in the depth and severity of poverty are also observed in the Northern Uplands and the North Central Coast, although declines in poverty headcounts were considerably slower. The Mekong River Delta, which produces half of Vietnam's rice output and experienced the fastest agricultural growth, only saw a moderate decline in poverty (11 percent). This may be due to the impact of Typhoon Linda that hit the Delta in 1997. Nonetheless, the declines in food poverty, poverty gap and square poverty gap were strong, suggesting that a substantial number of the poorest of the poor were lifted above the food poverty line and those who remained poor saw their living standards improve.

The Central Highlands experienced different poverty reduction dynamics: food poverty actually *increased* by 6 percent, whilst the general poverty headcount declined by 22 percent (this is only half the national rate of decline in poverty). The depth and severity of poverty did decline, but at a much lower rate than in other regions. As a result, by 1998, the Central Highlands had the highest levels of poverty gap (19 percent of the general poverty line) and square poverty gap.

The Sen-Shorrocks-Thon poverty index confirms two broad regional trends in poverty reduction (see the last set of columns in Panel 3 for a decomposition of the changes in SST poverty). First, in the three northern regions of Vietnam (Northern Uplands, Red River Delta and North Central Coast), changes in poverty gaps contributed between 37 to 46 percent of the total reduction in SST

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the general poverty rate dropped to 13 percent in 1998, two provinces had very high poverty rates such as in Binh Tuan (50 percent) and in Ninh Tuan (62 percent).

poverty. By contrast, in the three southern regions of Vietnam (South Central Coast, Central Highlands and South East regions), the decline in SST poverty was largely due to changes in the poverty headcount (73 to 86 percent of the total changes in SST poverty). This is particularly true for the Central Highlands where changes in poverty gaps contributed only 10% of total poverty reduction. The limited impact of changes in poverty gaps in the South East region, despite the earlier finding that the decline in poverty gap had been considerable (81 percent) is explained by the poverty gap being already low in 1992 (12 percent of the poverty line). By contrast, in the Mekong River Delta, improvements in poverty gaps contributed 74 percent of the changes in SST poverty. Finally, data on income distribution show that inequality among the poor was low in 1992 (0.33) and had increased moderately in 1998 (0.38) (see the Gini of poverty gaps in Panel 2). As a result, changes in the income distribution among the poor contributed marginally, albeit negatively, to the decline in poverty.

In sum, Vietnam's achievements in poverty reduction during the 1990s were remarkable in that (i) poverty was substantially reduced in absolute numbers *in all regions*; (ii) growth reached *the poorest of the poor*; and (iii) the average living standards of those below the poverty line improved substantially[162].

Table 4-1: Poverty Reduction by Region (1992-1998)

Panel 1	Expenditures per capita		General Poverty Headcount (%)			Food Poverty Headcount (%)		
	growth (%)	s.d.	1992	1998	chge.	1992	1998	chge.
Northern Uplands	42	56	80	65	-19%	38	33	-14%
Red River Delta	61	71	68	34	-50%	28	9	-68%
North Central Coast	56	79	74	52	-29%	34	21	-38%
South Central Coast	51	78	54	42	-23%	23	21	-7%
Central Uplands	61	100	67	52	-22%	30	31	6%
South East	78	85	43	13	-70%	14	3	-78%
Mekong River Delta	35	71	47	42	-11%	17	13	-25%
All Vietnam	**52**	**75**	**63**	**45**	**-29%**	**27**	**18**	**-32%**

NB: The food poverty line is the cost of the basket of food that provides 2,100 calories per person per day: VND 749,722 in January 1993 prices and VND 1,287,000 in January 1998 prices. The general poverty line adds non-food expenditures to the food poverty line and amounts to VND 1,160,000 in January 1993 prices and VND 1,790,000 in January 1998 prices.

[162] This does not mean that all individuals' welfare actually increased. The identities of the poor change over time, with previously non-poor individual falling into poverty. Using the panel features of the VLSS, Haughton, et al. (2001) show that a small but non negligible proportion of people actually fell into poverty. However, the mean welfare of the bottom distribution deciles did increase.

Panel 2	Poverty gap[1]			Sq. poverty gap[1]			Gini Poverty gap[2]		
	1992	1998	chge.	1992	1998	chge.	1992	1998	chge.
Northern Uplands	27	19	-31%	12	7	-40%	0.31	0.33	9%
Red River Delta	20	7	-66%	8	2	-73%	0.33	0.40	24%
North Central Coast	24	13	-46%	10	5	-55%	0.31	0.35	14%
South Central Coast	19	13	-29%	9	6	-34%	0.37	0.38	4%
Central Uplands	24	19	-21%	13	10	-24%	0.37	0.35	-4%
South East	12	2	-81%	5	1	-87%	0.37	0.41	11%
Mekong River Delta	14	9	-32%	5	3	-43%	0.35	0.39	11%
All Vietnam	**20**	**12**	**-42%**	**8**	**4**	**-49%**	**0.33**	**0.38**	**14%**

[1] *The general poverty is used*

[2] *Part of the Sen-Shorrocks-Thon index. See definition in the text.*

Panel 3	Sen-Shorrocks-Thon Index (SST)[1]			Decomposition of change in SST[2]				Contribution to reduction in SST poverty		
Regions	1992	1998	chge.	chge lnSST	chge lnFGT0	chge lnFGT1	chge ln(1+G)	FGT0	FGT1	Gini FGT1
Northern Uplands	0.36	0.25	-30%	-0.35	-0.21	-0.16	0.02	60%	46%	-6%
Red River Delta	0.26	0.10	-63%	-0.99	-0.68	-0.37	0.06	69%	37%	-6%
North Central Coast	0.32	0.18	-44%	-0.58	-0.35	-0.26	0.03	61%	44%	-6%
South Central Coast	0.26	0.18	-30%	-0.35	-0.28	-0.09	0.01	78%	25%	-3%
Central Uplands	0.34	0.26	-25%	-0.28	-0.25	-0.03	-0.01	86%	10%	4%
South East	0.17	0.03	-81%	-1.65	-1.21	-0.46	0.03	73%	28%	-2%
Mekong River Delta	0.19	0.13	-30%	-0.36	-0.13	-0.27	0.03	35%	74%	-8%
All Vietnam	**0.27**	**0.16**	**-40%**	**-0.51**	**-0.35**	**-0.20**	**0.04**	**68%**	**39%**	**-7%**

[1] *The general poverty is used*

[2] *FGT0 and FGT1 are the poverty headcount and the poverty gap respectively. See definition in the text.*

4.1.1.2 Pro-Poor Growth: Vietnam's Growth Incidence Curve (1992-1998)

How the gains from growth were distributed can be more directly assessed by using the Growth Incidence Curve (GIC) method developed by Ravallion and Chen (2003), which provides a graphical illustration of how the gains from growth were distributed across the income distribution. Table 4-2 presents the growth rate in expenditures at a given percentile and compares the mean growth rate for the poor (also called the 'pro-poor growth rate'[163] and evaluated at different poverty lines) to the mean growth rate over the entire distribution, and to the growth rate in mean expenditures. Figure 4-5 and Figure 4-6 in the Appendix of this section page 191 present the growth incidence curves for Vietnam and for all regions separately.

[163] Ravallion (2004: 4-5) explains that, "the Ravallion-Chen (2003) 'rate of pro-poor growth' is the mean growth rate of the poor. [...] Notice that the mean growth rate of the poor is not the same thing as the growth rate in the mean for the poor, which will not in general be consistent with even the direction of change in any sensible measure of the level of poverty". Rates of pro-poor growth are presented for different poverty headcounts (5%, 10%, 20% 30%, 50%, etc.).

The growth rates in Table 4-2 below confirm the trends in poverty reduction identified above. The fast reduction in poverty experienced in the Red River Delta and the South East region are explained by mean growth rates for the poor as high as 8 percent and 14 percent respectively at the 30th expenditure decile. In the South East, the pro-poor growth rates evaluated at different poverty lines are consistently higher than those for higher deciles. These trends in pro-poor growth rates help explain the remarkable speed and depth in poverty reduction experienced in these two regions.

The mean growth rates of the poor in other regions are much lower, also reflecting lower growth rates across the entire distribution and lower growth rate in mean expenditures (around 2 to 5 percent). Interestingly however, in all regions, the growth rates of the poor were equivalent or even higher than the mean growth rate. This is the case especially in the Mekong River Delta where the mean welfare of the poor grew at a rate twice higher than the mean growth rate, explaining why the depth of poverty could drop so sharply despite a moderate decline in poverty incidence.

Table 4-2: Pro-Poor Growth Rates

(Rural areas)	All Vietnam	Northern Upland	Red River Delta	North Central Coast	South Central Coast	Central Highlands	South East	Mekong River Delta
Poverty Headcount (%)								
5	5.5	8.3	4.8	6.6	14.0	4.6	16.7	3.6
10	4.8	6.3	6.5	6.4	9.0	4.4	15.6	4.5
20	4.8	4.7	7.7	5.7	5.6	3.7	14.0	4.5
30	4.9	4.0	8.0	5.7	4.8	3.5	13.7	4.2
50	5.0	3.8	8.4	5.7	4.6	3.4	13.0	3.5
60	5.1	3.8	8.5	5.6	4.5	3.5	12.8	3.2
70	5.1	3.8	8.7	5.7	4.3	3.7	12.6	2.9
80	5.2	3.8	8.8	5.7	4.2	3.7	12.4	2.6
Mean growth rate	**5.2**	**4.3**	**9.2**	**6.2**	**4.2**	**3.7**	**11.7**	**2.0**
Growth rate in mean pcexp	**5.3**	**4.6**	**9.6**	**6.6**	**4.0**	**3.9**	**10.5**	**1.0**
Poverty headcount 1998 (%)	45	65	34	52	42	52	13	42
Change in poverty headcount	-29%	-19%	-50%	-29%	-23%	-22%	-70%	-11%
Change in poverty gap	-42%	-31%	-66%	-46%	-29%	-21%	-81%	-32%
Change in square poverty gap	-49%	-40%	-73%	-55%	-34%	-24%	-87%	-43%

4.1.2 Sectoral Growth and Poverty Reduction

To what extent did agricultural growth contribute to Vietnam's impressive record in poverty reduction? At first glance, the potential for agricultural growth to increase welfare (directly or indirectly) is large. Most of the poor lived in rural areas and the livelihoods of rural households depend in large parts on agriculture

(World Bank 2003d 9-10). Therefore, *a priori*, rapid labour-intensive cereal-based agricultural growth could have been an all-important factor in lifting livings standards through its various multiplier effects (Mellor 1966; Mellor and Desai 1986; Timmer 1988; Lipton and Longhurst 1989; Delgado, Hopkins, and Kelly 1998; Mellor 1999).

However, it does not automatically follow that agricultural growth did play a key role in the reduction of poverty described in the previous section. On the one hand, some have argued that, particularly in the early stages of economic development, *intra*-sectoral agricultural growth matters most by having a direct effect on the income of the poor who are mainly employed in the agricultural sector (Mellor 1966; Lipton and Longhurst 1989; Huppi and Ravallion 1991; IFAD 2001; Lipton 2004). On the other hand, others have claimed that the interdependence among sectors implies that *cross-sectoral* spillover effects (i.e. between the agriculture, industry and service sectors) may matter more for poverty reduction (see the discussion of the impact of cross-sectoral spillover effects on poverty in Ravallion and Datt 1996: 4-5).

Secondly, as will be explained in detail later, the liberalisation of agricultural product markets in Vietnam during the 1990s triggered a sharp increase in food prices. Although higher food prices and lower input prices enhance farmers' incentives to increase food production, they also harm the welfare of net purchasers of food (Mellor 1986; Mellor and Desai 1986; Deaton 1997b). The net effect of agricultural reforms is therefore ambiguous. Before turning to the impact of price liberalisation on poverty in Section 4.2.3, I turn to the methodology proposed by Ravallion and Huppi (1991: 1656) to ascertain the contribution of agricultural growth to poverty reduction.

Changes in poverty are decomposed into three effects: (i) *intra-sectoral* effects that capture the contribution of gains to the poor originating *within* a particular sector; (ii) *inter-sectoral* effects, which capture the contribution of gains to the poor for shifting to other employment sectors; and (iii) *interaction* effects or the effects due to the interaction between intra-sectoral gains and population shifts between sectors. The decomposition of poverty performed here largely follows Bales, Tung and Cuc (2001) and differs from their work in that the

decomposition treats rural and urban households separately. Making this distinction allows one to ascribe rural poverty reduction directly to changes in the agricultural sector.

Seven major employment sectors, denoted by the subscript *i* in the equation below, are distinguished: (i) self-employed farmers; (ii) hired farm workers; (iii) self-employment in industry and construction; (iv) hired labour in industry and construction; (v) working in services (sales, restaurants, hotels); (vi) working for the government, the Communist Party or other social organisation; (vi) other services. Households were categorised in one employment category according to the total number of hours worked in that sector[164].

The decomposition of poverty is performed as follows: P refers to the FGT measures of poverty described in Section 4.1.1.1. The subscript refers to the VLSS survey year 1992 or 1998. The superscript U and R refer to the urban and rural sector respectively.

Sectoral Decomposition of Changes in Poverty:

$$P_{98} - P_{92} = \sum_{i=1}^{S} \left(P_{98}^{Ui} - P_{92}^{Ui}\right) n_{92}^{Ui} + \sum_{i=1}^{S} \left(P_{98}^{Ri} - P_{92}^{Ri}\right) n_{92}^{Ri}$$

(Intra-sectoral effects: changes in poverty *within* each sector at the 1992 population share)

$$+ \sum_{i=1}^{S} \left(n_{98}^{Ui} - n_{92}^{Ui}\right) P_{92}^{Ui} + \sum_{i=1}^{S} \left(n_{98}^{Ri} - n_{92}^{Ri}\right) P_{92}^{Ri}$$

(Inter-sectoral effects: changes in poverty arising from population shift *between sectors*)

$$+ \sum_{i=1}^{S} \left(P_{98}^{Ui} - P_{92}^{Ui}\right)\left(n_{98}^{Ui} - n_{92}^{Ui}\right) + \sum_{i=1}^{S} \left(P_{98}^{Ri} - P_{92}^{Ri}\right)\left(n_{98}^{Ri} - n_{92}^{Ri}\right)$$

(Interaction effects)

Two results are noteworthy. First, the decomposition between urban and rural areas in Table 4-3 shows that, although most of the poor reside in rural areas, intra-sectoral effects within the urban sector contributed to 45 percent of the total decline in poverty. The large contribution of the urban sector to total poverty

[164] The VLSS collected information on individuals' main and supplementary jobs. I adopt the categorisation used by Bales, Tung and Cuc (2001: 50), based on the number of hours work in one sector. Adults age 15 to 65 only are included in the analysis. Changes in poverty are aggregate measures for all households weighted by hours worked in each sector.

reduction probably reflects the remarkable drop in urban poverty from 25 percent in 1992 to 9 percent in 1998.

Secondly, and most importantly for the argument developed in this chapter, the results in Table 4-3 show that economic growth *within* each sector played a significant role in the reduction of poverty. The contribution of labour shifts between urban and rural areas remained marginal: *inter*-sectoral (urban/rural) effects accounted for only 5 percent of the total reduction in the poverty headcount. When poverty is measured by the poverty gap and the square poverty gap, the contribution of the rural sector is even more accentuated: intra-sectoral effects in the rural sector accounted for 63 percent and 68 percent of the total reduction in the total poverty gap and square poverty gap respectively.

Table 4-3: Urban/Rural Sectoral Decomposition of Poverty Reduction

Decomposition of poverty changes between rural and urban sectors (as a percentage of total poverty reduction)

	Intra-sectoral effects		Inter-sectoral population shifts	Interaction effect
	rural	urban		
Headcount	51.1%	44.8%	4.6%	-0.5%
Poverty gap	62.6%	34.6%	4.3%	-1.4%
Square poverty gap	67.7%	30.0%	4.2%	-1.9%

Table 4-4 presents the sectoral decomposition of the changes in the poverty headcount. Similar decompositions of the poverty gap and the square poverty gap are shown in Table 4-5 and Table 4-6 respectively. In each table, Column 1 and 2 show the decomposition for the rural and the urban sector respectively. *Within each sector*, intra-sectoral effects accounted for 95 percent of the total reduction in poverty incidence (97 percent when using the poverty gap and square poverty gap indices). Focusing on the rural sector (see column 1), gains in the agricultural sector[165] accounted for 67 percent of the reduction in poverty, although they represent only 12 percent of the gains in total value added between 1992 and 1998 (ADB, Bank, and UNDP 2000: 135). This proportion increases to 74 percent when poverty is measured using higher-order FGT measures, again, suggesting that the gains from agriculture growth were widely shared and

[165] Corresponding to employment sector 1 and 2 – self-employed farmer and hired farm worker.

reached the poorest of the poor. Improvements in welfare in the rural non-farm production sector[166] (which has direct and indirect linkages with the agricultural sector) accounted for 13 percent of the total reduction in poverty, a proportion that does not change when poverty is measured by the poverty gap or the square poverty gap.

It is also notable that in the urban sector (column 2), the agricultural sector accounted for 22 percent of the changes in the incidence of poverty[167]. Alike the trend observed in the rural sector, the contribution of the agricultural sector increases as one uses higher order FGT measures of poverty.

Population shifts between employment sectors (see column 3 in Table 4-4, Table 4-5, and Table 4-6) only explained a small proportion of the changes in poverty. Nevertheless, population shifts *away* from the agricultural sector, where poverty was at its highest levels, did contribute to the reduction of poverty by 10 to 14 percent. At the same time, the interaction effects were negative indicating that because poverty was also falling fast in the agricultural sector, this outward population shift had a negative offsetting effect on poverty reduction.

In sum, three main results stand out from this sectoral decomposition of poverty changes:

(i) *Intra*-sectoral effects account for an overwhelming share of the total changes in poverty[168];

(ii) Within the rural sector, intra-sectoral gains in the agricultural sector account for more than two-third of total poverty reduction;

(iii) The contribution of the agricultural sector to poverty reduction increases as one uses higher-order FGT measures of poverty, indicating that amongst all employment sectors, the gains from agriculture growth also reached the poorest of the poor.

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[166] Corresponding to employment sector 3 and 4 - self-employed production and hired production worker.

[167] Similarly, Ravallion and Datt (1996) find that in India, agricultural growth does more for *urban* poverty than does non-agricultural growth.

[168] Bales, Tung and Cuc (2001) found that *intra*-sectoral gains accounted for 92 percent of the reduction in the poverty headcount, of which the agricultural sector accounted for the largest share (60 percent).

Table 4-4: Sectoral Decomposition of Changes in Poverty Incidence

Poverty Headcount (as a % of total poverty reduction)	Intra-sectoral effects w/i rural sector* (1)	Intra-sectoral effects w/i urban sector* (2)	Inter-sectoral population shifts (3)	Interaction effect (4)
1 self-employed farmer	63%	18%	9%	-4%
2 hired farm worker	4%	4%	5%	-2%
3 self-employed production	7%	9%	1%	-1%
4 hired production worker	6%	23%	-2%	1%
5 sales-hotel-restaurants	10%	24%	-3%	2%
6 gov-party-soc org	3%	4%	-1%	1%
7 other services	2%	14%	-4%	3%
Total	95%	96%	5%	-1%

*NB: *Contribution of intrasectoral effects to poverty reduction in rural and urban sector*

Table 4-5: Sectoral Decomposition of Changes in Poverty Gap

Poverty Gap (as a % of total poverty reduction)	Intra-sectoral effects within w/i rural sector* (1)	Intra-sectoral effects within w/i urban sector* (2)	Inter-sectoral population shifts (3)	Interaction effect (4)
1 self-employed farmer	67%	21%	7%	-4%
2 hired farm worker	6%	7%	5%	-2%
3 self-employed production	7%	7%	1%	-1%
4 hired production worker	5%	20%	-2%	1%
5 sales-hotel-restaurants	8%	25%	-2%	2%
6 gov-party-soc org	2%	3%	-1%	0%
7 other services	2%	16%	-3%	2%
Total	97%	98%	4%	-1%

*NB: *Contribution of intrasectoral effects to poverty reduction in rural and urban sector*

Table 4-6: Sectoral Decomposition of Changes in Square Poverty Gap

Square Poverty Gap (as a % of total poverty reduction)	Intra-sectoral effects within w/i rural sector* (1)	Intra-sectoral effects within w/i urban sector* (2)	Inter-sectoral population shifts (3)	Interaction effect (4)
1 self-employed farmer	68%	21%	6%	-4%
2 hired farm worker	7%	9%	4%	-3%
3 self-employed production	6%	6%	1%	0%
4 hired production worker	5%	18%	-1%	1%
5 sales-hotel-restaurants	7%	25%	-2%	2%
6 gov-party-soc org	2%	2%	-1%	0%
7 other services	2%	18%	-3%	2%
Total	97%	99%	4%	-2%

*NB: *Contribution of intrasectoral effects to poverty reduction in rural and urban sector*

4.1.3 Preliminary Conclusions

It is time to take stock of the results obtained so far. This section focused on changes in welfare at the bottom of the income distribution and showed that poverty was not only substantially reduced in absolute numbers, but the living standard of those who were poor in 1998 had also improved significantly[169]. Whilst at this stage, it is not possible to attribute any causal factor to these patterns in poverty reduction, it is evident that economic growth was broad-based and reached the poorest of the poor.

Vietnam's growth incidence curve shows that the deep poverty reduction trends documented above were achieved through *high pro-poor growth rates*. Where the average growth rate in expenditure between 1992 and 1998 was high (such as in the Red River Delta and the South East region), the growth rate for the poor was also high. Where the average growth rate was lower, the growth rate for the poor was *higher* than for higher deciles. This pattern in pro-poor growth allowed a substantial number of poor people to either see their living standards improve or move out of poverty, even in regions where growth was slower.

Secondly, the sectoral decomposition of poverty reduction confirmed that *growth in the agricultural sector* had a major impact on poverty: in rural areas, intra-sectoral gains in the agricultural sector accounted for more than two-third of the total reduction in poverty; in urban areas, it even accounted for 22 percent of the changes in poverty.

[169] According to the Vietnam Inter-Ministerial Working Group (2003), preliminary analysis of data from the third round of the Vietnamese Living Standard Measurement Survey collected in 2002 indicates that poverty continued to decline at similarly rapid rates between 1998 and 2002.

4.2 Favourable Initial Conditions for Pro-Poor Agricultural Growth

This section explores the legacy of Vietnam's recent agrarian history and argue that egalitarian access to land, to irrigation, and to other yield-increasing technology, in conjunction with improving agricultural terms of trade at the start of the agricultural liberalisation period, made it possible for many Vietnamese farmers to directly benefit from agricultural growth through higher yields and higher farm income.

4.2.1 Initial Conditions and Obstacles for Pro-Poor Agricultural Growth in Theory

Research on the determinants of the poverty-reducing impact of growth across countries highlighted the role of assets in mediating the impact of growth on poverty reduction, and in influencing the rate of growth itself[170]. In brief, asset ownership (notably land wealth) influences growth and poverty reduction by stratifying the population into groups that distinguish themselves by their ability to access product and factor markets[171].

A particular point of contention in the literature centres on the relationship between access to land, agricultural growth, and poverty reduction. The debate has crystallised around three major standpoints[172], which differ as to *how* land should be redistributed but strikingly agree on the existence of initial structural conditions that need to be in place for growth to benefit the poor.

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[170] For a theoretical and empirical overview, see Deininger and Squire (1998); Bardhan, Bowles and Gintis (2000); Carter (2000); Ravallion (2001); Rodrik (2002).

[171] See Banerjee and Newman (1993); Carter and Mesbah (1993); Basu (1994); Carter (1996); Carter and Barham (1996); Piketty (1997); ibid. (1998); Atkinson and Bourguignon (2000); Bardhan, Bowles and Gintis (2000); de Janvry, et al. (2001); Rodrik (2002); Bourguignon (2003); Carter and Olinto (2003); Zimmerman and Carter (2003).

[172] A fourth standpoint, which strongly criticises the views presented here in a special issue of the Journal of Agrarian Change edited by Terence J. Byres (2004a) is not discussed here. The omission of power in economics and in researching land issues, acknowledged by Khan (2004), Dreze (2002) and Bardhan (2003), is admittedly an important limitation.

One stance championed by the World Bank (World Bank 2003b) relies on markets (land rental or land sales markets) to redistribute land to the rural poor. By contrast, the second stance is highly sceptical of the possibility to improve land access for the poor through market operations. It supports a radical transfer of land ownership from large landowners to smallholders through outright confiscation or through state interventions that lower land prices if land markets are to be used (Griffin, Khan, and Ickowitz 2002: 341; Griffin, Khan, and Ickowitz 2004). A third stance is equally sceptical of market-mediated land reforms but puts the emphasis on credit market failures and insists that land policies be accompanied with credit policies that lift the credit constraints faced by asset-poor smallholders (Carter and Mesbah 1993; Carter and Barham 1996; Carter 2000; Carter and Olinto 2003).

At the centre of all three stances lies the inverse relationship between farm size and land productivity (in labour surplus economies)[173], which has been the subject of intense theoretical and empirical debates that to this date remain unsettled[174]. While various hypotheses have been proposed[175], the inverse relationship is largely attributed to the labour costs advantage of small-scale producers who resort to cheap and easy-to-monitor family labour, in contrast with large-scale producers who need to hire labour and incur important search, supervision and coordination costs[176]. The inverse relationship provides the central rationale for all three standpoints, all somewhat agreeing that supporting smallholder agriculture is desirable both from an equity and efficiency perspective[177].

On the other hand, smallholders face a number of disadvantages that offset their labour cost advantage: (i) when economies of scale arise during the production

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[173] See the recent literature review on farm size by Eastwood, Lipton and Newell (2005).

[174] Dyer (2004) recently questioned the empirical evidence for the existence of the inverse relationship. A reply was to Dyer's challenge was provided by Griffin, Khan and Ickowitz (2004). Most of the evidence on the inverse relationship dates from the 1960s-1980s - see Berry and Cline (1979); IFAD (2001). Griffin, Khan and Ickowitz (2004) present some evidence for the 1990s.

[175] See particularly Sen (1966); Lipton (1974); Berry and Cline (1979); Sen (1981a); ibid. (1981b); Rudra (1982); Lipton (1983); Lipton and Longhurst (1989); Platteau (1992a); Benjamin (1995); Binswanger, Deininger and Feder (1995).

[176] Lipton and Longhurst (1989: 114-119); Platteau (1992a); Binswanger, Deininger and Feder (1995: 2707-2711) present evidence that small farms also use hired labour. However, since it is easier to supervise hired labour over a small surface with many family members per hectare, they still face lower supervision costs.

[177] The possibility to achieve both equity and efficiency aims through land reform is severely critiqued by Byres (2004b).

process[178], or (ii) when constrained access to working capital or consumption-smoothing credit prevents them from adopting a new technology or from engaging in high-growth activities[179].

Recent research comparing three Latin American countries[180], which have dissimilar agrarian structures but experienced similar agricultural export-led periods of growth during the 1970s and 1980s, showed that the severity of the wealth bias on rural markets was linked to the underlying ownership structure, or the country's *agrarian structure*.

In Chile and Paraguay, where land was highly unequally distributed, export crops either required important capital investments and involved greater risk exposure (fruits in Chile), or were not particularly responsive to the intensive application of labour (wheat and soy in Paraguay). Smallholders were therefore *less likely* to (i) access credit, (ii) adopt high-value added crops and (iii) choose long-term as opposed to short-term investments. They were squeezed out of the growth process and the agrarian structure grew even more unequal. By contrast, in Guatemala, where a more egalitarian agrarian structure prevailed, the labour intensive character of the export crop (winter vegetables) favoured small-scale production. The agro-export boom substantially contributed to reduce poverty and even allowed smallholders to accumulate land.

These Latin American case studies also illustrate how certain *crop characteristics*, when combined with a number of favourable initial conditions, can help mitigate the disadvantages faced by small-scale farmers when accessing factor markets. Smallholder-friendly crop attributes include: (i) high responsiveness to increases in the skilful application of labour (thereby exploiting the labour advantage of smallholders); (ii) short periods of time between the planting and the harvesting of the crop that reduce exposure to risks; (iii) low requirements in purchased inputs that minimise working capital requirements; (iv) no economies of scale during the production, processing or the

[178] Admittedly, this is hardly ever the case in agriculture.

[179] Binswanger, Deininger and Feder (1995: 2695) review the case for smallholder agriculture and discuss the existence/non-existence of economies of scale in agriculture. Lipton and Longhurst (1989) present evidence showing that where it was introduced, small farmers adopted the technology only two or three seasons after middle-size farmers (and not large landowners) adopted it.

marketing stages that cannot be circumvented through cooperative arrangements or rental markets[181]. By contrast, crops requiring large initial investments and with long gestation periods (e.g. plantation crops) are more likely to be adopted by rich farmers, who have more ready access to credit[182].

Importantly also, the diffusion of scale neutral and labour-intensive yield-raising techniques played an important role in the reduction of rural poverty (Lipton and Longhurst 1989). In their analysis of the agricultural development *cum* industrialisation process of Japan, Korea and Taiwan, Penelope Francks, Boestel and Kim (1999) showed that investments in large-scale irrigation infrastructures during the feudal and early modernisation periods allowed the diffusion of water control needed for the successful adoption of high-yielding varieties of seeds and other yield-raising inputs. Similarly, rural infrastructures (roads) and high levels of education (notably primary education) played a key role in enabling poor households to participate in the non-farm growth process in rural India (Ravallion and Datt 2002) or to multiply the returns from their land in Mexico (Finan, Sadoulet, and Janvry 2005).

To summarise, three important sets of conditions that favour pro-poor growth emerge from the literature. First, for a given growth rate, the distribution of land affects the rate of poverty reduction by influencing the degree to which rural markets, in particular credit markets, are biased against poor households. Second, promoting crops or technologies that exploit the advantages of small-scale farming can mitigate the disadvantages faced by smallholders. Finally, the impact of agricultural growth on poverty reduction can be substantially enhanced when a number of enabling conditions are in place. Three enabling factors are particularly important: (a) the development and diffusion of yield-raising technology, (b) investments in rural infrastructure (notably road and irrigation systems) and (c) human capital development. These three sets of conditions, i.e. (i) Vietnam's agrarian structure, (ii) the production characteristics of rice,

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[180] The results and a comparative analysis are presented in a series of articles by Carter and Barham (1996); Carter (2000); Carter and Olinto (2003).

[181] Binswanger, Deininger and Feder (1995) explain that intermediation generally allowed smallholders to thrive in many crops with post-harvest scale economies, notably rubber, tea, cotton, and sugar.

[182] The centrality of credit in agricultural production decision-making amply justifies the emphasis laid upon credit market failures.

Vietnam's main food and export crop, and (iii) other initial conditions, are explored in turn in the following section.

4.2.2 The Legacy of Vietnam's Agrarian History

Over the past 50 years, Vietnam experienced momentous economic and political changes (Kolko 1985; Beresford 1988; Kolko 1997; Le Ba Thao 1998). In this section, I argue that Vietnam's unique agrarian history created favourable conditions for agricultural growth to be inclusive of the poor. Key legacies of Vietnam's agrarian reforms include: (i) an egalitarian access to land brought about by past redistributive land reforms; (ii) an agrarian system centred around the production of rice using wet-rice farming techniques that are friendly to smallholders; (iii) widespread access to irrigation and other yield-increasing technology; (iv) relatively high levels of human capital in rural areas. Each of these factors is now reviewed in turn.

4.2.2.1 Egalitarian Access to Land

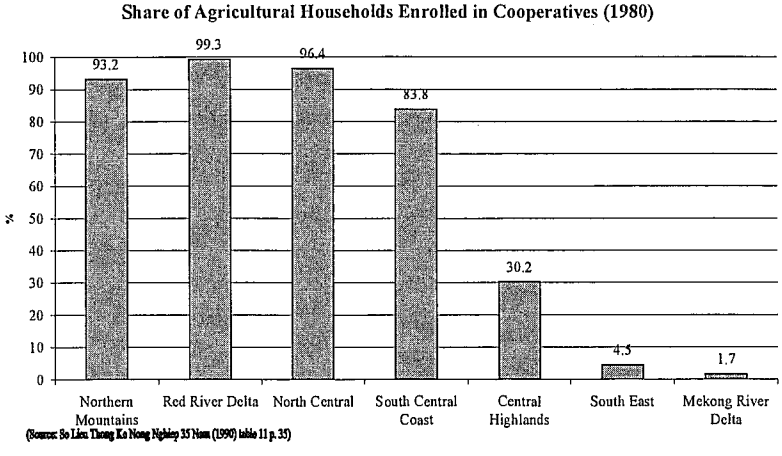
When Vietnam emerged from 30 years of war in 1975, it could benefit from the legacy of exceptionally far-reaching agrarian reforms that resulted in near-universal access to land in North Vietnam, and limited incidence of landlessness in South Vietnam.

Exceptional historical events allowed Vietnam to implement drastic changes in land property relations in a short historical time span. Kolko (1985: 14-16) explains how, during the French colonial period, agriculture was dominated by French colonial plantations, large estates, high levels of landlessness, and extreme misery. The land distribution figures of the late 1930s provided by Kolko are startling. In Cochinchina, 6,200 landlords with estates over 50 hectares owned 45 percent of rice land; an additional 60,000 landowners owned 37 percent of rice land. Tenancy was predominant (three-fifth of the Mekong River Delta, Vietnam's most important rice-growing region, was farmed by tenants), and three-fifth of the population was landless. In Tonkin, during the late 1930s, 30 percent of rice land belonged to large estates of 50 hectares or more,

those with 5-50 hectares of land, or only 2 percent of the landowning population, held another 20 percent.

In 1954, North Vietnam carried out a major land reform (the Land Revolution[183]), during which 810,000 hectares of farmland formerly owned by landlords were redistributed to 2.1 million peasants (Tran Phuong 1968). The redistribution of land was quickly followed by an extensive land collectivisation programme. Figure 4-1 below shows the reach of agricultural collectivisation in each region. In 1960, 86 percent of rural households had joined a cooperative (Chu Van Lam 1992: 33). By 1975, this share had increased to 97 percent of all households, including 88 percent who had joined high-level cooperatives[184].

Figure 4-1: Cooperatives (1980)



[183] The Land Revolution (Cac Mang Duong Dat in Vietnamese) recalls an intense period where land relations were completely redrawn and that still resonates in today's memories. See for example in *"Paradise of the Blind"* a powerful narration of that period by Vietnamese novel writer Duong Thu Huong.

[184] See Chu Van Lam (1992: 9-34); Hy V. Luong (1992); Yvon-Tran (1994). Between 1958 and 1965, several attempts were made to accelerate the collectivisation of land and enrol households into larger scale cooperatives. In keeping with the model of the Soviet Kolkhozes, large cooperatives (Hop Tac Xa in Vietnamese) regrouped households up to commune level (the Xa). Concurrently, the State increased its investments in rural infrastructure, most notably in large-scale irrigation systems. Joining a high-level agricultural cooperative meant that households had to hand over their land and their production tools (water buffalos, etc.) to the cooperative. Farm households retained their garden land (or the so-called 5-percent land), which they could farm independently. It also meant that farmers relinquished all agricultural management decisions to the cooperative leadership. Paddy land was worked in common by farmers who were integrated in specialised task teams. The cooperative management determined land use, which resulted in the spread of rice mono-cultivation during the cooperative period at the expense of the cultivation of other food crops. The cooperative leadership determined the production objectives and ensured the delivery of all necessary services (equipment, delivery of seeds, fertilisers, irrigation, veterinary services). Cooperatives also provided welfare services to their members, such as schooling, nurseries, and medical services. The fact that these social services could only be accessed by cooperative members served as an incentive to entice farmers to join the collective.

After two decades of collective farming, the decollectivisation of agriculture during the 1980s oversaw drastic changes in agriculture. Agricultural cooperatives were dismantled[185], the pre-eminence of household-based farming over collective farming was re-established, and farmland was redistributed to households according to family labour endowment. By all accounts, the redistribution of land during the late 1980s and early 1990s resulted in a remarkably egalitarian distribution of land[186].

The agrarian history of South Vietnam took a different trajectory after the partition of Vietnam in 1954, and until the country was reunified in 1975. A land-to-the-tiller programme was implemented in the early 1970s and saw the redistribution of 80 percent of agricultural land to 70 percent of the rural population. Following the reunification of Vietnam in 1975, the effort to collective land in South Vietnam was staunchly resisted, particularly in the South East region and the Mekong River Delta (Kolko 1985). Figure 4-1 shows the reach of the land collectivisation effort in 1980, and confirms the failure to collectivise land in the Southern regions of Vietnam (the South East and the Mekong River Delta, and to a lesser extent, the Central Highlands).

When one bears in mind the transformations in Vietnam's agrarian relations over the past 50 years, it is possible to appreciate the remarkable position in which Vietnam found itself at the start of the agricultural liberalisation period in 1992. As illustrated in Table 4-7 below, the redistribution of land undertaken in the late 1980s or early 1990s in North Vietnam, and in the early 1970s in South Vietnam, resulted in a remarkably limited incidence of landlessness and an egalitarian distribution of land.

Note however that the divergence in agrarian histories between North and South Vietnam is reflected in the higher prevalence of landlessness and a more unequal land distribution in South Vietnam. This North-South agrarian contrast is best illustrated by comparing the Red River Delta and the Mekong River Delta.

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[185] The 1988 Land Law marks the formal dismantling of agricultural cooperatives and the re-establishment of household-based farming. One has to wait until the enactment of the 1996 Cooperative Law for the reinstatement of a legal framework that allows cooperatives to be formed and provide services.

[186] See Hy V. Luong (1992); Chabert (1994); CIRAD-URPA (1995); Le, et al. (1996); Jesus and Anh (1998); Tran Thi Que (1998); Gironde (2001); Tanaka (2001); Ravallion and van de Walle (2004).

In the Red River Delta, land inequality is remarkably low: in 1992, landlessness was nearly absent at 3 percent, and the land Gini coefficient was only 0.29. Owing to its high population density (1,180 persons per km^2)[187], average farm size was only 0.3 hectare. Table 4-7 shows the extreme degree of land fragmentation that prevails in the Red River Delta, where 93 percent of farmsteads were smaller than 0.5 ha and 99 percent were smaller than 1 hectare. Most farms are small-scale family farms and competition from large-scale farm producers is extremely limited.

In the Mekong River Delta, land is more unequally distributed: in 1998, the farm size ratio of the fifth over the first expenditure quintiles was 2.3. Landlessness was much more prevalent (17 percent of households in 1992) and farms were larger: only 32 percent of farms were smaller than 0.5 ha, 27 percent ranged between 1 and 2 hectares, and 9 percent were larger than 2 hectares. In contrast to the Red River Delta, smallholders in the Mekong River Delta face greater competition from large-scale producers[188].

Overall, Vietnam's redistributive land reforms created a situation of quasi-universal access to land in North Vietnam and relatively limited incidence of landlessness in South Vietnam[189].

Table 4-7: Distribution of Land by Farm Size and Land Gini (1992)

1992 owned land	Northern Mountains	Red River Delta	North Central Coast	South Central Coast	Central Highlands	South East	Mekong River Delta	All Viet Nam
Landlessness[1]	2%	3%	4%	11%	4%	21%	17%	8%
Land Gini	0.41	0.29	0.41	0.43	0.45	0.45	0.44	0.49
<0.1 ha	9	10	13	9	10	8	2	9
0.1-0.2 ha	10	23	20	21	10	7	4	15
0.2-0.3 ha	12	31	20	20	7	10	6	17
0.3-0.4 ha	13	21	16	17	6	10	10	15
0.4-0.5 ha	9	7	12	11	6	7	9	9
0.5-0.6 ha	12	4	7	7	3	10	8	7
0.6-0.8 ha	12	1	6	5	17	10	14	8
0.8-1 ha	7	1	2	4	11	9	10	5
1-2 ha	12	1	4	4	21	24	26	11
>2 ha	3	0	1	2	10	5	9	3
Total	100	100	100	100	100	100	100	100

NB: VLSS 1992, rural households only. [self-weighted]

[1] Vietnam Development Report 2004 (World Bank), Table 3.1

[187] Dang Nguyen Anh, Tacoli and Thanh (2003)

[188] A similar agrarian structure has emerged in the South East region, where the prevalence of landlessness is highest, but where nevertheless the incidence of poverty declined the fastest and food poverty was eradicated.

[189] For comparison, Benjamin and Brandt (2004) document land Gini coefficients of 0.39 for Japan, 0.47 for Taiwan, 0.20 for South Korea, and 0.21 for China.

4.2.2.2 Smallholder-Friendly Rice Cultivation System

Over centuries, confronted to land scarcity and plentiful labour, Vietnam developed a permanent and intensive system of rice exploiting the advantage of small-scale farming[190]-[191]. In fact, the characteristics of wet-rice farming meet most of the conditions for pro-poor agricultural growth highlighted above.

First, wet-rice farming includes a number of tasks[192], which, when carefully executed, can make a decisive contribution to enhance yields[193]. Rice productivity is therefore critically dependent on the availability of skilled and experienced workers. In this case, family labour, which is easy to monitor and has a direct stake in the final output through own consumption and farm profits, has a definite advantage over hired labour. In fact, in the wet-rice cultivation systems of South-East Asia, household-based farming has been the most enduring form of agricultural organisation[194]. As Francesca Bray explains, under conditions of high population pressure and land scarcity,

> "Once rice cultivation techniques reach a certain level of intensification, the family farm comes to predominate as the basic unit of production. It shows a remarkable historical resilience: in China, family rice farms gradually ousted other forms of organisation in medieval times, served as a basis for flourishing and diverse economy for several centuries, and survived not only the demographic pressures and economic deterioration of the period 1800-1949 but also the rise and fall of the People's communes. In the other countries of monsoon Asia too, the household farm has persisted as the basic unit of agricultural production despite significant changes in other levels of economic and productive relations." (Bray 1986: 186)

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[190] Gourou (1936); ibid. (1952) documents the acute population pressure in the Red River Delta in the 1930s and describes the labour intensive cultivation methods that were developed over time across South-East Asia

[191] See Gourou (1936); Bray (1986); Nguyen Sinh Cuc (1995b); Le Ba Thao (1998). See also the quote from Bray (1986: 25) describing the main characteristics of wet-rice farming in Chapter 3.

[192] These tasks include: the selection of seeds to be planted in specially prepared seedbeds; the transplantation of seedlings in ploughed and flooded fields; during the maturation period other tasks comprise the weeding of fields, the application of fertiliser and spraying of pesticide, the monitoring of water levels, and finally the harvesting, threshing and drying of rice grains.

[193] Rice productivity is particularly responsive to complex decisions regarding the timing of operations and the type and quantity of fertilisers and pesticides, which need to be adjusted for local variations in soil quality, temperature, and water control.

[194] According to Yvon-Tran (1994); Hoang Viet (1999), the low productivity of agricultural cooperatives in North Vietnam can be attributed to the loss of the family labour advantage and to the prohibitively high costs of monitoring cooperative workers.

Other characteristics of rice production also work in favour of small family farms. For example, rice grains can be easily stored and do not require heavy investments in processing facilities[195]; economies of scale appearing during the marketing phase can be circumvented through cooperative arrangements; indivisible inputs like oxen can be hired or, as often happens in Vietnam, can be purchased and shared among a cluster of family farms[196].

4.2.2.3 Other 'Initial Conditions'

At the outset of the decollectivisation period, Vietnam benefited from important initial conditions favouring pro-poor agricultural growth: an egalitarian agrarian structure, and an agricultural sector dominated by a smallholder-friendly rice cultivation system. In addition, investments in rural infrastructure (in particular in irrigation) and in education undertaken during the pre-liberalisation period, added two favourable initial conditions.

Irrigation

Vietnam's irrigation infrastructure consists in large-scale hydraulic units (canals, reservoirs and pumping stations) and small-scale systems (wells and boreholes) and was built over centuries. Important efforts to expand irrigation and drainage systems were especially undertaken during the colonial period in South Vietnam, and during the collective period in North Vietnam.

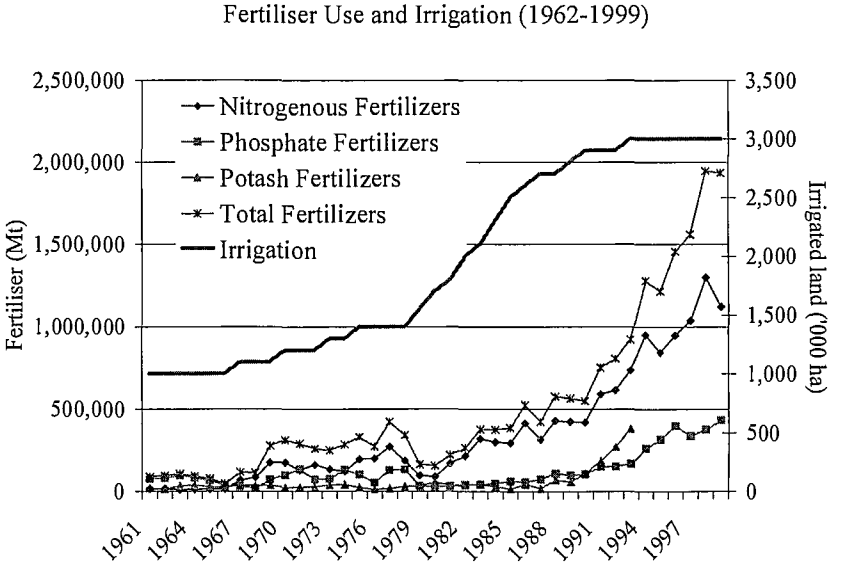
During the French colonisation period, additional irrigation and drainage investment allowed the expansion of cultivated land and the establishment of a plantation system, transforming South Vietnam into an exporting agricultural area. In North Vietnam, large-scale irrigation projects were initiated in the 1960s and the 1970s, absorbing 80 percent of the government's direct investments, and bringing 500,000 hectares of land under irrigation. By 1966, 73 percent of cultivated areas in the Red River Delta were equipped with electric irrigation and drainage pumping stations (Fontenelle and Tessier 2001). During the de-collectivisation period (1980-1993), another investment push across Vietnam

[195] Lipton and Longhurst (1989: chapter 3, 136-138 and 142-144)

brought 1 million hectares under irrigation and doubled the total irrigated area to 3.0 million hectares out of a total of 7.5 million hectares (see the top line in Figure 4-2 below, which maps the progression of irrigation between 1962 and 1999).

Data from the Vietnamese Living Standard Survey confirm this trend (see Table 4-8): between 1992 and 1998, the average proportion of irrigated annual land increased from 58 percent to 77 percent. In the Red River Delta, a large 92 percent of annual land was already irrigated by 1992, whilst in the Mekong River Delta, the share of irrigated annual land increased from 50 percent to 92 percent of annual land (see Table 4-8 below). Counterbalancing these positive achievements in the diffusion of water control, several studies have highlighted the severe state of disrepair of Vietnam's irrigation infrastructure because of insufficient maintenance work (van de Walle 1998; Fontenelle and Tessier 2001)[197].

Figure 4-2: Fertiliser Use and Irrigation (1962-1999)[198]



[196] Lipton and Longhurst (1989: 143) present several examples of the persistence of the inverse relationship in several areas where modern varieties seeds were introduced. Yang (1996) explains: "one of the clearest IRs [...] was a careful survey in Muda, Malaysia, which by 1972-3 was dominated by MV rice."

[197] The role of cooperatives in the provision of water control services actually *expanded* during the early decollectivisation period. Small pumping stations managed by cooperatives at the local level were able to provide farmers with a more flexible irrigation timetable than public companies operating larger primary hydraulic units. Fontenelle and Tessier (2001) reported that 50 percent of the irrigated area in the Red River Delta is supplied by cooperatives that are run independently from the public Irrigation and Drainage Management Companies (IDMCs).

[198] Source: FAO-STAT

Table 4-8: Irrigated Annual Land by Region (1992-1998)

Rural sample	Cultivating annual land		Irrigated land	
	1992	1998	1992	1998
	(% houseshold)		*(% annual land)*	
Northern Uplands	91	95	43	58
Red River Delta	92	93	92	94
North Central Coast	89	88	53	66
South Central Coast	61	86	56	70
Central Highlands	20	62	9	66
South East	34	50	30	62
Mekong River Delta	70	68	50	92
All Rural Vietnam	71	82	58	77

Yield-Increasing Inputs

As explained earlier, the role of cooperatives was dramatically reduced during the early decollectivisation period. As shown in Table 4-9, the role of cooperatives in the provision of inputs nonetheless survived, albeit only for a limited number of inputs (land preparation, irrigation, plant protection), solely in the Northern part of Vietnam, and had essentially disappeared with respect to the provision of seeds and fertilisers.

By 1992, the provision of agricultural inputs (fertilisers, seeds and pesticides) had been privatised, although a small and diminishing percentage of farmers in North Vietnam were still supplied by the government or cooperatives (Table 4-10). Cooperatives were mostly active in providing irrigation services and to a more limited extent technical assistance for plant protection.

Despite the privatisation of factor markets in North Vietnam, access to yield-raising inputs (seeds, fertilisers, pesticides) remained widely distributed, as evidenced in Table 4-11, which shows that in 1992 as many as 95 percent of households farming annual land had used chemical fertilisers and pesticides. Moreover, where access to technology was lowest, in the Central Highland, pesticide use rate increased from 55 percent to 73 percent between 1992 and 1998.

Table 4-9: Provision of Agricultural Inputs by Cooperatives (1992)

Rural sample	Received input from cooperative (yes/no)[1]	irrigation	preparation services	seeds	fertilisers	plant protection	other
	*as a % of rural households having received inputs from cooperatives						
Northern Uplands	84	88	0	0	10	50	61
Red River Delta	98	98	29	4	2	33	45
North Central Coast	88	79	7	2	0	37	28
South Central Coast	78	99	69	11	18	61	6
Central Highlands	31	92	0	0	0	8	0
South East	0	0	0	0	0	0	0
Mekong River Delta	0	0	0	0	0	0	0
All Rural Vietnam	89	92	23	3	5	39	39

[1] *as a % of HH farming annual land; Question from the VLSS: "have cooperatives provided land preparation, seeds, fertilisers, plant protection services, other, on annual cropland, allocated or LT use (question s9q9 and s9q10)*

Table 4-10: Providers of fertilisers (1992 – 1998)

	Provider of fertilisers (as % of users)					
	Government		Cooperative		Private	
	1992	1998	1992	1998	1992	1998
Northern Uplands	8%	25%	15%	10%	82%	71%
Red River Delta	12%	2%	15%	8%	80%	91%
North Central Coast	10%	7%	11%	2%	87%	93%
South Central Coast	6%	0%	23%	3%	82%	99%
Central Highlands	4%	2%	3%	0%	96%	99%
South East	0%	1%	0%	0%	99%	100%
Mekong River Delta	1%	1%	0%	0%	99%	100%
All Rural Vietnam	7%	7%	11%	5%	87%	90%

Table 4-11: Diffusion of Modern Agricultural Technology by Region (1992 – 1998)

Rural sample	Use of chemical fertilisers		Use of pesticides		Received technical advice	
	1992	1998	1992	1998	1992	1998
	(as a % of households farming annual land)					
Northern Uplands	94	94	91	91	47	53
Red River Delta	99	100	99	99	82	89
North Central Coast	94	96	96	94	85	86
South Central Coast	95	96	89	97	49	79
Central Highlands	79	73	55	73	11	56
South East	91	90	89	88	40	42
Mekong River Delta	93	94	94	96	53	48
All Rural Vietnam	95	95	94	95	62	70

Education

With respect to education, the reader is referred to Chapter 3, which documented in detail how Vietnam emerged from 30 years of war in 1975 with literacy and numeracy levels normally achieved by middle-income countries such as Thailand or Indonesia. Thanks to the push to generalise access to primary education during the early Communist period, by 1992, Vietnam's educational attainments were indeed remarkably high, with a low 7 percent illiteracy rate,

and an average of 6 years of education for the household head. Nevertheless, large disparities in educational attainments exist across regions in Vietnam and can attributed to the 1954 partition between North and South Vietnam (see Table 3-2 and Chapter 3 of this thesis for an in-depth discussion).

4.2.3 Preliminary Conclusions

This section showed how at the start of the agricultural decollectivisation period, Vietnam benefited from favourable initial conditions for pro-poor agricultural growth. These initial conditions included an agricultural growth process spurred by labour intensive and smallholder-friendly wet-rice cultivation techniques; *quasi*-universal access to land in North Vietnam and limited incidence of landlessness in South Vietnam; widespread diffusion of yield-raising technology; and relatively high levels of education.

All together, findings from Section 4.1.2 (Sectoral Growth and Poverty Reduction) and Section 4.2 suggest a strong link between agricultural growth and poverty reduction. However, the chain of causality remains unclear. Beyond the commonalities, there are important variations in poverty reduction, as well as significant disparities in initial conditions, and wide differences in agro-ecological conditions across regions. Moreover, within one region, it is important to account for the diversity of experiences across households, which may have similar levels of expenditures but hold different assets and therefore differ in terms of their abilities to capture the gains from growth. All of this is likely to influence the nature of the mechanisms at play in a particular region, and for a particular household.

I now turn to the welfare impact of the liberalisation of prices during the 1990s. Whilst higher agricultural terms of trade favour producers, they typically harm consumers. As is shown in the next section, rice being the main food staple and a major contributor to farm income, the overall welfare impact of the liberalisation of rice markets is far from clear.

4.3 Market Participation and Food Security in Vietnam

Although the liberalisation of agriculture generated substantial improvements in agricultural terms of trade, it also triggered a large increase in food prices. Thus, the reforms posed a central dilemma expressed by Amartya Sen as follows:

> "The real issue is that irrespective of whether the indirect effects of high food prices in raising rural incomes through incentives are strong, the direct effects of high food prices on poverty are substantial. Even if the indirect effects were powerful, which is far from obvious, the direct effects would remain immediate and important. [...] What is crucially important in this context is the fact that the two types of effects do not necessarily -indeed, do not even typically- work on the same group of people." (Sen 1986: 187)

This section explores the welfare consequences of such a large increase in food prices. Section 4.3.1 revisits the net benefit ratio method, which approximates first-order welfare impacts by the net production status of a household, and presents evidence of a substantial decoupling between net production status and welfare changes. To disentangle the ambiguous results obtained from first-order welfare impact methods, Section 4.3.2 explores the relationship between rice self-sufficiency and poverty reduction. Two key motivations for participation in rice markets, (i) changes in transaction costs and (ii) self-insurance against price risks, are discussed in Section 4.3.3.

4.3.1 Net Production Status and Rice Price Changes in Vietnam (1992-1998)

In Vietnam, the liberalization of agricultural export markets and the lifting of internal trade barriers during the 1990s triggered a substantial increase in agricultural prices. As shown in Table 4-12 below, between 1992 and 1998, consumer and producer rice prices rose by 46 percent and 50 percent respectively. At the same time, the lifting of import quotas for fertilisers and pesticides triggered a steep decline in agricultural input prices. According to Niimi, Vasudeva-Dutta, and Winters (2003), fertiliser prices fell by 19 percent in real terms (relative to CPI) between 1993 and 1998.

The fact that poor rural households have a high share of food expenditure and depend heavily on the market to procure food has raised concerns that higher food prices would worsen poverty[199]. On the other hand, the contention that higher food prices systematically harm the welfare of the poor has also been questioned, for example by research on India and Bangladesh, which showed that higher food prices benefited the landless poor through higher agricultural wages (Ravallion 1990; Ravallion 2000)[200]. Conversely, in Mexico, gains in household welfare from lower consumer prices were offset by reductions in unskilled wages and agricultural profits (Nicita 2004).

Whilst higher agricultural terms of trade favour the rural poor as farm producers, they can also harm them as rice consumers. Rice being Vietnam's main food staple and a major contributor to farm income[201], the overall welfare impact of the liberalisation of rice markets and of improving agricultural terms of trade is therefore far from clear. The difficulty in disentangling the effects of higher food prices on household welfare stems from the multiplicity of mechanisms at play, with food prices affecting rural households both as consumers and as income earners.

First, as consumers, households can respond to higher food prices by substituting away from expensive goods towards cheaper lower quality food items. As agricultural producers, they can modify crop choices and input uses in accordance with crop prices and factor returns to generate higher farm profitability. As wage-workers, they can modify their labour allocation decisions in response to changes in agricultural or off-farm wage rates. In addition, to complicate matters further[202], as Martin Ravallion explains,

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[199] This would be the case in most of Asia, Africa and Latin America according to Ravallion (1990); Barrett and Dorosh (1996), Eastwood and Lipton (2000: 51-52). See Saith (1981); Sen (1981c); Mellor and Desai (1986); Lipton and Longhurst (1989); Ravallion (1990); Barrett and Dorosh (1996); Carter (1996); Carter and Barham (1996); Ravallion and Datt (1996); Barrett (1998); Ahmed and Haggblade (2000).

[200] On the other hand, early research by Raisuddin Ahmed showed that rural labourer in Bangladesh, when rice prices rose, lost more as consumers than they gained as rice farmers.

[201] Rice cultivation clearly continues to dominate the livelihoods of Vietnamese households. On the production side, paddy is grown by 80 percent of rural households and contributes 85 percent of total food production. On the consumption side, rice procures on average 75 percent of total calorie intake.

[202] In their literature review of the welfare impact of trade policy, Winters, McCulloch and McKay (2004) and Hertel and Reimer (2004) identified a total of six channels linking prices changes and household welfare, These linkages include (a) price and availability of goods, (b) factor prices, income and employment, (c) government taxes and transfers influenced by changes in revenues from trade taxes; (d) incentives for investment and innovation, which affect long-run economic growth; (e) external shocks such as changes in terms of trade; (f) short-run risk and adjustment costs.

> "These income effects probably take longer than the expenditure effects. Some of the poorest households in rural areas could well lose initially from higher food prices, with the initial gains being concentrated amongst the rural non-poor. The proportionate losses of real spending power will be higher for the poor than the non-poor." (Ravallion 2000:355)

Therefore, the *net* impact of higher food prices on household welfare is ambiguous and depends on a household's ability to compensate negative expenditure effects with countervailing income effects: higher farm income, higher farm and off-farm employment levels, and/or higher wage rates. In fact, the large decline in poverty among urban wage-workers and rural non-farm workers in Vietnam indicates that part of the increase in food prices may have stemmed from rising demand from people with better living standards and who still have a high-income elasticity of demand[203].

Table 4-12: Changes in Consumer and Producer Rice Prices (1992-1998)[204]

Rice - Unit values	Consumer Unit Value			Producer Unit Value			Δ CPI (1998-1992)	Consumer Price / Producer Price	
	Jan 93 prices (1)	Jan 98 prices (2)	Δ (1998-1992)	Jan 93 prices (3)	Jan 98 prices (4)	Δ (1998-1992)		1992 (1)/(3)	1998 (2)/(4)
	('000 dong per kg)			*('000 dong per kg)*					
Northern Uplands	1.88	2.76	1.47	1.78	2.55	1.43	1.46	1.06	1.08
Red River Delta	1.87	2.78	1.48	1.81	2.61	1.44	1.46	1.03	1.06
North Central Coast	1.79	2.61	1.46	1.57	2.39	1.52	1.46	1.14	1.09
South Central Coast	1.93	2.83	1.47	1.51	2.32	1.53	1.47	1.27	1.22
Central Uplands	1.89	2.73	1.44	1.37	2.43	1.78	1.44	1.39	1.13
South East	1.76	2.57	1.47	1.63	2.34	1.44	1.47	1.08	1.10
Mekong River Delta	1.66	2.42	1.46	1.42	2.14	1.51	1.46	1.17	1.13
All Vietnam	**1.81**	**2.65**	**1.46**	**1.62**	**2.42**	**1.50**	**1.46**	**1.12**	**1.09**

NB: Only rural households

Notwithstanding the multiplicity of mechanisms at play, the first-order welfare impact of price changes has been approximated by the *net production status* of a household. To see why, let $V(p,y)$ denote a household's indirect utility function, which depends on y, the household's total income, and on p, a vector of consumption prices. Let M_a denote the marketed food surplus generated by the

[203] Insight from Michael Lipton.

[204] Note that the figures are different from those in Benjamin and Brandt (2004). This is because during 1998, the price of rice increased by 25.6 percent, whilst the price of non-rice food and general consumer price increased by only 2.7 percent and 7.4 percent respectively. To express the unit value of rice in January 93 or January 98 prices, consumer and producer unit values are adjusted by the monthly deflator *for rice*. Using a different deflator as Benjamin and Brandt seem to have done would inflate the unit value expressed in January 1998 and overstate the inflation in the price of rice between 1992 and 1998.

farm household. It can be shown that $\frac{\partial V}{\partial p} = \frac{\partial V}{\partial y} \cdot M_a$ (Barrett and Dorosh 1996; Barrett 1998). Since by common assumption, $\frac{\partial V}{\partial y} > 0$, the impact of higher prices on welfare is of the same sign as M_a. This result states what has become the standard partial equilibrium outcome: on the one hand, higher prices stimulate production and benefit *net sellers*; on the other hand, an increase in producer prices translates itself into higher consumer prices and impacts the welfare of *net buyers* adversely.

The net production status of a household is measured by the net benefit ratio (NBR), defined as the difference in monetary terms between the production and the consumption of rice as a proportion of total expenditures (Deaton 1997b). Producers with positive NBRs would benefit from an increase in prices. Households with negative NBRs are net consumers of rice and would be adversely impacted by an increase in food prices.

The Net Benefit Ratio methodology has been applied to study the welfare impact of price changes in Vietnam by Minot and Goletti (1998; 2000), and by Benjamin and Brandt (2004). In particular, Benjamin and Brandt (2004, Figure 5.4 and 5.5 - pp. 172-175) gauged the distributive impact of higher consumer rice prices between 1992 and 1998 by regressing the NBRs non-parametrically on log per capita income. They conclude:

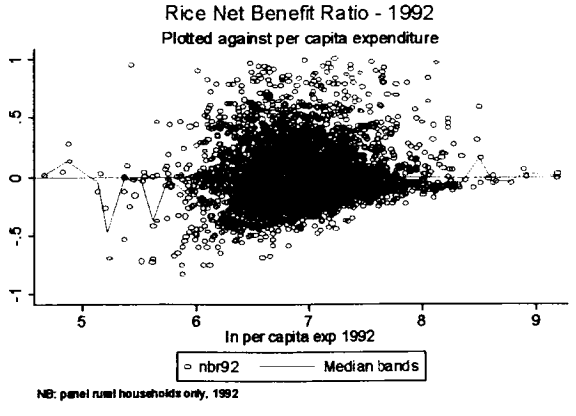
> "The liberalization of rice prices has been a double-edged sword, increasing the incomes of the poor, especially in the south, but also increasing the cost of food, which falls most heavily on the poor. On balance, except for the very poorest farmers, southern farmers across the income distribution benefited from the changes, whilst most northern households were better off, except at the bottom of the income distribution." (Benjamin and Brandt 2004: 177)

These trends seem at odds with the deep reduction in poverty documented in Section 4.1.1 above, and with the fact that, according to Van de Walle and Cratty (2004), "farm-only households are nationally both the poorest and the most common household type in rural Viet Nam".

Households are categorised as having a rice surplus (deficit) if their NBR is positive (negative). Looking at the NBRs more closely, one finds that higher rice prices would have affected a large proportion of the rural population adversely. A tabulation of NBRs by Minot and Goletti (2000, Table 39, page 61) shows that in 1992, about 60 percent of rural households were net consumers of rice. The smallest proportions of deficit households are in Vietnam's largest rice producing regions, the Red River Delta and the Mekong River Delta, where 45 percent and 55 percent of rural households had negative NBRs respectively. The highest percentages of deficit households are found in the Northern Upland, the Central Highlands, and in the South East region, where 62 percent, 82 percent, and 81 percent of rural households respectively were net consumers of rice. Therefore, a large percentage of the rural population was exposed to consumption price risks at the same time as the liberalisation of agricultural markets induced a sharp increase in food prices

An important caveat to the NBR method is that households at similar levels of income may have very different asset endowment and income-earning sources. As a result, when second-order income effects are taken into account, welfare impacts may vary widely amongst household at the same income level (Hertel and Reimer 2004; Ravallion and Lokshin 2004). This heterogeneity in impact at the same income level is likely to be particularly salient in Vietnam because of its diverse geographic and socio-economic landscape. Figure 4-3 below, which presents a scatter plot of the 1992 NBRs against the log of per capita expenditure, confirms that there are considerable variations in NBRs *at a given level of expenditure*.

Figure 4-3: Rice Benefit Ratio 1992



Caution is therefore required when interpreting the NBRs as they can only trace partial equilibrium effects and overlook more complex, general equilibrium effects, which need to be taken into account given the magnitude of the changes taking place in Vietnam. Most crucially, when wage and other supply responses affecting household income are taken into account, "the net position of the household becomes endogenous: sufficiently large consumption and income responses may cause an ex-ante net consumer become an ex-post net producer" (Porto 2005, p.1). Therefore, assessing the welfare impact of price changes through budget shares and income shares without integrating the impact on employment and earnings may yield considerably biased results (Ravallion 1998)[205].

In fact, using the panel data component of the VLSS and disaggregating the movements in and out of poverty by net production status suggests a substantial disconnect between net production status and changes in welfare. In most regions, most of the households that became non-poor (in relation to the food poverty line) were either deficit households in 1992 and in 1998, or had switched from being surplus producers in 1992 to being deficit households in 1998 (see columns 1, 2 and 4 in Table 4-13). In total, 63 percent of households that moved out of food poverty in 1998 were net consumers of rice. Therefore, if anything, poverty reduction seems to be associated with rice deficit rather than rice surplus.

[205] Ravallion (1990) provides the formulation of a second partial equilibrium model that takes into account adjustments on labour markets. When doing so, the standard partial equilibrium result depends on two further conditions: (i) whether the household is a net buyer or a net supplier of labour, and (ii) whether the price elasticity of wages is large enough, relative to the ratio of *net food expenditures/earnings* to *net wage earnings*. Similarly, if one extends the model to include the whole set of traded and non-traded goods as in Porto (2003), one needs to take into account how changes in the price of traded goods affect the price and the demand and production of non-traded goods. Porto evaluates the (first-order) welfare impact of changes in the price of traded goods with the budget shares of each good, the price elasticity of non-traded goods relative to traded goods, and wage price elasticities weighted by the share of labour income in total household income. The estimation of these models is extremely data intensive and unfortunately, there is insufficient data in the VLSS to estimate them.

Table 4-13: Moving Out and Falling into Food Poverty by Net Production Status

	Moving out of food poverty				Falling into food poverty			
	Surplus 92/ Surplus 98	Surplus 92/ Deficit 98	Deficit 92 / Surplus 98	Deficit 92/ Deficit 98	Surplus 92/ Surplus 98	Surplus 92/ Deficit 98	Deficit 92 / Surplus 98	Deficit 92/ Deficit 98
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Northern Uplands	15	15	7	63	16	18	14	52
Red River Delta	52	25	7	16	44	16	12	28
North Central Coast	22	21	4	52	28	22	9	41
South Central Coast	21	16	21	43	6	6	13	74
Central Highlands	0	0	7	93	0	0	0	100
South East	21	13	3	64	0	0	50	50
Mekong River Delta	27	15	15	43	40	13	13	35
Rural Vietnam	29	19	8	44	25	15	13	48

NB: Panel households only

Owing to the large number of households with negative net benefit ratios and the importance of rice in the livelihoods and consumption of rural households, one would therefore have expected a worsening in poverty. However, the poverty reduction trends documented earlier showed a deep decline in rural poverty. These two trends could be reconciled if poor households were more likely to have positive NBRs and be the beneficiaries of high rice prices. Analysis of rice production and consumption by both Minot and Goletti (Minot and Goletti 2000) and Benjamin and Brandt (Benjamin and Brandt 2004) seems to point to the contrary. In addition, there does not seem to be any systematic relationship between poverty reduction and the net production status of rural households.

4.3.2 Market Participation and Welfare in Vietnam

In order to disentangle the ambiguous results obtained from first-order welfare impact methods, this section explores the relationship between self-sufficiency in rice and poverty reduction. The consumption module of the VLSS collected data on whether rice consumed by households was acquired on the market or originated from own production. These consumption data are combined with production data to classify rural households into five categories according to their involvement in rice markets. First, households are *self-sufficient* in rice when they procure 100 percent of their rice consumption from home-production. Moreover, households are:

(i) *autarkic* if they cultivate rice for own consumption only, and are not involved in rice market activities, neither as sellers nor as buyers;

(ii) *sell-only* households if they participate in rice markets only as rice sellers; all their rice consumption comes from own production;

(iii) *buy-only* households if they participate in rice markets only as buyers but never as sellers of rice;

(iv) *sell & buy* households if they participate in rice markets both as sellers and as buyers of rice.

Note that self-sufficient households include *autarkic* and *sell-only* households.

Table 4-14 below presents a simple tabulation of participation in rice markets in 1992 and 1998. Overall, there was a substantial increase in the number of autarkic and 'sell-only' households, and a corresponding decline in the percentage of 'buy-only' households. All together, despite a significant number of households opting out of rice farming[206], the proportion of *self-sufficient* households increased significantly from 37 percent of rural households in 1992 to 45 percent in 1998. Furthermore, to explore how market participation decisions differ across income levels, three sets of nonparametric regressions are estimated where the independent variable is the logarithm of per capita expenditure and the dependent variable is a binary variable indicating the market participation status of a household. The results for self-sufficient, autarkic, and 'sell-only' households in 1992 and 1998 are shown below in Table 4-16. Each panel shows the average for North and South Vietnam. The two vertical lines in each graph indicate the expenditure thresholds for the food and the general poverty line. The graph labeled 'Total' shows the aggregate results for Vietnam in each year. A decomposition of the results in 1998 by region can be found in the appendix (Figure 4-8: Market Participation (decomposition by region)).

Although there was considerable variation in market participation across regions, two patterns in market participation nevertheless stand out, in particular between North and South Vietnam. First, on average, self-sufficiency diminished as income rose (see the bottom graphs in Panel A that show the aggregate results

[206] The proportion of rural households growing rice declined by 26 percent in the Central Highlands (to 61 percent of rural households in 1998), and by 20 percent in the South East region (to 48 percent of rural households). These two regions are characterized by high levels of crop specialization in perennial crops such as coffee in the Central Highlands, or in vegetable production in the South-East region.

for Vietnam in each year)[207]. Second, and most strikingly, in 1998, autarky *increased* with income levels in North Vietnam, whilst it *decreased* with income levels in South Vietnam.

Finally, that autarky is not necessarily associated with poverty is further confirmed in Table 4-15, which shows the poverty headcount ratio for each category of market participant[208]. Whilst food poverty generally declined for all four categories of market participants, improvements in living standards were particularly pronounced among autarkic and 'sell-only' producers. All together, food poverty among self-sufficient households declined by 53 percent between 1992 and 1998. This general pattern of food poverty reduction was particularly apparent in the Red River Delta, where food poverty declined by 86 percent among autarkic households, by 79 percent among 'sell-only' households, and by 35 percent among 'buy-only' and 'buy & sell' households. However, by contrast, in the Central Highlands and in the South Central Coast, food poverty actually *increased* among autarkic rice producers by 80 percent and 106 percent respectively.

Table 4-14: Rice Self-Sufficiency and Market Participation (1992-1998)

Rural Households	Rice producers		Self-Sufficient in rice				Autarkic		Rice Seller		Buy-Only households		Sell & Buy		Share of rice bought*	
	1992	1998	1992	1998	1992	1998	1992	1998	1992	1998	1992	1998	1992	1998	1992	1998
	(1) *(% of rural households)*		(2) *(% of rural households)*		(3) *(% of rice producers)*		(4) *(% of rice producers)*		(5) *(% of rice producers)*		(6) *(% of rice producers)*		(7) *(% of rice producers)*		(8) *(% total rice consumed)*	
Northern Uplands	94	89	39	50	41	54	22	27	34	40	45	33	15	13	35%	26%
Red River Delta	94	92	51	58	54	62	14	24	58	52	28	24	19	14	33%	30%
North Central Coast	88	85	30	44	35	50	15	22	41	44	44	34	21	16	38%	29%
South Central Coast	82	87	35	48	42	55	21	15	34	61	45	20	13	24	36%	21%
Central Uplands	80	60	25	25	28	42	17	26	15	21	68	49	4	10	59%	36%
South East	57	47	24	26	41	53	14	16	58	70	28	22	31	10	42%	34%
Mekong River Delta	74	64	32	37	42	55	7	6	76	86	17	7	41	38	47%	39%
All Rural Vietnam	**84**	**80**	**37**	**45**	**43**	**56**	**15**	**20**	**51**	**55**	**34**	**25**	**22**	**20**	**39%**	**30%**

NB: self-sufficient means that 100% of rice consumed comes from own production

** mean share among rice producers buying rice*

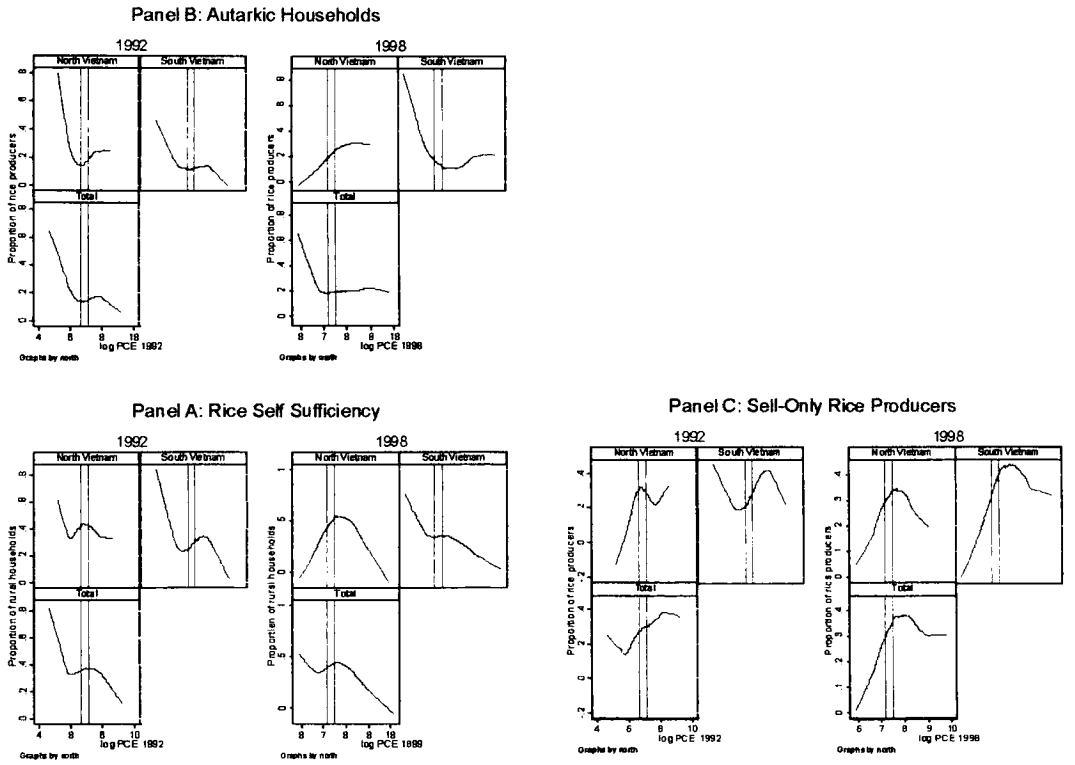
[207] On the other hand, note that although better-off farmers were more likely to participate in markets are net rice sellers, they were also less likely to grow rice.

[208] Results are shown using the food poverty line. Similar results are found when using the general poverty line.

Table 4-15: Market Participation and Food Poverty (1992-1998)

Food Poverty headcount (%)	Autarkic			Seller only			Buyer only			Seller & Buyer			Self-Sufficient		
Rural Sample - rice producers	1992	1998	chg.	1992	1998	chg.	1992	1998	chg.	1992	1998	chg.	1992	1998	chg.
Northern Uplands	37	14	-61%	24	25	2%	44	35	-20%	47	34	-28%	31	19	-37%
Red River Delta	25	3	-86%	32	7	-79%	28	18	-35%	30	19	-36%	30	6	-82%
North Central Coast	33	18	-46%	33	19	-41%	36	19	-48%	37	27	-28%	33	19	-43%
South Central Coast	15	32	106%	22	8	-64%	31	23	-26%	23	10	-54%	19	14	-25%
Central Highlands	33	60	80%	45	34	-25%	28	34	18%	50	25	-49%	38	50	33%
South East	4	0	-100%	8	0	-100%	20	1	-95%	27	2	-93%	7	0	-100%
Mekong River Delta	20	11	-41%	10	5	-52%	18	12	-30%	13	8	-34%	12	6	-52%
All Rural Vietnam	27	14	-49%	24	11	-56%	30	21	-31%	27	17	-38%	25	12	-53%

Figure 4-4: Proportion of self-sufficient households, autarkic, and 'sell-only' producers (1992-1998, North and South Vietnam)



4.3.3 Food security and Market Participation Decisions in Theory

In theory, there are two important motives for crop self-sufficiency. First, self-sufficiency may actually be an optimal choice for a household confronted to prohibitively high transaction costs; secondly, when risks are pervasive and insurance markets are missing, households may choose to become self-sufficient in order to insure themselves against price risks. Each explanation is now briefly reviewed in turn.

4.3.3.1 Transaction Costs

By most accounts, high transportation costs and trade barriers constitute important obstacles to the integration of product and factor markets in Vietnam. In the pre- and early reform period, substantial bottlenecks existed in the transfer of food from surplus to deficit regions, and in some regions, retail prices could be higher than farm-gate prices by 70 percent (Goletti and Minot 1997a; Goletti and Minot 1997b; Goletti, Minot, and Berry 1997)[209].

In the presence of high transaction costs, market participation decision become endogenous and depend on a household's own valuation of the non-traded good (Goetz 1992; Key, Sadoulet, and Janvry 2000)[210]. Let p_a be the market price of food and τ_a be the transaction costs incurred when selling or buying food on the market[211]. Chiefly, transaction costs lower the selling price for sellers ($p_a^b = p_a + \tau_a$), and increase the purchasing price for buyers ($p_a^s = p_a - \tau_a$). Households select themselves into one of three market participation regimes (autarky, net seller, and net buyer regimes) depending on the size of the transaction costs and the level of a household's internal price of food (also called shadow price).

In its standard formulation, the transaction costs model does not take into account the seasonality of agriculture and assumes away uncertainty and preferences for risk. Households are assumed to make discrete choices between selling, buying, or being self-sufficient in rice, and farm households that engage both in selling and buying activities (representing 20 percent of rice producers in Vietnam – see Table 4-14 on page 183) are ignored. Nevertheless, despite being highly stylized, the transaction cost model yields important insights as to how farm households react to changes in market conditions.

Figure 4-7 in the Appendix of this Chapter (page 193) gives a graphical illustration of how households switch regime when prices or transaction costs

[209] IFPRI's study showed that regional price differences in Vietnam were in excess of transportation and marketing costs.

[210] A transaction cost model developed by de Janvry, Fafchamps and Sadoulet (1991) shows how prohibitively high transaction costs motivate households to become self-sufficient in food.

change. To see how household select a particular market regime, define by p_a^* the household's internal price of food (also called shadow price), which equilibrates the household's demand (X_a) and supply (Q_a) for food. The wedge between the selling and the buying price $\left[p_a^s; p_a^b\right]$ is called the price band (see the area shaded in light blue colour in Figure 4-7). Because the shadow price p_a^* is determined by the household's food self-sufficiency condition, market participation regime is a function of household characteristics, including the household's endowments in land (A) and labour (L), other production characteristics (Z_q), factors that may influence the household's preference for food such as its dependency ratio (Z_a), the household's total income (y), as well as other market prices: $p_a^* = p_a^*\left(p_c, w, y, \bar{L}, \bar{A}, Z_a, Z_q\right)$.

Autarky[212] is chosen when the household's shadow price is located inside the price band ($p_a^s < p_a^* < p_a^b$). This is because with p_a^* below the purchasing price, the household is better off purchasing the staple from itself, whilst with p_a^* above the selling price, the household is better off supplying the good to itself. Similarly, the household chooses to be a *seller* when its shadow price is below the selling price ($p_a^* < p_a^s$). Finally, the household chooses to be a *buyer* when its shadow price is above the market buying-price ($p_a^* > p_a^b$).

When transaction costs decline, the price band narrows such that, at a given market price, and depending on the level of their shadow prices, previously autarkic households may decide to either become sellers or become buyers (see the area shaded in dark blue colour that indicates the narrowing of the price band in Panel B of Figure 4-7 in appendix). Higher food prices induce buyers with shadow prices between A1 and B1 to revert to autarky, and autarkic households with shadow prices between A0 and B0 to become net sellers (see Panel C).

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[211] Transaction costs are assumed to be similar for households living in the same community, and for buyers and sellers alike.

[212] In the transaction cost literature, autarky is also referred as self-sufficiency in reference to the self-sufficiency condition equilibrating demand and supply that is the hallmark of the model. In this chapter, I define as self-sufficient households that satisfy their consumption needs through own-production, but that can also generate a surplus to sell on the market.

Finally, when transaction costs decrease at the same time as prices increase, a greater proportion of autarkic households become sellers, whilst at the same time, a smaller number of households switch from the buyer to the autarkic status (see Panel C).

4.3.3.2 Self-Insurance against Price Risk

When price and output risks are pervasive, households' attitudes towards risks may affect *ex-ante* production decisions. When risk and self-insurance are taken under consideration, one obtains results that run counter to the classic finding that crops whose revenues are highly variable are less likely to be grown by risk-averse households (Finkelshtain and Chalfant 1991). On the contrary, one finds that risk-averse households would grow more of the risky crop (Barrett 1993). Growing a crop whose revenue is positively correlated with consumption prices becomes a form of self-insurance when insurance markets are missing and credit markets are rationed (Fafchamps 1992; Kurosaki and Fafchamps 2002).

These theoretical insights are particularly relevant for Vietnam, where drought, flood, typhoons, pests and other risks associated with the use of new seeds, pesticides and fertilisers are common occurrences, and where rice is both an important contributor to total income and is dominant in the diet of Vietnamese households. Whilst Vietnamese rural households undoubtedly benefited from lower transaction costs as trade barriers were lifted, they were also confronted to higher levels of food prices and still subject to important variability in prices due to agricultural seasonality and slow market integration (Minot and Goletti 1998; Minot and Goletti 2000).

4.4 Conclusion

This chapter showed that poverty in Vietnam was not only substantially reduced in absolute numbers, but that growth had also reached the poorest of the poor. It was also shown that *growth in the agricultural sector* contributed the most to poverty reduction. Moreover, the legacy of an eventful agrarian history enabled Vietnam to benefit from favourable initial conditions for pro-poor agricultural

growth, including a smallholder-friendly wet-rice cultivation system; widespread universal access to land; extensive diffusion of yield-raising technology; and as detailed in Chapter 3, a literate labour force.

The last section of this chapter highlighted a dilemma and a paradox: a dilemma because the increase in food prices triggered by the liberalisation of agricultural markets favoured the rural poor as farm producers, but possibly harmed them as consumers; a paradox because the deep trends in poverty reduction documented in Section 4.1 took place at the same as the rural poor experienced a large increase in food prices.

The net benefit ratio analysis showed that the majority of rural households were net consumers so that the overall welfare impact of higher food prices is far from clear. On the other hand, an important disconnect between the changes in welfare and the net production status of farm households was identified in Section 4.3.1.

First-order welfare analysis are based on a simplified model of the farm household, which captures the instantaneous effects of small price changes on welfare, holding everything else constant. In Vietnam's context, these methods are likely to yield considerably biased results as they ignore important longer-term general equilibrium effects, which depend on households' consumption, labour supply, and production choices, and would require modelling a complete supply and demand system. This limitation is readily acknowledged by Barrett and Dorosh[213]:

> "These first-order effects plainly ignore, however, partial equilibrium consequences of food prices on quantities demanded and supplied, as well as the general equilibrium consequences on employment patterns, wages, the prices of other factors and products, technological innovation, and other determinants of welfare." (Barrett and Dorosh 1996: 657)

For example, when adjustments on labour market are taken into account (holding everything else constant), the standard partial equilibrium result described in Section 4.3.1 depends on two additional conditions: the household's family labour endowment, and the price elasticity of wages relative to the ratio of *net*

[213] Deaton (1997a) provides similar caveats to the use of the net benefit ratio method.

food expenditures or earnings to *net wage earnings* (Ravallion 1990). A food *deficit* household who is also a net supplier of labour could eventually *gain* from an increase in food prices if the elasticity of wage to price and wage earnings as a proportion of total income are both large enough to compensate for the direct welfare loss due to the household's food deficit position[214]. As Porto explains, when wage and other supply responses affecting household income are taken into account,

> "the net position of the household becomes endogenous: sufficiently large consumption and income responses may cause an *ex-ante* net consumer become an *ex-post* net producer" (Porto 2005, p.1).

Therefore, for countries that experience important shocks or implement wide-ranging economic reforms like Vietnam, assessing the welfare impact of price changes through budget shares and income shares without integrating the impact on employment and earnings may yield considerably biased results (Ravallion 1998). On the other hand, allowing for general equilibrium effects would require estimating own price and cross-price demand elasticities as well as wage-price elasticities, an endeavour that is extremely data intensive and has been infrequently undertaken because of lack of data.

Section 4.3.2 presented a descriptive analysis of rice market participation and self-sufficiency using non-parametric methods, and pointed at a possible strategy adopted by households to protect themselves against price risk: higher levels of consumption out of own production. I have attempted to use reduced-form regressions to obtain a better understanding of the circumstances that induced the changes in market participation and rice self-sufficiency documented above, but have been unsuccessful at uncovering any relevant result. This does not come as a surprise as identification issues are rife. In the literature, only Kurosaki and Fafchamps (2002) could test the insurance against price risk model exposed above. They present both a reduced-form model that turns out to be suggestive of the presence of the insurance motive, but argue that only a structural model,

[214] Similarly, if one extends the model to include the whole set of traded and non-traded goods as in Porto (2003), one needs to take into account how changes in the price of traded goods affect the price and the demand and production of non-traded goods. Porto evaluates the (first-order) welfare impact of changes in the price of traded goods with the budget shares of each good, the price elasticity of non-traded goods relative to traded goods, and wage price elasticities weighted by the share of labour income in total household income.

which they go on testing, could conclusively test for this insurance against risk hypothesis. The literature on transaction costs is equally sparse because of lack of data.

As this chapter ultimately shows, despite the strong trends in agricultural growth and rural poverty reduction documented in Section 4.1, and despite the existence of favourable initial conditions as shown in this section, the sheer multiplicity of effects at play makes it difficult to causally determine the precise mechanisms through which (agricultural) growth translated itself into poverty reduction.

Ultimately, the paradox remains, although probably because second-order effects, in particular the effect on wage-rates and labour demand, cannot be properly accounted for because of lack of data.

4.5 Appendix

Figure 4-5: Growth Incidence Curve for Vietnam and North Vietnam (Northern Uplands, Red River Delta and North Central Coast)

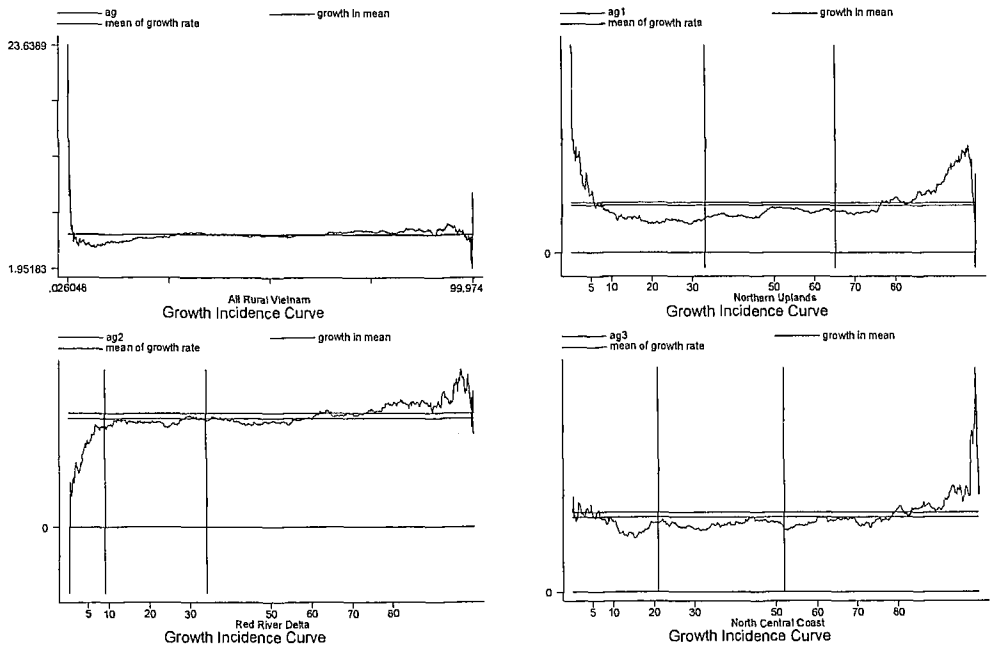


Figure 4-6: Growth Incidence Curve for South Vietnam (South Central Coast, Central Highlands, South East and Mekong River Delta)

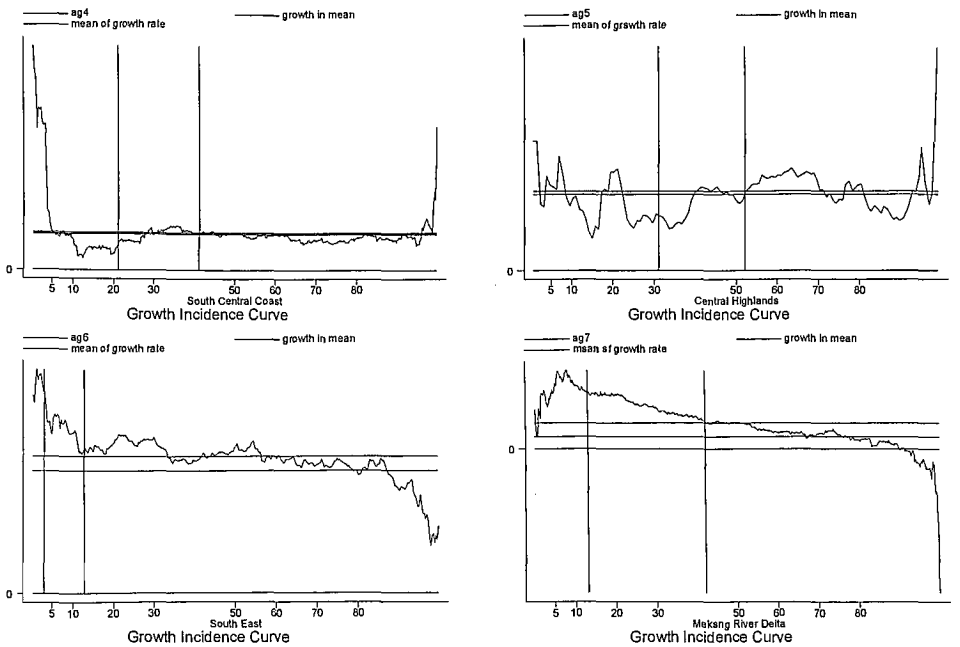
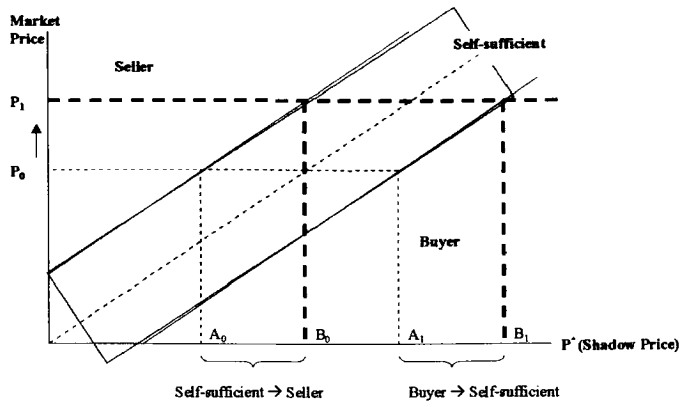
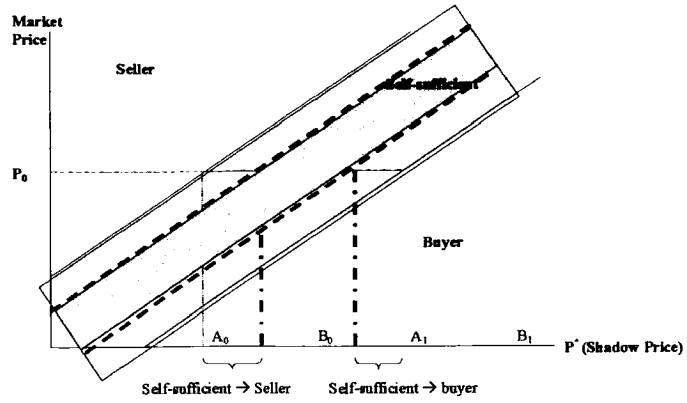


Figure 4-7: Market Participation and Transaction Costs

Panel A: Market Participation Regimes



Panel B: Lower Transaction Costs



Panel C: Higher Food Prices

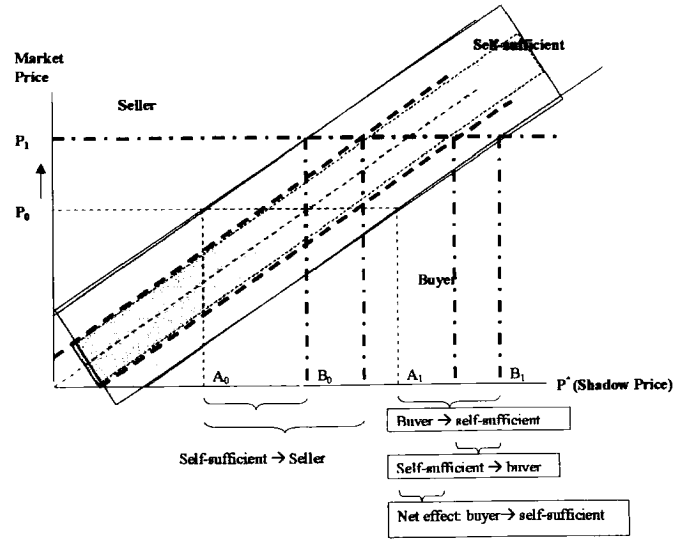
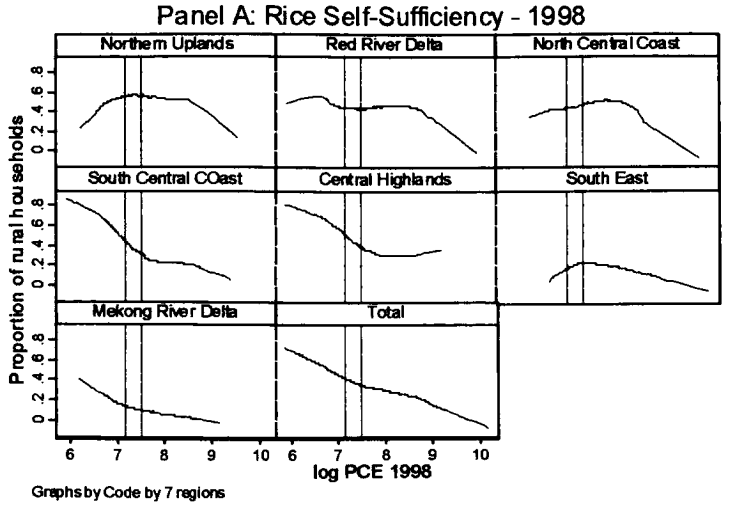
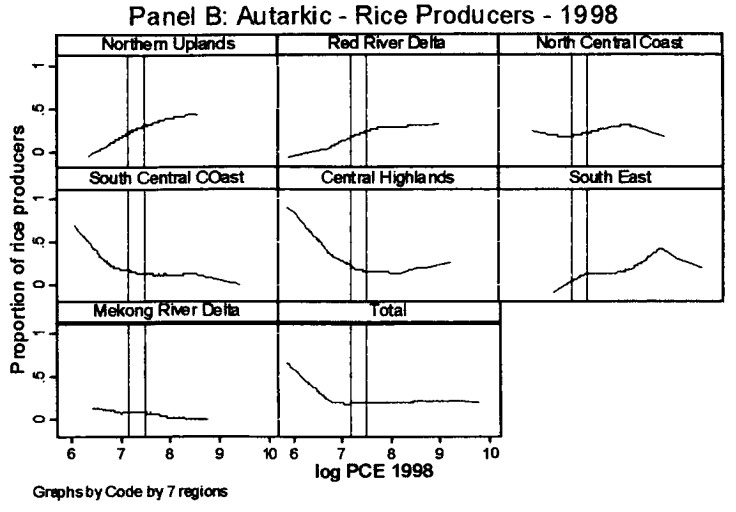
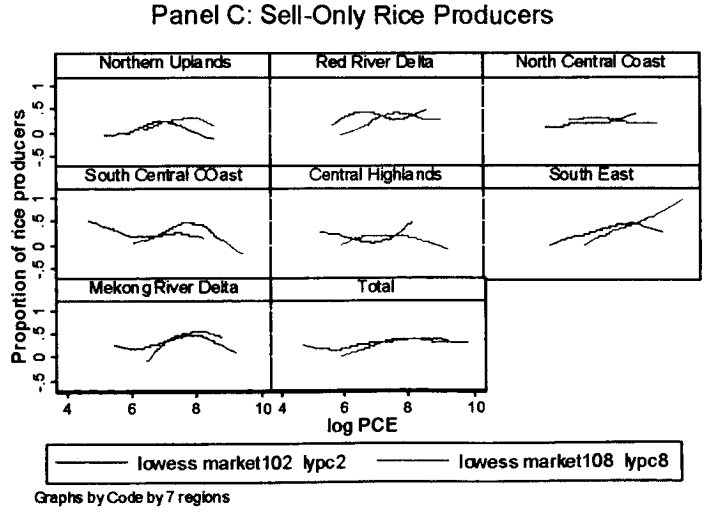


Figure 4-8: Market Participation (decomposition by region)







Chapter 5 - Contribution of the Thesis and Future Avenues for Research

This concluding chapter offers a review of the main findings from this thesis and discusses future avenues of research. It concludes with a discussion of the most important contributions, both methodological and substantive, of this thesis.

Chapter 2 investigated the impact of the 1993 Land Law on investment incentives, and found that the new Land Law seemed to have fulfilled its objective to stabilise expectations and encourage long-term investments. More interestingly, regional differences indicated a more complex working of land property relations and provided a way to pry into the very process of establishing a new private property rights system. One innovation in this chapter was to distinguish two distinct aspects of that process, i.e. (i) the strengthening of tenure security through a body of public rules; (ii) the role of formal institutions in enforcing or protecting these rights, and to identify them separately, with land tenure data extracted from the VLSS, and with provincial land titling data respectively. Basing the interpretation of the results on the history of Vietnam's land tenure, and exploiting diverging property rights ideologies between North and South Vietnam, it was possible to not only ascertain the importance of tenure security as an investment incentive, but to discuss and highlight the role of (formal) institutions in promoting a new property right paradigm.

The new Land Laws in Vietnam are effectively establishing a *quasi*-private property rights system, with an important emphasis on *exclusion* rights: i.e. the right to exclude others from accessing one's land. This is in sharp contrast with traditional land property rights, as they existed in pre-colonial times. Part of agricultural land was then communally held and was periodically redistributed in order to ensure a minimum subsistence level for the members of the village. The practice of land redistribution as it briefly re-emerged in Northern Vietnam from

the mid-80s up until around 1993 is evocative of this traditional form of land management and mutual insurance.

The 1993 Land Law (and subsequent Land Laws) expands and promises to protect the land rights to which individuals are entitled. On the other hand, the Land Law effectively promotes rights that become exclusive of the community[215]. Sikor (2001a) documents a situation in the Northern Uplands of Vietnam where a traditional conception of land rights centred on a guaranteed access, rather than on an exclusive right, to land clashed with the implementation of the new Land Laws. In that respect, the 1993 Land Law represents a potent shift in Vietnam's land tenure history. In such a context, where property rights ideologies clash, law enforcement institutions can play an important role in encouraging and supporting the shift towards the new property right paradigm.

However, the emphasis on exclusion rights and the ban on land redistribution brought about by the 1993 Land Law officially deprive village authorities of a potentially important insurance mechanism. Notwithstanding the political difficulties associated with such divestment of power, even if privatising land rights may be effective in providing better incentives for investments as showed in Chapter 2, it can also involve welfare costs (Baland and Francois 2003). This aspect of a land tenure system is important as resistance or scepticism towards the privatisation of land rights finds its origin in the loss of the insurance properties embedded in the periodic reallocation of land. Having explored the efficiency gains from privatising land, future important avenues of research include investigating the welfare costs stemming from that privatisation process.

The main results of *Chapter 3* are historical, empirical, and methodological. First, the analysis in Chapter 3 showed that it is possible to use household survey data to map the history of education in ways that are congruent with historical accounts and anecdotal evidence. Second, Chapter 3 shed light on the circumstances that allowed Vietnam to emerge from thirty years of war with high literacy and numeracy levels, despite severe resource constraints. Obviously, the exceptional circumstances under which the increase in literacy

[215] In law, the land belongs to the whole people, so that, as land rights become exclusive, the ultimate authority become the State.

took place in Vietnam cannot be generalised. However, several other countries also boasted relatively high levels of human development despite having low levels of welfare, including China and Kerala as noted by Dreze and Sen (1989), and Cuba as noted by Birdsall, Ibrahim and Gupta (2004).

Third, the results in Chapter 3 add more directly to the literature on education and productivity by highlighting the existence of non-linearities in the impact of schooling. In order to understand how education effects economic efficiency, more data need to be collected on the cognitive and/or knowledge content of each additional year of education. Empirically ascertaining the role of education in the process of economic development is extremely challenging because of the difficulties to obtain good measures of education, but also because of the near-intractable problem of controlling for omitting abilities. Chapter 3 contributed to the literature on the returns to education by providing an instrumental variable strategy that makes use of exogenous variations in educational attainments brought about by the 1954 partition of Vietnam.

However, as pointed out by Card (1999) and Heckman, Lochner and Todd (2003), estimating the precise returns to education is not necessarily of great interest since these are likely to vary across individuals, across regions, and across time. Therefore, making use of the different measures of education in order to uncover the processes through which education matters for economic efficiency, as is done in Chapter 3, is an avenue of research that is worth exploring further.

The contributions of *Chapter 4* are several-fold. First, it documented the width and the depth of poverty reduction trends in rural Vietnam, highlighting the remarkably pro-poor character of Vietnam's agricultural growth. To achieve such a result, Vietnam benefited from favourable initial conditions for pro-poor agricultural growth. Chapter 4 also highlighted the existence of a paradox: the deep trends in poverty reduction documented earlier took place at the same time as the rural poor experienced a large increase in food prices, and as the large majority of households were actually net consumers of rice. The decoupling between changes in welfare and net production status highlights the importance of accounting for second-order earning effects. In this chapter, I have

encountered the limits of partial equilibrium analysis, and have felt the need to account for general equilibrium effects. New tools are being developed that combine the use of macro-data (computable general equilibrium models) with micro-data to account for earning effects (Porto 2003). However, the data challenges are likely to remain great for a long time to come. It is probable that the only way to crack this paradox is to uncover it indirectly, as one assembles the jigsaw of a puzzle. Identification problems are also likely to remain challenging.

In this thesis, I hope to have shed some light on the multiplicity of mechanisms that enabled Vietnam to grow equitably since the start of its agricultural decollectivisation programme. Vietnam offers interesting lessons about equitable growth, since despite the considerable increase in food prices that followed the liberalisation of agricultural markets, Vietnam's growth pattern remained exceptionally pro-poor: poverty declined significantly in absolute terms, and a large proportion of the *poorest* of the poor also benefited from the general increase in welfare. In the past 50 years, Vietnam has provided different answers to the question of 'How to grow equitably'. Today, more than ever, Vietnam still asks itself that question, as it continues to grow, to industrialise and to urbanise, and as concerns grow about the prospects of an imbalanced growth.

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