
Jean George Louis Steve Sénèque

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June 1997
Canberra, Australia
DECLARATION

This thesis is my own work, except where otherwise indicated.

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ABSTRACT

In this thesis, I evaluate the impact of fundamental economic policy changes on the agricultural economy of Vietnam from 1989 to 1995, the period referred to as the "transition to the market". These economic policy changes included the return to private household farming through decollectivisation in 1988, and the implementation of macro economic stabilisation, market liberalisation and trade liberalisation policies in 1989.

Following these reforms, the agricultural growth rate almost doubled in comparison to its performance during the period of central planning (1954-1988). Despite this achievement, agricultural growth continued to lag far behind the growth rate achieved in the industrial and services sectors. I explore the reasons for this lag, and hypothesise that agriculture's lower growth rate compared to other sectors was due to Vietnam's weak rural development programme during the market transition period.

This thesis distinguishes three broad elements of an effective rural development programme: rural infrastructure; agricultural support services; and social services. My contention is that a weak rural development programme limited agricultural growth because it was ineffective in easing constraints that affected farmers from achieving greater efficiency in agricultural production. The most significant constraints were slow rural infrastructure development, inadequate agricultural services such as credit facilities and extension services, and the inability by most of the rural population to access these most basic elements of a rural development programme. On the other hand, the positive incentives created by decollectivisation and macro economic stability following Vietnam's switch to an outward-oriented market economic system were the major driving force behind the agricultural sector's higher annual average real growth rate between 1989 and 1995, in comparison to the period under central planning.

The analysis provides some support to the hypothesis posed in this study. The data shows that farmers were more efficient in cultivating rice, the traditional crop, and less efficient in other crops adopted more recently. Given the poor quality of data I collected and work with at time of research, these results are correlated in a qualitative analysis with a the lack of technical knowledge and imperfect market information on non-rice crops. My analysis suggests that government has a role to play in improving access to information by investing in communications, market development, provision of credit, and extension services, in order to improve farmer's efficiency in agricultural production. The thesis concludes with policy recommendations aimed at improving productivity and growth in agriculture in Vietnam, principally continued macro stability, enhancement of property rights and more investment in the elements of a rural development programme.
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<th>Full Form</th>
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<tr>
<td>ANU</td>
<td>Australian National University</td>
</tr>
<tr>
<td>CMEA</td>
<td>Council for Mutual economic Assistance</td>
</tr>
<tr>
<td>CPV</td>
<td>Communist Party of Vietnam</td>
</tr>
<tr>
<td>DAE</td>
<td>Department of Agricultural Extension of MAFI</td>
</tr>
<tr>
<td>DRV</td>
<td>Democratic Republic of Vietnam</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agricultural Organisation of the United Nations</td>
</tr>
<tr>
<td>GSO</td>
<td>General Statistical Office</td>
</tr>
<tr>
<td>HCMC</td>
<td>Ho Chi Minh City</td>
</tr>
<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
</tr>
<tr>
<td>LR</td>
<td>Likelihood Ratio</td>
</tr>
<tr>
<td>MAFI</td>
<td>Ministry of Agriculture and Food Industry</td>
</tr>
<tr>
<td>MFC</td>
<td>Marginal Factor Cost</td>
</tr>
<tr>
<td>MPP</td>
<td>Marginal Physical Product</td>
</tr>
<tr>
<td>MPS</td>
<td>Material Product System</td>
</tr>
<tr>
<td>MOF</td>
<td>Ministry of Finance</td>
</tr>
<tr>
<td>MWR</td>
<td>Ministry of Water Resources</td>
</tr>
<tr>
<td>MVP</td>
<td>Marginal value Product</td>
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<tr>
<td>VNIAS</td>
<td>Vietnamese National Institute of Agricultural Science</td>
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<tr>
<td>OLS</td>
<td>Ordinary Least Squares</td>
</tr>
<tr>
<td>PCF</td>
<td>Popular Credit Fund</td>
</tr>
<tr>
<td>PCS</td>
<td>Product Contract System</td>
</tr>
<tr>
<td>PNI</td>
<td>Produced National Income</td>
</tr>
<tr>
<td>RRD</td>
<td>Red River Delta</td>
</tr>
<tr>
<td>RSB</td>
<td>Rural Shareholding Bank</td>
</tr>
<tr>
<td>RVN</td>
<td>Republic of Vietnam</td>
</tr>
<tr>
<td>SBV</td>
<td>State Bank of Vietnam</td>
</tr>
<tr>
<td>SPC</td>
<td>State Planning Committee</td>
</tr>
<tr>
<td>SRV</td>
<td>Socialist Republic of Vietnam</td>
</tr>
<tr>
<td>SOE</td>
<td>State Owned Enterprises</td>
</tr>
<tr>
<td>TPS</td>
<td>Three Plan System</td>
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<tr>
<td>UNSNA</td>
<td>United Nations System of National Accounts</td>
</tr>
<tr>
<td>VBA</td>
<td>Vietnam Bank for Agriculture</td>
</tr>
<tr>
<td>WPS</td>
<td>Work-point system</td>
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<td>VLSS</td>
<td>Vietnam Living Standard Survey</td>
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MEASUREMENTS

The average annual exchange rates dong:US$ over the period 1989 to 1995 are as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>dong/US$</th>
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<tr>
<td>1989</td>
<td>4,730</td>
</tr>
<tr>
<td>1990</td>
<td>5,133</td>
</tr>
<tr>
<td>1991</td>
<td>9,274</td>
</tr>
<tr>
<td>1992</td>
<td>11,150</td>
</tr>
<tr>
<td>1993</td>
<td>10,640</td>
</tr>
<tr>
<td>1994</td>
<td>10,955</td>
</tr>
<tr>
<td>1995</td>
<td>11,025</td>
</tr>
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*dong* One unit of Vietnamese currency - the dong.

*ha* hectare

*kg* kilograms.

*sao* is a unit of land measuring 360 m²

*ton* one metric ton.
CHAPTER 1

THE AGRICULTURAL ECONOMY OF VIETNAM

1.1 OBJECTIVE AND SCOPE OF STUDY

In this thesis, I wish to evaluate the impact of economic policy changes on the agricultural economy of Vietnam from 1989 to 1995, or the period referred to as the "transition to the market". The importance of this inquiry into Vietnam’s agricultural economy is the impact that fundamental policy changes, implemented from 1988 under the policy of doi moi (renovation), had for increasing agricultural productivity and growth, and economic growth.

My objective in writing this thesis is to contribute to the literature focusing on Vietnam’s economy since the inception of doi moi in 1986. Presently, scholars of Vietnam generally recognise that the agricultural sector and the economy between 1989 and 1995 responded positively to the economic reforms instituted since 1988 (see Booth and Vo Nhan Tri 1992; Jamieson et.al. 1992; Fforde and de Vydler 1995; Ljunggren 1993; Kerkvliet and Porter 1995; Nguyen Van Bich 1994; UNDP 1995; World Bank 1995a and Vo Tong Xuan and Timmer 1990). These studies, however, do not adequately question whether such economic development policies were (and are still) appropriate for the agricultural sector. In this study, I aim to provide detailed analysis of the impact of the economic reforms instituted since 1988 on the agricultural sector, and contribute to the discussion on an appropriate economic development strategy for Vietnam’s agrarian economy at an early stage of development.

The comparisons that I make between the former central planning period and the period of the transition to the market aim to illustrate the achievements made in the latter period. Similarly, comparisons made between the agricultural sector and the industrial and services sectors are drawn in order to put the agricultural sector into economic perspective. It is not, however, an attempt to comprehensively evaluate the impact of economic policies on other economic sectors. Overall, this thesis evaluates the impact of economic policy changes on the agricultural economy of Vietnam from 1989 to 1995 from both a macro and micro economic perspective.

1.2 SOME OBSERVATIONS ABOUT THE VIETNAMESE ECONOMY

Vietnam claimed independence from France in August 1945, at the end of the Second World War. France maintained its power over Vietnam, and soon after the First
Indochina War (1946-1954) broke out. North Vietnam liberated itself from France in 1954, and a peace treaty was signed between the two countries, after it was agreed that the country be divided into two zones pending a national referendum. This never took place and the country remained divided into: North Vietnam or the Democratic Republic of Vietnam (DRV) and South Vietnam or the Republic of Vietnam (RVN). Another long and devastating war (the Second Indochina War) broke out between 1965 and 1975 in an effort by the government of the DRV to reunite the two parts of the country. It was not until 1975 that the country was reunited to form the Socialist Republic of Vietnam (SRV). As this thesis is concerned with the impact of central planning policies on the agricultural sector and economy of Vietnam, I follow the situation of the DRV in the period up to 1975 and then for the whole country in the period following reunification in 1975. For an account of the economic policies of South Vietnam and its economic development experience before 1975, see Nguyen Hung Tien (1978), Dacy (1986) and Beresford (1989:47-89).

In 1954, at the outset of modern economic development in Vietnam, economic planners adopted a socialist central planning framework to chart the country's path to modern economic growth and rapid economic development. At the time, economic growth was about three per cent per annum. In order to achieve economic development, agricultural production, as all other production, was collectivised to provide the resources for increasing industrial capacity (see Fforde and Paine 1987). This inherently inward-oriented economic development strategy, which afforded much protection to industrial development, was perceived by the socialist government at the time to be the main source of economic growth.

In 1988, after four decades of central planning, economic planners had achieved an annual real economic growth rate of 4.1 per cent on average (table A.1, Appendix A). While seemingly a great achievement, considering that Vietnam had been ravaged by two wars, economic planners had less cause to be jubilant when considering that the real per capita economic growth rate averaged a mere 1.4 per cent annually (ibid.). The year 1988 marked an important turning point for the agricultural sector when complete decollectivisation and a plan to strengthen Vietnam's rural development programme were introduced under a government decree known as Resolution No. 10. The year 1988

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1 A definition of inward-orientation and outward-orientation is provided in section 2.2.1 of chapter 2.

2 This growth was measured in 1989 constant prices (see Appendix A for notes on the measurement), and is based on the average between 1958 and 1988. Data on economic growth rates for the years 1954 to 1957 were not available.

3 Compared to Indonesia where the real per capita GNP growth rate was an annual average of 4.9 per cent between 1965 and 1984, and in Thailand where it was 4.2 per cent for the same time period (World Bank 1986:180), Vietnamese economic planners did have less to feel jubilant about.

4 A rural development programme includes government policies encouraging both public and private sector investments in rural development.
also marked the last year that the inward-oriented economic development model under central planning was implemented. Following March 1989, the government implemented fundamental economic reforms which included: a macro economic stabilisation programme; trade liberalisation and greater economic openness; and a shift to a market-oriented system of resource allocation (a single price system).

In 1995, seven years after the inward-oriented central planning economic development model was abandoned and fundamental economic reforms were embraced by the Vietnamese government, the economic record tells a different story. Over the transition to the market period (1989-1995) economic growth in Vietnam surged to 7.7 per cent on average, per annum (table A.1, Appendix A). Unlike the former central planning period, Vietnamese economic planners over this period have much cause to celebrate, considering that the annual average real per capita economic growth rate rose on average to 5.4 per cent (ibid.).

It appears that following the policy changes of 1988 and 1989, Vietnam’s economy performed very strongly compared to the former central planning period. A comparison of the agricultural sector over the two periods also indicates that growth in this sector improved dramatically, rising on average from 2.8 per cent between 1958 and 1988 to 4.3 per cent between 1989 and 1995 (figure 1.1). Between 1958 and 1964, agriculture accounted for 47 per cent of GDP; by the end of central planning in 1988 this share declined to 45 per cent, and at the end of 1995 it had fallen to 27 per cent (figure 1.2). The small decline in the share of agriculture in GDP during the central planning period compared to the transition to the market period indicates that a more rapid process of structural transformation occurred in the latter period compared to the former period.

**Figure 1.1 The average real growth rate of each economic sector during central planning & the transition to the market**

![Graph showing the average real growth rate of each economic sector during central planning & the transition to the market](Source: Table A.1, Appendix A)
During the central planning period, agriculture’s average contribution to the real economic growth rate was very low at 1.3 per cent in comparison to the other sectors (figure 1.3). This outcome is not surprising when taking into account the bias against agriculture inherent in the inward-oriented economic development model adopted by the Vietnamese government under central planning (I discuss this issue further in chapters 2 and 3). As a result of the positive changes in the economic policy framework aimed at agriculture in 1988 and the economy as a whole from 1989, one could have expected agricultural growth and its contribution to economic growth to be greater relative to the contributions of other economic sectors. Instead, we observe the contrary: real value added growth in agriculture was low compared to the other economic sectors. Low agricultural growth combined with agriculture’s declining share of GDP in the period of the transition to the market, culminated in a very low contribution to the annual average economic growth rate (1.6 per cent) over the period, which did not differ much from the
previous central planning period (figure 1.3). In this case, I find the outcome surprising, because it implies that economic policy changes were not effective in facilitating rapid growth in agriculture relative to other sectors. The importance of this observation prompted me to ask: How effective were the economic policy changes, since 1988, in facilitating agricultural growth during the period of transition to the market?

1.3 The hypothesis

It is my hypothesis that the weak rural development programme existing in Vietnam between 1989 and 1995 did not contribute significantly to agricultural growth. A weak rural development programme imposed a limitation on agricultural growth because it was ineffective in mitigating the factors constraining farmers from achieving greater efficiency in agricultural production. The most significant constraints were slow rural infrastructure development, inadequate agricultural services such as credit facilities and extension services, and the inability by most of the rural population to access these most basic elements of a rural development programme. On the other hand, the positive incentives created by decollectivisation and macro economic stability following Vietnam's switch to an outward-oriented market economic system were the major driving force behind the agricultural sector's higher annual average real growth rate between 1989 and 1995.

Accordingly, I argue in this thesis that the Vietnamese government's objective to transform Vietnam from an agrarian country to a modern industrial economy and to then derive the main source of economic growth from industry was not achieved under central planning. The inward-oriented economic policies adversely affected macro economic balances and incentive structures in all sectors of the economy, especially in agriculture where economic policies caused the greatest distortions. Although the government was partially successful in boosting economic growth by stimulating production incentives through management style reforms and price reforms from as early as 1981, these reforms did not address important macro economic imbalances. The macro economic imbalances that persisted throughout much of the central planning period eroded incentive structures and made high economic growth unsustainable. Consequently, up to 1988, the year before major economic reforms under doi moi were formally applied, Vietnam remained fundamentally a low-income agrarian country, with low economic growth.

5 In agriculture the product contract system (PCS) was implemented, while in industry the three plan system (TPS) was introduced. See chapter 3 for a detailed discussion.
It was not until 1989 that some of the necessary economic policies for sustaining economic growth in all sectors were set in place. These policies carried forward from the economic reforms under doi moi. In March 1989, the government embarked upon a process of economic change through the implementation of self-imposed economic reforms. These reforms sought to stabilise a highly unstable economy, adopt a market-oriented economic system by abandoning the centrally-planned economic system and open up its previously closed economy to international trade, while retaining a single political party system - the Communist Party of Vietnam (CPV). Further economic reforms were implemented up to 1995 under doi moi, especially in land law and the financial sector.6

These economic reforms and policies mark a significant change in the Vietnamese government’s economic development strategy compared to the former central planning period (1954-1988). The government changed Vietnam’s economic development orientation from one that was strongly inward-oriented to one that is moderately outward-oriented. These fundamental changes set in place some of the necessary conditions for improving incentive structures across all sectors of the economy. These conditions can be largely described as: a stable macro economy - low budget deficits and inflation; a moderately open economic and trade system; and a system of allocation by prices determined through supply and demand forces. In contrast to the former period under central planning when economic growth was low on average, the economic reforms implemented by the government since the inception of doi moi achieved high economic growth and promoted rapid economic development up to 1995.

Based on the experience of Asian countries achieving rapid sustainable economic development, which I review in chapter 2, I argue that the broad elements of an appropriate economic development strategy for an agrarian country at an early stage of economic development includes an efficient rural development programme couched in a stable macro economic environment. (These elements are mentioned in section 1.4.1, page 7 and discussed in detail in sections 2.4.3 and 2.4.4 of chapter 2). Following this development strategy, I argue that the government of Vietnam from 1989 to 1995 made significant progress in achieving a sound macro economic environment but was weak in instituting an effective rural development programme.

In the course of developing this argument in the following chapters, I will answer the following questions:

- What is an appropriate policy framework for agricultural development and growth for a low-income agrarian country, such as Vietnam, at an early stage of economic development?

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6 Economic reforms beyond 1995 have not been considered in this study.
• Why did Vietnamese policy makers decide to abandon the inward-oriented economic development model after 35 years of central planning?

• Which new policies were implemented to stimulate the agricultural sector and the economy, and how effective were they?

• Were farm households producing efficiently from an allocative and economic viewpoint after the introduction of economic reforms in 1988 and 1989, and which factors constrained their ability to allocate resources efficiently?

• How do these constraints relate to the wider economy, especially to the rural development programme at the time?

• Does the potential exist for improving farm household efficiency and productivity in the post-1995 period, and how can it be achieved?

1.4 METHODOLOGY

1.4.1 A framework for evaluating Vietnam’s agricultural economy

In order to support my hypothesis, I use a neo-classical economic framework to discuss and evaluate Vietnam’s achievements in the agricultural sector and the economy during the market transition period. This framework is based on a combination of theories from the neo-classical economic development and trade literature (following Johnston and Mellor 1961; Krueger 1978, 1981; Oshima 1987, Sachs and Warner 1995 amongst others). It is formulated with the specific purpose of determining an effective development strategy for an agrarian country at an early stage of economic development. It does this by determining the necessary policies required for achieving rapid agricultural and economic development in a typically “Asian” country. The importance of focusing on Asia is discussed in chapter 2.

In brief, this framework considers an “inward-oriented” economic development strategy as detrimental to economic development for a low-income agrarian country in the long run, especially for Vietnam which is heavily dependent upon its agricultural sector. This is because the mix of policies adopted under such a strategy is biased against agriculture. While the policies appear rewarding in the short run for an agrarian economy in the sense that an industrial sector emerges, too much reliance on protecting industry at the expense of agriculture over the long run leads to a slow down in exports, increase imports, and low economic growth (Little et.al. 1970; Balassa 1983; Krueger 1981). In contrast, the framework sees an “outward-oriented” economic development strategy, which includes an effective rural development programme, as conducive to high economic growth and rapid economic development. This is because the mix of macro economic and trade policies under this strategy is neutral to the development of all economic sectors and does not bias development in one sector in favour of another.
over the long run. And because an agrarian country at the early stages of development is most productive in its agricultural sector, implementing an effective rural development programme, which delivers rural infrastructure, agricultural services and social services efficiently to the rural sector, facilitates agricultural production and stimulates the economic growth process. All of this can impact transaction costs facing farmers and thus lower the total cost of purchasing inputs and increase the net revenue received from sales of farm output.

I argue in this thesis that there are essentially three crucial elements for a successful economic development strategy in the case of Vietnam at its early stage of economic development: (i) an effective rural development programme; (ii) private property rights and decision making powers; and (iii) a stable macroeconomic environment. These elements and their part in the framework are now reviewed.

1.4.1.1 Rural development programme

An effective rural development programme itself includes three essential elements: (i) rural infrastructure; (ii) agricultural support services; and (iii) social services. Rural infrastructure includes the provision of: rural roads; electrification; communication; irrigation and dikes; processing and storage facilities, and market development. Market development, in turn, is facilitated by infrastructure such as roads and communication, and links agricultural producers to markets, which can lower transaction costs of buying farm inputs and selling farm outputs. Agricultural support services includes: research capacity; extension and technical services; credit; and marketing. Social services include policies and public investment in education and health, that improve human capital. In Vietnam, the provision of social services is an important element for economic development, especially when considering that 90 per cent of the country's poor live in the countryside (SPC and GSO 1994; World Bank 1995a).

All these elements are pertinent to the development process because they mitigate the impact of factors constraining farmers' production efficiency, thereby not only facilitating agricultural production efficiency but also improving agricultural productivity. Constraints hindering the efficiency of farmers usually include: low agricultural productivity from a limited amount of land or poor fertility; poor irrigation to support cropping intensification and diversification; limited access to markets for buying inputs and selling agricultural output; lack of knowledge of cultivation techniques and market prices; lack of education to acquire knowledge about productivity-enhancing technology and new techniques; poor access to extension services, limited or no access to credit for supporting agricultural production; poor health and education impairing labour productivity; amongst numerous other constraints.
Because of market failure\(^7\), however, the efficient provision of most essential rural infrastructure, agricultural support services and social services cannot be achieved through the market system (Meier 1983:137-138; Timmer et al. 1983:155). This limitation provides the justification for government to play an important role in providing these public goods and services.

1.4.1.2 Private property rights and decision making powers

Underlying all efficient economic decisions is the assumption that private property rights are fully vested in the good or services that the decision is being made for. This attribute is important as it allows economic agents to efficiently allocate resources they own and control. In the absence of property rights, or if property rights are attenuated, the ability of the economic agent to make efficient economic decisions will be affected.

During central planning in Vietnam, farm households lost their rights to private property and the right to make decisions about what to produce, how to produce it, when to produce it, and how much of it to produce. All these decisions were replaced by the planning system. Assuming that efficient use of resources requires that users have the power to determine the best way to use those resources, it seems logical that the loss of ownership rights over all factors of production, including the loss of decision making power, posed a serious obstruction to incentives for efficient production, since all links between agricultural producers and the final product were removed. Consequently, restoring or improving the tenuation of property rights should have a positive impact on production incentive.

1.4.1.3 Stable macro economic environment

Another empirical observation of countries successfully achieving rapid economic development is that an effective rural development programme was couched in a stable macro economic environment (Reidel 1993). Therefore, in addition to providing public goods and services, the government also has an important role to play in achieving and maintaining a stable macro economic environment through policy intervention. The justification for this intervention is that providing a stable macro economy enables efficiency in private sector investment and economic growth, both crucial to long term economic development.

The elements for achieving a stable macro economic environment are: rational management of public finances; an open trade regime; and policies encouraging the development of competitive markets. Rational management of public finances requires

\(^{7}\) Market failure arises when markets cannot price a good or service because of non-rivalrous, non-excludability and non-rejectability associated with the good or service. Market failure is further discussed in section 2.4.5.1 in chapter 2.
that the government exercise fiscal and monetary policy discipline; ensure adequate budget balances; and use non-inflationary modes of financing budgetary expenditures. An open trade regime requires that the mix of trade policies be neutral to growth in all sectors, that no one sector is discouraged from developing efficiently, and that a single appropriately valued currency system is in place. Policies encouraging competitive market development need to focus on factor markets, especially land, labour and credit (capital) at the early stages of development, as well as removing barriers to free trade and competition set up by government monopolies.

1.4.2 Evaluating the impact of economic policies on the agricultural sector and the economy

Although I provide a brief assessment of Vietnam's agricultural sector and economy during the central planning period from 1954 to 1988, the major part of this study is devoted to an analysis of the impact of economic policies on the agricultural sector and the economy during the market transition period.

In this part, which is the macro economic analysis segment of my thesis, I use a number of input indicators to gauge the extent to which rural development policies were effectively implemented in Vietnam over the two periods. Input indicators include indices of public investment in rural infrastructure, agricultural services and social services, such as health and education in Vietnam. In evaluating the macro economic environment in which Vietnam's rural development policies were implemented, the following are indicative of the government's actions to provide a stable macro economic environment the inflation rate, budget balances, modes of financing the budget deficits, current account balances, and trade development indicators. On the output side, the impact of rural development and macro economic environment on agricultural development can be measured by real growth in the agricultural sector; agricultural land and labour productivity indices; the area of land brought under irrigation; the level of road density (kilometre of roads to square kilometre of land); and other indicators.

1.4.3 A framework for evaluating farm household efficiency

In order to support my claim that the slower growth observed in the agricultural sector between 1989 and 1995 was due to a weak rural development programme and to evaluate the impact of economic policy changes on the agricultural sector, I assess agricultural production data from 100 farm households for their efficiency in resource use and in achieving their optimal production outcome. This part of the thesis is the micro economic assessment of economic policies on farm household production. The link between a rural development policy and agricultural growth is based on the understanding that the impact of a rural development programme at the micro level eases (both directly and indirectly) the factors constraining agricultural producers from
achieving greater efficiency from available resources. Consequently, I would expect that a weak rural development programme, which does not ease the constraints faced by farmers, results in low levels of efficiency in resource use and production at the farm level. In order to show this, I use a profit maximisation model based on the neo-classical theory of the firm to derive an allocative and economic efficiency index for the 100 farm households. This model follows the theoretical constructs of Yotopolous and Nugent (1970).

The agricultural production data I used in this study is from 100 farm households in the agricultural commune of Quoc Tuan in the Red River Delta. Although a greater sample of cross-sectional data from other farming communities across Vietnam would have been ideal for this study, restrictions on my travel to the Vietnamese countryside at the time of research in 1991 and 1992 made it difficult for me to collect data. Nevertheless, my host institute in Vietnam: the Vietnamese National Institute of Agricultural Science (VNIAS). VNIAS provided me with several subsets of data from farm households across North Vietnam. Unfortunately, only the set from Quoc Tuan was suitable for analysis the analysis I had in mind, since it had the most detail production data. Although the data is limited to one geographical area of Vietnam, which as described in section 4.4 of chapter 4, is an area relatively well-endowed with rural, agricultural and social infrastructure, it is representative of similar areas across Vietnam where their inhabitants enjoy good access to rural infrastructure and services. The data, however, is not representative of remote areas lacking access to the most basic elements of rural infrastructure and agricultural and social services.

This limitation does not detract from the discussion held in this thesis, since the results found for Quoc Tuan may be extrapolated for the areas facing less ideal conditions. For example, if farmers in a relatively well-endowed agricultural commune, such as Quoc Tuan, are constrained from achieving greater economic efficiency because of limitations in rural development, then the constraints facing the farmers of more remote agricultural areas must be even more limiting on the economic efficiency.

The farm household production data was assessed within a neo-classical profit maximisation model, and tested to confirm its applicability to the underlying assumption of profit maximisation behaviour. The neo-classical profit maximisation model offers a convenient tool for providing useful information on the economic behaviour of the households in relation to the way they use resources in agricultural production. Specifically, the model allows an evaluation of the efficiency with which households allocate their resources and quantifies this finding in the allocative efficiency index. Similarly, derivation of the marginal cost of production related to each production activity allows for an evaluation of the household's overall efficiency behaviour. In addition, the model ascertains whether households are achieving the maximum possible profit in the production process.
The profit maximisation model is applied to four crops: spring season rice (or spring rice); main season rice (or main rice); non-rice food crops (a combination of sweet potato, corn and potato crops); and cash crops (a combination of garlic and onions) to derive the production parameters of each crop. Based on the statistical significance of the profit maximisation model for each crop, the allocative efficiency index for each crop production is analysed in order to evaluate how farm households allocated their resources within the production process and how the allocation of resources in one crop compared with another.

Using the efficiency measures of the farm households, further analysis is carried out to explain the variation in the average farm household's overall profit maximisation and overall resource allocation according to a number of economic factors. Factors such as technical efficiency, diversification of household production, level of consumer demand within the household and the level of food availability in the household were identified as factors likely to influence the ability of farm households to produce efficiently. This was analysed using multivariate regression analysis. I had hoped for a more direct link of rural development factors (such as quality of rural roads, the availability of agricultural support services, including rural credit) with the deviations in farm household efficiency, however, the limitations of the farm household production data acquired in Vietnam, as explained in section 1.5.3 below, prevented me from realising this aim in this study. Nevertheless, the available factors, especially technical efficiency and diversification of household production are clearly influenced by a rural development programme, and their relationship with the deviations in household production efficiency allows for an indirect assessment of the impact of a Vietnam’s rural programme at the micro level. These findings are then discussed in light of the economic policy changes implemented since 1988.

1.5 DATA SOURCES

1.5.1 Data collection

The materials and statistical data used in this thesis were obtained from both the Australian National University (ANU) and fieldwork in Vietnam. English, French and Vietnamese language sources were consulted at the ANU, while Vietnamese language materials and statistical data were collected during fieldwork in Hanoi, Vietnam, between July 1991 and March 1992, and September to November 1992.

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8 All crops cultivated were used to represent the farm households agricultural production because the quality of the data in other production activities was too poor to be used in the profit maximisation model. These crops average almost 75 per cent of the average household's net income and, therefore, representing the major proportion of household income.
The data I collected during fieldwork centred on both the macro and micro economic components of this study. Macro economic data was collected at the central level. The chief source of this data was the General Statistical Office (GSO) in Hanoi. Data from the GSO was obtained primarily from published documents spanning 40 years (1950s-1990s). The bulk of the macro economic data collected, compiled and used in this study was directly attained from various departments of the GSO in Hanoi, specifically the Ministry of Agriculture and Food Industry (MAFI) and the Ministry of Water Resources (MWR).

In this regard, it is important to mention that at the time of fieldwork in 1991 and 1992, this macro economic data was extremely difficult to attain. Either the data was collated from published statistical compilations, which are referred to in Appendix A, or from data compiled by employees of the GSO, and that came with a large price tag. Both sources of information presented their special circumstance. The difficulty with the former was that having once purchased the statistical books I had to get them out Vietnam. Such books were classified and marked “secret data”. But the fact that I was able to buy such books from “second-hand book shops” or more appropriately have “professional book hunters” locate them for me in 1991-2 meant that some degree of declassification was being allowed by the authorities. Nevertheless, I was required to clear these books with the Ministry of Interior before leaving the country. Surprisingly only one book was confiscated and, at the time, I had not really appreciated its importance. It was a statistical book with national accounts data from the 1960s, which only later when I realised its importance I to spend many months in Australia piecing together some fragmentary national accounts from other sources in order to get a complete series. The second source of data, which was compiled for me by the GSO, was extremely difficult to verify or cross-check with other sources. As such, and for the purpose of this analysis, I have taken the data upon good faith; however I hasten to add that there is a good possibility that Vietnamese national account data could be flawed and the reasons why are addressed in section 1.5.2 below.

In addition, I collected micro economic data necessary for evaluating the efficiency of farm households at the farm level. This data was originally collated by researchers from VNIAS and provided to me by Professor Dao The Tuan, Director of VNIAS. After evaluating the data, I found only one set to be suitable for empirical analysis. This is a set of farm household production data collected from Quoc Tuan agricultural commune in Nam Thanh district of Hai Hung province in the Red River Delta in 1990/1991. The data set provides a survey of production activities and income structures of 100 farm households over the agricultural year - February 1990 to January 1991. I elaborate on the quality of the data in section 1.5.3, page 15.
1.5.2 A note on macro economic data

Official sources of Vietnamese statistics present numerous problems. Amongst the most important problems are: the unreliability of the data; its inconsistency; and the unavailability of relevant information. It is difficult, if not impossible, to cross-check Vietnamese data, as its sources were shrouded in secrecy. Vietnamese statistical sources rarely explain how the data series were compiled. In addition, Vietnam up to 1990 followed a national accounting system based on the Soviet Union method of Material Product System (see Appendix B). As a result, much economic activity, especially services in the non-material product sector, went unrecorded. Another distortion in the recorded data was the fact that most prices used in valuing economic output were determined by a price-fixing authority. Consequently, much of the output of the non-prioritised sectors (e.g. agriculture and non-government services) was under-valued through biased terms of trade compared to prioritised sectors of the economy (e.g. industry).

Yet another limitation of Vietnamese data is that published statistics focus mainly on the output side rather than the input side. For example, the GSO extensively reported the level of output for food crop production in all provinces each year. However, GSO statistics do not report the use of agricultural inputs, such as chemical fertiliser, labour or any other inputs used in production by crop or by region. Agricultural statistics typically focus on cultivated area, yield and production.

Another reason why Vietnamese data should be treated cautiously is the unreliability of reporting from the production unit. It is recognised by many Vietnamese and foreign scholars that the data reported by cooperatives, state-owned enterprises (SOE), and other firm level production units did not always reflect the real level of production. The arbitrary and unrealistic production targets set by higher levels of administration were to blame for false reporting of production plans and balance sheets from cooperatives and SOE (Quang Truong 1985:99).9 The degree to which this type of misrepresentation distorts the national data cannot be ascertained. However, with no other means of validating production statistics, official data from the central planning period should be treated as indicative only of trends rather than absolute outcomes.

The implementation of the United Nations System of National Accounting (UNSNA) from 1990 improved the reliability of the available macro economic data in Vietnam. Subsequent to the adoption of the UNSNA, the GSO readjusted earlier economic output figures back to 1986. Therefore, the figures used in this thesis from 1989 to 1995 are generally reliable.

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9 It was common practice for cooperatives to prepare two sets of plans and keep up to three sets of balance sheets. One set of plans was used officially to submit to higher levels for approval while the other set was used in the cooperative for actual planning and distribution of resources.
1.5.3 A note on farm household data

It should be noted that acquiring farm household level data was extremely difficult at the time of fieldwork in 1991 and 1992. As a foreign researcher, I faced numerous difficulties in receiving permission to observe work in agricultural communes, to collect data and to talk to farmers freely. Moreover, although visiting agricultural communes was made possible, provided I had an official escort accompanying me at all times, residing in communes was not permitted for foreigners. Instead, I stayed at official district guest houses and then travelled to the communes where I collected data. Given these restrictions it would have been extremely time-consuming and costly to conduct my own survey and to monitor farmer's economic activities and behaviour over the course of an agricultural year. Consequently, I relied on the farm household production data collected and provided by VNIAS.

In 1992, I received farm household production data from five different communes in the province of Hai Hung. These data were the most recent collected by VNIAS after the main economic reforms of 1988 and 1989 had been implemented, and reflected the agricultural year spanning February 1990 to January 1991. The data, however, was very poor. Only one agricultural commune - Quoc Tuan - had the least bad data. In general, the production data is sufficient to allow for the measure of farm households' production efficiency using a profit maximisation model (see sections 4.4 and 4.5, chapter 4). However, the data is not robust enough to lend itself to more rigorous analysis than that performed in this thesis. As it is cross-sectional data, determining the economic behaviour of agricultural producers over time was not possible.

Another important limitation I faced in my analysis, which I should point out at the very outset of this study, is that I did not have any data related to the observed or recorded price of inputs and outputs transacted by farm households from these communes. As such, estimating the production parameters of various crop production using a profit maximisation model, as discussed in chapter 4, had to rely on a reconstruction of price data that farm households' were likely to face in the agricultural commune of Quoc Tuan. Price data was acquired through VNIAS, through their collection of historical records of output and input prices from various markets in Nam Thanh district (the district where Quoc Tuan agricultural commune is situated). Since I did not have the exact prices farm households paid for inputs and expected for outputs, the prices which are discussed in section 4.4.1 of chapter 4 and Appendix F are assumed to be the best available information for conducting this analysis. This subject is further discussed in chapter 4 and Appendix F.

Moreover, because the farm household data is focused on production, and lacks information about households' consumption and expenditures, as well as their risk preference, it does not allow a formal evaluation of attitudes towards risk and utility-maximisation via a measurable model. Nevertheless, based on the statistical evaluation...
of the profit maximisation model, the results were sufficient to allow an evaluation of farm households' efficiency in agricultural production, and to make some comment about the shape of their underlying utility function. I would have liked to collect better data from agricultural communes to allow for a more precise evaluation of farmer's economic behaviour but, unfortunately for the reasons mentioned above, collecting data this way would have been costly, time consuming and difficult.

1.6 Structure of thesis

In chapter 2, I present the analytical framework of this thesis. Most importantly, this chapter specifies the main elements of an economic development strategy considered appropriate for a low-income agrarian country, such as Vietnam. The chapter starts by explaining why many developing countries adopted an inward-oriented development strategy at the start of their development process, and what were the consequences of that strategy. It contrasts this strategy with an outward-oriented development strategy and explains the reasons why many developing countries have switched to this strategy, if they had not already implemented it from the outset of development. In relation to a low-income agrarian country, the main emphasis of an outward-oriented development strategy is that it stresses the need to raise agricultural productivity and establish outward-orientation right from the outset of development.

Chapter 3, provides the reader with the macro conditions facing agriculture in the 1990s. In light of the analytical framework presented in chapter 2, chapter 3 contrasts the former central planning period with the transition to the market period (1989-1995). The chapter provides evidence to support the claim that a weak rural development programme was ineffective in improving the conditions facing agricultural producers in Vietnam and, as a consequence, did not contribute significantly to agricultural production. Alternatively, I argue that the growth witnessed in the agricultural sector during this period was more the result of improved incentive framework through private farming and a stable macro economic environment.

In order to provide some evidence that in Vietnam low agricultural growth was related to a weak rural development programme at the micro level, chapter 4 uses farm data to measure the economic efficiency of agricultural producers. The argument is that a weak rural development programme is a key factor limiting the agricultural producer from achieving greater efficiency in production and, hence, achieving greater output. In order to measure farm household efficiency, I assume that agricultural producers behave as profit maximisers. Following this assumption, the theoretical and empirical model for measuring the agricultural producer's allocative and economic efficiency is presented, and all estimated models are statistically tested for the applicability of the production data to the profit maximisation restrictions. Following this test, the estimated production parameters and efficiency indices are assessed.
Chapter 5 explores the results of the analysis in chapter 4, with the specific purpose of explaining why farm households depart from the optimal outcome, based on the imposed profit maximisation model. Departures from the optimum can be explained by factors such as the level of technical knowledge of farmers, the aversion to risk, availability of agricultural services and many other factors. However, as discussed in that chapter, the results of the statistical analysis were inconclusive, probably because of the poor data, that I collected. As a result, the chapter qualitatively evaluates the impact of various factors influencing the average farm household’s economic behaviour.

Chapter 6 summarises the main findings of this thesis, and makes a number of policy recommendations. Most importantly, it argues that Vietnam should maintain its pace of economic reforms, but placing more emphasis on implementing policies that facilitate increases in agricultural productivity, such as strengthening its rural development programme, and generating the conditions for high economic growth and rapid economic development. The implies that strengthening Vietnam’s weak rural development programme has the potential to lift its agricultural productivity and release the forces of economic growth, provided that the incentive structure related to property rights and decision-making powers are further improved and that macro economic stability is maintained.
2.1 INTRODUCTION

This chapter sets out the analytical framework to assess the impact of economic policies on the agricultural economy of Vietnam. I review the agricultural development, economic development and trade literature relevant to an agrarian country at the early stages of economic development, with reference to those Asian countries successfully achieving swift progress in economic development.\(^{10}\) I contrast the two strategies that have been influential over time and that were adopted in Vietnam: an inward-oriented and outward-oriented economic development strategy, as Vietnam adopted the first strategy during 35 years of central planning (1954-1988), and switched to the second after sweeping reforms in 1989.

The discussion in this chapter contrasts the two strategies by focusing on their impact on the incentives of agricultural producers, macro economic stability and investment for raising agricultural productivity. The model of economic development through agriculture, developed in the following pages, is applied to an analysis of Vietnam’s agricultural economy in chapter 3.

In section 2.2, I define inward-orientation and outward-orientation. Following these definitions, I ask, in section 2.3, why economic planners in some agrarian countries, including Vietnam, opted to develop industry through inward-orientation rather than start with agriculture as a major source of economic growth? Why were these economic planners misguided in the beliefs they held about the role of agriculture at the early stages of development? What consequences did their strategy have on agriculture and economic growth, and the overall economic development process? In section 2.4, I contrast the outcome of countries adopting an economic development strategy that focuses on agriculture at the early stage of economic development. In this

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\(^{10}\) Some development economists have expressed the relevance of a Taiwanese economic development model for Vietnam, see Dapice (1993) and Reidel (1993).
section, I ask: how does agriculture contribute to economic development? What essential steps are required to achieve rapid progress in economic development for an agrarian country? What role can government play at an early stage of economic development? How can agricultural development be initiated and sustained for economic development? Section 2.5, presents the major conclusions of this chapter.

2.2 INWARD-ORIENTATION VERSUS OUTWARD-ORIENTATION

2.2.1 Defining inward and outward-orientation

An inward-oriented economic development strategy is defined as an approach to economic development that affords protection to domestic industries through “import-substitution” policies, such as tariffs, quantitative controls, import and export licensing, and overvalued foreign exchange rates. Import-substitution policies provide economic incentives for producers to manufacture an item for domestic consumption rather than for export, greater than would otherwise exist in a free trade situation (Krueger 1981:8). In addition, this strategy follows the infant industry argument which maintains that a new industry which is viable in the long run should be protected in the short run (see Myint 1971 chapter 6; Little et al. 1970:118-121; Krueger 1981:5-7).

The alternative, an outward-oriented economic development strategy, is defined as a mix of both import-substitution and export-promotion policies that provide domestic producers with the incentive of greater profits to sell overseas than in the domestic market (Krueger 1981:10). Although import-substitution policies are part of a developing country’s outward-oriented strategy, they are not an end in themselves, but only a first step on the way to developing an internationally competitive economy (Gillis et al. 1992:459). Typically, the mix of policies which promote exports may include removing existing trade barriers, devaluing the exchange rate, and relying on prices set in the market to allocate productive resources (World Bank 1987:93).

In defining these development strategies for practical purposes, Sachs and Warner (1995:29) have focused on trade policy, which is perhaps the most important element of the overall policy framework. The authors judged a country to be an inward-oriented (closed) economy if it has at least one of the following characteristics: non-tariff barrier covering 40 per cent or more of trade; average tariff rates of 40 per cent or more; a black market exchange rate that has depreciated by 20 per cent or more relative to the official exchange rate, on average; a centrally-planned (socialist) economic system (as defined by Kornai 1992); and a state monopoly on major exports. Conversely, a country is

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11 According to Sachs and Warner (1995:60) among developing countries, open trade has tended to be correlated with other features of a healthy economy, such as macro economic stability and the reliance on the private sector as the main engine of growth.
judged to be an outward-oriented (open) economy if it has none of these five conditions. Sachs’ and Warner’s characterisation provides a useful tool with which to evaluate Vietnam’s economic development strategy in chapter 3.

The accepted standard in the economic development literature is that an outward-oriented strategy is a more acceptable strategy for economic development than an inward-oriented strategy (see Krueger 1978, 1981; Reidel 1988; Sachs and Warner 1995). Because the overall policy framework under outward-orientation is neutral, it allows export expansion (of agricultural and labour-intensive industrial tradables) and efficient import-substitution to go hand in hand (Balassa 1983:216), and avoids the high economic costs and the inefficient economic development associated with an inward-oriented development strategy (Krueger 1981). These issues are further taken up in the remainder of this chapter.

2.2.2 Choosing to develop the industrial sector before the agricultural sector

In the period since the end of the Second World War, economic planners in many developing countries have held vastly different views on how economic development should be initiated, and how they hoped it would be sustained in the long run. At the time, many developing countries characterised by low levels of per capita GDP and little or no industrial capacity to manufacture goods, that would otherwise have been imported for consumption in the domestic market, chose to develop the industrial sector as the engine of economic growth and the means for economic development through an inward-oriented strategy. Consequently, such countries became characterised by a distinctive (market-oriented) economic system that assigned the state sector the predominant role of industrialisation, though not the monopoly on industrial ownership as in centrally-planned economies.

In the fifty years of economic development since the end of the Second World War, compelling evidence has emerged to show that the countries most likely to succeed in sustaining economic development in the long run are those starting with an outward-oriented economic development strategy, or those correcting their development strategy by switching to outward-orientation after a short period of inward-orientation (Krueger 1978, 1981; Sachs and Warner 1995). In addition, numerous lessons have emerged as to why developing countries with large agricultural sectors, and characterised by low agricultural productivity, need to initiate their economic development process by adopting a strategy that allows agriculture to do well right from the outset (see Oshima 1987). On the other hand, taxing agriculture through economic policies that protect

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12 However, this remark is not a generalised theoretical argument or empirical observation for all developing countries. For example, Hong Kong and Singapore, both have had a successful development record that did not start from agriculture as the basis of economic growth.
industrialisation, has had a limited impact on agricultural and economic growth over the long run (Little et al. 1970; Krueger et al. 1992).

One good, and perhaps the most basic, reason why an outward-oriented economic development strategy is appropriate for an agrarian economy at an early stage of development is that it allows agriculture to be the basis for economic growth while allowing it to develop in line with non-agricultural sectors. This is because the overall mix of economic policies is neutral to all sectors and does not discourage the production of tradables goods and services across all sectors of the economy. Since an agrarian country has a comparative advantage in producing tradables, such as agricultural and labour-intensive rural products, at an early stage of development, such tradables are profitably sold abroad (Krueger et al. 1992). The economic development literature on Asia, in particular Japan and Taiwan, provides strong empirical evidence to support this approach to economic development (see Lee 1971; Ishikawa 1976; Okhawa et al. 1969; Krueger 1978; Okhawa and Shinohara 1979; Anderson and Hayami 1986, Oshima 1987). Other countries, such as Malaysia and Thailand, that have emulated a "Taiwanese approach" to economic development have more recently exhibited similar development successes (see Okita 1980; Oshima 1987; Reidel 1993). (An outward-oriented economic development strategy for an agrarian country is detailed in section 2.4)

2.3 INAPPROPRIATELY STARTING ECONOMIC DEVELOPMENT WITH AN INWARD-ORIENTED DEVELOPMENT STRATEGY

2.3.1 Misguided beliefs

Why then did economic planners in some developing countries, especially low-income agrarian countries such as Vietnam, opt to develop industry through an inward-orientation rather than start with outward-orientation focusing on agriculture (where its comparative advantage lies) as a major source of economic growth at the outset of development? That is, why were economic planners misguided in the beliefs that they held about the role of agriculture at the early stages of development?

As this thesis is concerned with Vietnam, which for most of the period since the end of the Second World War was a centrally-planned economy, it is necessary to distinguish the beliefs held by economic planners adopting this economic system, as opposed from those adopting a market-oriented economic system, as to why industrial development should be promoted ahead of agriculture, and which policies should be adopted to this effect.
2.3.1.1 Policies for industrialisation in centrally-planned economies

To understand the industrial development of centrally-planned economies of a socialist type, it is necessary to trace back the origins of these policies in the former Soviet Union which later became the model for Vietnam (see Fforde and Paine 1987). The attitude to industrial development in centrally-planned economies can be traced back to Marx's "original socialist accumulation", which inevitably followed the brutal expulsion of peasants from their land and enforcement of high saving rates, thereby ensuring the initial push to speed up the growth of capitalism through industrialisation (see Marx chapter 26 in Tucker 1978:431-434). Seizing Marx's idea, Preobrazhenskii (1965) argued that something similar must occur under the centrally-planned economic system. This theory revolved around the argument that turning the terms of trade against agriculture, 'the price scissors' as Preobrazhenskii called it, would speed the rate of accumulation for industry without affecting workers in the urban sector.

Although Preobrazhenskii's approach was initially rejected by the Communist Party in the Soviet Union in fierce debates, Stalin in July 1928 embraced this "coercive" model, to quote Ellman (1989:105), when he levied the “tribute” on the peasantry which effectively turned the terms of trade against agriculture. Under central planning farm lands were collectivised, agricultural producers lost their private property rights and their ability to make allocative decisions, in order that the central government could mobilise resources from agriculture for development of the industrial sector. A fundamental feature of this approach to industrialisation is that state ownership of the factors of production affected the incentive structure facing producers, especially in view of the fact that the allocation of resources and investment across all sectors of the economy was determined by administrative guidelines and guided by prices set according to administrative principles rather than market forces.

Although this Stalinist model became a dominant force in the socio-politico-economic development of the Eastern European countries, China, North Korea and Vietnam all embracing socialism from the mid 1940s, and subsequently of many other developing countries, this model is now everywhere completely abandoned, with the exception of North Korea. The reasons for abandoning this model in the case of Vietnam are discussed in chapter 3.

2.3.1.2 Policies for industrialisation in developing market economies

Favouring industrialisation was not only a premise of socialist economic planning, but also of market-led economies. There is a view held by many economists that the

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13 For a list of countries formerly under the socialist planning system see Kornai (1992:6-7).
14 For a general treatment of this issue see Csaba (1990), de Vylder (1990), Gardner (1989), Kolodko et al. (1991), Kornai (1990) and Ronnas and Sjoberg (1990).
bias towards industry stemmed primarily from misinterpretation of some of the main theoretical models which were the orthodoxy in the 1950s and 1960s (Staatz and Eicher 1984; Oshima 1987; Timmer 1988; Warr and Martin 1990). Economic planners neglected agriculture because they believed that agricultural resources could be extracted for the development of industry and, to some extent, that resources were not required to modernise agriculture. Warr and Martin (1990:2) attribute these beliefs to a misinterpretation of two common generalisations about agricultural transformation in a country's economic development process: namely, i) the higher economic returns to mobile factors of production in industry than in agriculture (the productivity difference expounded in dual-economy models) provides ii) the economic incentives for resources to move out of agriculture during the economic growth process (the decline of agriculture described in growth models).

A number of development practitioners in the 1950s and 1960s were very influential in convincing economic planners in developing countries to adopt an inward-oriented development strategy to promote industrialisation based on the productivity difference argument. The Prebisch-Singer thesis, advanced in 1950, postulated that because of a secular tendency for the international terms of trade to turn against countries that export primary products and import manufactures, the scope for growth through agricultural and other primary export production was extremely limited, and as a result priority should be given to the import-substitution of manufactured goods over the export-promotion of agricultural goods (Prebisch 1950, 1963; Singer 1950). In similar fashion, Hirschman (1958:109) argued that government investment should be centred on industry as it would lead to more rapid and more broadly based economic growth than investment in agriculture which lacked any "direct stimulus to the setting up of new activities through linkage effects". In the dual-economy models, such as those of Lewis (1958), Ranis and Fei (1961) and Fei and Ranis (1964), which were developed to understand the relationship between the traditional agricultural sector and the modern industrial sector, the agricultural sector was incorporated into the market as a means for equating productivity differences and removing dualism. However, most interpretations of these models, which became the main teaching paradigms, ignored the factors needed to modernise the traditional agricultural sector (Timmer 1988:288). Essentially, this inward-oriented approach to development strongly reinforced the view of productivity difference between agriculture and industry.

The other misinterpretation concerns a generalised finding of economic growth theory. Growth models attempt to explain the process of agricultural transformation from a primarily agrarian to an industrial economy (see for example, Clark 1940; Kuznets 1964, 1966). During the growth process, the agricultural sector experiences the

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15 For a full treatment of these issues see Ingersent and Ghatak (1984:97-112), Staatz and Eicher (1984:5-7) and Hayami and Ruttan (1985:22-33).
inevitable occurrence of secular decline, or a decline in the economic importance of the agricultural sector relative to other sectors. Secular decline occurs when rapid growth in agricultural productivity, emanating from technological changes, results in surplus agricultural production which subsequently lowers the price of agricultural produce and diminishes agriculture's contribution to GDP. Thus, the paradox created by the need for rapid growth in agricultural productivity and output, and the decline in the agricultural sector's share of output and labour force, which is not a contradictory process, gave rise to a widespread misperception that agriculture is unimportant - that it does not require resources or a favourable policy environment - because its relative share of the economy declines (Timmer 1988:277).

Yet another explanation for why agriculture was neglected in favour of industrial development in many developing countries is that development economists have ill-understood it. Mellor (1991:440) pointed out that given the importance in western economic thought of economic growth in both theoretical (Solow 1988) and empirical (Dennison 1962, 1967) work, one must wonder why technological change played such a small role in the thinking about growth in developing countries. The reason, according to Mellor, is obvious: since developing countries are predominantly agricultural, for technological change to play a major role in the economic growth process it must occur in the dominant agricultural sector. But because economic planners failed to comprehend and pursue technological change in agriculture, the focus shifted to the industrial sector. Such a turn of events naturally meant that large-scale, capital-intensive industrial development was pursued instead of promoting and encouraging small-scale labour-intensive non-agricultural activities already existing in many developing countries at the initial stages of economic development. With that outlook, economic planners saw the engine of growth as an expansion of the capital stock and industrial capacity, bolstered by technology from developed countries (Mellor 1991).

2.3.2 The effects of an inward-oriented strategy on the agricultural sector and the economy

In this section I will illustrate how an inward-oriented economic development strategy influences the agricultural sector and the economy.

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16 This phenomenon is a closed economy concept or it can be assumed that the world is a closed economy.

17 This decline is not contradictory. Schultz (1953) depicted this decline using the Engel's Law phenomenon - in a closed economy with constant prices, rising income per capita will shift expenditure to services and manufacturing goods relative to food (agricultural products). This operates through the income elasticity of demand for food, which is less than unity, so as incomes are rising less of each unit of income is spent on food. Therefore, the Engels Law and the lower price in agriculture ensures the gross value of agricultural product will grow less than the gross domestic product.
2.3.2.1 The impact of an inward-oriented strategy on agriculture

Protectionist policies in an inward-oriented strategy can be viewed as a double-edged sword when it comes to taxing agriculture: they raise the price of manufactured industrialised goods relative to agricultural goods in the domestic market, and by supporting the exchange rate reduces the domestic currency receipts from a given quantity of agricultural exports. Consequently, exports, especially agricultural exports, which make up the major part of an agrarian country's export revenue at the early stages of development, when the country is allowed to trade freely, are discouraged by both the increased cost of imported inputs and the increased cost of domestic inputs relative to the price received by exporters. The rise in the relative cost of domestic inputs occurs through domestic inflation or an appreciation of the exchange rate following the imposition of barriers to imports (World Bank 1987:78). In this sense, the domestic terms of trade are turned against agricultural production in the domestic market and the foreign exchange rate is turned against agricultural exports in international markets.

Krueger, Schiff and Valdés (1988, 1992)\textsuperscript{18} have evaluated the extent to which incentive structures in the production of agricultural tradables were affected by the underlying economic development policy framework implicit in the industrialisation strategy adopted by 18 developing countries from 1975 to 1984. The incentive structure was measured by the direct (sector specific)\textsuperscript{19} and indirect (economy wide)\textsuperscript{20} policy effects of the overall economic policy framework on the production of agricultural tradables. Krueger, Schiff and Valdés (1992:28) concluded that:

Indirect measures have substantially reduced agricultural prices relative to prices in other sectors, with an effect on prices nearly triple that of direct sectoral measures. ... Of the indirect interventions, industrial protection has penalised agriculture more than overvaluation of the real exchange rate in two thirds of the countries examined. The effect of indirect taxation has dominated both direct taxation of exportables and direct protection of importables (ibid.).

The preceding discussion suggests that “getting the price right” by simply removing the protectionist policies, which improves the terms of trade and incentives structures facing agricultural producers, is a necessary condition for increasing agricultural productivity. However, this in itself is not a sufficient condition for sustaining agricultural productivity increases necessary for long term economic development (see discussion in section 2.4.2). In order to increase agricultural

\textsuperscript{18} See Lecaillon et al. (1987).

\textsuperscript{19} The direct effect is measured by the proportional difference between the producer price and the border price, adjusting for distribution, storage, transport, and other marketing costs. The measure is equivalent to the rate of nominal protection.

\textsuperscript{20} The indirect effect has two components. The first is the impact of the unsustainable part of the current account deficit and of industrial protection policies on the real exchange rate and thus on the price of agricultural commodities relative to non-agricultural nontradable goods. The second is the impact of the industrial protection policies on the price of agricultural commodities relative to non-agricultural tradable goods.
productivity, agriculture requires adequate resources to develop at the initial stages. (This argument is fully developed in section 2.4.)

Hayami and Ruttan (1985:418-419) have argued that few developing countries managed to increase their agricultural productivity significantly before embarking on a policy to mobilise agricultural resources to develop the industrial sector through an inward-oriented development strategy. The reason agricultural productivity has remained either stagnant or too low, is that too little investment made its way into agricultural and rural development at the early stages (Little et al. 1970). Krishna (1982) has shown under a wide range of conditions that in order to achieve an annual growth rate of three to four per cent in agricultural output, between 20 and 25 per cent of national investment needs to be allocated to agriculture. Krishna (ibid.) argues that in the past, few developing countries have allocated anywhere near this level of investment to agriculture.

The role that most governments in developing countries have played in providing public investment for economic development has been clearly biased towards industrial development, argues Oshima (1987). Even in countries where subsidies were provided to agriculture to offset protectionist policies directed against imported agricultural inputs such as fertilisers, technology and irrigation equipment, these subsidies were too low (as a proportion of the value-added in agricultural output) to offset the bias against agriculture created by higher industrial prices, and its concomitant, an overvalued exchange rate (Little et al. 1970:9).

2.3.2.2 The impact of central planning policies on agricultural producer incentives

Although the effects of an inward-oriented strategy on agriculture addressed above are common to both a centrally-planned and a market-oriented economic system, the disincentives created by loss of property rights as a result of central planning policies is clearly an important distinguishing feature of the central planning system. The policy instruments employed under a central planning system adversely affect production incentives in the agricultural sector because agricultural producers do not have the right to exercise control over the allocation of all resources except their labour effort.

The right to own resources and the power to make allocative decisions in production are important incentives to achieve greater internalisation of external profits (Alchian 1965; Demsetz 1967; Alchian and Demsetz 1972). A necessary condition for efficient use of resources is that users have the power to determine the best way to use those resources free of interference from others, which implies the equality of marginal products from alternative uses (Demsetz 1967). This comes about through efficient markets and a legal framework that enforces individuals' rights. An important determinant of interference is the nature of the ownership rights which an individual has over resources (Furubotn and Pejovich 1972). The degree of exclusiveness in the use of
a resource represents the most important quality of ownership rights for the efficiency with which economic activity can be conducted by individuals (Barzel 1989). Logically, it follows that when an individual lacks the right to allocate resources because of high costs associated with policing and enforcing the right, or when state intervention prohibits private property rights, economic inefficiencies arise (Demsetz 1967:348).

Under central planning, in Vietnam and elsewhere, collectivising the factors of production within the economy became a necessary measure of central planning. Farm households belonging to cooperatives lost their rights to private property and the right to make decisions about what to produce, how to produce it, when to produce it, and how much of it to produce. All these decisions were replaced by the planning system. In principle, the plan, through negotiations between the state and cooperative management, provided the target and guidelines for collectivised agricultural production. Arguing from the above viewpoint, it seems logical that the loss of ownership rights, including the loss of decision making power, posed a serious obstruction to incentives for efficient production, since all links between agricultural producers and the final product were removed.

Furthermore, because labour was organised into work teams under collectivisation, the incentive structure was significantly altered. Unlike on wage farms in market economies, where hired labour is offered a wage up to their marginal product, labour in cooperatives is, in principle, rewarded by a share of the collective production calculated as the share of work points accruing to a worker relative to the total work point issued to all members of the cooperative. The cooperative reward structure can also reward labour up to its marginal product, as on the wage farm, but only under perfect supervision (Alchian and Demsetz 1972; Sen 1981). Therefore, unless cooperative management can effectively monitor and supervise work teams, and distribute work points along the principle of "to-each-according-to-their-work", cooperative members will not be rewarded up to their marginal product of labour. In the absence of perfect monitoring and supervision, the incentive to work effectively in a cooperative or work team is lowered (Alchian and Demsetz 1972). (I will discuss these issues in the case of Vietnam in section 3.2.3.2 of chapter 3.)

2.3.2.3 Macro economic stability under an inward-oriented strategy

The economic policies employed under an inward-oriented development strategy have turned out to place pressure on macro economic balances, such as budgetary (fiscal and monetary) balances, balance of payments and foreign exchange reserves. Prolonged use of an inward-oriented strategy creates and, in many cases, exacerbates macro economic imbalances, which results in excessive inflation (Johnson 1966; Little et. al. 1970; Krueger 1981; Sachs and Warner 1995). Inflation is defined as a sustained
increase in the general price level. Inflation, in turn, leads to greater protectionism, which further entrenches the reliance on protectionist policies (Johnson 1966).

The empirical evidence suggests that many developing countries resorted to inflationary means of financing development, perhaps with the exception of some Asian countries which are discussed in section 2.4.6 (see Killick 1981; Gillis et al. 1992:338-343). In the countries adopting an inward development strategy, inflation is usually caused by excessive fiscal deficit financed mainly, if not entirely, from expanding the money supply and/or excessively borrowing on international markets, thereby leading to a build-up of foreign debt.21

The high and unstable inflation which comes as a result of an expansion in the money supply can lead to real appreciation of the currency and negative real interest rates. Consequently these factors i) distort the efficient allocation of resources in the production process; ii) dissipate resources accumulated from inflation-related development on consumption; iii) reduce incentives for investment in productivity enhancing technology, because of the greater cost of investment decisions due to uncertainty attached to economic policies; iv) diminish a country's international competitiveness; and v) lead to financial dis-intermediation which, in turn, exacerbates fiscal imbalance and propels the country into economic crisis (Killick 1981; Reidel 1993).

As macro economic instability worsens from inflationary financing of economic development, protectionism becomes further entrenched. For developing countries facing international competition and maintaining a fixed exchange rate22, inflation introduces a progressive tendency towards exchange rate overvaluation and balance of payment difficulties, which leads to greater reliance on protectionist policies (Johnson 1966). This happens because governments of inward-oriented developing countries have placed more emphasis on saving foreign exchange than earning it, and by financing domestic investment through domestic savings rather than foreign investment (Little et al. 1970:10). Too much cheap foreign exchange has been devoted to the imports of capital equipment and too little to materials because import controls have made it easier to import capital equipment than material, and cheap credit provided to large scale industry has created the incentive to import more capital goods than could be used (Little et al. 1970:9). Inevitably, industrialisation puts an initial strain on a country's balance of payments, because the increased demand for capital good imports, made

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21 Here, I have assumed a monetarist view of inflation rather than a structuralist view. That is to say that inflation in developing countries is more the result of excessive growth in the money supply and in credit than from structural problems. For a debate of the monetarist versus the structuralist view see de Oliveira Campos (1964).

22 In most developing countries, there is a strong tendency to maintain a fixed exchange rate system, and to support that system to the limit of their foreign exchange reserves, borrowing power, and the ability to use exchange rate controls.
cheaper by protectionist policies, draws on the country limited foreign exchange supplies. Increasing foreign exchange shortages have become perceived as a major obstacle to economic growth (Krueger 1981). These factors are discussed in chapter 3 in relation to Vietnam.

The end result of inflationary development policies, therefore, is that they are unlikely to achieve a stimulating effect, but on the contrary likely to retard economic growth (Johnson 1966).

2.3.2.4 The overall impact of an inward-oriented strategy on the economy

Based on empirical research, numerous economists have pointed out that pursuing economic development through inward-orientation is subject to numerous limitations. According to Little et.al. (1970:11) such a process can only continue for a limited period, perhaps 15-20 years, before the country "runs out of import-substitution". Once inward-orientation becomes entrenched a developing country neglects to produce the goods and services it is most efficient at. For populous agrarian countries of Asia, such as Vietnam, they neglect their comparative advantage in labour-intensive agricultural and rural products, which they have at the early stages of development. In addition, pursuing an inward-oriented strategy further strengthens productivity in the industrial sector compared to the agricultural sector, thereby causing resources to move out of agriculture to industry, which leads the country further away from its comparative advantage in agriculture (Balassa 1983:216). The end result, as Krueger (1981:8) elaborates, is that pursuing an inward-oriented strategy over time leads to a general tendency for a country’s rate of economic growth to slow down as import-substitution becomes deeper entrenched; material imports to grow at least as fast as GDP, if not faster; and exports to grow more slowly than GDP, if at all.

Even more compelling are the recent findings by Sachs and Warner (1995) comparing the effects of inward-orientation (closed-economy) on economic performance with those of outward-orientation (open-economy). Using data from 111 (mostly developing) countries between 1970 and 1989, and dividing them into inward and outward-oriented economies, the authors show that outward-oriented economies out performed inward-oriented economies in three main areas of economic performance: i) economic growth; ii) avoidance of extreme macro economic crises; and iii) structural change (Sachs and Warner 1995:34-60). In the area of economic growth and orientation, the authors found that outward-orientation plays an important role in economic growth; with outward-oriented economies growing by 2.5 per cent on average above inward-oriented economies.23 In the area of macro economic crises, the authors found only one

23 This finding is consistent with the findings of other researchers, including: Bhalla (1994) quoted in Sachs and Warner (1995), de Long and Summers (1991), Dollar (1992), and Levine and Renelt (1992).
out of 17 outward-oriented developing countries had a crisis whereas 59 out of 73 inward-oriented developing countries had either a debt crisis, large external payments arrears or inflation in excess of 100 per cent. In the area of structural adjustment, outward-oriented economies tended to adjust much more rapidly from being primary-intensive to manufacture-intensive exporters.

In relation to the developing countries of Asia, Oshima (1987:347) has argued that in countries such as Japan and Taiwan, where agriculture relative to other sectors was allowed to develop up to full employment at an early stage of economic development before industrialisation was promoted, the contributions of the agricultural sector to economic development have been significant. By comparison, countries such as China, India and Vietnam plunging into heavy industrialisation, or Indonesia and Philippines, which started with a very strong emphasis on industrialisation, have encountered numerous difficulties in effectively transforming the greater part of their inward-oriented economies from agriculture to industry, and achieving swift progress in sustainable economic development. As a result, many of these countries found it necessary at some point to change their economic development strategy in order to focus on outward-oriented agricultural development (ibid.). In the case of China24, Indonesia, Malaysia and Thailand, which switched to an outward-oriented strategy in the 1970s, economic performance since then suggests that economic development has been sustainable.

In sum, it is a mistake to encourage industrialisation through inward-orientation and to simultaneously by-pass agricultural development in the economic development process, as the foregoing discussion established. The following section outlines an appropriate economic development strategy achieved by first developing agriculture through outward-orientation.

2.4 A STRATEGY FOR FACILITATING ECONOMIC DEVELOPMENT IN A LOW-INCOME AGRARIAN COUNTRY

2.4.1 The balanced approach for starting economic development

The preceding discussion indicated that many development practitioners and economic planners devising development strategies at the early stages of their country’s development did not understand agriculture's unique features nor its complexities. They also over-estimated capacity of central planners to achieve economic efficient outcomes. Not all economists, however, shared the misguided beliefs posited by the main teaching paradigms of the times. In a seminal article by Johnston and Mellor (1961), the authors

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24 See also Lin (1992) in the case of China, and Shangjin Wei (1993) who presents evidence that trade liberalisation played an important role in China’s growth.
stressed the importance of the interrelationship between agriculture and industry at the initial stages of economic development. The authors asserted that the nature of agriculture's role is highly relevant to determining the appropriate balance between the agricultural and non-agricultural (industrial) sectors with respect to public investment, budget allocations to public support in research and education-extension programmes, and the burden of taxation levied on different sectors (ibid.:566). In this regard, Johnston and Mellor (1961:571-581) proposed five important ways in which agriculture contributes to economic growth at the initial stages of development. These five paths of influence are as follows: (i) agriculture increases food supplies for domestic consumption; (ii) it earns foreign exchange by expanding agricultural exports; (iii) it releases labour for employment in non-agricultural sectors; (iv) it increases rural incomes and thus contributes to capital formation through the supply of domestic savings; and (v) it increases the size of the market for industrial output. Johnston and Mellor placed equal weighting on all of these factors despite the extracting nature of some of the factors.

An important feature of the Johnston-Mellor thesis is that they contended that 'balanced growth' is required, in the sense that simultaneous efforts to promote agricultural and industrial development are required (ibid.:590). This thesis differed from others by drawing the inference that agricultural development should precede or take priority over industrial expansion (or for that matter, the opposite). While the authors recognised the fact that some developing countries faced constraints in implementing everything at once, they argued that:

"it is precisely this consideration which underscores the importance of developing agriculture in such a way as to both minimise its demands most needed for industrial development and maximise its net contribution to the capital required for general economic growth (ibid.:591)."

Other development practitioners have also emphasised the interdependence between agriculture and industry (Jorgenson 1961; Nichols 1963; Schultz 1953). In particular, in Jorgenson's (1961) dual-economy model there is a role for investment in the modernisation of agriculture right from the initial stages of the development process in order to increase the productivity of traditional agriculture. Schultz (1964) stressed that increased agricultural productivity and output could be brought about by technical progress such as improved agricultural inputs and techniques, research leading to these factors, and the education of farmers regarding this technology, implying the need to invest in agriculture.

25 These types of contribution were similarly expounded by Kuznets (1964) who suggested that agriculture contributes to overall economic growth and development in four ways: a product contribution; a market contribution; a factor contribution; and a foreign exchange contribution. Also see Ghatak and Ingersent 1984, Chapter 3, for an elaboration of these contributions.
Therefore, balanced growth of both agriculture and industry, which Reynolds (1975:14-15) calls the "dynamic view of agriculture", sees agriculture playing a greater role in economic development when simultaneously developed with the non-agricultural sectors. The view that agriculture should be supported to contribute to economic development gained prominence in the 1970s and features strongly as the preferred approach to economic development for agrarian countries in the 1990s (see Aziz 1990:21-28).

The balanced view of economic development also goes hand in hand with an outward-oriented economic development strategy. The importance of an outward-oriented development strategy from an agricultural sector point of view, however, is that the mix of policies is neutral between the incentives to imports and exports (see definition in section 2.2.1). Therefore, in the context of a neutral set of policies, the aggregate effect of all policies, that is fiscal, monetary, sectoral and trade policies, is to offer equal incentives to the production of tradables. Broadly speaking, however, such policies require a comprehensive and effective rural development programme which encompasses the development of rural infrastructure and the provision of agricultural support and social services.

It should be asked then: how can agriculture be developed to contribute more completely to the economic development process? In order to fully answer this question, a series of other questions need to be considered. These questions are posed at the start of each of the following sections.

2.4.2 Starting economic development with agriculture

Why is it important for a low-income agrarian country such as Vietnam to raise agricultural productivity and adopt outward-orientation right from the outset of economic development and maintain it throughout the process?

2.4.2.1 The importance of raising agricultural productivity in economic development

A common feature of most low-income agrarian countries is low agricultural productivity, high underemployment (and unemployment) and poverty (Hayami and Ruttan 1985, Meier 1984). This summed up the state of Vietnam in 1995. As discussed earlier, agricultural growth in Vietnam was comparatively lower than other sectors during the market transition period (see section 1.2, chapter 1). Compared to an official national unemployment estimate of 10 per cent in 1995, some 35 per cent of the rural population were estimated to be underemployed (GSO 1995b). This was very high considering that in 1995 73 per cent of the total labour force were employed in the agricultural sector and about 80 per cent of the population resided in countryside. Most striking, as revealed by the Vietnam Living Standard Survey (VLSS), 51 per cent of the
Vietnamese population in 1993 were living below an absolute poverty line\textsuperscript{26}, and 90 per cent of these impoverished people lived in the countryside (World Bank 1995a:142).

These features are also common to other "monsoon Asian\textsuperscript{27}" countries at the early stage of economic development (Oshima 1987).\textsuperscript{28} In monsoon Asia, the drier months of the year are a serious impediment to labour employment and consequently to the average annual income of farm households, which also bears relevance to overall national income and economic growth (see Oshima 1987:29-33). As a consequence, income is lower in the drier (slack) months than in the wet (busy) months and, because agricultural families are engaged in a variety of on-farm and off-farm activities, the annual productivity of the family farm household as a whole is lower than when it is fully employed.\textsuperscript{29} As a result, the prevailing level of aggregate demand is insufficient to achieve higher economic growth rates (ibid.).

Over the past few decades, several economists have stressed that starting the economic growth process in agrarian countries requires that agricultural productivity be raised (Mellor 1966; Oshima 1987). In order to increase agricultural productivity in a low-income agrarian country it is necessary to implement an effective rural development programme. Such a programme delivers rural infrastructure (roads, irrigation, etc.); agricultural support services (credit, extension, new technology, inputs, marketing, etc.); and social services (education and health). A rural development programme has an immediate mitigating effect on factors, such as poor access to markets, poor irrigation facilities, inadequate credit and extension services, and low levels of literacy and poor health. These factors constrain the average farm household from achieving full efficiency in agricultural production. As such, a rural development programme, when it is effectively delivered, has the potential to improve the efficiency of farmers in agricultural production which facilitates their agricultural productivity. (These elements are further discussed in sections 2.4.3 and 2.4.4, in this chapter.)

\textsuperscript{26} The absolute-poverty line is based on consumption expenditure required for subsistence. The World Bank (1995a) determined that for the rural sector in 1993 it was US$ 98, compared to the absolute-poverty line of US$ 122 for the urban sector.

\textsuperscript{27} A term used by Harry Oshima (1987) to described a wide sub-section of Asian countries, comprising Northeast Asia (Japan, South Korea and Taiwan), South Asia (Bangladesh, India, Pakistan and Sri Lanka) and Southeast Asia (Indonesia, Malaysia, Philippines and Thailand).

\textsuperscript{28} However, this is not to suggest that low-income developing countries anywhere else are less afflicted by underemployment in the agricultural sector.

\textsuperscript{29} In monsoon Asia, labour is usually underemployed during the slack drier months of the year (from October/November to May/June). This contrasts sharply with the wet monsoon period (from May/June to October/November) when heavy demands are placed on labour in agriculture-based activities. Inadequate moisture during the drier seasons combined with a large agricultural labour force in countries such as Bangladesh, China, India and Vietnam provide insufficient employment during this period. What little work is available is usually of low-intensity, short-duration, intermittent and irregular (Oshima 1987:59).
Increasing the productivity of the farm household, in turn, releases a series of dynamic events. Increased productivity makes work more abundant during the year, which over time moves an underemployed agricultural sector towards full employment, and raises rural incomes. Rising rural incomes generate increased expenditure on other items. Provided the macro economic environment is conducive to private investment (I discuss this issue in section 2.4.6), more money will be spent on capital improvements, new technology, extension services and better agricultural supplies. Increased productivity in agriculture implies that more labour will be required for cultivation, seedling preparation, transplanting, weeding, fertilising, harvesting, and water control for rice and other crops.

As agricultural productivity rises with a consequent increase in net income in the agricultural sector, expenditure of that income stimulates growth in the high-income elasticity component of agriculture, causing a rise in the demand for livestock, fisheries and forestry products (Mellor 1966; Oshima 1987:61). In addition, farm households increase their demand for non-food crop goods and services, especially labour-intensive consumer goods within the rural sector, such as processed food, cloth, and household utensils. Consequently incomes in the rural sector begin to increase. In turn, higher incomes in the rural sector generate demand for industrial consumer goods outside of the traditional food crop sector, such as clothes, footwear, household utensils, farm inputs and implements, thereby creating a market for these labour-intensive industries. Greater demand for labour-intensive products generates employment outside of the food crop sector. Provided labour markets are not constrained by institutional factors, such as government policies preventing rural-urban migration, the mobilisation of labour to these industries and their supporting services from the rural sectors accelerates (Oshima 1987:62).

A key feature of the foregoing model is that it relies on consumer goods expenditure through a rural-urban link as a stimulus to economic growth (Mellor 1976). As the incomes derived from increased agricultural productivity are increasingly spent outside the agricultural sector, the non-agricultural sector, in turn, demands more agricultural goods. Given that there is a high marginal propensity to consume in a low-income agrarian country at the early stages of economic development, the incomes generated from all these activities raise aggregate demand and provide a large multiplier effect on the national economy. Therefore, agricultural and economic growth follows naturally from a rise in agricultural productivity.

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30 It should also be noted that, although this model places emphasis on rural-urban links as an essential requirement for efficient labour-intensive industrialisation in an agrarian country from an early stage of economic development, some countries have succeeded in developing their economies through outward-oriented industrialisation and without much help from rural consumer demand (e.g., Hong Kong and Singapore in the extreme).
2.4.2.2 Linking agriculture with outward-orientation

A crucial need at the early stage of economic development is to meet the increased food demand of an expanding population whose average income is growing. The increased demand for food can be met either from expanding domestic food production relative to food imports or vice versa. Which option a country chooses, however, will depend on its comparative advantage. Because the typical developing country in monsoon Asia at the early stages of economic development has a large agricultural sector, its comparative advantage at this early stage is clearly in producing labour-intensive agricultural and rural products. In this regard, an outward-oriented strategy at this early stage has much to contribute to economic growth through its neutral economic policy framework.

Under a neutral policy framework, which combines import-substitution and export-promotion policies, the aggregate effect of all economic policies (fiscal, monetary, sectoral and trade policies) is to offer equal incentives to the production and export of tradables. For a country at an early stage of development, it implies that most agricultural and labour-intensive rural goods will be exported profitably to an international market. In addition, foreign exchange is not only preserved through import-substitution policies under an outward-oriented strategy, but also earned through export-promotion policies. Increased availability of foreign exchange, and provided the foreign exchange market is not heavily regulated by the government, the necessary tools, equipment and machinery that complements labour-intensive industries at the nascent stages of industrial development can be imported from abroad.

As the above process continues over the years, the increase in employment tends to outpace the growth of labour supply; the labour market begins to tighten up and real wages start to rise with the approach towards full employment (Oshima 1987:62). It follows that this process should be sustained for longer periods for a developing country with higher levels of unemployment and higher rates of labour supply growth. At this stage the agricultural sector will reach a position where labour can be released to the industrial sector, while food production continues to increase with rises in agricultural productivity, per capita national incomes and population.

This juncture also marks an appropriate time to switch industrial support to more export-promotion policies. This is because in the run-up to full employment in agriculture, domestic demand for manufactured goods has been increasing and, in turn, allows labour-intensive import-substituting industries to increase scale and external economies, build up experience and develop knowledge about the domestic and international markets. Having acquired these attributes it is appropriate for industry at this stage to compete more actively in world markets. Such a step in an agricultural-led and export-led development strategy for a low-income agrarian country, should be easy to implement since simpler and fewer varieties of machines and technologies are
required for industrialisation at the early stages and take less time to master and operate efficiently. As the country exploits its comparative advantage in its labour-intensive industries and establishes new markets, and as its labour-intensive products become more competitive on foreign markets, expansion of these industries draws more labour from an agricultural sector already reaching full employment, further tightening the labour market and raising real wages (Oshima 1987:63). At this point there is a shift of workers from low-paying informal work, and from the household work as men and women enter the labour market.

Compared to an inward-oriented economic development strategy, an outward-oriented development strategy does not attempt to by-pass the vital stage of agricultural and rural development and economic growth mentioned above, and thereby neglect the comparative advantage an agrarian country has in stimulating economic growth from an agricultural and rural base. Instead, outward-orientation, when accompanying a rise in agricultural productivity, exploits the country's comparative advantages by developing agriculture and labour-intensive rural industries. An outward-oriented development strategy also places the economy on the path to rapid economic development.

The economic development record of Japan, Taiwan and South Korea and, more recently, Malaysia and Thailand clearly reflects the merits of this strategy (see Okhawa et.al. 1969; Lee 1971; Krueger 1978; and Oshima 1987). Moreover, since the mid-1980s there has been a trend among developing countries, such as China and India, which plunged into heavy industrialisation, and Indonesia and the Philippines, which placed too heavy an emphasis on industrialisation at the very beginning, to change strategy in order to focus on developing agriculture (Oshima 1987).

Therefore, the positive effect of raising agricultural productivity through an effective rural development programme and adopting outward-orientation in a low-income agrarian country is that the country has the potential to: remove the constraints preventing farmers from achieving greater efficiency; increase employment, increase aggregate demand, raise national incomes and accelerate economic growth.

2.4.3 Conceptual aspects of productivity and efficiency improvements

The discussion in this section aims to conceptually illustrate how the provision of an effective rural development programme facilitates growth in agricultural productivity.

2.4.3.1 The relationship between agricultural productivity and economic efficiency

In an agrarian country, low agricultural productivity implies that agricultural producers in that country are not producing on their outer bound production possibility
frontier, given relative prices, available technology and all other information. On the contrary, agricultural producers are likely to be anywhere underneath the production possibility frontier, but not on it. Low agricultural productivity, therefore, implies that agricultural producers are not efficient in using all the available information, resources and technology in producing along their production possibility frontier. Such agricultural producers are not considered economically efficient. Economic efficiency is defined as a product of allocative and technical efficiency. Allocative efficiency means that given input and output prices there exist one level of inputs that will maximise output, while technical efficiency means achieving the maximum level of output using the best-practice-use method concerning the available input (hence, no other method for input application in the production process will produce a better outcome). Therefore, in order to increase agricultural productivity, which requires moving the producer closer to the outer bound production possibility frontier, the degree to which agricultural producers are economically efficient must be lifted until they are fully efficient.

How does one lift economic efficiency? In order to answer this question effectively, I will review the economic literature related to the economic behaviour of agricultural producers with respect to agricultural production, as any informed opinion on how agricultural producers allocate resources will be underpinned by how producers behave economically. However, the intention of the following sections is not to argue in favour of any particular economic behavioural principle (this discussion is developed in section 4.2 of chapter 4), but to explore the reasons why some economists think that farm households are not economically efficient. The purpose of this investigation is intended to illustrate the factors preventing agricultural producers from achieving greater economic efficiency. In chapters 4 and 5, I investigate whether these factors affect the efficiency with which Vietnamese farm households conduct agricultural production.

2.4.3.2 Understanding economic efficiency through the economic behavioural principle of profit maximisation and utility maximisation

There are essentially two complementary schools of thought concerning the economic behaviour of farm households: i) farm households behave in a profit maximising manner; and ii) farm households behave in a utility-maximising manner.

In the case of profit maximisation, the farm household chooses the mix and level of inputs that yields the profit maximising level of output, subject to input and output prices and given a particular technology. In the case of utility maximisation, the farm household chooses a particular set of actions that maximises its utility, subject to certain

31 An illustration of an outer bound production possibility frontier is available in most economic text books, for example see Fischer and Dornbusch (1983:9).

constraints. In both cases just described, it is assumed that the farm household is operating in complete certainty. However, in the real world farm households (and decision makers) face uncertainty.

**Uncertainty** can be defined as a situation where it is not possible to attach probabilities to the occurrence of events. Uncertainty is a condition affecting all production activity in a country, and it is usually considered more of a problem in agricultural production than in industrial production, due to the influence of climate and other natural factors on production and the length of the production cycle. In addition, agricultural producers in developing countries face uncertainty from natural hazards, market fluctuations, social factors, government intervention, wars and external factors (Ellis 1988:81-82).

However, when decision makers are able to formulate subjective probabilities about the occurrence of events and outcomes, uncertainty is reduced to **risk**. In relation to risk, economic agents are either risk-averse, risk-neutral or risk-taking in relation to their preference for a certain outcome. As a consequence of uncertainty and attitudes to risk, farm households are said to be maximising their expected profit or utility, because at the time economic decisions are made to maximise the objective function, farm households will only be able to attach certain probabilities to an expected profit or utility level.

Most studies measuring the economic and/or allocative efficiency of farm households in developing countries, based on the profit maximisation principle, do not account for risk in the measurement of efficiency. Instead most studies assume profit maximisation. Following this school of thought, T.W. Schultz (1964) advanced the hypothesis that farm households in developing countries are "efficient but poor". This proposition advances the notion that farm households are behaving in a "profit maximising" manner and that there is complete certainty in their decision making process. As such, there is an underlying assumption that markets are perfectly competitive, which implies farm households are efficient in perceiving prices and, therefore, allocate resources efficiently. The practical consequence of this behavioural model is that farm households have positive supply responses when input prices fall or output prices rise, or when both happen.32

The proposition that farm households are efficient because they are profit maximisers has had a lasting influence on some economists with respect to the decision-making process of farm households. Many economists have followed in this tradition, particularly in studies of Indian farmers (see Chennareddy 1967; Hopper 1966; Sahota

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32 Askari and Cummings (1976) provide some strong evidence in their studies to support the view that farm households in developing countries (with underdeveloped rural markets) respond positively to relative prices.
1968; Yotopolous and Nugent 1976). Other studies conducted elsewhere have included: Nigeria (Norman 1977), Philippines (Kalirajan 1990) and Sri Lanka (Ekanayake 1987). These studies found that farm households were allocatively efficient, since the household's marginal value product (MVP) for the variable inputs used in agricultural production approximated their market factor cost (MFC), hence \( k_{ij} \) in equation (4.29) of chapter 4, is close to unity.

However, not all economists accede to the empirical evidence supporting the profit maximisation hypothesis. One economist strongly opposed to this view is Michael Lipton. Based on Lipton's (1968: 330-2) observations of Indian farm households, he strongly believed that the profit maximisation approach implied by equation (4.29), in chapter 4, is erroneous because it does not hold under true uncertainty. Lipton (op cit.) also stressed that the profit maximisation approach diverges from utility-maximisation under imperfect rural market conditions.

In relation to agricultural producers in low-income agrarian countries where market and information are far from perfect, many economists believe that farm households are risk-averse and that they maximise their expected utility (see Anderson, Dillon and Hardaker 1977; Dillon and Scandizzo 1978; Lipton 1968, and Roumasset, Boussard, and Singh 1979). Some economist explain risk-averse behaviour by the need for the average farm household in a low-income agrarian country to meet its 'security-first' requirement (Bell 1972; Roumasset 1976; Scott 1976). For such households, adequate stability of output and income, and the avoidance of significant short term losses in order to secure basic subsistence, take precedence over profit maximisation (Lipton 1968; Wolgin 1975). In this case, a risk-averse farm household chooses a particular set of actions (allocation of input, consumption of output, work outside the farm, etc) which renders it the safest possible (utility-maximising) outcome, even if it subjectively determines that the probability of the worse state (to which the action is attached) will occur is lower than that of a better state (with a different action and better outcome).

Economists such as Anderson, Dillon and Hardaker (1977), Binswanger and Sillers (1983), Dillon and Scandizzo (1978), Roumasset (1976) and Roumasset, Boussard, and Singh (1979) have found evidence to support the hypothesis that farm households are risk-averse. Others, such as Dillon and Anderson (1971) re-examined the results of certain studies measuring the allocative efficiency of farm households, using the profit maximisation model. The authors found support for Hopper's (1966) conclusion that farm households are allocatively efficient, while no support could be found for Channareddy's (1969) conclusion, and that of Yotopoulos' (1967) was inconclusive. Although, Dillon and Anderson (1971) are critical of the profit maximisation approach, their re-examination, which involved a probability distribution
methodology, could not conclusively refute the general finding that farm households are allocatively efficient (profit maximising).

Comparing the two hypotheses, the consensus view is that the profit maximising farm household is allocatively efficient (Schultz 1964; Hopper 1966), while the risk-averse utility-maximising farm household is allocatively inefficient (from the profit-maximisation viewpoint). That is, the risk-averse utility-maximising farm household misallocates its resources from a comparative static viewpoint. From the profit-maximisation (or efficiency) viewpoint, risk-averse behaviour leads farm households to over-estimate the expected MVP of variable inputs above its MFC (i.e., \( \text{MVP} > \text{MFC} \Rightarrow k_{ij} > 1 \)) which from that viewpoint results in the misallocation of resources (Wolgin 1975:626 Bliss and Stern 1982:290). As a result, the over-estimation of the MVP leads households to under-allocate inputs compared to the optimal outcome under the profit maximisation situation.

Despite these contrasting results with respect to the allocation of inputs, the fact remains that farm households behave efficiently given their underlying attitude to risk. Indeed, while it is correct that risk-averse behaviour results in inefficient allocation of resources, this interpretation must be qualified by the fact that it is made from a profit maximisation viewpoint. In other words, such an interpretation is incorrect from the risk-averse viewpoint. That is, because the household's objective function is to maximise expected utility, the resultant outcome, which differs from the allocative efficiency result under profit maximisation hypothesis, is the optimal outcome for the household given its aversion to risk (see Wolgin 1975:629; Anderson and Griffiths 1982:230-231). In this regard, Norman (1977) argued that adopting a risk avoidance production strategy such as crop diversification, is not necessarily in conflict with the efficiency criteria, and nor can economic behaviour that is inconsistent with profit maximisation be attributed to risk. Norman (1977:88) regarded that the "growing of crop mixtures provides an outstanding example of a practice meeting both the profit maximisation and security criteria" associated with risk aversion.

The preceding discussion cited numerous references where empirical evidence exists to support both hypotheses and, as a result, neither of the hypotheses are overturned. The main point stressed in this review is that whichever behavioural assumption is made, the resultant allocation is efficient, provided other factors are not influencing it (see section 2.4.3.4).

2.4.3.3 Some observations related to risk-averse economic behaviour and the allocation of resources

In an economic and physical setting where farm households live close to subsistence, risk-averse behaviour can obstruct the adoption of new technology such as HYV, as well as influence the use of resources associated with new technology,
especially when farm households are uncertain about the future outcomes of adopting the new technology due to a lack of information (Hiebert 1974; de Janvry 1972). Roumasset (1976) demonstrated that the non-adoption of modern high yielding varieties of rice (HYV) was the result of greater disaster-level yield probabilities associated with HYV in rain-fed crops. On the other hand, Hiebert (1974) examining the effects of uncertainty (due to imperfect information) on the decision to adopt fertiliser-responsive HYV crops found that resources were under-allocated. Similarly, Bell (1972) showed that in the simple case of where a HYV crop was chosen, farm households with small plots of land applied less fertiliser per unit land, since their subsistence requirement per hectare were higher than households with more land, thereby compelling them to curb their spending on fertiliser, which as a result failed to increase yield in the case of poor weather or irrigation infrastructure.

However, in regard to the uncertainty associated with new technology in agriculture, Hiebert (1974) found that the probability of adopting a HYV increased as the stock of information pertaining to modern production techniques increased, such as information flowing through extension services. Moreover, Hiebert found that if different producers had different capabilities to interpret and analyse information because of the education they received, the likelihood of adoption was positively related to producer knowledge and skills.

Another important empirical finding in relation to risk-averse economic behaviour is that improved wealth or agricultural incomes decreases risk aversion in farm households (Hamal and Anderson 1982; Binswanger and Sillers 1983). As Hamal and Anderson (1982:223) concluded in their study of the relationship between absolute risk aversion and the incomes of Nepalese rice farmers:

"Farmers' levels of absolute risk aversion are negatively related to their present wealth which, in turn, is obviously related closely to such things as area of arable land and average annual income. Partly because of the prevalence of risk aversion, these rice farmers may be unwilling to adopt new technologies perceived to be risky. However, as they manage to increase their wealth, their potentially impeding aversion to risk will tend to diminish, ... , and any risk-constrained adoption may increase."

2.4.3.4 Other factors leading farm households to be inefficient

As Norman (1977) pointed out, not all economic behaviour that is inconsistent with profit maximisation can be attributed to risk aversion. Deviations from the profit maximisation principle can be explained by a multitude of factors affecting the farm

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33 For a theoretical treatment of this issue see Arrow 1965.
34 Absolute risk aversion is defined as $RA(W) = -U''(W)/U'(W)$, where $U(W)$ is the utility of wealth and the primes denote derivatives (Pratt 1964; Arrow 1965).
35 Note, however, that Binswanger and Sillers (1983) in their empirical study found no evidence to support the proposition that an increase in wealth or income was indirectly related to risk aversion.
household's decision to allocate resources efficiently, and preventing them from behaving in an optimising manner. Chief amongst these are: modelling specification errors; data problems; market imperfections; institutional constraints; lack of technical knowledge and know-how, and imperfect information preventing farm households from correctly formulating expected prices.36

In relation to specification errors, Junankar's (1980a, 1980b, 1982) work on the economic behaviour of farm households in the prosperous rice growing region of India's Tamil Nadu led him to the finding that the profit maximisation model is not supported by data. Junankar (1980a; 1980b) rejected the profit maximisation behavioural assumption because of the weak results he derived from the restricted profit function and the allocative efficiency index based on a Cobb-Douglas production function. Junankar argued that the model was mis-specified.37 Although in a later study, Junankar (1982) adopted the translog production function, a more flexible functional form, he still rejected the profit maximisation hypothesis not because of mis-specification but because a number of neo-classical assumptions were not valid. Junankar (ibid.) explained that data problems, uncertainty and institutional constraints were factors that contributed to the rejection of the profit maximising behavioural assumption in this case.

In relation to data problems, inaccurate data has also been cited as a source of measurement errors, while data aggregated over time tends to hide particular relations. Junankar (1982) believed that the proper specification of the profit maximisation model should include uncertainty of both production and input and output prices. Although Junankar's analysis did not formally include an evaluation of the economic decisions of farm households under uncertainty, he made several references to the study of risk-averse farmers in Palanpur - India by Bliss and Stern (1982). In remarking that production uncertainty is to some extent under the control of the farmer in terms of the appropriate usage of farm inputs and better timing of input applications, Junankar alluded to the technical know-how of the farm household as a factor explaining the deviation of the household from profit maximising behaviour. Indeed, allocative inefficiency is exacerbated when the farm household have incomplete technical information and know-how, which is discussed further below in this section.

In relation to imperfect markets and institutional constraints, Bliss and Stern (1982:289) argued that an imperfect credit market was largely responsible for the excess of the MVP over MFC \( (k_{ij}>1) \) when risk-averse farm households produce under uncertainty. Institutional factors constraining the availability of inputs to farm households also prevent them from using the optimal level of resources in production. It

36 For a concise review of the findings of empirical research on the variability of firm performance see Fare et al. (1985).

37 Note Chand and Kaul's (1986:162) criticisms concerning the rigidities of the Cobb-Douglas profit function.
is common knowledge that limited access to credit is a factor hindering agricultural production (Bhadhuri 1973; Bharadwaj 1974). In a situation where access to formal credit is limited for some reason or another, the availability of informal credit at usurious rates, may cause households to under-allocate investment in farm inputs because credit is too expensive. In this regard, Bhadhuri (1973) and Bharadwaj (1974) argued that institutional constraints such as underdeveloped rural (credit) markets are linked with barter arrangements. That is, farm households leasing land or taking credit are locked into selling output and providing labour services to the landlord.

In the case of education, technical knowledge and know-how, Kalirajan and Shand (1988a:84) showed varying levels of technical efficiencies between farm households producing rice in Tamil Nadu, India was a result of factors such as farming experience, extension visits, willingness to adopt new methods, and the years of education received by individual farmers. Furthermore, Kalirajan and Shand (1988b:15) demonstrated empirically that technical efficiency influences allocative efficiency. This differs from the assertion advanced by Farrell (1957) that allocative efficiency and technical efficiency are independent, and that firms (farm households) can be allocatively efficient without being technically efficient, or vice versa. However, Kalirajan and Shand (ibid) qualified their assertion for two reasons. Firstly, their methodology utilises the neo-classical definition of technical efficiency which means that the firm produces on the outer bound production frontier which determines the maximum possible output for a given technology and level of input. Secondly, the test of causality used by them draws some methodological criticism (see Wu (1983) cited in Kalirajan and Shand 1988b).

It is important to note that in Kalirajan’s and Shand’s methodology inefficiency is associated with producing at any point below the outer bound production frontier, for a given technology and level of input. However, this inefficient point need not be inconsistent with producing optimally for a given set of prices. This is what they call the “pseudo optimal level”, which refers to the point where the firm’s (farm household’s) actual “observed” production function intersects the price plane. At this point, the firm is allocating inputs efficiently but is not economically efficient in production. This is also the same point that Schultz (1964) referred to in remarking “the poor but efficient farmer”, since he observed that farmers were allocating their scarce resources very efficiently for a given (inferior) technology but were too poor to adopt a superior technology. Note also that the actual observed production function need not be the production frontier, such that the gap between the two production functions is theoretically the “technical gap”. Thus, if farmers improve their techniques resources allocation by using the best practice methods and inputs available to them they can lift their allocative efficiency as they close their technical gap by moving to the outer bound production frontier. In this sense, the Kalirajan and Shand (ibid.) argued that improving
technical efficiency can improve allocative efficiency and thereby result in an economically efficient outcome along the frontier. Therefore, Kalirajan and Shand's (ibid) formulation of economic efficiency is not only the product of allocative and technical efficiencies, but argues that technical efficiency influences allocative efficiency.

Lastly, in relation to complete information and formulation of expectations, it can be argued that two expectations are important to the farm household: yield expectations and price expectations. Although it is outside the scope of this thesis to present a formal model of either expectation's formulation process, the assumption is made that households are rational and systematic in their economic decision-making process, which is based on their expectations about future prices incorporating all past and present information. That is, farm households form their price expectations rationally (see Muth 1961).38 Given this assumption, households' yield expectations are based on their price expectations. That is, given the production technology, and the level of fixed inputs in the short-run, households determine the level of output they wish to supply to the market based on their price expectations. Following this decision process, Kalirajan (1990:77) notes that given factor prices, the efficient use of inputs in production is affected by the divergence of ex-ante expected output prices from ex-post actual prices, and by the household's over- or under-estimation of marginal rates of substitution due to non-profit maximising (risk-averse) behaviour.

What happens when the farmer's ex-ante expected price of the kth crop ($P^e_k$) deviates from its ex-post actual price ($P_k$)? If $P^e_k > P_k$, then farm households will under-allocate their variable resources, given their production technology and fixed inputs. This, in turn, implies that they do not achieve the maximum profit possible. Alternatively if $P^e_k < P_k$, then households over-allocate their variable resources which also implies that profits are not maximised.

Which factors lead the households' expected price to diverge from the ex-post actual price? A number of factors influence households' price expectation, and these are based on whether their previous price expectations are correct. If households are correctly formulating their price expectations, which implies that all relevant information is built into their price expectation model, then only exogenous shocks will lead to a divergence between expected and actual prices. Exogenous shocks arise from unexpected fluctuations in supply or demand. Supply side shocks arise as a result of unexpected weather conditions which affect crop output either positively or negatively.

38 For a review of the rational expectations literature see Kantor (1979). Note, however, that the use of adaptive expectations models of yield and price is well developed in the literature. For the classical treatment of the adaptive expectations model in agricultural supply response see Nerlove (1958). For a theoretical and empirical review of the literature on agricultural supply responses see Askari and Cummings (1976).
Demand side shocks arise as a result of an unexpected rise or fall in the demand for the commodity. Therefore, based on actual prices, the profit maximisation model determines an optimal solution that indicates that the average farm household is either over-allocating resources when $P_k < P_k^*$ or under-allocating when $P_k > P_k^*$.

On the other hand, if households are not correctly formulating their price expectations then there is no dispute that resources will be misallocated. If households are rational then why would they get their price expectations wrong? In a market-oriented economy, efficient price formation, which depends on complete markets and information, determines efficient resource allocation. However, in a setting where markets and information are incomplete, exogenous shocks have a tendency to also add force to the divergence between expected and actual prices, as well as influence the risk behaviour of farm households with respect to their economic decisions (Pope and Just 1991).

2.4.3.5 How the provision of an effective rural development programme facilitates growth in agricultural productivity

The preceding sections indicated numerous reasons why farm household do not achieve full economic (or allocative) efficiency in agricultural production. These reasons also indicate which factors constrain farm households in developing countries from achieving greater economic efficiency in production. Chief amongst these factors are: imperfect markets; incomplete information; institutional constraints such as limited access to extension services, technology and credit; low level of farming experience and education; and errors in calculating expected prices.

In view of these factors, it is clear that government has a role to play in instituting policies and providing public investment that mitigate these constraints and increase agricultural productivity (see discussion section 2.4.4). Removing institutional constraints calls for investment in areas that encourage the development of institutions such as farmer organisations (for the exchange of information), extension services, new technology, etc. Improving the level of education can also be facilitated through public investments in education and extension services. Improving the ability of farmers to formulate better expectations will also depend on the ability to access market and other information which, in turn, depends on public investment in information dissemination. As information improves, farmers are more likely to adopt new technology and techniques.

In section 2.4.3.2, I mentioned that although risk-averse farm households under-allocate resources in comparison to profit maximising farm households this outcome is an efficient form of resource allocation given the farm household's aversion to risk. Secondly, it was noted in section 2.4.3.3 that risk-averse farmers are less likely to adopt new technology due to the uncertainty of outcome. Thirdly, also in section 2.4.3.3, it
was mentioned that improving the level of income or wealth of risk-averse farmers can decrease their aversion to risk. These three points suggest a strong role for government in the provision of public goods in a low-income agrarian country where imperfect markets and incomplete information pervade. Hence, when investment in rural infrastructure, agricultural support services and social services (see section 2.4.4) are made, thereby improving access to information and markets, reducing the cost of transportation, etc, which in turn lifts agricultural productivity and rural incomes, the farm household’s aversion to risk may decrease. Consequently, the farm household will be more willing to adopt new productivity-enhancing technology which, in turn, increases the income of the farm household. Sustained over a period, this implies that the extent of the under-allocation of resources associated with risk-aversion (from the profit-maximisation point of view) is gradually narrowed as farm households move closer to a profit-maximising solution. The result of decreasing a farm household’s aversion to risk then is that agricultural productivity will be accelerated.

2.4.3.6 An example of how infrastructure development facilitates the agriculture

In order to give a concrete example of the positive impact that the provision of infrastructure can have on the agricultural sector consider findings of the study by Ahmed and Hussain (1990). The authors focused on two farming villages in Bangladesh - an agrarian country in monsoon Asian. In their study, Ahmed and Hussain compared certain aspects of agricultural production in relation to the level of infrastructure development for the two farming communities. The relevant infrastructure compared were roads, electrification, communication and institutional services.

Firstly, the authors found that infrastructure affects agricultural production indirectly through prices, diffusion of technology and the use of inputs. Although the authors found that the price of paddy paid to farmers was about the same in all villages, fertiliser prices were 14 per cent lower and labour costs 12 per cent higher in developed villages relative to underdeveloped villages (Ahmed and Hussain 1990:42). Moreover, significantly higher intensity of technology usage characterised the developed villages: 105 per cent more arable land was irrigated; 71 per cent more land cultivated to HYV; and 92 per cent more use of fertilisers.

Secondly, infrastructure development indirectly affects the composition of rural employment by making non-agricultural jobs more accessible to those with better skills and some assets (ibid.:56). In turn, this leads to a reduction in the use of family labour and an increase in the wage labour in agriculture, which provides employment to farm households with marginal or no land. The increase in demand for hired labour puts upwards pressure on wage rates, thereby increasing the wage earning of farm household labour for the same amount of labour.
Thirdly, infrastructure had by far the most profound effect on the income of rural poor. Ahmed and Hussain (1990:70-71) asserted that infrastructural endowment caused household incomes to rise by 33 per cent. A breakdown of this increase showed that incomes from agriculture increased by 24 per cent; from livestock and fisheries 78 per cent; from wages 92 per cent; and from trade and industries 17 per cent. A striking feature of this income increase is its distribution. Functionally landless and small farmers captured most of the increases in agriculture, wages, livestock and fisheries, while large land owners captured most of the increase in trade and industries (ibid.).

Finally, infrastructure development encourages rural savings and investment indirectly through its positive effect on income (ibid.:98). Although the average saving rate in villages with better developed infrastructure (15%) was not too different from underdeveloped villages (13%), gross investment per household was about 14 per cent greater in villages with better developed infrastructure compared to villages with underdeveloped infrastructure. Ahmed and Hussain (1990:99) assert that in order to increase productive investment, infrastructure development should be provided along with other incentive policies - institutional credit for the poor, for example. While the landless and small land owning households access credit primarily through friends, relatives and money lenders, what institutional credit is available goes mostly to large land owners. Infrastructure development was found to improve access to institutional credit almost sevenfold (ibid.:108-111).

2.4.4 The elements of an effective rural development programme

What are the necessary elements for an effective rural development programme for raising agricultural productivity?

Following the discussion in sections 2.4.2 and 2.4.3, a number of important but ideal investment areas for government intervention (public investment) are necessary in order to develop an effective rural development programme.

(i) Rural infrastructure:

- supply of rural transportation routes, such as roads, canals, bridges linking isolated communities to district or provincial towns, thus facilitating market development, which permits increased commercialisation and lowers marketing costs;
- telecommunication infrastructure allowing the flow of information to the rural population concerning market information, farming methods, health and education information, etc.;
- electrification for productive use and for improving the standard of living of the rural population;
• irrigation and water management for greater control of water resources and for intensifying the cultivation of arable land in drier seasons, thus removing some of the slack in employment usually afflicting labour-abundant agrarian countries.

(ii) Agricultural support services:
• production and dissemination of new technology and inputs by building up agricultural and related industry research via research institutes;
• supply of agricultural extension and technical services;
• adequate supply of credit to agriculture and rural sectors to fund both working capital and long term investments; and
• developing agricultural marketing services.

(iii) Social services:
• provision of increased education and technical skills to the agricultural/rural population, thus allowing for the augmentation of the rate of return to human capital and augmenting the stock of such capital; and
• provision of health services, leading to changes in demographic structure in the direction of falling rates of mortality, morbidity, and fertility.

2.4.5 The role of government in facilitating agricultural productivity

2.4.5.1 The justification for government intervention

A necessary requirement at the start of the development process is that government provide public investment for infrastructure, institutional support and social services, and an appropriate macro economic policy framework for inducing private investment. Leaving aside the need to provide a stable macro economic framework, which is discussed in section 2.4.6; what justifies government intervention at any stage of the economic development process?

In order to answer this, it is necessary to consider what it is that governments provide and why they provide them instead of the market system? Essentially governments provide investment (capital expenditure) in infrastructure such as roads, power plants, dams, irrigation, etc., and incur (current) expenditure in administration, economic services (such as information dissemination, extension and technical services), social services (education and health, for example) and many other expenditure items. In general, the benefits associated with public goods (and services) are indivisibly spread among the entire community, whether or not particular individuals desire to consume them. Three factors characterise a public good: (i) non-
rivalrous consumption - one person's consumption does not deprive others; (ii) non-
excludability - one person's use is impossible to exclude others; and (iii) non-
rejectability - an individual cannot abstain from its consumption even if that person
wants to. As such, allocating public goods and internalising their associated profits is
difficult from a market viewpoint.

Based on the nature of these characteristics, it is evident that markets fail to
allocate these "public" goods. This form of market failure is one reason why
government intervene to allocate some goods and services. As Timmer et.al. (1983:155)
put it:

for all its efficiency in allocating economic resources, a competitive market economy
cannot accomplish some important social goals without careful government intervention.

However, while market failure arising out of public goods provides one reason
why governments must intervene at all stages of economic development, other reasons
exist which may be more unique to a developing country:

Market failure can exist in various forms: (1) the market does not function properly - the
case of market imperfections; (2) the market result is incorrect - the case of externalities;
(3) no market exists for the relevant activity - the case of public goods; and (4) the market
yields undesirable results in terms of objectives other than resource allocation. In these
cases of market failure market prices do not exist, or do not reflect the true value , or are

The consequence of these aspects of market failure bear considerable importance to
efficient resource allocation and affect competitive equilibrium, especially for
developing countries, as Meier (ibid.) notes:

A state of underdevelopment is in large measure synonymous with pervasive market
imperfections. A variety of market imperfections can reduce the efficiency of private
market performance. The properties of efficient resource allocation and Pareto optimality
of distribution, which characterise a competitive equilibrium, depend on the existence of a
competitive set of markets. But an underdeveloped economy is to some extent an 'empty
economy' with an incomplete set of markets. Moreover, ... a market may be deficient in the
provision of information or subject to lags in adjustment, or characterised by insufficient
competition amongst firms.

As a consequence of market failure, the pattern of resource allocation will differ
from the postulated efficient allocation based on better functioning markets. Thus, it can
be argued that it is in the public's interest to have the government correct these
deficiencies by providing the public goods. In this regard, the scope for providing public
goods and services is wide in developing countries and this is presented in section 2.4.5.

2.4.5.2 Where to allocate public resources

Since there is a need for governments to intervene because of market failure, where
should public resources be directed at the initial stages of development when the
country is predominantly agricultural?
Although the response is likely to be at the margin, this is still a difficult question to answer, because of differences in resource endowment, level of development, political agenda, and other factors distinguishing developing countries. Nevertheless, the economic development literature provides some indications.

The prevailing orthodoxy in the economic development literature is that public investment is not only important for developing certain rural infrastructure such as irrigation and providing agricultural support services such as research into new technology (seeds, techniques), credit, extension and technical services, but has far-reaching implications when directed at improving infrastructure such as roads, communication and electrification and social services such as education and health that reach all sectors at the early stages of development. Oshima (1987:60,348) elucidates the importance of directing public investment to these areas at an early stage:

There is a need for dams and canals to irrigate dry crops, rural transport for marketing, and improvements in institutions such as farm cooperatives, irrigation associations, and extension services. ... The skills for growing rice crops exist, and some of the physical infrastructure and institutions are already in place. To improve and extend them requires minimal demands on new knowledge, technologies, skills, and institutions, in contrast to more sophisticated industrialisation, where the required centralised capital, sophisticated management, scientists, technicians, bureaucrats, skilled workers, urban institutions for external economies, and large markets are scarce or limited. ...[Thus] agricultural development is more efficient than industrialisation in the early phase of the transition because the traditional physical infrastructure, institutions, and manpower skills and experience already exist to allow a fast start of growth. Improvements can be made without much external assistance, and while the economy begins to take off, infrastructure, institutions, and skills and experience for industrialisation can be accumulated.

It is precisely this point that is relevant to an agrarian economy at the initial stages of economic development. Scarce resources should be invested in the sectors where they are most productive. At the early stage this usually means that much of these resources need to be directed to the agricultural sector because less public investment is required in facilitating technological changes in agriculture. Because the skills are already there, a unit of public investment will be more efficient when invested in agriculture relative to industry. While this path facilitates the development of agriculture, it also places less pressure on budgetary allocation than would be required when industrialisation is pushed at the outset of development, and is less likely to resort to inflationary means of financing economic development.

This approach to public investment in economic development is a key feature underpinning many of the Asian countries either successfully attaining rapid economic development (e.g., Japan, Taiwan and South Korea) or countries switching to agricultural development after a period of pursuing industrialisation through an inward-oriented strategy (e.g., Indonesia and Thailand) (see Johnston and Kilby 1975; Oshima 1987). In the case of Taiwan, which has been well documented in the literature, the most important feature characterising its success in the modernisation of agriculture and rapid pace of economic development was the substantial and effective support given to
research and education, the combination of which helped to develop new technology (HYV rice) suitable to local conditions, as well as an educated labour force (Myers and Ching 1964:563). In addition to public investment in research and education, infrastructure was effectively developed in the rural regions.

2.4.5.3 How much public investment to allocate?

In relation to an effective rural development programme, what level of public investment is adequate to generate and sustain growth in agricultural productivity?

There appears to be no set amount of public investment to implement an effective rural development programme for agricultural development. However, it can be argued that developing countries that have managed to lift agricultural productivity and output growth at the initial stages of economic development have done so by devoting a sizeable proportion of national investment to agricultural and rural development.

In the case of Taiwan, outlays in capital expenditures by economic planners at an early stage of development amounted to an average of about 25 per cent of total government expenditures (Johnston and Kilby 1975:252). Of the total capital expenditures, over 50 per cent was allocated to the construction and upgrading of transport infrastructure, and by the 1920s most parts of Taiwan had access to inexpensive transportation facilities (Ho 1971:314). Substantial public investment outlays were also made in irrigation, drainage and flood control, which according to Lee (1971:110) accounted for almost 15 per cent of the total capital expenditure during the 1920s. Compared to the later period between 1956 and 1960, when industrial development was being promoted and after agriculture had sufficient time to develop, investment in irrigation declined to 7.5 per cent of total capital expenditure.

Easterly and Rebelo (1993) have shown that public infrastructure investment represents a large fraction of both total and public investment in developing countries. In general, low-income countries invested as much as 20 per cent of total national investment in infrastructure, while middle-income countries invested a slightly higher proportion at 22 per cent. As a proportion of total public investment, however, low-income countries allocated about 37 per cent of their investment to infrastructure, while middle-income countries allocated considerably more at 57 per cent. As earlier mentioned, Krishna (1982) has shown that in order to achieve an annual growth rate of 3-4 per cent in agricultural output, at least between 20 and 25 per cent of national investment is required in agriculture.

Based on these proportions of investments allocated to infrastructure, it would appear that if agriculture is to contribute to economic development in Vietnam, similar proportions need to be allocated at this initial stage of economic development.
2.4.6 The importance of achieving and maintaining macro economic stability

Why is it just as important to establish and maintain a stable macro economic environment, and how can macro economic stability be achieved? To answer these questions, consider the experiences of countries adopting different economic development strategies with respect to inflation, and consider what happens when economic policies cause inflation compared to when macro economic stability is achieved. (Recall that the causes of inflation were discussed in section 2.3.2.3.).

In Asia, countries such as Indonesia and Philippines, that started with a very strong emphasis on industrialisation through inward-oriented development policies, or Vietnam, which plunged heavily into industrialisation, have experienced greater inflation relative to countries starting with an outward-oriented development strategy at an early stage of development, such as South Korea and Taiwan, or countries switching to this strategy in the 1970s, such as Malaysia and Thailand (see table 2.1). From 1980 to 1993, Indonesia reduced its average rate of inflation following a switch to an outward-oriented development strategy. The Philippines was slower to switch economic development strategies, thereby showing little downward movement in the average rate of inflation over the same period. Vietnam, on the other hand, which strongly followed an inward-oriented strategy until 1988, excessively relied on financing large fiscal deficits with borrowings from the central bank thereby lifting inflation to hyper-levels in the mid-1980s (this issue is further discussed in chapter 3).

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Vietnam</td>
<td>9.0</td>
<td>142.0</td>
</tr>
<tr>
<td>Indonesia</td>
<td>21.5</td>
<td>8.5</td>
</tr>
<tr>
<td>Philippines</td>
<td>13.3</td>
<td>13.6</td>
</tr>
<tr>
<td>Malaysia</td>
<td>7.3</td>
<td>2.2</td>
</tr>
<tr>
<td>Thailand</td>
<td>9.2</td>
<td>4.3</td>
</tr>
<tr>
<td>Taiwan (a)</td>
<td>7.1</td>
<td>-0.5</td>
</tr>
<tr>
<td>All developing countries</td>
<td>18.5</td>
<td>72.8</td>
</tr>
</tbody>
</table>

Notes: (a) The years for Taiwan are 1965-1980, and 1980-1990.

In contrast, inflation in Taiwan, and countries such as Malaysia and Thailand that have emulated the Taiwanese economic development model, was very low compared to the other Asian countries, or the average for all developing countries (see table 2.1). According to Reidel (1993:412-413), maintaining macro economic stability is an important goal of economic planners in these countries. In order to maintain macro economic stability both Taiwan and Thailand placed ceilings on nominal interest rates
(ibid.). For these countries, keeping inflation low has been the key instrument in maintaining positive real deposits rates of interest, which has contributed substantially to financial deepening and rising private savings. Moreover, the nominal exchange rate devaluations which were implemented at the same time these countries embarked upon an outward-oriented development strategy (in the 1970s) translated into real devaluations and were sustained and even further strengthened by maintaining low inflation, thereby increasing international competitiveness (ibid.)

In general, developing countries adopting an inward-oriented development strategy have experienced higher (and in some cases, unstable) inflation. Allowing high and unstable inflation to persist for any length of time adversely affects the mobilisation of domestic savings, especially from a large rural population, and discourages private investment. Wage earners will prefer to spend their earnings on commodities or convert paper money into real assets, rather than risk an erosion of their money wealth from rising prices. A constant nominal interest rate in the face of rapid inflation implies that real interest rates are lower or even negative, in the case of excessive inflation. People are dissuaded from holding wealth in the form of bank savings, and prefer to hold real assets such land, gold, etc. The uncertainty associated with high and unstable inflation also raises the cost of investment decisions for private investors. These effects also have an important implication for the agricultural/rural sectors: the positive impact that a rural development programme can have on improving allocative and production efficiencies and augmenting agricultural productivity and incomes is likely to be short-lived or eroded. High and unstable inflation lowers the real value of projects in rural infrastructure, agricultural support services and other services. The end result is that a country experiences reductions in international competitiveness and inefficiencies in the allocation of resources, lowering productivity across all economic sectors (Reidel 1993).

In contrast, a stable macro economic environment as reflected in low rates of inflation is important because it allows for efficient allocation of resources, encourages domestic savings, promotes both domestic and foreign investment, and reduces balance of payment pressures resulting from the adverse impact of inflation on exports (Killick 1981). In the case of Vietnam, the preceding discussion suggests that inflation should not reach a chronic level if economic growth and development in the long run is to be sustained. However, the crucial factor for Vietnam is to manage the financing of development in a manner that does not exceedingly rely on borrowing from the central banking system or on international markets.

2.5 CONCLUSION

This chapter discussed two approaches available to a low-income agrarian country, such as Vietnam, for economic development at the outset: an inward-oriented economic development strategy or an outward-oriented economic development strategy.
It was clear from the economic development literature reviewed in this chapter that many developing countries at the outset of economic development (in the 1950s, 1960s and 1970s) adopted an inward-oriented development strategy to promote and protect industrial development. Although this strategy appeared rewarding at the initial stages, prolonged application of the strategy resulted in weak economic performance for many countries. In many agrarian countries, too much protection of industries created too great a diversion of scarce resources from agriculture to industry. As a consequence, investment in rural development was insufficient to facilitate the rapid productivity changes required in the agricultural sector to bring about a reduction in rural incomes, an increase in aggregate demand, and high economic growth. Prolonged use of the inward-oriented strategy resulted in weak incentive structures in agriculture, especially under a central planning economic regime, low investment in agriculture, and macroeconomic instability. In turn, the results were low agricultural output and economic growth and slower economic development.

Following the economic outcome just mentioned, which I will consider for Vietnam in chapter 3, the decision to shift to the alternative strategy of outward-orientation became an inevitable choice for many countries. Based on the discussion provided in this chapter, there are several reasons why an outward-oriented development strategy is considered highly relevant and appropriate for Vietnam’s economic development in the long run.

Firstly, those Asian countries achieving and sustaining rapid economic development recognised the importance of developing agriculture by lifting agricultural productivity. This task is crucial because lifting agricultural productivity, which is generally low at the outset, is necessary to facilitate the development process. Moreover, raising agricultural productivity raises rural incomes and mitigates poverty, which is predominantly concentrated in the rural sector.

Secondly, a crucial issue in agricultural development at an early stage of economic development is the low agricultural productivity arising as a result of economic inefficiencies in production. Economic inefficiencies arise as a result of limited: availability to full information; access to markets, and credit and extension services, for any given technology. These constraints imply that the modernisation of traditional agriculture is an important step. Providing public goods and services has the ability to ease these constraints, which consequently allows farmers to produce with greater efficiency, thereby raising agricultural productivity. Therefore, the strategy stresses that a key factor in raising agricultural productivity is the provision of an effective rural development programme that delivers rural infrastructure, agricultural support services and social services. Because market failure is present at an early stage of economic development, underdeveloped and weak markets are unable to provide these goods and
services. Therefore, there is a need for careful government intervention in providing a rural development programme.

Thirdly, an outward-oriented development strategy also places emphasis on the need for government to create and maintain a stable macro-economic environment that is conducive to economic development. Economic policies that imbue fiscal and monetary discipline and maintain an outward-oriented development focus are therefore necessary elements in the overall economic development process right from the outset. A stable macro-economic environment allows efficient allocation of resources, encourages domestic savings, promotes both domestic and foreign investment, and reduces balance of payment pressures resulting from the adverse impact of inflation on exports.

Finally, when an effective rural development programme, which encompasses the efficient provision of public goods and services to the agricultural and rural sectors, is established in a stable macro-economic environment, the conditions for rapid economic development through agricultural development are present. Therefore, adopting economic policies that deliver an effective rural development programme and maintain macro-economic stability is not only important for economic development, but also necessary for overall economic efficiency.
3.1 INTRODUCTION

This chapter analyses the effectiveness of the economic development policies instituted in Vietnam during the transition to the market period (1989-1995) in facilitating agricultural growth and accelerating economic growth and development.

I start this chapter, in section 3.2, by briefly reviewing the inward-oriented economic development policies of the central planning period (1954-1988) and their effects on the agricultural sector and the economy. The relevance of this review is to provide the backdrop for the 1988 and 1989 policy reforms, and to contrast the more positive impact on the agricultural sector and economy of the outward-oriented economic development policies instituted since 1988. In this section, I aim to explain why Vietnamese policy makers abandoned the inward-oriented economic development model after 35 years of central planning.

In the remainder of the chapter, I ask in section 3.3: What fundamental policy changes were instituted during the doi moi period to stimulate both the agricultural sector and the economy? In section 3.4, I ask: How effective were these economic policies in facilitating agricultural and economic growth and development, and why? And in section 3.5, I ask: How the new policies were limited in stimulating the agricultural sector and economic growth and development?

3.2 THE EFFECTS OF INWARD-ORIENTED ECONOMIC DEVELOPMENT POLICIES ON AGRICULTURE AND THE ECONOMY DURING CENTRAL PLANNING

3.2.1 The policy framework

Past and present development policies in Vietnam have emphasised the alleviation of poverty as the central objective of economic development (Le Duan 1962; SRV 1995). With this central economic development objective in mind, Vietnamese economic planners, at the outset of modern economic development, were very much
influenced by a Stalinist-style socialist development model (Fforde and Paine 1987). (The instruments of central planning were described in sections 2.3.1.1 and 2.3.2.2 of chapter 2.) In 1954, the socialist government of North Vietnam (DRV) adopted this model, which strongly favoured economic policies promoting rapid industrialisation, especially heavy industry. This strategy adopted by the socialist government of North Vietnam at the outset, and later imposed on South Vietnam after the two parts were reunified in 1975, was typically that of an inward-oriented development strategy discussed in section 2.3 of chapter 2.

Following the adoption of this model, a number of institutional and economic policies aimed at both the agricultural and non-agricultural sectors were implemented in an effort to bring about rapid economic development (Fforde and Paine 1987:1). Corresponding with the objective of the socialist government of Vietnam to seize control of mobilisable resources for economic development according to a planned economy, agricultural production was reorganised through collectivisation (see Fforde 1989; Le Duan and Pham Van Dong 1975; Nguyen Khac Vien 1971; and Nguyen Van Tiem 1991). Following this transformation, households ownership rights in the factors of production, such as land, capital items, farming implements, machinery and livestock were converted to collective property by the cooperative (Nguyen Khac Vien 1971:270). Consequently, farm households also lost their ability to make allocative decisions about the use of such assets and factors of production.

An important aspect of collectivisation was the changing role of decision-making and the basis of payment received by cooperative workers. Under central planning all decisions were implemented from the centre down to the local unit of government. All agricultural production and marketing decisions pertaining to cooperative land were removed from the household or individual farmer. Since the cooperative had control of the final output, it also had the obligation of delivering compulsory state procurements and extracting a certain proportion for financing collective investments and consumption, before distributing the balance to workers (ibid.). Cooperative members were no longer able to claim payment of rent on contributed capital and, thus, the only form of payment received by cooperators was based on their labour inputs, paid according to a work points system (ibid.).

There were two exceptions to the loss of decision-making power over the allocation of certain resources: workers retained control over their labour effort and they had access to some land. Firstly, although farm household labour was organised into work teams, farmers still had the power to decide how much labour effort to exert in productive activities. Secondly, although the government of Vietnam removed farmers'
right to virtually all factors of production, farmers were never completely alienated from all land. Under the constitution for the formation of agricultural cooperatives, each farm household was entitled to a small garden plot; these plots equalled in total no more than five per cent of the cooperative's arable land (Nguyen Khac Vien 1971:271; Fforde 1984). The 'five per cent plot', as it was popularly referred to, became the basis of the farm household's private economy, since the output from these plots could be consumed or sold on the parallel (free) market.

A number of extractive instruments were implemented concurrently with the policy to collectivise agriculture. These included moral incentives, taxes, obligatory delivery of grains to the state by cooperatives, two-way exchanges (inputs for output), incentive sales, free market control (see Nguyen Khac Vien 1964:6; Vu Huy Bang 1967:140-42), and between 1981 and 1988 purchases by contract. Since cooperatives contributed a large proportion of agricultural (and non-agricultural) production and were considered the basic unit of production, they also became the conduit through which such instruments were implemented.

Another important policy for mobilising resources for economic development under central planning was the pricing policy, which had three objectives: to control the free market; to keep prices stable, especially agricultural and consumer prices; and to turn the terms of trade against agriculture and in favour of industry. Accordingly, prices for almost every good and service in the planned economy, including the exchange rate, were administratively determined (see Fforde 1989; White 1985). An important element of the price policy, together with macro economic planning, was the government's "bureaucratic centralised state subsidy system" (Dang Duc Dam et al. 1991:10). This system subsidised priority sectors, such as industry and construction, through lower input prices in an effort to encourage economic growth and development. As a result, the government pursued an expansionary fiscal and monetary policy during this period (ibid.).

Under inward-orientation, the government provided a number of different forms of protection to industry: annual industrial production plans and targets were set by state planning authorities for a wide range of industry; a number of official agencies were responsible for providing state-owned enterprises (SOE) with the necessary inputs to achieve these production targets; incentives were provided for SOE to sell in domestic markets; all export and imports operations were conducted by state trading monopolies; and state trading monopolies had exclusive access to over-valued foreign currencies, especially convertible currencies (Dang Duc Dam et al. 1991:58-60; UNIDO 1991:23).

In addition, foreign trade was closely managed by the government through trade agreements arranged between state trade monopolies and foreign governments. The government maintained a dual trade system, very much like its dual price system, for trade transactions with non convertible and convertible currency countries. Trade to
non-convertible areas (other socialist economies), was conducted on bilateral or multilateral terms operated under barter arrangements, where the exchanged goods were traded at negotiated prices in transferable roubles (Dang Due Dam et al. 1991:61). The exchange rate between the *dong* and the transferable rouble was determined by the State Bank of Vietnam (Vietnam's central bank) and held fixed between 1960 and 1981 at 5.64 (*ibid.*). On the other hand, trade transactions with convertible areas (non-socialist countries) were conducted at the official exchange rate set between the *dong* and the US dollar, well below market rates (*ibid.*). For example, in 1985, the ratio between the official and market rate of foreign exchange was 7.6 (*ibid.*:62). It was not until central planning was abandoned in 1989 that the gap between the official and market rates was allowed to close, and free market trade in currency became legal.

### 3.2.2 The performance of the agricultural sector and the economy after 35 years of inward-orientation under central planning (1954-1988)

The economic performance of the agricultural sector and the economy as a whole during the period of central planning was weak when compared to the performance of prioritised economic sectors, and in comparison to its performance after reforms were introduced in 1988/1989. In the agricultural sector, labour productivity grew by 1.5 per cent, while land productivity grew by 1.3 per cent annually between 1954 and 1988 (see figure 3.1, and table 3.2 on page 60). In comparison, annual growth in both labour and land productivity in the transition to market period (1989-1995) almost doubled to 4.5 per cent and 3.7 per cent respectively, broadly indicating the different impact of the two sets of development strategies on the performance of the agricultural sector.

**Figure 3.1 Labour and land agricultural productivity in Vietnam (1956=100)**

The result of low average productivity in agriculture during central planning was an equally low average level of agricultural growth (see figure 3.2). Between 1958 and 1988 the annual average growth rate in the agricultural sector amounted to 2.8 per cent.
The sluggishness with which the agricultural sector grew over this period is evident when compared with the industrial and services sectors over the same period, or with the market transition period (see figure 3.3 and table 3.1, page 61). The slow growth in agriculture relative to industry and services over the central planning sub-periods indicates the bias against agriculture and the preference for the prioritised industrial sector, as a consequence of inward-oriented policies protecting domestic industries (see figure 3.3).

**Figure 3.2 The contribution to real economic growth by each economic sector during central planning & the transition to the market**

![Figure 3.2](image)

**Figure 3.3 Real value-added growth by economic sectors during different periods under central planning (in 1989 constant prices)**

![Figure 3.3](image)

Real economic growth between 1958 and 1988 in socialist Vietnam averaged 4.1 per cent per year (see figure 3.2). Although this rate of growth is certainly high, considering Vietnam’s average per capita economic growth rate over this period provides a more sobering picture. Since Vietnam’s annual average population growth
rate relative to its economic growth rate was quite high (2.6%), the average annual real per capita economic growth rate was 1.4 per cent during this period. At this extremely low rate, it implies that it would take almost 50 years before real GDP per capita doubled in Vietnam. This was clearly an unacceptable prospect for the policy makers of a low-income agrarian country expecting to reap the rewards of 35 years of inward-oriented development.

### Table 3.1 Economy and sectoral indicators

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</thead>
<tbody>
<tr>
<td>Real value-added growth by economic sector</td>
<td>%</td>
<td>Agriculture</td>
<td>3.7</td>
<td>1.2</td>
<td>-2.9</td>
<td>7.0</td>
<td>1.8</td>
<td>2.8</td>
<td>4.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Industry</td>
<td>15.0</td>
<td>6.1</td>
<td>13.0</td>
<td>4.0</td>
<td>6.4</td>
<td>8.3</td>
<td>9.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Services</td>
<td>24.0</td>
<td>1.0</td>
<td>2.0</td>
<td>0.5</td>
<td>6.0</td>
<td>6.7</td>
<td>10.0</td>
</tr>
<tr>
<td>Sectoral shares by economic sectors (d)</td>
<td>%</td>
<td>Agriculture</td>
<td>46.5</td>
<td>46.0</td>
<td>42.8</td>
<td>51.4</td>
<td>43.6</td>
<td>46.9</td>
<td>33.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Industry</td>
<td>25.6</td>
<td>30.0</td>
<td>36.6</td>
<td>31.5</td>
<td>29.5</td>
<td>29.9</td>
<td>27.4</td>
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<td></td>
<td></td>
<td>Services</td>
<td>28.0</td>
<td>24.0</td>
<td>19.6</td>
<td>17.1</td>
<td>27.0</td>
<td>23.2</td>
<td>39.1</td>
</tr>
<tr>
<td>The amount of real economic growth accounted by each economic sector (c)</td>
<td>%</td>
<td>Agriculture</td>
<td>2.0</td>
<td>0.5</td>
<td>-1.2</td>
<td>3.0</td>
<td>0.8</td>
<td>1.3</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Industry</td>
<td>3.0</td>
<td>1.8</td>
<td>2.8</td>
<td>0.8</td>
<td>1.7</td>
<td>1.9</td>
<td>2.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Services</td>
<td>2.8</td>
<td>-0.1</td>
<td>0.8</td>
<td>0.1</td>
<td>1.9</td>
<td>0.9</td>
<td>3.8</td>
</tr>
<tr>
<td>Real per capita economic growth (c)</td>
<td>%</td>
<td>4.4</td>
<td>-0.5</td>
<td>-0.2</td>
<td>1.6</td>
<td>2.1</td>
<td>1.4</td>
<td>5.4</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
(b) 1958-1985 measured in PNI, 1986-1995 measured in GDP (see Appendix B).
(c) In constant 1989 prices.
(d) In current prices.
Source: Table A.1, Appendix A.

### Figure 3.4 The share of the economy accounted for by each sector during different periods under central planning

![Figure 3.4](image_url)

In line with the sluggishness in agricultural growth and per capita economic growth, there were no clear signs that structural change occurred over the central
planning period when comparing the sub-periods (see figure 3.4 and table 3.1, page 61). Over the duration of central planning, agriculture remained the dominant sector. This outcome contrasts sharply with the market transition period when government policy makers in Vietnam switched to a more outward-oriented economic development strategy.

Table 3.2 Agricultural sector indicators

<table>
<thead>
<tr>
<th>Agricultural Sector Indicators</th>
<th>Unit</th>
<th>Start of Central Planning</th>
<th>Second Indochina War</th>
<th>Reunification</th>
<th>Sectoral and Price Reforms</th>
<th>Wage &amp; Price Reforms</th>
<th>Central Planning Period</th>
<th>Market Transition Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural productivity Index for Labour (1956=100)</td>
<td>Ratio</td>
<td>105.0</td>
<td>101.0</td>
<td>112.7</td>
<td>126.2</td>
<td>140.2</td>
<td>112.5</td>
<td>162.1</td>
</tr>
<tr>
<td>Agricultural productivity Index for Land (1956=100)</td>
<td>Ratio</td>
<td>111.5</td>
<td>109.7</td>
<td>94.2</td>
<td>111.4</td>
<td>133.3</td>
<td>111.3</td>
<td>157.7</td>
</tr>
<tr>
<td>Growth in agricultural productivity for Labour (b)</td>
<td>%</td>
<td>1.7</td>
<td>-0.7</td>
<td>4.2</td>
<td>3.7</td>
<td>1.2</td>
<td>1.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Growth in agricultural productivity for Land (b)</td>
<td>%</td>
<td>2.8</td>
<td>-0.2</td>
<td>-9.2</td>
<td>7.0</td>
<td>0.9</td>
<td>1.3</td>
<td>3.7</td>
</tr>
<tr>
<td>The share of agricultural production by: (b)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food grain</td>
<td>%</td>
<td>62.3</td>
<td>54.9</td>
<td>50.3</td>
<td>50.7</td>
<td>48.0</td>
<td>54.5</td>
<td>49.7</td>
</tr>
<tr>
<td>Other crops</td>
<td>%</td>
<td>17.8</td>
<td>23.4</td>
<td>27.2</td>
<td>25.5</td>
<td>25.7</td>
<td>23.2</td>
<td>24.7</td>
</tr>
<tr>
<td>Livestock</td>
<td>%</td>
<td>19.9</td>
<td>21.7</td>
<td>22.6</td>
<td>23.8</td>
<td>26.3</td>
<td>22.3</td>
<td>25.6</td>
</tr>
<tr>
<td>Food crop production per capita</td>
<td>kgs</td>
<td>311.1</td>
<td>248.0</td>
<td>254.5</td>
<td>287.2</td>
<td>295.3</td>
<td>276.3</td>
<td>345.8</td>
</tr>
<tr>
<td>State-determined price for paddy rice per kilogram</td>
<td>dong</td>
<td>0.24</td>
<td>0.29</td>
<td>0.28</td>
<td>0.59</td>
<td>126</td>
<td>13</td>
<td>na</td>
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<tr>
<td>(in Hanoi)</td>
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<tr>
<td>Market price for paddy rice per kilogram (in Hanoi)</td>
<td>dong</td>
<td>0.56</td>
<td>1.22</td>
<td>1.92</td>
<td>2.12</td>
<td>212</td>
<td>23</td>
<td>na</td>
</tr>
<tr>
<td>Ratio of state-determined price to market price for</td>
<td>ratio</td>
<td>2.3</td>
<td>4.3</td>
<td>6.8</td>
<td>4.2</td>
<td>1.9</td>
<td>3.9</td>
<td>1.0</td>
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<td>rice</td>
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<td>Employment of Labour by sectors:</td>
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<tr>
<td>Agriculture</td>
<td>%</td>
<td>82.3</td>
<td>70.7</td>
<td>67.9</td>
<td>71.4</td>
<td>72.8</td>
<td>73.4</td>
<td>72.7</td>
</tr>
<tr>
<td>Industry (c)</td>
<td>%</td>
<td>9.2</td>
<td>14.7</td>
<td>15.9</td>
<td>15.2</td>
<td>13.9</td>
<td>13.6</td>
<td>13.5</td>
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<tr>
<td>Services (t)</td>
<td>%</td>
<td>8.5</td>
<td>14.6</td>
<td>16.2</td>
<td>13.4</td>
<td>13.3</td>
<td>13.0</td>
<td>13.7</td>
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</tbody>
</table>

Notes:
(b) In constant 1989 prices.
(c) Hectares are the arable land area in Vietnam.
(d) Labourers are proxied by the agricultural population.
(e) Includes industry, construction.
(f) All other sectors except agriculture and industry.
na = not available for this series.
Source:
Table A2, Appendix A.
In addition, based on empirical evidence from other low-income countries that successfully developed with an outward-oriented development strategy, the outcome observed in Vietnam during central planning differs from the *a priori* expectation that during a country's economic transformation the share of agriculture declines relative to the industrial sector when the sectors are allowed to develop freely (see Kalirajan and Kapucinski 1995, Sachs and Warner 1995).

3.2.3 The factors influencing agricultural and economic growth during central planning

3.2.3.1 The factors affecting growth

Why did Vietnam experience slow agricultural and economic growth during the central planning period? The slowdown has been traditionally blamed on the disruption of war, and the mobilisation of resources required to defeat the US armed forces and liberate south Vietnam over the period 1965 to 1975, including the mobilisation of vast amounts of foreign aid that were diverted to funding the war (see Kaye 1962 and Lavallee 1971). There is also evidence that rural regions were more severely affected by labour shortages due to conscription (Lowe 1996). However, both Vietnamese and Western economists more frequently argue that fundamental flaws in the neo-Stalinist model rather than war and poor weather are the root cause of the slow growth in agriculture and the economy (Nguyen Sinh Cuc 1995; Beresford 1988; Fforde and Paine 1987). From my reading of the data I concur more with this latter view, and will therefore argue in this section that low agricultural productivity, low average growth in the agricultural sector, and low level of economic growth can be attributed to the effects of inward-oriented policies implemented under central planning. In this section, I follow the analytical framework set out in sections 2.3 and 2.4 of chapter 2. That is, the effects of inward-orientation on the performance of the agricultural sector and the economy in Vietnam during central planning can be explained by: i) the level of public investment used to establish an effective rural development programme; ii) the incentive structure of agricultural producers; iii) and the state of macro economic stability. Each theme is explored in the following sections.

I would like to state at the outset that this qualitative analysis of the factors affecting agriculture and the economy proceeds from an econometric evaluation. This evaluation is not presented here, but instead in Appendix C. I estimate the influence of different types of proxy variables for a rural development programme, agricultural producer incentives and macro economic instability on agricultural productivity and per capita output. The diagnostic results reported in Appendix C indicate that none of the
equations were supported by the data. That is, the estimated coefficient measuring the relationship between growth and the factors influencing it for each equation violated the best linear unbiased estimate rule (see Stewart and Wallis 1986). Because of this limitation in the econometric assessment, I provide a qualitative assessment of factors impeding agricultural and economic growth in the following sections.

3.2.3.2 Low public investment in a rural development programme

Between 1958 and 1988, the government of Vietnam allocated about 30 per cent of total public investment to major infrastructure works, such as transport, communication and irrigation (see figure 3.5, and table 3.3 on page 65). In contrast, Easterly and Rebelo (1993) (quoted in section 2.4.5.3 of chapter 2) found that low-income developing countries invested about 37 per cent on average in infrastructure, and middle-income countries about 57 per cent on average, which suggests that economic planners in Vietnam under-allocated public investment to these areas. If one considers investment to transport infrastructure alone, the contrast is even larger: between 1958-1988 economic managers in Vietnam allocated about 21 per cent to this sector (figure 3.5 and table 3.3), while during a comparable development period in Taiwan in the 1920s economic managers there allocated over 50 per cent to transport infrastructure (Ho 1971:110).

40 Three equations were estimated: agricultural (labour) productivity; agricultural (land) productivity and economic output per capita, in order to ascertain the relationship between the factors I presented as influencing agricultural productivity and, in turn, economic growth. Based on a neo-classical production function, the independent variables were arable agricultural land; public investment in agriculture (in real 1989 prices); public investment in transport and communication (in real 1989 prices); the percentage of farm households whose production decision are affected by the collective system, as proxied by the percentage of households in the cooperatives; the size of government budget balances as a share of GDP; and the size of the trade balance as a share of GDP.

41 Although the data reports the combined figure for transport and communication, the share of the latter in the total allocation of public investment to that sector ranged between 5 and 10 per cent up to 1988.

42 Note, however, that because the available statistics only reports the combined figure of transport and communication, that the proportion to transport infrastructure is, in fact, less if public investment in communication is subtracted from the combined amount. Moreover, if it is assumed that only a small part of the public investment in transport and communication was directed to the rural sector, then the actual sum allocated to the rural sector was far less than 20 per cent. In this case, Vietnam was far behind the average low-income developing country, according to the observations of Ho (1971) and Easterly and Robelo (1993).
Figure 3.5 The annual average public investment allocated to sectors affecting the rural development programme (1958-1988)

(Source: table A.3, Appendix A)

Table 3.3 Public investment in Vietnam

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<tbody>
<tr>
<td>Public investment (capital expenditure) as a share of PNI/GDP (b) (d):</td>
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<td>% Total investment, of which:</td>
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<td>% Agriculture &amp; forestry</td>
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<td>% Irrigation &amp; water management</td>
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<td>% Transport &amp; communication</td>
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<td>% Industry &amp; construction</td>
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<td>% Commerce and services</td>
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<td>% Social services (c)</td>
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<td>Public investment allocated to various sectors as a share of total public investment (d):</td>
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<td>% Agriculture &amp; forestry</td>
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<td>% Irrigation &amp; water management</td>
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<td>% Transport &amp; communication</td>
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<td>% Industry &amp; construction</td>
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<td>% Commerce and services</td>
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<td>% Social services</td>
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<tr>
<td>% Administration and others</td>
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</tbody>
</table>

Notes:
(b) See Appendix B for description of PNI and GDP.
(c) Includes Education, health, pension, culture and scientific research.
(d) In current prices.

Sources:
Table A.4 Appendix A.
The small share of public investment allocated to the transport sector, in comparison both to Taiwan and the average for low-income developing countries, was probably nowhere near adequate considering the destruction caused to transportation and communication infrastructure during the Second Indochina War in North Vietnam (see Salisbury 1967; Chaliand 1969). Although data on the stock of transportation routes for this period is not available, it is reasonable to assume that much of the public investment to transportation and communication during and shortly after the war was directed to repair work, rather than to increasing the stock of transportation infrastructure throughout Vietnam. In short, transportation remained seriously underdeveloped during this period.

In relation to agricultural investment, Krishna (1982) argued that in order to achieve an annual growth rate of between 3-4 per cent in agricultural output, at least 20-25 per cent of national investment should be allocated to agriculture (see section 2.4.5.3 of chapter 2). Between 1958 and 1988, the share of public investment to agriculture (including forestry and irrigation) was 19.2 per cent per year on average, and the average annual growth rate in the agricultural sector was 2.8 per cent over the period (see figure 3.5, and tables 3.1 & 3.3). Based on Krishna's investment criteria, every one (1) per cent of national investment in agriculture increases growth by an increment of 0.15 to 0.16 per cent. Each unit of public investment in Vietnam between 1958 and 1988 returned on average an increase of 0.146 per cent to agricultural growth: this result, suggests that the return to agricultural growth from public investment to the agricultural sector in Vietnam during the central planning period was closely in line with Krishna’s criteria.

Using Krishna’s model, (for every 1 per cent of investment an outcome of 0.15 per cent in growth), I estimated the expected agricultural growth rate over the central planning period using the actual level of public investment as a share of total investment allocated to the agricultural sector. In figure 3.6, I compare the expected growth rate with the actual rate of growth in agriculture. The difference between the two growth rates indicates the aggregate influence of all other factors on growth in the agricultural sector.

The average annual expected agricultural growth rate in Vietnam during the central planning period when compared with the average annual actual growth rate clearly shows a close proximity (see figure 3.6). However, examining the annual average expected and actual growth rates in the agricultural sector during different sub-periods under central planning indicates from the difference in these growth rates that agricultural growth was extremely volatile and highly affected by factors other than

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43 If it is assumed that because the Vietnamese central planning system was not encouraging of private sector investment and consequently the proportion of private sector investment in agriculture was close to zero, then public investment during this period was a close proxy to national investment.
investment. Based on the time period covered for this analysis of Vietnam, the influencing factors can be anything ranging from the impact of war on the normal life of Vietnamese citizens, to the effects of inward-oriented centrally-planned economic policies on producer incentives and macro economic stability, to the impact of low public investment on transportation infrastructure and market development, and so on. These issues are dealt with sections 3.2.3.3 and 3.2.3.4.

Of particular interest are: the war period (1965-1975), when the actual growth was less than the expected, suggesting that the war and other factors had a negating effect on the positive effect of agricultural investment; the reunification period (1976-1978) when the forced collectivisation of national agriculture outweighed all the positive effects of agricultural investment; and the sectoral reform period (1979-1985) when the positive impact of easing some of the constraints of the central planning model supplemented the positive contribution of agricultural investment. Overall, however, figure 3.6 suggests that both the negative and positive effects of all factors external to the influences of agricultural investment more or less cancelled each other out, so that the average annual growth in agriculture over the central planning period was almost entirely accounted for by the average share of agricultural investment allocated to the sector.

**Figure 3.6 The expected and actual annual average agricultural growth rate during different periods under central planning (1958-1988)**

In the agricultural sector, developing irrigation was recognised as an important element for increasing agricultural productivity during the central planning period (Nguyen Khac Vien *et al.* 1967:83). Over this period, close to 9 per cent of total public investment was allocated to irrigation. Concomitantly, the area of land brought under irrigation increased from 24 per cent of total agricultural land in 1976 to 27 per cent in 1988 (GSO 1991d). The surface of irrigated land grew close to 2.6 per cent annually.

---

44 I have used total agricultural land rather than total arable land, as the available data on the former offered a better time series than was available for the latter. In any case, the proportion of arable land to
between 1976 and 1988. Comparing this with an annual growth rate of 1.6 per cent in agricultural land over the same period, indicates that the growth rate in the proportion of land brought under irrigation between 1976 and 1988 was effectively one (1) per cent (ibid.). The extremely low level of irrigation development during the central planning period in Vietnam reflects the equally low level of public investment directed towards irrigation. Investment to irrigation was obviously too inadequate to further accelerate agricultural growth through an expansion of irrigated lands.

Comparing the combined share of public investment allocated to agriculture, irrigation, transport and communication, which amounted to about 40 per cent, with the combined share allocated to the prioritised sectors of industry and government services (52%), the bias towards the prioritised sectors, especially industry (41%) appears obvious. This empirical observation is in line with the findings that most countries adopting an inward-oriented development strategy allocate a major share of investment to the protected sector (see Little et al. 1970).

Lastly, it should be noted that almost 85 per cent of Vietnam’s population lived in the countryside during the central planning period and a national population growth was about 2.6 per cent. This implies that with an average annual agricultural growth rate of 2.8 per cent, growth in agriculture was largely offset by the high population growth rate during the central planning period.

Based on the foregoing discussion, the following observations on public investment during the central planning period can be made: i) in comparison to other developing countries, public investment in agriculture and transport infrastructure was below average; ii) the incremental increase in agricultural growth from a one per cent increase in agricultural investment was in line with that observed in other developing countries; iii) the low public investment in irrigation had low pay-offs in terms of the area of land brought under irrigation; iv) the prioritised sectors of the economy, especially industry, received the greatest share of total public investment; and v) a large population, with a high growth rate, largely offset Vietnam’s agricultural growth rate over the period.

Following these observations, what can we say about the effectiveness of public investment in Vietnam’s rural development programme on the agricultural sector? As I argued in section 2.4.5.2 of chapter 2, it is more effective for an agrarian country to allocate the major part of its public investment funds to the agricultural sector at the early stage of economic development, since the associated productivity of the investment is greatest in that sector. Economic planners in Vietnam did the converse.

total agricultural land normally varies between 90-95 per cent; therefore, is a good proxy. Moreover, I used the area cultivated for the dry season rice crop as a proxy to irrigated land, as this crop cannot be cultivated without some form of irrigation and is, therefore, representative of irrigated land.
They were, therefore, not allocating an adequate level of investment to effect further growth in the agricultural sector and, as a result, not allocating their scarce public funds efficiently; nor were they maximising the potential productivity from agriculture at an early stage of development.

3.2.3.3 Weak incentives created by central planning policies

How did a central planning framework affect production incentives? In section 2.3.1.1 of chapter 2, I argued that there were essentially two factors that affected the incentive structure of the average farm household in Vietnam during the period of central planning: the collectivisation of agriculture and the implementation of a stable price policy (see government price for paddy rice compared to market prices in table 3.2, page 62). In turn, weak incentives arising from these policies contributed to the inefficient use of resources and lowered agricultural production.

Under central planning in Vietnam, farm households lost their ownership rights over productive assets and resources, and their ability to make individual decisions about the use of such assets and resources. The labour of farm households were organised into work teams for collective farming. As a result, the incentive structure facing farm households in Vietnam's countryside was fundamentally changed. This is in opposition to the principle that a necessary condition for efficient use of resources is that users have the power to determine the best way to use them (Demsetz 1967, see section 2.3.2.2 of chapter 2). Since Vietnamese farmers no longer controlled most factors of production in agriculture and had no direct link to the final output of the collective, but rather were linked to a proportion of the production in the collectivity, the incentive for the efficient use of resources in collective production weakened.

Furthermore, because labour was organised into work teams the compensation structure was altered such that workers would not be rewarded fairly unless supervision of their effort was perfect (Alchian and Demsetz 1972; Sen 1981). Hence, in the absence of perfect supervision not all labourers would be compensated up to their marginal product of labour as on a wage farm. As a consequence, the incentive to allocate labour and non-labour resources in agricultural production would have weakened.

Lastly, as mentioned above, economic planners in Vietnam maintained a stable price policy up to the early 1980s, in an attempt to control the free market, especially agricultural and consumer prices, and turn the terms of trade against agriculture and in favour of industry. This policy was also a great disincentive to agricultural production from the point of view of the collective. Since farmers involved in collective work were not directly connected to the end-product, and they could potentially dispose of only a small proportion of the end-product on a controlled market after meeting government and cooperative obligations, farmers had virtually no price incentives to guide their allocative decisions. As discussed in section 2.3.2.2, the outcome was highly likely to
have been inefficient, and this is borne out by the economic performance of the agricultural sector during this period.

In order to illustrate the impact of the central planning policies, consider the agricultural indicators presented in table 3.2 and figure 3.6. Following the collectivisation of most agricultural land in North Vietnam between 1958 and 1964, and a long war between 1965 and 1975, agricultural productivity (see figure 3.1), agricultural output and food crop production per capita fell drastically, as a consequence of the initial shock of the inward-oriented central planning policies on agriculture and the disruption to normal life resulting from the war. The sharp falls in agricultural production, especially rice production during these periods, widened the gap between the state and market prices, thereby increasing the ratio of state to market prices (see table 3.2). The situation grew worse shortly after Vietnam was reunified in 1976 and became critical between 1977 and 1978. Between 1977 and 1978, the average annual growth rate in agricultural productivity fell by 6.1 per cent for labour and 12 per cent for land. Agricultural production fell by 3.1 per cent, and food output per capita was down to 238 kilograms in 1978 (see table A.2, Appendix A). The sharp reduction in Vietnam’s extremely thin food grain supplies caused a massive price hike for rice in the parallel market, which is reflected by the widening gap between market prices and administratively determined government prices for rice, a ratio of 6.8 between 1977 and 1978 (see table 3.2). As figures 3.1 and 3.6 indicate agricultural growth and productivity reached its lowest point during the reunification period.

How did farmers adapt their economic choices to this economic reality? Farm households faced a growing shortage of food grains and essential foodstuffs through the cooperative system throughout the 1960s and 1970s. Consequently, with the declining economic situation of low agricultural productivity, slow agricultural and economic growth, rising prices and resource scarcity, it became increasingly important to secure subsistence through alternative means. As a result, households found it necessary to devote more of their labour effort, the only factor of production still in their control, to private farming in order to supplement their low cooperative incomes with income derived from the output of their small private garden plots. Put differently, the incentive for the average farm household was to minimise labour effort in cooperative work, not only because the marginal cost of labour exceeded the marginal return to labour in that sector, but also because the marginal return to labour in the private plot sector exceeded the marginal cost of labour in the cooperative sector (see, Fforde 1989; Hy Van Luong 1992).

Throughout the 1960s, farmers met this declining situation in (collective) agriculture with growing resistance to collectivist ideology, and turned more and more to their private plots (see White 1988:144-145; Fforde 1989:194-197; Hy Van Luong 1992:204). Although falling agricultural production led to a greater concentration of
labour effort in private plots which, in turn, pushed agricultural productivity even lower in the collective sector, this vicious circle never escalated to a situation where cooperative work was altogether abandoned, but it certainly affected the output of cooperatives (Fforde 1989:45).

Attesting to the adverse impact of the central planning policies on agricultural production incentives was the fact that the government was forced to introduce economic reforms to ease a food and economic crisis mounting in the rural regions of Vietnam by the late 1970s. Reforms were first introduced in the agricultural sector in 1979, when a policy to ease the move to collectivise farm land in southern Vietnam was instituted (see Premier's Directive 1979; Council of Ministers 1980). Not long afterwards, in 1981, a comprehensive plan to stimulate incentives was implemented in the agricultural sector under the product contract system (PCS), in the industrial sector under the three point system, and throughout the economy as a whole through a series of price reforms (see Party Secretariat Directive 1981; Nhan Dan 1981; Fforde and de Vylder 1988).

The PCS reform was an attempt to partially decollectivise agricultural production by contracting a parcel of land to farm households and allowing them to have responsibility for production activities. In price reforms, many attempts were made between 1981 and 1987 to close the gap between market and state prices, the most important of these being the wage, price and currency reform in 1985 (see Nhan Dan 1985; Dao Thien Thi 1985; Councils of Ministers 1985, and To Huu 1985).

The government’s implementation of sectoral and price reforms between 1979 and 1987 was a response to the inefficiencies and disincentives created by the inward-oriented centrally-planned economic development policies. Under this broad set of policy reforms, the government aimed to:

1. remove the inefficiencies of the central planning system by stimulating production incentives and promoting greater efficiency in resource use;
2. improve incentives within the centrally planned economic framework by loosening central control rather than abandoning it altogether;
3. transfer responsibility and give more autonomy to individuals to make (partial) production decisions; and
4. close the gap between state prices and free market prices, and allow some role for market mechanisms in the exchange of inputs and outputs, thereby allowing free market prices to play a greater role in the decision-making process of farm households.

What impact did these economic measures have on agriculture and the economy as a whole? The immediate impact on agriculture as a result of easing the
collectivisation and price stabilisation policies was a dramatic surge in agricultural productivity, especially land productivity up 7 per cent (see figure 3.1 and table 3.2), agricultural growth (see figure 3.6), food crop production per capita and a narrowing of the gap between market and state prices for rice to a ratio of 4.2, down from 6.8 between 1976 and 1978 (see table 3.2). As a consequence of improved productivity, the annual average real agricultural output growth rate forged ahead between 1979 and 1985 by 7 per cent (see table 3.1). As the agricultural sector during this period accounted for over half of Vietnam’s economic worth, the strong growth in the agricultural sector also boosted overall economic growth to 3.9 per cent (see table 3.1).

These positive results from incentives policies of the 1980s confirm that the limitations imposed on farmers' incentives by central planning policies were constraining on agricultural sector growth. In their analysis of agricultural reforms on production, Pingali and Vo Tong Xuan (1990) have confirmed that reforms significantly improved the ability of farmers to achieve greater productivity. Similar reforms in China also secured positive results for Chinese farm households (see Lin (1989) and McMillan et.al. (1989)).

3.2.3.4 Macro economic instability

How did an inward-oriented economic development strategy affect macro economic balances in Vietnam? And, in turn, how did these macro economic balances influence agricultural and economic growth?

Krueger (1981) observed that pursuing an inward-oriented development strategy over time leads a country's: i) rate of economic growth to slow down, as import substitution becomes deeply entrenched; ii) material imports to grow at least as fast as GDP; and iii) exports to grow more slowly than GDP (see section 2.3.2.4 of chapter 2, page 29). In addition, Sachs and Warner's (1995) observed that countries adopting inward-orientation (closed-economies): i) grew on average at least 2.5 per cent more slowly than outward-oriented economies; ii) were more likely to have a macro economic crisis, e.g., debt crisis, large external payments in arrears, or inflation over 100%; and iii) adjusted more slowly in the structure of its economy than outward-oriented economies. Using these criteria, I evaluate the macro economic impact in Vietnam during central planning.

The average annual growth rate of imports (13.8%) in Vietnam grew much faster than GDP (4.1%) during the central planning period (see table 3.3). But at the same time growth in exports (14.0%) not only surpassed growth in GDP, but also growth in imports. In order to elucidate this deviation from Krueger's generalisations, I looked at the balance of payment, current account, capital account, imports, exports and the trade balance as a share of GDP. These statistics revealed a trend that is more in line with Krueger's (1981) observations. It can be observed in table 3.4 (page 73) that, over
several sub-periods under central planning the size of exports as a share of GDP fell continuously, and over the entire central planning period the size of imports as a share of GDP was almost four times as large as the size of exports as a share of GDP. The end result of this wide gap between imports and exports was a large trade deficit, equivalent to almost a quarter of the GDP during the central planning period (see table 3.4). In this regard, the trends in Vietnam’s trade statistics during the period in which it persisted with inward-orientation under central planning are in line with Krueger’s (1981) general observations of countries adopting inward-oriented economic development policies.

Table 3.4 Macro economic balances in Vietnam

<table>
<thead>
<tr>
<th>Macro Economic Stability Indicators</th>
<th>Unit</th>
<th>Years and Periods (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Official inflation rate (b)</td>
<td>%</td>
<td>0.9</td>
</tr>
<tr>
<td>Government budget balances as a share of PNI/GDP (c) (d)</td>
<td>%</td>
<td>0.3</td>
</tr>
<tr>
<td>Source of financing the budget deficit as a share of the budget balance (d)</td>
<td>%</td>
<td>0.0</td>
</tr>
<tr>
<td>State bank issues</td>
<td>%</td>
<td>0.0</td>
</tr>
<tr>
<td>Government securities</td>
<td>%</td>
<td>0.0</td>
</tr>
<tr>
<td>Foreign grants and loans</td>
<td>%</td>
<td>0.0</td>
</tr>
<tr>
<td>National savings &amp; investment as a share of PNI/GDP (d)</td>
<td>%</td>
<td>0.0</td>
</tr>
<tr>
<td>National savings = national investment</td>
<td>%</td>
<td>0.0</td>
</tr>
<tr>
<td>Domestic savings</td>
<td>%</td>
<td>0.0</td>
</tr>
<tr>
<td>Foreign savings</td>
<td>%</td>
<td>0.0</td>
</tr>
<tr>
<td>Public investment</td>
<td>%</td>
<td>0.0</td>
</tr>
<tr>
<td>Non-public investment</td>
<td>%</td>
<td>0.0</td>
</tr>
<tr>
<td>Balance of payments as a share of GDP, of which:</td>
<td>%</td>
<td>0.0</td>
</tr>
<tr>
<td>Current account as a share of GDP (d)</td>
<td>%</td>
<td>0.0</td>
</tr>
<tr>
<td>Capital account as a share of GDP (d)</td>
<td>%</td>
<td>0.0</td>
</tr>
<tr>
<td>Trade Developments</td>
<td>%</td>
<td>15.3</td>
</tr>
<tr>
<td>Growth in exports (f)</td>
<td>%</td>
<td>9.4</td>
</tr>
<tr>
<td>Growth in imports (f)</td>
<td>%</td>
<td>10.9</td>
</tr>
<tr>
<td>Exports as a share of PNI/GDP (d)</td>
<td>%</td>
<td>17.1</td>
</tr>
<tr>
<td>Imports as a share of PNI/GDP (d)</td>
<td>%</td>
<td>-6.2</td>
</tr>
</tbody>
</table>

Notes:
(b) From 1957 - 1985 official inflation is a combination of both the organised and free market. From 1986-95, the change of retail prices in the free market.
(c) PNI/GDP see Appendix B.
(d) In current dong values.
(e) Includes errors and omissions.
(f) In current USD value.
(g) 1983-1985
(h) 1983-1988
(i) 1985
(j) 1985-1988
Source:
Table A3, Appendix A
Following Sachs and Warner’s criteria, it is clear from table 3.1 that real economic growth (4.1%) during the inward-orientation period (1958-1988) grew more slowly relative to the period when Vietnam pursued an outward-oriented development strategy (7.7%) (1989-1995). (I discuss the results of outward-orientation in greater detail in sections 3.4 and 3.5.) Moreover, the level of inflation, the size of the government budget balance as a share of GDP, and the size of both the balance of payments and trade balance as share of GDP throughout the 1980s all showed evidence of the macro economic crisis (see table 3.4), similar to that observed by Sachs and Warner (1995) for countries adopting inward-orientation.

Inflation worsened after Vietnam was reunified, when it climbed over 20 per cent. A major factor contributing to this outcome was the "bureaucratic centralised state subsidy system" (see section 3.2.1) because it underpinned a policy of fiscal and monetary expansion. Evaluating the trends in the government budget balance indicates that a deficit was incurred soon after adopting inward-oriented policies and increased steadily over the years of central planning. Moreover, following the economic reforms implemented since 1981 (see section 3.2.3.3), the vain attempts by policy makers to continually adjust state prices to market prices, and lift the wages of state sector employees, placed a lot of pressure on the government budget balances (see table 3.4). This policy response got out of hand in 1985, when the government implemented a wage, price and currency reform to counter the erosion in the real spending power of state sector wages caused by inflation.

Fighting inflation with inflationary means of financing the deficit as described above further fuelled inflation. As table 3.4 makes clear, economic managers in Vietnam increased the relative proportion of the budget deficit being financed by State Bank of Vietnam money issues between 1983-1985 and 1986-1988. The simultaneous impact of increases in wages and prices (state prices being moved closer to free market prices) and reforms in the currency was a massive flood of money into the economy that pushed prices to hyper-inflationary levels (775% in 1986). It is reasonable to assume that this high level of inflation experienced in Vietnam during the 1980s seriously distorted the efficiency with which resources were allocated; dissipated wealth; and reduced incentives for investment in productivity-enhancing technology.

According to Sachs and Warner’s third observation, Vietnam showed little evidence of structural adjustment between the late 1950s up to 1988 as discussed in section 3.2.2. In fact, during the time policy makers persisted with inward-orientation under central planning, the structure of Vietnam’s economy remained fundamentally dominated by the agricultural sector and was not transformed into a modern industrial economy, contrary to their hopes at the start of the development process in the mid 1950s.
Therefore, it is evident that the inward-oriented economic development policies implemented under a central planning economic system in Vietnam had an adverse effect on macro economic balances. The more Vietnamese policy makers persisted with inward-orientation, the greater their reliance grew on policies that distorted Vietnam’s budget and external trade balances, exacerbated inflation and led to a highly unstable macro economy towards the end of the central planning period.

3.2.4 Why the inward-oriented development strategy under central planning was abandoned

Although the initial impact of the sectoral reforms on agricultural and economic growth was positive up to the mid 1980s (see tables 3.1 and 3.2), failure to seriously address macro economic problems meant that growing macro economic distortions, such as a large fiscal deficit, large balance of payments deficit and rapid inflation, led to a highly unstable macro economic environment between 1986 and 1988 (see table 3.3). The positive impact of the sectoral reforms in agriculture and across the economy was limited by the underlying macro economic weaknesses and, as a result, growth in the dominant agricultural sector was drastically reduced after 1986.

Faced with the situation that has been described above, economic planners in Vietnam must have realised that improving producer incentives through sectoral policy reforms had limited impact given the highly distorted economic environment emerging from the mid 1980s. What were required instead of sectoral policies, which addressed the symptoms rather than the illness, were fundamental economic policies that addressed the core of the macro economic problems: the system that produced budget imbalances and inflation. Given the extent of the distortions by 1988, the Vietnamese government was left with no other choice but to institute economic reforms that replaced that system. Indeed, in 1989, the government instituted economic reforms to establish macro economic stabilisation, liberalise the market and shift to a more outward-oriented economic development strategy.

However, although the government effectively abandoned 35 years of central planning adopted under its socialist agenda, it did not abandon its firm hold on political power in favour of political pluralism as countries of former Eastern Europe and the USSR. Vietnam continues to remain a one party system ruled by the Communist Party of Vietnam.
3.3 CHANGING THE ECONOMIC DEVELOPMENT FRAMEWORK

3.3.1 Agricultural reforms in 1988 - Resolution No.10

In April 1988, policy makers pushed through an agricultural policy known as Resolution No 10, following a sharp slowdown in the performance of the agricultural sector between 1986 and 1988 compared to the period of high agricultural growth between 1979 and 1985. The main objective of this new policy was to stimulate producer incentives by giving farm households complete independence in production and sales decisions and by allocating a certain amount of land to farm households (Nhan Dan 1988, Socialist Republic of Vietnam 1990). The resolution made farm households in agricultural cooperatives completely responsible for production and sales decision, and imposed upon them only the obligation of certain government taxes and district fees, such as agricultural tax and irrigation fees. This mandate officially recognised the farm household as the main unit of production, and relieved cooperatives from direct production management responsibilities. Instead, cooperatives were expected to become agencies of services to the farm household. Nevertheless, the government retained the principle that land is owned by the state, but permitted usufruct rights in land, which gave farm households a de-facto tenure in land. Long term (up to 15 years), non-transferable tenure rights were implemented by a Land Law in 1988, and most households received an allocation of land. However, very few households have received land use certificates.45

Furthermore, Resolution No.10 stipulated that agricultural investment would play a stronger role in the production process of agricultural outputs, especially in the production of grains and foodstuffs. Capital investment, agricultural implements and material would be concentrated in the rice growing deltas, and other key agricultural commodity producing areas (Nhan Dan 1988). Public investment in agriculture would be aimed specifically at giving priority to irrigation and water management projects, and to research in agricultural science and technology (ibid.). In addition, the services of other sectors such as the heavy industries sector and the construction sector would be promoted in order to accelerate the development of the agricultural sector by contributing material and services (ibid.). Under Resolution No.10 the government also promised that an agricultural investment bank would be established immediately in order to provide agricultural development loans to the collective and household production sectors, "thereby enabling poor peasants to avoid borrowing money at high interest rates from private individuals" (ibid.).

45 In reality, there has been an active market in land with or without use right certificates, - effectively creating a market in land.
These policy shifts in agriculture, although late to come, were in keeping with the objectives of the fourth five year plan announced in December 1986 at the time of the inauguration of *doi moi* when the government stated that agriculture, along with the export and consumer goods sectors, would be given priority. In line with this aim, two major policies unfolded under Resolution No. 10:

- a de-collectivisation policy - which replaced the cooperative as the basic unit of production with the farm household, but without removing the cooperative’s administrative function; and

- the strengthening of Vietnam’s rural development programme - as indicated by the government’s intention to increase public investment in the agricultural areas facilitating agricultural productivity: irrigation and research, and improving credit access for agricultural producers by establishing an agricultural development bank (Socialist Republic of Vietnam 1990).

### 3.3.2 Economic stabilisation reforms in 1989

Under the structural adjustment programme from March 1989, the government abandoned the central planning economic management system in favour of a market-oriented system of economic management. It did this by abandoning the practice of setting prices administratively and liberalising national markets in most commodities to allow market forces to determine prices in the economy. Accompanying the transformation of the economic system, was the implementation of a package of monetary, fiscal, trade and exchange rate policies designed to stabilise Vietnam’s volatile macro economy. This package sought to reduce triple digit inflation caused by excessive government subsidies and exacerbated by the 1985 prices, wages and currency reforms; raise the level of real interest rate to stimulate increased domestic savings for investment; bring the budget deficit under control by consolidating public sector finance through the removal of subsidies, reduce government employment and freeze state employees' wages; establish a realistic exchange rate by devaluing the official rate to the level prevailing in the free market; and increase the level of exports and access to imports by liberalising the trade regime.

The stabilisation programme clearly indicated that the government came to realise the necessity of addressing the macro economic imbalances and micro economic inefficiencies of the central planning framework by abandoning that framework altogether rather than continuing with piecemeal sectoral reforms. In addition, the reforms also demonstrated a decision to adopt an outward-oriented development strategy by both devaluing the currency and creating a unified exchange rate. In doing so, Vietnamese policy makers were to some degree emulating a Taiwanese approach to economic development. Taiwan in the late 1950s initiated currency reforms when it adopted outward-orientation (Okita 1980).
3.3.3 Other reforms in the 1990s

Following the two major set of reforms instituted in 1988 and 1989, a number of important reforms focusing on the institutional and regulatory requirements of a more market-oriented economy were implemented in Vietnam up to 1995. In particular, laws concerning the establishment and operation of private enterprises were enacted; and laws hardening the budget of inefficient state-owned enterprise were also passed in 1990 and 1991. In 1992, a new constitution was passed which legalised the process of economic reforms. As a result, a new land tenure law was passed in July 1993, which allowed farmers to transfer, rent and inherit the right of land use. This policy was also supported by other regulations passed between 1993 and 1994, which further improved and clarified the security of land tenure for farm households in Vietnam. Another important reform instituted in March 1993, was Decree No. 13 which provided the principles for establishing an Agricultural Extension System in Vietnam. Under this policy, extension centres are to be set up in each province, and the provinces are free to set up extension stations in each district or groups of districts. Extension stations are responsible for organising training, demonstration plots, excursion to model farms, and a number of other activities. In effect, these policy should further encourage Vietnamese agricultural producers to make long term investment in agricultural production.

3.4 THE PERFORMANCE OF THE AGRICULTURAL SECTOR AND ECONOMY AFTER SEVEN YEARS OF OUTWARD-ORIENTATION IN A MARKET SYSTEM

How effective were economic reforms in accelerating agricultural productivity and growth, and stimulating economic growth? In the agricultural sector, the strong growth in labour productivity and land productivity starting from 1980 was sustained throughout the 1980s and endured into the 1990s (see figure 3.1, page 59). On average, agricultural productivity surged forward in the period of the transition to the market in comparison to the previous central planning period (see table 3.2, page 62). The result of this surge in agricultural productivity was a concomitant increase in the rate of agricultural output over this period (see table 3.1, page 61). During the seven years in which the government pursued a more outward-oriented development strategy in a market-led economic system, the agricultural sector increased its average rate of growth to 4.3 per cent compared to the average of 2.8 per cent yielded under central planning period (see figure 3.7, page 79 and table 3.1, page 61). Similarly, Vietnam’s average rate of economic growth between 1989 and 1995 was almost double that of the centrally planned period (see figure 3.2 and table 3.1).

46 See Decree 315 (1990), and Decree 332 and 338 (1991).

47 See Decrees No. 64 (Sep, 1993) and Regulation number 60 (Jul, 1994).
Given the short period of time in which policy makers in Vietnam have pursued an outward-oriented development strategy, the economic performance of the agricultural sector and the economy as a whole during the period of the transition to the market starting in 1989 was very strong in comparison to the previous central planning period (see tables 3.1 and 3.2, and figures 3.1 and 3.2). However, comparing agricultural growth to the industrial and services sector growth, indicates that the agricultural sector grew slowly between 1989 and 1995 (see figure 3.7). In particular, agriculture’s contribution to the economic growth rate between the two periods was very marginal, increasing on average from 1.3 per cent during central planning to 1.6 per cent during the market transition period (see figure 3.1). Although industry’s contribution to economic growth was slightly greater than agriculture (moving from 1.9% to 2.3% over the two periods), it was certainly less than services, which on average moved from 0.9 per cent to 3.8 per cent between the two periods.\(^{48}\) The agricultural sector’s low average contribution to economic growth is surprising given the fact that a great deal of the economic reforms occurring in Vietnam were aimed specifically at the agricultural/rural sector, such as Resolution No.10, Decree No.13 and the Land Laws, or aimed at the factors facilitating these sectors, such as macro economic stabilisation reforms.

This observation led me to ask: How effective were the economic policy changes since 1988 in facilitating agricultural growth?

Despite greater productivity, the low agricultural growth rate relative to other sectors and agriculture’s small contribution to economic growth is a concern for a low-income agrarian country such as Vietnam. As discussed in section 2.4 of chapter 2, high

\(^{48}\) Note, however, that this very large incremental change between the two period for the service sector’s contribution to real economic growth may be attributed to the fact that the system of national accounting was different between the two periods with respect to measuring the economic output of the service sector. Under the MPS system, many service activities went unrecorded in the economy. Whereas, under the UNSNA system many of these services were recorded. As a result, service sectors contribution to economic growth would be large.
agricultural productivity and high growth underpins economic activities in all other sectors of the economy at the early stages of economic development. Based on the fact that up to 1995, 80 per cent of the population resided in the countryside, 73 per cent of the labour force were employed in the agricultural sector, and agriculture accounted for almost 30 per cent of GDP, Vietnam could hardly be considered anything but an agrarian economy. The low growth rate of agriculture relative to the other sectors, could be assumed to mean that economic reforms were inadequately implemented and, as a result, were not effective in facilitating agricultural growth.

I hypothesised in chapter 1 that the higher real growth rate recorded in Vietnam’s agricultural sector between 1989 and 1995, compared to the previous period, was partly due to the positive impact of a return of production responsibilities to farm households under Resolution No.10 and partly to the enabling macroeconomic environment created by a self-imposed macroeconomic stabilisation programme. It was not, however, thanks to the effective rural development programme promised under Resolution No. 10. In section 3.5 of this chapter, which follow, I aim to provide evidence and arguments that supports this hypothesis.

3.5 THE FACTORS INFLUENCING AGRICULTURAL AND ECONOMIC GROWTH DURING THE MARKET TRANSITION PERIOD

3.5.1 A weak rural development programme

3.5.1.1 An overview of public investment in the rural development programme

Was the level of public investment allocated to the rural sector adequate for establishing an effective rural development programme in Vietnam during the market transition period? The average level of public investment fell in relation to GDP following the decision by the government of Vietnam in 1989 to stabilise Vietnam’s huge macroeconomic instability through economic reforms aimed at consolidating government spending, and the maintenance of this policy throughout the 1990s. The annual average level of public investment between 1989 and 1995 amounted to 6.7 per cent of GDP, declining precipitously from its annual average size of 18.4 per cent during central planning (see table 3.3, page 65).

In line with the reduction of total public investment as a share of GDP, the relative shares of public investment allocated to different economic sectors also fell sharply between the two periods (see figure 3.8, page 81). In particular, the decline in public investment allocated to transport and irrigation infrastructure, agricultural services and social services fell in some cases by as much as 80 per cent, compared to the averages recorded during central planning.
Although all sectors were affected by the sharp reduction in public spending, as a result of the economic stabilisation measurements necessary to reduce Vietnam’s massive government budget deficit and rein in inflation (see table 3.4, page 73), the industrial sector relative to the other economic sectors continued to receive the major share of public investment. This shift in the allocation of public investment between the two periods is evident in figure 3.4, which illustrates public investment to different sectors as a share of total investment. Most striking is the magnitude of the fall in the annual average share of investment allocated to agriculture between the two periods. In constant 1989 prices, and US dollar terms, the annual average budget allocation to agriculture fell from US$ 45 million between 1958 and 1988 to US$ 24 million between 1989 and 1995.\(^{49}\) While the annual average share of investment allocated to irrigation improved from US$ 36 million during the central planning period to US$ 44 million during the market transition period, and the share allocated to transport and communication fell.\(^{50}\) The share of investment to social services and to administration in contrast to the other sectors rose noticeably. Although the average share allocated to the industrial sector fell by about a quarter, the sector continued to benefit by receiving the largest share of investment relative to the other economic sectors.

In view of the sharp decline in the average share of public investment allocated to the rural infrastructure, agricultural support and social services sectors\(^{51}\), it is

\(^{49}\) My own estimation based on data provided by the GSO.

\(^{50}\) Note that during the market transition period, the share allocated to communication as a share of total investment to the transport and communication sector increased to between 20-25 per cent between 1989 and 1993. From 1994, investment in transport and communication had more or less an equal weight (50/50).

\(^{51}\) These sectors are: transport, communication and irrigation with funds allocated to rural infrastructure; agriculture with funds allocated to agricultural support services, such as the establishment of rural credit...
understandable that the elements of a rural development programme were affected. During the market transition period, an average of 25 per cent of total public investment was allocated to infrastructure development (table 3.3, page 65), far less than the average of 37 per cent of public investment allocated to infrastructure in low-income developing countries (Easterly and Rebelo 1993), and less than the 30 per cent of total public investment funds that was allocated to infrastructure development during central planning. The share of public investment allocated to agriculture (including irrigation) slipped from an annual average of 19.2 per cent during central planning to 13.6 per cent during the transition to the market (see figure 3.9). Comparing agricultural investment in Vietnam to Krishna’s (1982) benchmark of 20 per cent, indicates that the public investment program aimed at agriculture also suffered in the latter years. It follows, that the smaller share of public investment allocated to infrastructure, agriculture (including irrigation) and social services in relation to GDP and total public investment during the market transition period was even less inadequate for developing an effective rural development programme, than the former inward-oriented centrally-planned period.

**Figure 3.9** The annual average allocation of investment as a share of total public investment to different sectors

<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Administration, commerce and others</td>
<td>12%</td>
<td>5%</td>
</tr>
<tr>
<td>Social Services</td>
<td>10%</td>
<td>9%</td>
</tr>
<tr>
<td>Industry &amp; construction</td>
<td>7%</td>
<td>28%</td>
</tr>
<tr>
<td>Transport &amp; communication</td>
<td>21%</td>
<td>16%</td>
</tr>
<tr>
<td>Irrigation</td>
<td>41%</td>
<td>11%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>10%</td>
<td>16%</td>
</tr>
</tbody>
</table>

(Source: table A.3, Appendix A)

services and extension services; and social services with funds allocated to education and health services in the rural regions.

52 This is the sum of public investment to irrigation, transport and communication.
The foregoing discussion draws out four observations for the market transition period: i) public investment as a share of GDP fell as a result of the stabilisation reforms; ii) the share of investment allocated to a rural development programme fell both in relation to GDP and to total public investment; iii) compared to the former central planning period, the lower level of public investment in the elements of a rural development programme were less adequate to develop it effectively; and iv) the industrial sector continued to receive the largest share of public investment.

3.5.1.2 Low transport investment

It is difficult for farm households to benefit from the transition to a market economy, unless the goods they produce can be efficiently brought to market. The primary factor preventing farmers from getting their goods to market is the inadequate state of Vietnam’s transportation network. If the cost associated with getting the produce to market is made inefficiently high because of a weak transportation network, then producing the good for market is unprofitable.

During the 1990s, the government exerted much effort to improve Vietnam’s transportation network. Although it is true that the share of public investment in transport infrastructure in relation to GDP and total public investment was lower on average during the market transition period than the former central planning period as I argued in the previous section, in real terms it increased by over 25 per cent annually between 1990 and 1995 (see table 3.5). Table 3.5 also reports that on average over 80 per cent of the public investment allocated to the transport sector was targeted at road construction between 1991 and 1995. The balance of 20 per cent was allocated to canal and rail transportation. Despite the government’s intention to rapidly increase investment in transport infrastructure, the fact remains that investment in the rural infrastructure (transport, communication, electrification and irrigation) was extremely low both in relation to GDP and total public investment (see section 3.5.1.1). Moreover, there is some evidence in table 3.5 to suggest that a great deal of this investment was not allocated to road construction projects linking small agricultural communes to local or regional markets. Table 3.5 indicates that the major share of public investment was distributed to central government management, who are charged with upgrading and constructing major national and city transport routes. In contrast, the minor share of public investment to transport infrastructure went to local government management, comprising the provincial, district and commune government, charged with road construction and maintenance in their respective administration, which often means the countryside. This bias in distribution of funds tends to favour development of urban transportation routes and major highways, rather than development of more rural-urban linkages.
Table 3.5 Public investment in transport, 1990-1995

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Real growth in investment to the transport sector (%) (a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>26.1</td>
</tr>
<tr>
<td>Distribution of investment in transport to: (b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Roads</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Others (railways, waterways)</td>
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<td>Distribution of transport investment by area of administration: (b)</td>
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<tr>
<td>Central government</td>
<td></td>
<td></td>
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<tr>
<td>Local government (c)</td>
<td></td>
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</thead>
<tbody>
<tr>
<td>39.5</td>
<td>13.1</td>
<td>55.8</td>
<td>7.2</td>
<td>33.8</td>
<td>7.0</td>
<td>26.1</td>
</tr>
<tr>
<td>67.6</td>
<td>32.4</td>
<td>89.6</td>
<td>10.4</td>
<td>10d</td>
<td>10d</td>
<td>84.3</td>
</tr>
<tr>
<td>59.8</td>
<td>59.0</td>
<td>52.5</td>
<td>55d</td>
<td>55d</td>
<td>56.3f</td>
<td></td>
</tr>
<tr>
<td>40.2</td>
<td>41.0</td>
<td>47.5</td>
<td>45d</td>
<td>45d</td>
<td>43.7f</td>
<td></td>
</tr>
</tbody>
</table>

Notes:  
(a) In constant 1989 prices.  
(b) Current prices.  
(c) Includes provincial, district and commune governments.  
(d) Estimated from data in MOF (1996).  
(e) Based on the average for 1992-1995  
(f) Based on the average for 1991-1995  

Sources:  

Not only was investment low and unequally distributed, its effectiveness in increasing Vietnam’s road density (the kilometres of road per square kilometre) was also limited. Unfortunately, accurate and consistent time series data of Vietnam’s stock of transportation routes is not available for the years prior to 1994. However, in 1994, Vietnam conducted its first major survey of the transportation network. The total length of Vietnam’s roads spanned 177,259 kilometres in 1994, of which only 8.5 per cent were all-weather roads (sealed with asphalt), indicating that the density of paved roads in Vietnam was 0.045 km/km² (GSO 1995a:296). This level of road density was comparable to Malaysia’s road density which was 0.06 km/km² in 1980 and Thailand’s road density of 0.046 km/km², but very small in comparison to Indonesia which had a road density of 0.30 km/km² (World Bank 1994b).

Considered by their area of administration, just over half of the provincial roads, four-fifth of the district roads, and 95 per cent of commune roads were unpaved in 1994 (see table 3.6). The area administered by the central government had the smallest proportion of unpaved roads, which reflects the larger share of public investment to the transport sector that was administered by the central government. Furthermore, over four-fifth of Vietnam’s road network was unpaved in 1994, and that these were predominantly in the countryside. During the wet season, many of these roads were rendered impassable, making it almost impossible for farmers to get to market.

This data on Vietnam’s road network indicates that more public investment is needed if the government is serious about providing true rural-urban linkages. (Policy recommendations for improving Vietnam’s transportation network are presented in chapter 6.)
3.5.1.3 Market development

In section 2.4.4, I argued that investment in the transport sector facilitates the development of markets. Section 3.5.1.2 argued that the level of public investment in transport and communication was very low and as consequence road density in Vietnam is amongst the lowest in the region. Following these observations, how did the national markets evolve over the transition period? Figure 3.10 (page 86) which presents the inter-city ratios of rice and urea prices between the Hanoi and Ho Chi Minh City (HCMC) markets between 1989 and 1993, gives an indication of how markets evolved, at least in the capital cities.

It is noticeable that the variability in the price ratio between the two markets was greater for rice than for urea, with higher rice prices in the north. At the start of the period, higher prices in the north reflect the lower level of production in the region, and consequently supply shortages. If the distribution system across Vietnam were better, then the disparity in prices for both commodities in periods of scarcity in the north relative to the south would have been less. Between 1989 and 1993 there was a noticeable reduction in the volatility of price differences between the two commodities in the two markets. This suggests that the upgrading of the route between HCMC and Hanoi improved the distribution of these commodities between the north and the south, which would also suggest a clear linked between transport and market development. This link, however, is not so clear. What is more evident is the fact that agricultural production, especially rice production, rose significantly in the north as it did in the south over 1992 and 1993 (see table 3.2, page 62). It is the abundance of rice that became available in 1992-3 which better explains the reduction in the disparities in prices. Therefore, this suggests that the reduction in the volatility of price differences is not conclusively the result of improvements to the transportation network, which in any case was small as suggested by table 3.6.
The market for urea between the two capital cities was not as volatile as the rice market. The only significant divergence in the prices between the two city markets was in 1990 when the supply of urea was seriously affected by massive cuts in Soviet aid (the principle source of urea). Faced with a low capacity to manufacture urea domestically, prices pushed upwards in 1990. However, the volatility of the ratio of urea prices between the two city markets stabilised and approached unity from 1991 to 1993, indicating a similar trend to that of the rice market.

In addition, monopolistic (government) barriers in the commodities market posed a great hindrance to the efficiency of national markets. According to Fforde and Sénéque (1995) government intervention in Vietnam occurs in the monopolistic control of distribution, processing and trade systems of commodities such as rice and urea. In relation to the rice market, the SPC and FAO report (1993:41) showed that because of government controls in the rice markets, the rice marketing margin was between 30 and 40 per cent in Vietnam, which was very high when compared to a 10 per cent margin in Thailand.

Rural markets in Vietnam tend to be localised and lack the benefit and competitive element of long distance trading (Timmer 1993:192), which as argued in section 3.5.1 of chapter 3 reflects the low level of road density in Vietnam and ability of farmers to be able to access permanent markets. Moreover, the inadequate provision of formal rural credit (see section 3.5.1.3) to finance crop purchase by traders and

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53 The availability of urea in 1990 fell to 183kg/ha compared with its 1985 level of 272kg/ha for cultivated rice land (MAFI 1992)
marketing investment in purchasing trucks, and to finance milling and warehouse facilities seriously limited the marketing process by blocking the emergence of the private traders who would facilitate market exchanges (ibid.).

This discussion suggests that while major capital city markets up to 1993 evolved into more efficient markets relative to rural markets, markets as a whole in Vietnam were fragmented, uncompetitive and, from the point of view of a large rural majority, difficult to access.

3.5.1.4 Weak agricultural support services

Another factor preventing the agricultural sector from developing more rapidly was the inadequate level of public investment for developing irrigation and rural institutions, such as credit facilities and agricultural extension services, during the market transition period (see figure 3.8 and 3.9). In order to illustrate how a low level of public investment affected the agricultural sector, I will discuss its impact on the increase in irrigation, and the availability of credit and extension services to farm households.

3.5.1.3.1 Public investment and irrigation

What impact did public investment in irrigation have on the supply of irrigated lands? Compared to the central planning period, the average annual share of public investment allocated to irrigation in relation to GDP was much lower during the market transition period (1989-1995) (see figure 3.8 and table 3.3, page 65). The yearly average share of investment to irrigation development, in relation to total public investment was unchanged over the two periods (see figure 3.9 and table 3.3). However, the effectiveness of investment in increasing the area of land under irrigation between the two periods is very different. The yearly average rate of growth in irrigated land during the market transition period was higher at 4.2 per cent than it was during the central planning period (2.6%) (see table 3.7), especially considering that public investment in irrigation as a share of GDP was higher in the latter period (see figure 3.9). On the other hand, the annual average growth in arable agricultural land in Vietnam, which is very limited, slowed down between the two periods. As a result of this slowdown and the increase in the growth of irrigated land, the proportion of irrigated land to agricultural land increased significantly between the two periods; thereby contributing in real terms to the stock of irrigated land in Vietnam (see table 3.7).

How did this achievement compare with other wet-rice farming countries in the region? Table 3.7 shows that the yearly average growth rate of irrigated land during the central planning years from 1976 to 1988 was below Korea, Malaysia, and Taiwan, but ahead of Indonesia, Philippines and Thailand (in the period 1960-1980). However, after
the switch to an outward-oriented development strategy (1989-1995), the average growth rate of irrigated land in Vietnam surpassed most countries with the exception of Bangladesh and Korea.

Table 3.7 Selected statistics of irrigated land in Vietnam and selected Asian countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Period or years</th>
<th>Annual growth in</th>
<th>Irrigated land as a share of total agricultural land</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Irrigated land</td>
<td>Agricultural land</td>
</tr>
<tr>
<td>Vietnam</td>
<td>Central planning (1976-1988)</td>
<td>2.6</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>Market transition (1989-1995)</td>
<td>4.2</td>
<td>1.2</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>1960-1980</td>
<td>8.5</td>
<td>-</td>
</tr>
<tr>
<td>China</td>
<td>1960-1980</td>
<td>1.9</td>
<td>-</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1960-1980</td>
<td>1.4</td>
<td>-</td>
</tr>
<tr>
<td>South Korea</td>
<td>1940-1960</td>
<td>5.0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1960-1980</td>
<td>2.8</td>
<td>-</td>
</tr>
<tr>
<td>Malaysia</td>
<td>1960-1980</td>
<td>2.8</td>
<td>-</td>
</tr>
<tr>
<td>Philippines</td>
<td>1960-1980</td>
<td>2.4</td>
<td>-</td>
</tr>
<tr>
<td>Taiwan</td>
<td>1940-1960</td>
<td>2.8</td>
<td>-</td>
</tr>
<tr>
<td>Thailand</td>
<td>1960-1980</td>
<td>2.4</td>
<td>-</td>
</tr>
<tr>
<td>Asia (a)</td>
<td>1960-1980</td>
<td>2.1</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes: (a) Excluding Vietnam, Cambodia, Laos and Nepal.
Sources: Vietnam = Table A.2, Appendix A.
All other countries, Barker et.al. (1985:98)

Figure 3.11 Investment in irrigation against growth in irrigated lands

Despite the lower share of public investment in irrigation in relation to GDP, the consistent growth of investment in irrigation in the 1990s appears to have contributed
strongly to the expansion of irrigated land, as figure 3.11 indicates. The stronger growth in irrigated land reflects the influence a stable macro economic environment is having on investment (a full discussion of the macro economy is provided in section 3.5.3). A stable economy, i.e., the lower level of inflation during the 1990s, meant that capital expenditure in irrigation was more effective than it had been during the very high inflationary period of the 1980s under an inward-oriented centrally-planned economic development strategy.

In addition, a stable economic environment has also contributed to growth in private investment (see table 3.4, page 73). Although formal data on the level of private investment allocated to small irrigation development is not available, my field observations in 1991 and 1992 of the number of farmers that have invested in small motorised pumps gives me an indication that the liberalisation of the market and an encouraging macro economic environment provided them the incentive to invest in land improvements, such as irrigation. Overall, the positive results achieved with respect to investment in irrigation are good reasons why policy makers should allocate a greater share of public investment to irrigation at this early stage of development. This issue is further discussed in chapter 6.

3.5.1.3.2 The availability of rural credit

Another important element affecting agricultural growth during the transition to the market period was the availability of credit to the agricultural and rural sector. What institutional framework evolved during the market transition period to deliver rural credit to farmers in Vietnam? Prior to the break up of the collective system in Vietnam in 1988, rural credit was predominantly supplied through certain branches of the State Bank of Vietnam (SBV) to agricultural cooperatives. The government, through Resolution No. 10, realised that the agricultural and rural sector would be better served by the establishment of a separate bank. The government delivered its promise, in part, when it established the Vietnam Bank of Agriculture (VBA) in 1988 to provide short- and medium-term credit to rural organisations, as well as to farm households and the emerging private sector. The situation quickly changed following the liberalisation of the market in 1989 when the demand for capital by the private sector in the countryside soared in line with the structural shift to a market economy, yet other formal credit institutions were not allowed to establish until later, in 1992, when Popular Credit Funds (PCF) and Rural Shareholding Banks (RSB) were formed. In addition, despite their suppression during the central planning period, informal credit institutions and markets have enjoyed a huge resurgence following the 1989 reforms.
How effective were formal rural credit institutions\textsuperscript{54} in delivering credit to farm households? Although the VBA was established in 1988, it did not really start lending to farm households until mid-1991. At the end of 1991, private sector lending to individual farmers or farm households was only 7 per cent of its loan volume portfolio, and by the end of 1992 reached 26 per cent (World Bank 1993:149). The proportion of loans granted to farm households grew dramatically over the next few years to reach over 50 per cent towards the end of 1994 (World Bank 1995b:142). Poor rural households were clear benefactors of this increase during this time period. According to official figures quoted by the World Bank, 10 per cent of the loans volume went to poor households, which made up 40 per cent of all household loans made by the VBA (ibid.)

Popular Credit Funds (PCF) are commune level credit institutions introduced in 1993 into 14 provinces on a pilot basis by the SBV, as the VBA was unable to fill the huge demand for capital created by the collapse of many informal rural credit cooperatives in 1990. The PCF are an initiative of the SBV to increase small farmer’s access to production capital. As such, PCF only provide short term credit through small working capital loans ranging between US$ 5 and US$ 100. At the end of 1994, they were an estimated 150 PCF operating in Vietnam having US$ 6 million in outstanding loans (World Bank 1995b: 70). Rural Shareholding Banks (RSB) have also made an impact on rural credit, with an estimated 16 RSB licensed by the SBV at the end of 1994. RSB provide small loans to farmers, ranging between US$ 100 and US$ 300. According to the World Bank (1995b:71), the proportion of the RSB loans to poor farm household significantly exceeded the proportion of poor households in the district in which they operated. This suggests that RSB were targeting loans to poor farm households.

How effective were formal credit institutions in distributing their credit? Two types of distributions are important: by area of investment and by geographical region. According to the data available for the VBA loans in 1992, 23 per cent of the short term credit loans were allocated to production and farm input supply loans, 25 per cent went to food marketing loans and 10 per cent to agro-industry loans (World Bank 1995b:64). Broadly speaking, the World Bank (1995b:65) estimated that roughly 10 per cent of all formal credit was allocated to capital investment in land improvement, irrigation, cattle breeding, fisheries and tree crops; 15 per cent allocated to marketing activities in trading and small processing activities; and the balance (75%) to production uses.

In relation to the distribution of loans by geographical region, the available data indicates that VBA loans reached many farm households in some of Vietnam’s poorest regions. The distribution of PCF loans, however, was not equitable, which may also

\textsuperscript{54} Although data from the banking sector was once a heavily guarded state secret, getting a hold of this information for the market transition period was no less simpler and the transparencies in the data was not always so obvious as major institutions, such as the World Bank and IMF, have discovered.
reflect its more recent entry into the formal rural credit market; this structure will need some time to penetrate into the poorer regions. On the balance, however, the available data indicates that over 50 per cent of the formal rural credit loans were allocated to households in fertile rice growing regions of Vietnam (Red River Delta and Mekong Delta), which also happened to be regions facing less poverty (see table 3.8).

**Table 3.8 Distribution of rural credit by formal lending institutions against a relative ranking of poverty by regions (poorest-richest)**

<table>
<thead>
<tr>
<th>Regions</th>
<th>Poverty rate (a)</th>
<th>Incidence of poverty in Vietnam</th>
<th>Distribution of VBA loans in 1992 to farm households (%) (b)</th>
<th>Distribution of PCF loans in 1994 (%) (c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Central Coast</td>
<td>70.9</td>
<td>20.8</td>
<td>11.3</td>
<td>na</td>
</tr>
<tr>
<td>Northern Uplands</td>
<td>58.6</td>
<td>19.3</td>
<td>22.5</td>
<td>7.2</td>
</tr>
<tr>
<td>Central Highlands</td>
<td>50.1</td>
<td>3.3</td>
<td>1.5</td>
<td>3.7</td>
</tr>
<tr>
<td>Red River Delta</td>
<td>49.0</td>
<td>18.7</td>
<td>10.9</td>
<td>27.6</td>
</tr>
<tr>
<td>South Central Coast</td>
<td>48.5</td>
<td>12.6</td>
<td>6.5</td>
<td>5.8</td>
</tr>
<tr>
<td>Mekong Delta</td>
<td>47.7</td>
<td>18.3</td>
<td>41.6</td>
<td>47.8</td>
</tr>
<tr>
<td>Southeast Area</td>
<td>32.8</td>
<td>7.0</td>
<td>5.7</td>
<td>8.0</td>
</tr>
<tr>
<td>Rural</td>
<td>57.2</td>
<td>89.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>25.9</td>
<td>10.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vietnam</td>
<td>50.9</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Notes
(a) based on the headcount index reported in SPC/GSO 1994.
(b) based on a total loans portfolio to farm household of 720 billion dong (USD 64.6 million).
(c) based on a total loans portfolio of 66.3 billion dong (USD 6.05 million).

Sources:
Poverty incidence data from SPC/GSO (1994)
PCF bank loan data from World Bank (1995b:70)

The distribution patterns up to the mid-1990s suggested that i) loans to investment and marketing activities in agriculture were heavily under-funded by formal lending institutions; ii) the small loans assisting low-income farm households were predominantly allocated to more prosperous regions of Vietnam; and iii) that a good deal of the gap between the demand for credit and the formal supply of credit was filled by the informal sector.

How much capital is required in the countryside, and were supply conditions during the market transition period adequate for this need? Based on an estimate that 25 per cent of loan applications were being met by the VBA in 1993, the World Bank estimated that the demand for credit was about US$ 3.0 billion (see World Bank 1993:150; 1995b:67). Assuming that the need for credit in 1994 increased by the inflation rate (14.4%) to US$ 3.43 billion, and that there was US$ 875 million55 of

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outstanding loans from the formal sector, the ratio between the outstanding loans and demand for loans suggests that the proportion of demanded credit met by formal credit institutions was more or less unchanged at 25 per cent. Therefore, these estimates imply that up to 75 per cent of rural credit requirement was potentially filled by private savings or informal credit institutions in 1993 and 1994.

How have informal credit institutions and markets compensated for the gaps of the formal credit market? The fact that agricultural growth averaged 4.3 per cent between 1989 and 1995 suggests that the rural sector found the necessary funds to finance credit requirement. In fact, as suggested above, up to 75 per cent of the rural credit requirement was potentially financed from private savings and informal credit networks. Supporting this assertion with reliable data is, however, extremely difficult because of the lack of empirical research on this important rural institution. Nonetheless, there is some evidence in the VLSS (SPC/GSO 1994:239) (based on a survey of 4,800 households) that 75 per cent of the loans taken by surveyed households was from the informal sector (money lenders, relatives and other private individuals), 23 per cent of formal loans were from private and government banks, and 2 per cent of the loans were from cooperatives. Of these loans in total, 34 per cent were borrowed for agricultural purposes (ibid.). Informal lending rates were about three times higher than formal lending rates for short-term credit, and between 5 and 6 times that of the formal sector for one year loans (World Bank 1995b:73).

Based on these finding, several observations can be made: i) although the proportion of the total rural credit requirement financed by formal credit institutions increased from 1991 to 1994, the estimated proportion (25%) financed by formal institutions was very small relative to the funds financed from private savings or informal credit institutions; ii) the possibility that farm households may have met their financial needs from their own savings; and iii) the willingness of households to seek credit from the informal sector reveals that this practice is ubiquitous and common, despite the high interest rates.

Why is it important to improve the efficient delivery of rural credit? The acquisition of new technology, such as HYV crops that increase agricultural productivity, and modern inputs, such as fertilisers and pesticides, is clearly dependent on access to credit. In addition, many of the small businesses that emerged subsequent to the 1988/89 reforms, and that supply inputs and consumer goods to farmers, provide extension services, market farmers' output, process agricultural produce into foodstuffs, etc., also depend on rural credit to finance their working capital and fixed capital (Drabek 1991:163-165; Timmer 1993:192; Dang Phong 1993). As explained in section 2.4.2 of chapter 2, this economic relationship between the agricultural sector and non-crop producing rural sector, following an increase in agricultural productivity, has the capacity to expand rural employment and provides the driving force behind agricultural
and economic growth for an agrarian country such as Vietnam. In view of the situation concerning the availability of formal rural credit to farm households up to the mid-1990s in Vietnam, it is obvious that its low level of penetration into poor regions of Vietnam and its low share of total credit demanded are in part responsible for constraining farm households who could not get access to informal credit sources from further expanding agricultural productivity and production.

3.5.1.3.3 Public investment and the agricultural support system

Another element limiting agricultural sector growth during the transition to the market was the lack of an effective agricultural support system. By an agricultural support system, I mean the system for i) the supply of agricultural research and delivery of extension advice to farmers, and ii) the supply of agricultural inputs, such as seeds, fertilisers, pesticides, and agricultural services, such as pesticide control, veterinary services, machinery services, etc. Prior to the break up of the collective system in 1988, this system was predominantly controlled by the state and cooperative sectors, while the role of the private sector in the delivery of agricultural support services was insignificant. Following 1988, however, the private sector (farmer groups and private enterprises) has grown in importance relative to the state and cooperative sectors.

In order to evaluate the impact of low public investment on the delivery of Vietnam’s agricultural research and extension services capacity, consider how effective its research and extension system was in reaching farmers during the market transition period. Since the agricultural sector was reformed in 1988, almost every major International Agency report published on Vietnam’s agricultural sector has pointed out the impracticality of the set up of Vietnam’s research institutes. As of 1995, 31 different agricultural research institutes with about 5,500 staff, of which 280 had postgraduate degrees, were in existence (FAO 1995:21). Moreover, 13 of these research institute operated in the Red River Delta alone. According to a FAO study:

"...the [research] system is plagued with problems of under-funding, low quality staff, inadequate research facilities, very little on farm adaptive research to feed extension advice, and it is estimated that only around 30% of total research expenditures are financed through the state budget, while the rest need to be obtained through other sources..." (FAO 1995:22).

The same study drawing from the VLSS (SPC/GSO 1994:265-268) provides an indication of the level and type of advice received by farmers in different parts of the country (FAO 1995:23-24):

i) Government agencies are the most important source of technical advice for farmers in north Vietnam, whereas media sources such as radio and television

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advertisements are important means of transmitting technical information to farmers in the south.

ii) Most technical advice is provided for the rice crop, especially advice on crop season and seeds, and very little is provided for other crops.

iii) In the north most technical assistance is on crop season and seeds, whereas in the south advice is more balanced, including advice on fertiliser and pesticide application, and crop management.

iv) The radio is an important source of technical information. About one third of Vietnamese households own a radio in 1993.

v) Television is an important source of information for fertiliser, pesticides and irrigation, yet its coverage in the countryside is very low. Only 9 per cent of Vietnamese farm households owned a television in 1993.

vi) Poorer households were more dependent on government agencies for extension advice than the richer farm households.

vii) Very little market information is received from extension agents.

viii) Livestock extension services were mainly concentrated on veterinary medicines and vaccines.

Realising the weakness of Vietnam’s agricultural extension system in the countryside following the introduction of Resolution No 10, the government made an effort to improve the situation when it implemented Decree No. 13 in 1993. The objective of this decree was to establish a national extension programme to coordinate and disseminate technical advice in agricultural techniques throughout Vietnam’s countryside. The lead government agency charged with coordinating and delivering this service is the Department of Agricultural Extension of the Ministry of Agriculture (DAE). But as with many of Vietnam’s government services, low public investment affected the efficient delivery of the service. According to the FAO (1995:25) Decree No 13, up to 1994, had not been properly implemented because of inadequate institutional arrangements and the low priority attached to the programme on the part of the central government, evident in the slow disbursement of the DAE’s budget.

The liberalisation of the free market in 1989 has contributed strongly to the role of the private sector in the supply of inputs at the farm level. Where the cooperative and state agencies had the major share of farm input supplies during central planning, this share has waned considerably. In the case of seeds, fertilisers and pesticides, the private sector accounts for about 80 per cent of the supply (ibid.:33). Only in northern Vietnam do government supply agencies and cooperatives have some relevance in the supply of pesticides (ibid.).
What impact did this low level of investment have on agricultural growth? As I mentioned in section 3.2.3, although I tried to measure the relationship between certain factors and the agricultural and economic growth through econometric analysis, the weak results of this analysis were not useful in providing information on such relationships (Appendix C). Moreover, in the case of the market transition period, a time series of seven years (1989-1995) was not sufficient to estimate the equations. Therefore, using Krishna’s criteria (see section 2.4.3 of chapter 2), I estimated the expected agricultural growth rate for agriculture between 1989 and 1995.

i) Based on the observation that the return to agricultural investment during the central planning period discussed in section 3.2.3 is in line with Krishna’s findings, it is likely that agricultural investment during the market transition period contributed to only a small proportion of the sector’s actual growth, as figure 3.12 illustrates. While this gives a rough indication of the impact of agricultural investment on agricultural growth, the question remains as to the other factors contributing to the difference between actual and expected growth rates. The other factors contributing to agricultural growth certainly include: the impact of public investment in rural infrastructure; public investment in social services; the restoration of property rights and decision-making power; macro economic stability; and good weather. However, attaching individual weights to each respective factors is too speculative.

Figure 3.12 The expected and actual growth rate in the agricultural sector (in constant 1989 prices) 1989-1995

Nevertheless, in section 3.5.2, I discuss how restoring property rights and decision-making power had an effect on agriculture; and in section 3.5.3, I discuss how a stable macro economic environment also contributed to the performance of the agricultural sector.
The foregoing discussion of public investment in the agricultural sector as well as other available data allow us to make a number of observations:

ii) Although public investment in irrigation as a share of GDP was lower on average during the transition to the market compared to the central planning period, there was an expansion of irrigated land. This expansion increased the proportion of irrigated land to all agricultural land.

iii) Lower inflation improved the effectiveness of low public investment, and encouraged private investment in irrigation, which resulted in the increase growth of land under irrigation.

iv) The availability of rural credit from formal institutions was very slow to develop in the early 1990s. It was not until 1994 that formal credit was extended to farm households in a major way. As a result, private savings and informal credit was an important source of production finance.

v) Most of the formal credit was allocated to funding agricultural production, with very little for marketing and capital investment. In addition, over half of the formal credit allocated to farm households went to the households in the fertile rice growing regions of Vietnam.

vi) Agricultural extension was not far-reaching, and technical advice was still narrowly focused on rice cultivation and not much on other crops.

vii) Media was an important means of technical information dissemination.

viii) Poorer households depended more on government advice.

3.5.1.5 Social services in the rural sector

Social services should be an integral part of a rural development programme because a more educated rural population is more likely to be better informed about new technologies and to adopt new technologies and cultivation techniques. Better health and lower mortality rates mean more productive farmers, and less poverty in the rural regions. This portion of the rural development programme in Vietnam during the market transition period showed some improvement. Public investment in social services increased in relation to total public investment despite a fall in the average level of social investment as a share of GDP over the two periods (see figure 3.9, page 82 and table 3.3, page 65). Social indicators of health and education levels also improved compared to the previous period.

This rise in government spending on education and health since the start of the market transition period in 1989 is illustrated by figure 3.13. It shows that the level of expenditure in health rose as a share of GDP from its worse period at the end of central planning 1987-1988, but did not exceed the level it reached in 1986. Consequently, per
capita spending in health remained very low during the market transition period, never exceeding US$ 1.30 per person. Spending on education, on the other hand, enjoyed a significant boost and by 1995 had multiplied by four its share of GDP, from 0.5 per cent in 1988 to 2.1 per cent in 1995. As a result, education spending per capita rose significantly in real terms.

Compared to other countries in the region, total public expenditure on education, health and housing, which amounted to 4.5 per cent of GDP, placed Vietnam slightly above the overall average for social spending, and well ahead of Indonesia and south Asian countries (see table 3.9). However, in health spending, Vietnam lags behind most other Asian countries. On the other hand, in 1992 and 1995 Vietnam spent more than the average Asian countries on education and social relief.

Figure 3.13 Trends in social spending in education and health, 1989-1995

Notes (a) per capita expenditure in real 1989 prices was estimated by deflating the current value of education and health spending by the GDP deflator, then dividing by the prevailing exchange rate of 1 USD: 4,730 dong in 1989.
Table 3.9 Public expenditure in social services across different Asian countries, 1992

<table>
<thead>
<tr>
<th>Country</th>
<th>Health as a (%) of GNP</th>
<th>Education as a (%) of GNP</th>
<th>Social Relief as a (%) of GNP</th>
<th>All Social Services as a (%) of GNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>1.68</td>
<td>0.72</td>
<td>1.20</td>
<td>3.60</td>
</tr>
<tr>
<td>India</td>
<td>0.46</td>
<td>0.29</td>
<td>1.26</td>
<td>2.00</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1.71</td>
<td>0.41</td>
<td>0.31</td>
<td>2.43</td>
</tr>
<tr>
<td>Nepal</td>
<td>0.52</td>
<td>2.22</td>
<td>0.92</td>
<td>3.66</td>
</tr>
<tr>
<td>Pakistan</td>
<td>0.47</td>
<td>0.17</td>
<td>0.73</td>
<td>1.37</td>
</tr>
<tr>
<td>Philippines</td>
<td>3.35</td>
<td>0.81</td>
<td>0.46</td>
<td>4.61</td>
</tr>
<tr>
<td>South Korea</td>
<td>3.08</td>
<td>0.35</td>
<td>1.92</td>
<td>5.34</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>2.81</td>
<td>1.53</td>
<td>4.23</td>
<td>8.58</td>
</tr>
<tr>
<td>Thailand</td>
<td>3.04</td>
<td>1.03</td>
<td>0.88</td>
<td>4.94</td>
</tr>
<tr>
<td>Asia average</td>
<td>1.97</td>
<td>0.99</td>
<td>1.30</td>
<td>4.26</td>
</tr>
<tr>
<td>Vietnam 1992</td>
<td>1.03</td>
<td>1.35</td>
<td>2.15</td>
<td>4.53</td>
</tr>
<tr>
<td>Vietnam 1995 (a)</td>
<td>1.00</td>
<td>2.10</td>
<td>3.29</td>
<td>6.39</td>
</tr>
</tbody>
</table>

Note: (a) 1995 estimates from MOF 1995.

How effective was the government in targeting education and health spending at the rural regions? Based on the average division of public expenditure for central government and for local government expenditure between 1989 and 1995, which provides a crude estimate of the division of public investment between the urban and rural areas, almost 74 per cent of total public expenditure in education and 62 per cent of the public expenditure in health went to the rural regions (MOF 1996). In order to verify these proportions, the World Bank (1995a:194) using data reported in the VLSS, measured the efficiency of targeting public subsidies for education between 1992 and 1993 and found that, across all education programmes, 66 per cent of the public subsidies were allocated to the rural areas. In health, 73 per cent of public subsidies reached the rural sector (ibid:73). Although there is some variation in the proportions allocated to rural areas between the two sources, both are consistent in the fact that the major share of public investment in education and health was allocated to the rural sector during the market transition period. This evidence suggests the rural (agricultural) sector benefited from the real increase in government spending in the social sector.

How did the real increase in social spending affect education and health in the rural regions of Vietnam? One way to assess the effectiveness of social spending in the rural sector is to evaluate how many schools and hospitals were built. However, more schools do not necessarily mean more educated people and more hospitals do not necessarily mean more healthy people, though we hope that the two factors are related. A better indicator of the effectiveness of public spending are outcome indicators, such as literacy rates for education, and mortality rates for health.
Table 3.10 shows that education and health indicators are reasonably good in Vietnam, especially when compared with other countries in the region (see table 3.11, page 100). Tables 3.10 and 3.11 show that Vietnam had already achieved a high standard in literacy during the central planning period, and significant progress was made in lowering child mortality during the same period. Despite the low level of per capita income in Vietnam during the central planning period, mortality was lower and literacy higher than in some Asian countries with higher per capita incomes, and certainly well above other Asian countries with comparable incomes. The statistics in table 3.10 also indicates that the education and health indicators have continued to improve following the switch to a market-oriented economy; especially notable is the dramatic reduction in the mortality rate of children under five years old. This provides some evidence that public expenditure in education and health had the desired effect.

Table 3.10  Education and health outcome indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Central Planning Period</th>
<th>Market Transition Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literacy rate (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban n.a.</td>
<td>na</td>
<td>93.3 d</td>
</tr>
<tr>
<td>Rural n.a.</td>
<td>na</td>
<td>84.8 d</td>
</tr>
<tr>
<td>Total 84.0 c</td>
<td></td>
<td>86.6 d</td>
</tr>
<tr>
<td>Child mortality rate (a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban n.a.</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Rural n.a.</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Total 119 c</td>
<td></td>
<td>68 e</td>
</tr>
<tr>
<td>Children under 5 receiving</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vaccinations (b)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban n.a.</td>
<td>na</td>
<td>67.4 d</td>
</tr>
<tr>
<td>Rural n.a.</td>
<td>na</td>
<td>43.2 d</td>
</tr>
<tr>
<td>Total 27 c</td>
<td></td>
<td>46.6 d</td>
</tr>
</tbody>
</table>

Notes and sources:

a  Based on the under five year old mortality rate. Equal for every 1,000.
b For four vaccines: tuberculosis, DPT, measles & polio.
c 1985: UNICEF, 1988
d 1993: (VLSS) SPC/GSO 1994:55,89
e 1994: UNICEF 1995

While these average figures compare well with other developing countries, there remains a gap in the indicators between the rural and urban areas (table 3.10). Literacy rates in the country side were about 10 per cent lower than the urban areas and, although a breakdown of child mortality was unavailable, the percentage of young children receiving the four World Health Organisation recommended vaccines were clearly skewed away from those in the countryside, which suggests that mortality rates were probably higher.

However, these indicators are not a perfect reflection of the impact of government spending on social services, if one considers that private spending on education and
health also increased during the market reform. Indeed, 85 per cent of the per capita spending on health and just over half the spending on education was from private sources (table 3.12). As was observed for irrigation, the high level of public spending is probably a consequence of rising incomes, along with pressure on thinly distributed social services.

### Table 3.11 Mortality and literacy rates in selected Asian countries

<table>
<thead>
<tr>
<th>Country</th>
<th>GNP per capita (USD-1987)</th>
<th>Mortality rate (a)</th>
<th>Literacy rate (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malaysia</td>
<td>1810</td>
<td>106</td>
<td>32</td>
</tr>
<tr>
<td>Thailand</td>
<td>850</td>
<td>149</td>
<td>49</td>
</tr>
<tr>
<td>Philippines</td>
<td>590</td>
<td>135</td>
<td>73</td>
</tr>
<tr>
<td>Indonesia</td>
<td>450</td>
<td>235</td>
<td>119</td>
</tr>
<tr>
<td>India</td>
<td>300</td>
<td>282</td>
<td>149</td>
</tr>
<tr>
<td>China</td>
<td>290</td>
<td>202</td>
<td>43</td>
</tr>
<tr>
<td>Laos</td>
<td>170</td>
<td>232</td>
<td>159</td>
</tr>
<tr>
<td>Vietnam</td>
<td>170</td>
<td>233</td>
<td>88</td>
</tr>
<tr>
<td>Nepal</td>
<td>160</td>
<td>297</td>
<td>197</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>160</td>
<td>262</td>
<td>188</td>
</tr>
</tbody>
</table>

Notes: a) based on under five year old mortality (in every 1,000)
      b) based on persons over the age of 15 years old.


Based on the foregoing discussion of the social sector, the following observations can be made:

i) Although public expenditure in education and health as a share of GDP was lower on average during the market transition period, it increased significantly from the last year of the central planning period (1988).

ii) Compared to other developing countries in Asia, the Vietnamese government allocated an above-average level of public expenditure to education and health.

iii) Following the introduction of market reforms in 1989, private education and health spending increased dramatically.

iv) In comparison to many countries in its region, Vietnam enjoyed a relatively low level of child mortality and high level of literacy in the 1990s.

v) Child mortality was further lowered and adult literacy improved during the transition to the market period, thereby sustaining the positive social achievements made during the central planning period.

vi) Despite the large share of public expenditure distributed to the rural regions, the higher child mortality and lower literacy rates in the rural areas compared to the urban areas indicates that the government in Vietnam needs to better target public expenditure in the countryside.
Table 3.12 The estimated per capita total spending structure in education and health in 1989 and 1993 (in US$ - current values)

<table>
<thead>
<tr>
<th>Sector</th>
<th>1989 expenditure per capita (b)</th>
<th>Share of 1989 expenditure (%)</th>
<th>1993 expenditure per capita (b)</th>
<th>Share of 1993 expenditure (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>na</td>
<td>na</td>
<td>$2.71</td>
<td>54</td>
</tr>
<tr>
<td>Public</td>
<td>$1.03</td>
<td>na</td>
<td>$2.33</td>
<td>46</td>
</tr>
<tr>
<td>Total</td>
<td>na</td>
<td>na</td>
<td>$5.04</td>
<td>100</td>
</tr>
<tr>
<td>Health</td>
<td>$1.67</td>
<td>71</td>
<td>$7.27</td>
<td>85</td>
</tr>
<tr>
<td>Private</td>
<td>$0.68</td>
<td>29</td>
<td>$1.33</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>$2.35</td>
<td>100</td>
<td>$8.60</td>
<td>100</td>
</tr>
</tbody>
</table>

Notes: Sources:
(a) values were converted to World Bank 1993; 1995a:190.
(b) current prices
na = not available

3.5.1.6 The effectiveness of investment in the rural development programme

What remains now is to provide an indication of how well Vietnamese farmers and rural inhabitants were able to access different elements of a rural development programme. Table 3.13 depicts the situation in Vietnam in 1992/1993, in both north and south Vietnam. The data was drawn from the VLSS, which surveyed 3,791 farm households in the rural regions and provides reasonable representation of farm households in Vietnam.

The data in table 3.13 (page 102) suggests that a large proportion of Vietnam’s rural population had access to a passable road, although the information does not allow us to determine whether the road is still passable in the wet season. While access to passable roads was better in the north, the data does not take into account the fact that the rural population in the south also have access to many canals, which provides a convenient form of transportation. Despite the high level of access to a passable road, only half of the rural population had access to a permanent market. An interesting observation is that the rural population in the north had poorer access to markets, especially the poor who are in many instances isolated in very remote regions of north Vietnam (see UNDP 1995).

The data on agricultural services was mixed. In agriculturally rich south Vietnam, a smaller proportion of Vietnam’s rural population had access to an agricultural extension office, compared to the north. Overall, less than 25 per cent of the rural population had access to an agricultural extension office, which is a good indication of the weakness of the government’s extension programme. However, the data reveals that the majority of farm households were visited by an extension agent, and there appears to be no difference between the south and the north.
Table 3.13 Access to elements of a rural development programme in Vietnam’s countryside, 1992/1993

<table>
<thead>
<tr>
<th>ELEMENTS OF A RURAL DEVELOPMENT PROGRAMME</th>
<th>Percentage of rural population with access to infrastructure and services by different income groups (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vietnam</td>
</tr>
<tr>
<td></td>
<td>Total (d)</td>
</tr>
<tr>
<td>RURAL INFRASTRUCTURE</td>
<td></td>
</tr>
<tr>
<td>Passable road</td>
<td>70.2</td>
</tr>
<tr>
<td>Public transport</td>
<td>52.1</td>
</tr>
<tr>
<td>Electricity/generator</td>
<td>87.7</td>
</tr>
<tr>
<td>Pipe-Bourne water</td>
<td>5.0</td>
</tr>
<tr>
<td>Permanent Market</td>
<td>53.3</td>
</tr>
<tr>
<td>Post Office</td>
<td>34.4</td>
</tr>
<tr>
<td>AGRO-CULTURAL SERVICES</td>
<td></td>
</tr>
<tr>
<td>Agricultural Extension Office</td>
<td>24.5</td>
</tr>
<tr>
<td>Agricultural Ext. Agent Visited</td>
<td>71.6</td>
</tr>
<tr>
<td>SOCIAL SERVICES</td>
<td></td>
</tr>
<tr>
<td>Lower Secondary School</td>
<td>87.9</td>
</tr>
<tr>
<td>Upper Secondary School</td>
<td>9.8</td>
</tr>
<tr>
<td>Dispensary</td>
<td>32.3</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>70.0</td>
</tr>
<tr>
<td>Clinic</td>
<td>93.3</td>
</tr>
<tr>
<td>Physician</td>
<td>96.1</td>
</tr>
<tr>
<td>Nurse</td>
<td>90.5</td>
</tr>
<tr>
<td>Adult Literacy Programme</td>
<td>84.1</td>
</tr>
<tr>
<td>COMBINATIONS</td>
<td></td>
</tr>
<tr>
<td>Passable road, Public Transport, Permanent Market</td>
<td>32.7</td>
</tr>
<tr>
<td>Passable road, Public Transport, Permanent Market, Electricity, Post Office</td>
<td>22.1</td>
</tr>
<tr>
<td>Lower secondary school, Clinic, Ag extension office, Adult literacy programme</td>
<td>16.3</td>
</tr>
<tr>
<td>Passable Road, Public Transport, Permanent Market, Electricity, Post Office, Lower Secondary School, Clinic, Ag Extension Office, Adult Literacy Programme</td>
<td>4.9</td>
</tr>
</tbody>
</table>

Notes:
(a) Based on the headcount poverty line of a sample size of 4,800 households from the VLSS. Poor Poor represents the first three expenditure quintiles, non-poor represents the top two quintiles.
(b) North Vietnam is the northern uplands, red river delta and north central coast regions.
(c) South Vietnam is south central coast, central highlands, southeast and mekong delta regions.
(d) Calculated from a weighting of 65% for north Vietnam, and 35% for south Vietnam. That is, a greater proportion of Vietnam's rural population are in the north.


Most of the rural population in Vietnam enjoyed access to many important social services. In this regard, the VLSS data supports the observations made in section 3.5.1.4 that a large share of the public expenditure programme was allocated to the rural region. Only in regard to upper secondary high school access, were the majority of farm households across Vietnam affected. Almost 90 per cent of farm households in Vietnam
had access to a lower secondary high school, which supports the observation made earlier that about 87 per cent of those living in the countryside in the early 1990s were literate (see section 3.5.1.4).

The discussion above illustrated the ability of Vietnam’s rural population to access individual elements of the rural development programme. Consider now the proportion of the rural population that were able to access a number of the elements simultaneously. The last section of table 3.13 is telling of the effectiveness of Vietnam’s rural development programme during the market transition period. At a basic level, only a third of Vietnam’s farm households in 1993 had access to a passable road, some form of public transport and a permanent market. Access to this combination of infrastructure was lower for those living in the north compared to the south. There was no difference between the proportion of poor farm households and non-poor farm households enjoying access to this combination of infrastructure. Worse, however, was the fact that less than a fifth of the poor living in north Vietnam lived in communities with this combination of infrastructure, compared to twice as many of the non-poor. Quite clearly then, this situation reflects the fact that the rural populations’ access to basic infrastructure was inferior.

Taking a wider look at the proportion of farm households that had access to some of the most important elements of a rural development programme, the picture is disconcerting. Less than 5 per cent of all farm households had access to the combination of rural infrastructure, agricultural services and social services (in the final row of table 3.13). However, the percentage of households that had access to this combination of infrastructure and services was lower in the south than in the north. This peculiar outcome could be an averaging problem, the weighting attached to social services being large in the aggregation of this combination. Nevertheless, the extremely small proportion of rural households that were able to access this combination of infrastructure and services reflects the fact that Vietnam’s rural development programme was too weak and ineffective to reach a greater number of people during the market transition period.

These observations strongly suggests that policy makers in Vietnam were not allocating their scarce public funds efficiently. Moreover, during the market transition period, they neglected agriculture’s comparative advantage and agriculture’s potentially high productivity at an early stage of economic development by not allocating the major share of the limited amount of public investment to that sector.

3.5.2 Restoring property rights and decision-making powers

What impact did restoring property rights and returning the decision-making power to farm households have on agricultural production? It follows from the discussion provided in section 2.3.2.2 of chapter 2, that if ownership rights...
decision-making power are restored to agricultural producers, some serious obstructions to production incentives would be removed (see Demsetz 1967). Indeed, figure 3.2 and table 3.2 (page 62) indicate that in the period following the freeing up of agricultural decision-making and allowing farmers access to land in 1988, growth in agricultural productivity and output rose significantly compared to the previous central planning period.

Both labour and land agricultural productivity rose sharply following the reforms in 1988 and 1989, continuing its climb upwards following the earlier reforms of 1981 discussed in section 3.2.3.3. Growth in agricultural productivity was quite large over the market transition period, growing by 4.5 per cent and 3.7 per cent on average respectively for labour and land agricultural productivity (see table 3.2, page 62). A small amount of structural change also occurred during this period, indicating that agricultural producers diversified agricultural production a little. The share of the value of food grain production in the gross value of agricultural production declined on average from 55 per cent during the central planning period to about 50 per cent in the latter period (see table 3.2). Most significantly, the average food crop production per capita on average rose to 346 kilograms between 1989 and 1995, compared to 276 kilogram in the previous period (see table 3.2).

These large positive increases certainly indicate that the decollectivisation process had, in part, a positive impact on producer incentives. Pingali and Vo Tong Xuan’s (1990) study of the decollectivisation process in Vietnam certainly confirms this positive impact. Econometric evidence provided by these researchers suggest that the PCS, initiated in 1981, increased the productivity of rice farmers in northern Vietnam by about 12 per cent and in the south by 16 per cent (Pingali and Vo Tong Xuan 1990).

### 3.5.3 Stabilising the macro economy and opening up trade

Was the package of economic reforms implemented by the government from 1989 effective in stabilising the economy and switching Vietnam towards outward-orientation? It is evident in table 3.4 (page 73) that Vietnamese economic managers successfully stabilised the macro economy and opened up the country to international trade.

Most importantly, economic managers consolidated the budget through the implementation of a tight fiscal and monetary policy regime to bring inflation down rapidly. The extent of the government’s tight fiscal policy is evident in the degree to which capital expenditure (public investment) was consolidated. As indicated in table 3.3 (page 65) the size of public investment as a share fell from 17.9 per cent during central planning to 7.7 per cent during the transition to the market. As a result, the economic managers were able to quickly reduce the average size of the government
budget to 3.5 per cent during the market transition period in comparison to its double digit figure in the early 1980s (see table 3.4, page 73).

An important indicator of the government's adherence to tight monetary policy management during this latter period was the means by which the budget deficit was financed. Table 3.4 clearly shows that foreign grants and loans and government bonds (securities) were the principal means of financing the deficit. Compared to the last years of central planning (1986-1988) where over 56 per cent of the deficit was financed through central bank money issues, this large amount was reduced to about 16 per cent on average between 1989 and 1995 (table 3.4).

However, economic planners did relax the tight monetary policies slightly in 1990 and 1991 in order to bail out ailing SOE finding the new hard-budget environment too difficult to operate in, by granting them subsidies. The easing of policies had an immediate impact on inflation, which increased to around 67 per cent over 1990 and 1991 (see table 3.4, page 73), and pushed real interest rates down, thereby affecting the public's confidence in the banking system. However, renewed efforts to maintain fiscal and monetary discipline in 1992 helped inflation fall steadily. The end result of prudent fiscal and monetary policy management in Vietnam was a sharp reduction in inflation from a high of 775 per cent in 1986 (following the disastrous price and wage reform in 1985) to a low of 15 per cent in 1995 (see table A.3, Appendix A).

In the external sector, a switch to a more outward-oriented development strategy from 1989 by adjusting the official exchange rate in line with the parallel market rate and by opening up the country to international trade, curtailed the large deficits building up in Vietnam's balance of payments and trade balance. After only seven years of outward-orientation, exports as a share of GDP increased to 26 per cent compared to an average of 9.3 per cent under inward-orientation during central planning. Since imports as a share of GDP between these two periods remained more or less at the same level, the size of Vietnam's trade deficit was significantly reduced from 27 per cent to 6 per cent (see table 3.4). The balance of payment deficit (as a share of GDP) was also reduced significantly over this period, being pushed down to under 2 per cent compared to an amount of over 10 per cent between 1983 and 1988. These results accord with the generalised findings of Krueger (1981) discussed in section 2.3 of chapter 2.

Although the economic reform process up to 1995 made significant inroads in providing a relatively less distorted policy environment than that prevailing under the central planning system, a few remnants of the old system, such as government monopoly on exports and some high tariff rates for manufactured goods were still present in Vietnam up to 1995. Nevertheless, considering the speed at which Vietnamese economic managers reduced the trade and balance of payment deficits between 1989 and 1995, it would be fair to say that the policy reforms implemented up
to the end of 1995 were very positive steps towards a more outward-oriented development strategy.

As pointed out in sections 2.3.2.3 and 2.4.6 of chapter 2, keeping inflation low in many Asian developing countries has been the key instrument in maintaining positive real interest rates, which has contributed substantially to financial deepening and a rise in private savings. Compared to the former central planning period, especially in the 1980s when real deposits rates of interest were negative, positive real interest rates have generally been maintained since economic stabilisation reforms were implemented in 1989. In line with this economic measure, financial deepening as represented by the ratio of currency and deposit liabilities of banks (or M3) to GDP, averaged about 25.5 per cent between 1989 and 1994, compared to an average of 9.5 per cent in the last years of central planning (1986-1988) (World Bank 1993:242; 1995b:11). Financial savings (total financial liabilities) in relation to GDP also increased over these two period, rising from an average of 17.2 per cent (1986-1988) to 26.7 per cent in the transition to the market period (World Bank 1993:242; 1995b:98). Despite, the increase in financial savings, much of the holdings in Vietnam were in currency over this period. As a percentage of broad money Vietnamese held about 45 per cent in 1994, compared to an average of 8 per cent held by ASEAN member countries and 23 per cent held by a number of transitional economies on average (World Bank 1995b:99). This situation reflects the lack of confidence in the banking system that emanated from the very unstable and high inflationary period of the 1980s under central planning, when many Vietnamese held large amounts foreign currency, gold and other stores of wealth (see McCarty 1994). Nevertheless, the positive real interest rate environment existing since 1989 relative to foreign interest rates, the progressive liberalisation of the exchange and trade regimes and the greater availability of foreign currency by the public in the market transition period are factors leading to the increase in Vietnamese dong deposit. As a percentage of GDP, private sector dong deposits substitutes, which attracts higher interest rates, increased from virtually nil in 1989 to about 17 per cent in 1994 (World Bank 1995b:12).

Following the argument that low inflation and control of budgetary balances through careful monetary policy management is the linchpin of a healthy economy, it can be expected that the uncertainty associated with the high and unstable inflationary period of the 1980s eased dramatically during the lower inflation period of the 1990s. As a result, the cost of investment decision-making for private investors improved, thereby stimulating investment. The national savings and investment data presented in table 3.4 (page 73) shows that national investment increased significantly between 1989 and 1995, compared to the former central planning period. Most evident of the private

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57 These include: Albania, Bulgaria, China, Hungary, Laos Mongolia, Poland and Romania.
sector's response to the emerging positive environment for investment in the Vietnam’s new market economy was the very large increase in the proportion of non-public investment in relation to GDP, which rose from 4.4 per cent on average between 1985-1988 to almost 11 per cent in the market transition period. Vietnam’s capital expenditure program also benefited from the stable economic environment in the sense that high inflation did not erode the economic worth of public investment program intended for agriculture and the rural regions to insignificance.

The foregoing discussion provides evidence that the stabilisation and structural reforms in Vietnam were successful in stabilising its highly volatile economy and turned its trade sector to greater outward-orientation, Vietnam still has further to go before it installs a macro economic and trade framework that is truly suited to its market economy. To this end, reforms are still needed in the financial, industrial, public and trade sectors. I will turn to these reforms in chapter 6.

3.6 CONCLUSIONS

This chapter set out to answer two main questions: 1) why was central planning and inward-orientation abandoned in favour of a more outward-oriented and market led economic model in Vietnam? How did this switch affect the development of the agricultural sector, where the majority of Vietnam's population live?

In answer to the first question, I have argued that central planning and inward-orientation was abandoned because of the growing weight of economically unviable results. Over the 35 years of inward-orientation, economic growth as a whole, and agricultural growth and productivity in particular were weak. I explained the relatively weak performance of agriculture by three factors: the low level of investment in elements of a rural development programme (rural infrastructure, agricultural support services and social services) relative to the amounts applied in other developing countries, the removal of economic incentives for producers with the collectivisation of land and loss of decision-making powers, and the macro economic instability caused by a system of massive subsidies and price controls.

The situation of the economy overall in this period can be summed up in the following points:

1. Compared to other developing countries, Vietnam invested very little in rural transport and communications, and favoured industry over agriculture in the distribution of public funds.

2. The return on public investment in agriculture was in line with Krishna's criteria of 0.15 per cent agricultural growth for 1 per cent of GDP invested, but as such this return was low in relation to the population growth rate. The effect of low investment was low growth in agriculture and declining returns for farmers.
3. Collectivisation of land and production removed decision-making powers and incentives from farmers. The effect of this policy was visible in low agricultural productivity, and the move by farmers to cultivating their "five per cent plots" especially in the late 1970's.

4. The heavy reliance on subsidies increased the budget deficit and fuelled inflation. Attempts to readjust state prices to market prices through expansionary monetary policies exacerbated inflation, which erupted into a full macro economic crisis in 1986.

The attempts at sectoral reforms in agriculture, notably by increasing producer incentives through production contracts, indicate that policy makers were aware of some of the causes of low agricultural growth and productivity. However these were insufficient in tackling the fundamental flaws of inward-orientation as the 1986 crisis attested. This realisation led to the adoption of an outward-oriented, market-led economic system following the 1988-89 reforms.

The period of transition to the market system witnessed much encouraging development in the agricultural sector, as this chapter has shown: the economy grew by 7.7 per cent on average, almost double the average rate of the previous period, agricultural growth and productivity also increased by twice that of the previous period. With rising GDP came rising real levels of state investment in the areas that directly affect agricultural development: transport and communication infrastructure, irrigation, rural credit, extension services and social services, as well as a growing awareness on the part of the government of the importance of developing agriculture through such investments. However, as I have remarked throughout this chapter, agricultural growth remained low in relation to other sectors, an outcome that militates against the principle that agriculture should develop strongly at the initial stages of development if long-term economic growth and development is to be sustained.

This chapter has emphasised the overwhelming positive impact of a return of production responsibilities, property rights and decision-making power to farm households on production incentives, as well as macro economic stability, on the improved growth and productivity of the market system. In an environment of lower inflation, emerging markets, good fiscal management, and control over one's resources, producers were better able to plan and produce rationally. However, the main constraint on agriculture in achieving more positive results remains a weak and inconsistent rural development programme, hampered by a falling level of public spending as a share of total expenditure and as a share of GDP to a sector which should really be given priority. I drew out the following factors of a rural development programme influencing the level of relative growth in agriculture during the market transition period:
1. **Transport and communications:** the allocation of funds was biased against rural regions on the one hand, and limited in increasing the road density on the other. Vietnam has a lower road density than many of its regional neighbours, and this affects the ability of farmers to access information and markets for their production.

2. **Irrigation:** Investment in irrigation remained low but improved in real terms, and certainly improved in efficiency thanks to a better macro economic environment: growth in irrigated land was almost double that achieved under central planning. Private investment most certainly played a large role in this improvement.

3. **Rural credit:** For the first time, Vietnam installed a structure of rural credit in 1988 through the VBA, which however remains unevenly distributed regionally, with the majority of funds going to households in the rice-growing regions. While more poor households received formal credit in the mid-1990s than at the inception of the scheme, most credit was obtained from the informal credit market and went to fund production costs rather than to investing in land and marketing.

4. **Extension services:** The provision of expertise to farmers was geared towards rice cultivation, crop season and seed advice, rather than market information or instruction on the application of pesticide and fertiliser. I noted strong North-South differences in the type and medium of advice provided. The system remains weak and in need of investment and development.

5. **Social services:** Health and education were one area where Vietnam had achieved good results already under central planning. A level of literacy of nearly 90 per cent and a low level of child mortality, at 7 per cent, was achieved in the latter period thanks to rising levels of both public and private investment.

6. **Rural services as a whole:** the most revealing statistic is certainly the fact that only five per cent of the rural population in Vietnam had access to a crucial combination of the above elements: a passable road, a permanent market, an agricultural extension worker, a school and clinic.

The conclusion of this chapter is that the improvements to agricultural production incentives through better defined property rights and decision-making power of agricultural producers, and macro economic stability and greater economic openness that Vietnam's leaders have struggled to achieve since 1989, although a success, are not sufficient on their own in assuring long-term agricultural and economic growth and development. If one accepts the principle that economic development should commence with agriculture in an agrarian country, then these policies also need to be complemented by an effective rural development programme, which Vietnam clearly did not have during the market transition period. Chapters 4 and 5 will provide further evidence and analysis to the point that agricultural producer's decisions and efficiency in
production of certain crops reflect such shortcomings in information on markets, rural credit, agricultural extension, etc. In order to remove the remaining bias against the development of agriculture in what remains an agrarian economy, the shortcoming in the rural development programme will have to be remedied.

4.1 INTRODUCTION

In this chapter I will present a framework for measuring the economic efficiency of farm households in the agricultural programme of Quoc Tuan in North Vietnam, in order to understand how far they contributed to the poverty changes of 1981 and 1989 and how limitations in Vietnam's rural development programme affected agricultural productivity, which is discussed in chapter 5. I begin this chapter, in section 4.2, by justifying my use of the profit maximization principle to the study following Nakamura's (1985) approach. In section 4.3, I specify the theoretical and empirical profit maximization model to derive the efficiency measures of farm households. Section 4.4 presents a description of the farm household productivity function used to derive the efficiency indices and shows the performance correlation of the household and their locality. In section 4.5, I apply the methodology to the data, the results are statistically compared to assess how similar or not the profit maximization model is appropriate and the efficiency measures of the model are statistically evaluated. The findings of this chapter are summarized in section 4.6.

4.2 THE ECONOMIC BEHAVIOUR OF THE Farm HOUSEHOLD: UTILITIES MAXIMIZATION FROM PROFIT-MAXIMIZATION OR NOT?

4.2.1 Justification of the profit maximization model adapted to evaluate farm household efficiency

Based on the discussion presented in section 4.1, that investment factors are, in general, risk-neutral, it would appear that the maximization of expected utility would (with full-information scenario and the correct framework) result in an appropriate behavioral model to evaluate the economic efficiency of farmers from Quoc Tuan. However, farmers' work qualities and output information on farm household risk preferences are not available in the data used in this thesis, consequently, we use...
CHAPTER 4

MEASURING THE EFFICIENCY OF FARM HOUSEHOLDS IN THE AGRICULTURAL COMMUNE OF QUOC TUAN, VIETNAM

4.1 INTRODUCTION

In this chapter, I will provide a framework for assessing the economic efficiency of farm households in the agricultural commune of Quoc Tuan in North Vietnam, in order to understand how farmers responded to the policy changes of 1988 and 1989 and how limitations in Vietnam's rural development programme affected agricultural producers, which is discussed in chapter 5. I begin this chapter, in section 4.2, by justifying my use of the profit maximisation principle in this study following Nakajima's (1986) exposition. In section 4.3, I specify the theoretical and empirical profit maximisation model used to derive the efficiency measures of farm households. Section 4.4 presents a description of the farm household production data used to derive the efficiency indices, and gives some background information on the households and their locality. In section 4.5, the empirical model is applied to the data, the results are statistically evaluated to determine whether or not the profit maximisation model is appropriate and the production parameters of the model are statistically evaluated. The findings of this chapter are summarised in section 4.6.

4.2 THE ECONOMIC BEHAVIOUR PRINCIPLE OF THE FARM HOUSEHOLD: UTILITY MAXIMISATION, PROFIT MAXIMISATION OR BOTH?

4.2.1 Justification of the profit maximisation model adopted to evaluate farm household efficiency

Based on the discussion presented in section 2.4.3 that low-income farmers are, in general, risk-averse, it would appear that the maximisation of expected utility model (with risk-aversion factored into the objective function) would be an appropriate behavioural model to evaluate the economic efficiency of farmers from Quoc Tuan. However, because both qualitative and quantitative information on farm households' risk preferences was not available in the data used in this micro economic analysis, such
a model could not be used. The poor quality of data is further discussed in section 4.4.1 (page 129).

However, the discussion presented in section 2.4.3.2 indicated that while the profit maximisation (the efficiency hypothesis (Schultz 1964 and Hopper 1966)) is not always accepted as a general (or composite) hypothesis (see Lipton 1968; Junankar 1980a, 1980b; Bliss and Stern 1982), the hypothesis is not overturned by the alternative hypothesis of risk-averse utility maximisation (see Norman 1977). Following this observation, it can be argued that the profit maximisation and utility maximisation principle when applied to the same farm household is not necessarily inconsistent. That is, a utility maximising household can also be profit maximising, not only if it can be established that the utility function is a constant function of the profit function, but also because the complex nature of the farm household requires it to combine economic decisions concerning production, consumption and allocation of resources, most importantly household labour, which implies that it is maximising both utility and profits in its economic decisions. In order to show that a utility maximising farm household also maximises profit in relation to the production aspect of its household activities, I follow the theoretical exposition of Nakajima (1986) which is presented in the following section (4.2.2).

4.2.2 A theoretical exposition of farm household economic behaviour

According to Nakajima (1986), the farm household can be defined as an economic entity which possesses the characteristics of the farm firm (production aspect), the labourer household (work and income aspects) and the consumer household (consumption aspect), and whose behavioural principle is utility maximisation.

Nakajima (1986) extended Chayanov's framework to include factor markets. The logic of Chayanov's position is that it is irrelevant to consider the efficiency of the farm household, since the household economy is uniquely based on providing for itself and not in earning profits (Chayanov 1966:5). However, Nakajima (1986) by extending Chayanov's framework to include factor markets and theoretically illustrated that, when factor market exists, households make rational choices just as they do in the absence of factor markets. The only difference is that in the absence of labour markets, rational decisions on labour allocation are based on the subjective informal valuation of

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58 Chayanov in the 1920s studied the economy of Russian farm household and theorised on how a family would subjectively allocate its own labour in producing its own consumption good. Using the neoclassical concept of the marginal utility curves, Chayanov (ibid.:81-84) asserted that a worker will cease working when the marginal disutility of labour (drudgery of labour) equals the marginal utility of output produced (satisfaction of household demand) (ibid.:6). Since labour effort (degree of self-exploitation) is determined by the pressure of household needs, workers are required to work harder when providing for more consumers. Chayanov (1966:77) used the ratio of consumers to workers in the household - consumer worker ratio (CW) - in order to measure the pressure of consumer or household needs (or indicate the importance of the dependency ratio).
household labour; and in the presence of markets, household labour allocation are based on the market wage rate.

A farm household is viewed by Nakajima as a complex mix of these three economic entities, and there are similarities and differences between the farm household and each of these three entities. Concerning the production aspect, both the farm household and the farm firm are similar in the sense that their primary objective is production. On the other hand, they differ with respect to the methods of production and the distribution of output. The farm household employs mainly its own family labour and consumes part of its production, while the farm firm neither employs its own family labour or consumes part of its production. In addition, although the farm firm is an economic entity which is characterised by utility maximisation, the behavioural principle of the farm firm is characterised by profit maximisation.

Utility maximisation means that farm households make decisions consistent with their personal objectives. Therefore, when the utility maximising household is confronted by a choice between alternative actions, it will select the alternative that yields the highest personal welfare and happiness. On the other hand, profit maximisation means that the farm household chooses the level of agricultural output that maximises profit, given production technology, relative market prices and the availability of inputs. Economic decisions related to utility maximisation are firmly rooted in the neo-classical economic theory of the consumer, and that of profit maximisation in the theory of the firm.

In relation to the work and income aspect, the similarities between the farm household and the labourer household are numerous: both entities use family labour to obtain income; the behavioural principle of both is utility maximisation; and the amount of family labour used to earn an income is an argument which enters each entity's utility function. Conversely, the two differ in that while the farm household makes decisions about how much and what to produce to obtain a mixed income, the labourer household works as an employee to obtain a wage income.

Finally, in relation to the consumption aspect, the farm household and the consumer household are similar in that they are both characterised by the utility maximisation behavioural principle with the amount of goods consumed enters each entity's utility function. On the other hand, while the farm household participates in production activities, the consumer household does not; and while the utility function of the farm household contains family labour, the consumer household does not (ibid.).

Following on the similarities and differences between the farm household and the individual aspects of the constituent households presented above, the ensuing sections, which follows Nakajima framework, set out the assumptions and equilibrium conditions for each economic entity in order to derive the utility or profit maximisation.
4.2.2.1 Assumptions and the subjective equilibrium conditions facing the farm firm

- The behavioural principle of the farm firm is profit maximisation.
- There is no seasonality and \( i \)th farm firm produces one output, whose production function can be specified as:

\[
Y_i = f(x_{i1}, \ldots, x_{ik}, x_{ik+1}, \ldots, x_{im}) \quad i = 1, 2, 3, \ldots, n \quad j = 1, 2, 3, \ldots, k, k+1, \ldots, m
\]

where \( x_{i1}, \ldots, x_{ik} \) are fixed inputs and, \( x_{ik+1}, \ldots, x_{im} \) are variable inputs for the \( i \)th farm firm.\(^{59}\)
- The production function has the following properties: \( F_{x_{ij}}>0 \), and \( F_{x_{ij}x_{ij}}<0 \).\(^{60}\)
- Farm firms face a competitive product market, where product prices are given and farm firms act as price takers.
- Farm firms face competitive factor markets for variable factor inputs \( (x_{i1}, \ldots, x_{im}) \) used in production. The respective prices of the variable inputs \( (w_1, \ldots, w_m) \) is given, and the farm firm chooses the quantity of the \( j \)th variable input it wishes to hire.
- Farm firms maximise profit in the short run (restricted profit function) and fixed inputs are taken as given.

Given that output is determined endogenously, the introduction of profit maximisation as a behavioural assumption introduces an allocative relationship between inputs and outputs, which holds simultaneously with the technological relationship of the production function (Yotopoulos and Nugent 1976:84). Based on these assumptions, the subjective equilibrium condition for the profit maximising farm firm can be derived from the underlying production function technology in equation (4.1), and relative market prices through the profit function.

Given the levels of inputs and assuming no optimising errors of allocative efficiency, the first order conditions for profit maximisation yield a set of equations which hold simultaneously:

\[
p \frac{\partial f(x)}{\partial x_j} = w_j \quad j = 1, 2, \ldots, m. \quad (4.2)
\]

\(^{59}\) Note that the farm firm's output \( (Y_i) \) in equation (4.1) is non-stochastic, but deterministic for the purpose of this exposition. This restriction is relaxed in section 4.3 when the stochastic production function is set out.

\(^{60}\) In practice, the marginal physical product of the \( j \)th variable input \( (F_{x_{ij}}) \) may be zero when the variable input reaches some amount, e.g., labour during the inactive period of the year. Once \( F_{x_{ij}} \) reaches zero \( F_{x_{ij}x_{ij}} \) also assumes zero. Therefore, although it may be more appropriate to assume that \( F_{x_{ij}} \geq 0 \), and \( F_{x_{ij}x_{ij}} \leq 0 \), given that the equilibrium points are usually allocated in the region where \( F_{x_{ij}} > 0 \), and \( F_{x_{ij}x_{ij}} < 0 \), the possibility that \( F_{x_{ij}} = 0 \), and \( F_{x_{ij}x_{ij}} = 0 \) is ignored.
where \( p \) and \( w_j \) are the price of output and the \( j \)th variable input respectively, and \( \frac{\partial f(x)}{\partial x_{ij}} \) is the marginal product with respect to the \( j \)th variable input.

The above equations imply that the marginal value product of the \( j \)th variable input equals its market price. Therefore, equations (4.2) yields the necessary and sufficient conditions for maximising the farm firm’s profit. Solving equations (4.1) and (4.2) simultaneously yields the production parameters which allow for the derivation of the profit maximising output and variable inputs.

4.2.2.2 Assumptions and the subjective equilibrium conditions facing the labourer household

- The behavioural principle of the labourer household is utility maximisation.
- The labourer household faces a competitive labour market, where wage is given and it chooses how many hours (or workdays) of family labour \( [x'_{1i}] \) in a year it will supply.
- The household possesses a certain amount of asset-income \( [I_i] \), which can be positive, zero or negative. Its total income is then:

\[
L_i = w_{i1} x_{i1} + I_i \quad i = 1,2,3,\ldots,n. \quad (4.3)
\]

- The utility function of the \( i \)th labour household is given as:

\[
U_i = u(L_i, x_{i1}) \quad i = 1,2,3,\ldots,n. \quad (4.4)
\]

where utility is a function of total income \( (L_i) \) and the total labour \( (x_{i1}) \) (workdays) of the household in a year, and it is assumed that the following properties hold for the utility function:

\[
U_{L_i} > 0, \quad U_{x_{i1}} < 0, \quad U_{L_iL_i} > 0, \quad U_{x_{i1},1} > 0. \quad i = 1,2,3,\ldots,n.
\]

and

\[
\frac{\partial L_i}{\partial x_{i1}} = \frac{U_{x_{i1}}}{U_{L_i}} \text{ is a positive sloping curve.}
\]

- The assumption of \( U_{x_{i1}} < 0 \) implies that labour brings about direct disutility due to the physical and mental pain of having to work. It also contributes indirectly to disutility through reducing leisure or home time.

Given these assumptions and relations, the sufficient condition for maximising the utility of the labour household is given as follows:

\[
-\frac{U_{x_{i1}}}{U_{M_i}} = w_i \quad i = 1,2,3,\ldots,n. \quad (4.5)
\]
Therefore, equation (4.5) implies that the marginal valuation of family labour is equal to the market wage rate. Equations (4.3) and (4.5) are sufficient to yield the equilibrium values for $x_{i1}^*$ and $L_i$ (i.e., $x_{i1}^*$ and $L_i^*$) (Nakajima 1986:154).

4.2.2.3 The subjective equilibrium conditions facing the consumer household

- The behavioural principle of the consumer household is utility maximisation.

- The consumer household faces a competitive product market where the price of output [$Z_i$] consumed by the $i$th household is [$p$]. A further simplifying assumption is that [$Z_i$] is the same commodity as the commodity [$Y_i$] produced by the farm firm in section 4.2.2.1. For example, this might be paddy rice or wheat.

- Through certain means, such as trade and off-farm work, the consumer household acquires money income [$I_i$], of which a certain portion is expended on the consumer good [$Z_i$] and the remaining portion is held in the form of money [$M_i$]. Therefore, the budget constraint for the $i$th consumer household is:

$$I_i = p.Z_i + M_i \quad i = 1,2,3,...,n. \quad (4.6)$$

where $Z_i$ is the amount of the commodity purchased for consumption by the $i$th household.

- The utility function of the $i$th consumer household is defined as:

$$U_i = u(M_i, Z_i) \quad i = 1,2,3,...,n. \quad (4.7)$$

where:

$$U_{Z_i} > 0, \text{ and } U_{M_i} > 0; \text{ and } U_{Z_i} / U_{M_i} > 0.\!\!$$

Following these assumptions, the consumer household is assumed to maximise the utility function in equation (4.7) subject to its budget constraint in equation (4.6). This yields a subjective equilibrium for the $i$th consumer household of:

$$\frac{U_{Z_i}}{U_{M_i}} = p \quad i = 1,2,3,...,n. \quad (4.8)$$

which implies that the marginal subjective valuation of the consumer good is equal to its market price. Therefore, solving equations (4.6) and (4.8) simultaneously yields the level of consumption of the commodity [$Z_i^*$] and the income [$M_i^*$] that maximises utility (Nakajima 1986:147).4

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61 Hicks (1932) called the [$U_{Y_i}/U_{M_i}$] term the "marginal rate of substitution of consumer good for money". Nakajima (1986:146), from the perspective of the (farm) consumer household calls this the "marginal subjective valuation of consumer good".
4.2.2.4 The subjective equilibrium conditions facing the farm household

- We now consider the farm household as the complex product of the above entities. That is, the farm household that consumes part of its production and faces competitive product and factor markets.

- The behavioural principle of the farm household is utility maximisation.

- The money income of the farm household is a complex of the relevant budget constraints from the farm firm, the labour household, and the consumer household. Accordingly, the budget constraint for the $i$th farm household:

$$M_i \equiv p.f(x_{i1}, \ldots, x_{i(K-1)}, x_{iK}, \ldots, x_{im}) - \sum_{j=2}^{k} w_j x_{ij} + w_1 x_{i1} - P.Z_i + I_i$$

or

$$M_i = \Pi_i + w_1 x_{i1} - P.Z_i + I_i$$

$$i = 1, 2, 3, \ldots, n. \quad (4.9)$$

$$j = 2, 3, 4, \ldots, m.$$

where $x_{i1}$ is the amount of family labour and $x_{i1}$ is the amount of input on its own farm. Equation (4.9) implies that the farm household's money income is made up of (i) the profit from the farm firm; (ii) the wage income of the labour household; (iii) the negative of the income in kind in monetary terms (or the monetary value of the goods consumed from farm production); and (iv) other asset or acquired income, respectively.

- The farm household's utility function is assumed to be:

$$U_i = u(M_i, x_{i1}, Z_i) \quad (4.10)$$

where the following standard assumption holds: $U_{M_i} > 0$, $U_{x_{i1}} < 0$, $U_{Z_i} > 0$.\(^{62}\)

Given the above assumptions and relations, the farm household maximises equation (4.10) subject to equation (4.9). However, because the budget constraint contains the characteristics of the farm-firm, labour and consumers, the farm household's economic decision making behaviour is influenced by the behaviour of these entities. First, when the farm household behaves as a firm farm, it will have to maximise its short-run profit in order to maximise its utility. In this regard, the complex of the farm household is delineated. The farm household behaves as a firm farm when it is concerned with farm production. At this stage, the farm household is concerned with choosing the optimal level of variable inputs $[x_{i1}^*]$, which includes the optimal level of labour input $[x_{i1}^*]$, in order to endogenously determine the optimal level of output

\(^{62}\) It follows that the marginal valuation of family labour in monetary terms is positive - $U_{x_{i1}M_i}$; the marginal valuation of family labour in terms of the consumption good is positive - $U_{x_{i1}Z_i}$; and the marginal valuation of the consumption good in terms of money income is negative - $U_{Z_iM_i}$.
[\(Y_i^*\)] given relative prices faced by the farm household in competitive factor and product markets and the underlying production technology. Given the optimal level of variables inputs and the optimal level of output, the maximum profit \([\Pi_i^*]\) is achieved. The subjective equilibrium condition sufficient to yield the maximum profit is given by equation (4.2), which, when simultaneously solved with equation (4.1), yields \(Y_i^*\), \(x_{ij}^*\), and \(\Pi_i^*\) (see section 4.2.2.1).

Consequently, when the farm household maximises its utility function [equation (4.10)] it will be subject to the following budget constraint:

\[
M_i = \Pi_i^* + w_1x_{1i} - pZ_i + I_i \quad i=1,2,3,...,n \tag{4.9*}
\]

which incorporates the maximum profit \([\Pi_i^*]\). Therefore, when the farm household maximises its utility it does so in a two stage method: firstly, it maximises the profit of farm household agricultural production; and secondly, maximises utility derived from money income, the family labour must exert, and from the goods consumed (see Nakajima 1986:96,138).

The preceding mathematical exposition of the economic entities of a farm household showed the underlying behavioural principle of this complex entity. Although, it is understood that the farm household maximises utility, the farm household (as a farm firm) must follow the profit maximisation principle first, if it maximises utility. Thus, utility and profit maximisation principles are not inconsistent in the overall optimising behaviour of the farm household, as the former implies the latter and vice versa. Following Nakajima's (1986) logic, I use the profit maximisation model in order to evaluate the economic efficiency of farm households in Vietnam. Note that the use of a profit maximisation model can tell us much about the efficiency of farm households in Vietnam provided the optimal outcome derived from the profit maximisation approach is used as the benchmark for measuring the efficiency of farm households, so that any deviations from this benchmark can be examined to determine the factors causing them. An evaluation of deviations as it pertains to Vietnamese farm households is provided in chapter 5.

4.3 A PROFIT MAXIMISATION MODEL APPROACH TO MEASURING EFFICIENCY

4.3.1 Estimation of the production parameters in the profit maximisation model

Production parameters can be derived in two alternative ways given a particular production technology. The primal approach yields the estimates of parameters directly from the production function, while the dual approach relies on the cost or profit functions to derive them indirectly. Indirect approaches are generally preferred because they avoid the problem of simultaneous equation bias associated with the estimation of
the primal function (Lau and Yotopoulos 1971). The method employed in this section is to derive the production parameters using the primal function along with the marginal productivity conditions.

If output is determined endogenously, then the introduction of profit maximisation as a behavioural assumption introduces an allocative relationship between inputs and outputs, which holds simultaneously with the technological relationship of the production function (Yotopoulos and Nugent 1976:84). Based on these assumptions, the equilibrium condition for the profit maximising (farm) firm can be derived from the underlying production function technology in equation (4.11) and relative market prices through the profit function.

Consider the production function of the ith farm firm (farm household) is output $Y_i$ which is influenced by variable inputs $x_{ij}$ and is stochastic:

$$Y_i = f(x_{i1}, \ldots, x_{ik}, \ldots, x_{im})e^{u_i} \quad i = 1,2,3, \ldots, n$$

$$j = 1,2,3, \ldots, k,k+1, \ldots, m$$

where $x_{i1}, \ldots, x_{ik}$ are fixed inputs, $x_{ik+1}, \ldots, x_{im}$ are variable inputs, and that $e^{u_i}$ implies $Y_i$ is stochastic, and that $u_i$ captures random factors such as errors in measurements, the combined influence of omitted variables and deviation from the true functional relationship. The value of $u_i$ can be positive, zero or negative and $u_i$ is normally and independently distributed [$u_i \sim NID(0, \sigma^2_u)$].

The restricted (short-run) profit function is specified as:

$$\Pi_i = pY_i - \sum_{j=1}^{m} w_j x_{ij} \quad i = 1,2,3, \ldots, n. \quad (4.12)$$

$$j = 1,2,3, \ldots, m.$$

where $p$ and $w_j$ are the price of output and the $j$th variable input respectively. When the production function in equation (4.11) is stochastic, the objective function or the maximum profit $[\Pi_i^*]$ can be specified as a standard Lagrangean:

$$\Pi_i^* = pY_i^* - \sum_{j=1}^{m} w_j x_{ij}^* - \lambda [Y_i - f(x_{i1}, \ldots, x_{ik}, \ldots, x_{im})e^{u_i}] \quad (4.13)$$

Consequently, deriving the necessary and sufficient condition for maximising profit from equation (4.13) yields:

$$\frac{\partial f(x)}{\partial x_{ij}} = \frac{w_j}{p} \quad j = 1,2,3, \ldots, m. \quad (4.14)$$

where the left hand side of equation (4.14) is the marginal physical product (MPP$_{ij}$) of the $j$th input for the $i$th household. This merely states that the slope of the household’s

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63 However, there is evidence in the literature that when farmers maximise expected profit (Zellner et al. 1966), simultaneity bias is removed.
production function with respect to the \( j \)th variable input equals the real price \((w_j/p)\) of that input at the profit maximising point.

If the household is efficient in allocating resources, then the factor share (demand) equations for variable inputs can be derived directly by solving equation (4.14). However, because equation (4.14) is non-stochastic, the production parameters in the profit maximisation model are derived under the assumption of perfect market conditions. That is, expected prices are equal to real actual prices. This seems to suggest that under the imperfect market conditions facing farm households in Quoc Tuan (as indicated below in section 4.4) the strict economic efficiency assumption of the profit maximisation model is ruled out. On the contrary, this problem may be resolved by relaxing the restrictive assumption of allocative efficiency in order to allow farm households to be allocatively inefficient.

When the household is allocatively inefficient and also making systematic errors, then the MPP\(_{ij}\) can be expressed as:

\[
\frac{\partial f(x)}{\partial x_{ij}} = \frac{w_j}{p} + u_{ij}
\]  

(4.15)

where \( u_{ij} \leq 0 \). When \( u_{ij} \) is zero, households are allocatively efficient. In addition, the MPP\(_{ij}\) may involve measurement and statistical errors which are captured in equation (4.16) by adding another disturbance term \( v_{ij} \), which is normally and independently distributed \([v_{ij} \sim NID(0, \sigma^2_v)]\).

\[
\frac{\partial f(x)}{\partial x_{ij}} = \frac{w_j}{p} + u_{ij} + v_{ij}
\]  

(4.16)

\[
\frac{\partial f(x)}{\partial x_{ij}} = \frac{w_j}{p} + w_{ij}
\]  

(4.17)

where \( w_{ij} = (u_{ij} + v_{ij}) \) and is assumed to have multivariate normal distribution \([w_{ij} \sim N(0, \sigma^2_w)]\).

Therefore, the system of equations specified by (4.11) and (4.17) can be estimated simultaneously to yield the required parameters of the production function, under the imperfect market assumption. Note that the above model does not explicitly incorporate risk. I did not specify an elaborate model explicitly incorporating risk because of the fact that the data I had to work with was poor and restrictive, and that I had not controlled the collection of the data. Recall that a discussion of the quality of the data was provided in section 1.5 of chapter 1, and it will be further discuss in context of agricultural production efficiencies below in sections 4.3.4 and 4.4.1 of this chapter.
4.3.2 Deriving the optimal economic decision rules under profit maximisation

Assigning a functional form to equation (4.11), allows for the derivation of the optimal level of output and variable input use, and the maximum profit. A variety of functional forms can be specified. A number of different functional forms were tested, which included using a transcendental, translog, quadratic and Cobb-Douglas production functions, in order to estimate the production parameters of the four crops: spring rice; main rice; non-rice food crops; and cash crops (see the empirical model specification in section 4.3.4, page 126). The adequacy and efficiency of these results were statistically tested if they were solvable, which meant only for the case of the transcendental and Cobb-Douglas production forms, since in the case of the quadratic and translog functional forms the results were insolvable due to multi-collinearity and a near singular variance – covariance production matrix (see also sections 4.3.3.2 page 125, and 4.3.4, page 126). In case of the quadratic and Cobb-Douglas production functional forms, the results derived from the former functional form yielded less efficient results than those yielded by the latter functional form. Therefore, the functional form utilised in this thesis is the Cobb-Douglas functional form and can be derived as follows, based on the Yotopoulos and Nugent (1976) approach:

\[ Y_i = A \prod_{p=0}^{m} x_{ij}^{\beta_j} e^{v_i} \quad i = 1, 2, 3, \ldots, n \quad (4.18) \]

\[ j = 0, 1, 2, \ldots, m \]

where \( \beta_j \) is the production parameter of the \( j \)th input and \( \beta_j > 0 \). Assume for convenience that there is only one fixed input \( x_0 \), then the MPP\( j \) of the \( j \)th variable input specified by equation (4.18) can be defined as:

\[ \frac{\partial Y_i}{\partial x_{ij}} = \beta_j Y_i x_{ij} \quad i = 1, 2, 3, \ldots, n. \quad (4.19) \]

\[ j = 1, 2, 3, \ldots, m. \]

Since the profit maximising first order condition is:

\[ \begin{bmatrix} p & \frac{\partial Y_i}{\partial x_{ij}} \end{bmatrix} = \beta_j \frac{p Y_i}{x_{ij}} = w_j \quad (4.20) \]

rearranging equation (4.20) and raising both sides to the power of \( \beta_j \) yields:

\[ x_{ij}^{\beta_j} = \left[ \beta_j Y_i \frac{p}{w_j} \right]^{\beta_j} \quad (4.21) \]

Let \( \frac{w_j}{p} = C_j \), such that equation (4.21) becomes:

\[ x_{ij}^{\beta_j} = \left[ \beta_j Y_i \frac{1}{C_j} \right]^{\beta_j} \quad j = 1, 2, 3, \ldots, m. \quad (4.22) \]
Substituting equation (4.22) into (4.18) yields:

$$Y_i = A x_0^m \prod_{j=1}^{m} \left[ \frac{\beta_j Y_i^{-1}}{C_j} \right] e^{u_i}$$

$$= A x_0^m \prod_{j=1}^{m} \left[ \frac{\beta_j}{C_j} \right] \prod_{j=1}^{m} \left[ Y_i \right] e^{u_i}$$

$$= A x_0^m \prod_{j=1}^{m} \left[ \frac{\beta_j}{C_j} \right] \sum_{j=1}^{m} \beta_j Y_i^{m}$$

(4.23)

let $\left[ \sum_{j=1}^{m} \beta_j \right] = h$ and $\left( A x_0^m \prod_{j=1}^{m} \left[ \frac{\beta_j}{C_j} \right] \right) = \theta$, such that equation (4.23) can be re-specified as:

$$Y_i = \theta, \ Y_i^h = \theta_i$$

to yield the profit maximising level of output for the $i$th household. Therefore, substituting equation (4.24) into (4.22) and rearranging, the profit maximising level of use of the $j$th variable factor is derived as:

$$x_{ij}^* = \left( \frac{\beta_j}{C_j} \right)$$

(4.25)

Following equations (4.24) and (4.25) the maximum restricted profit is:

$$\prod Y_i^* = p Y_i^* - \sum_{j=1}^{m} w_j x_{ij}^*$$

$$= p \theta_i^{1-h} - \sum_{j=1}^{m} w_j \left( \frac{\beta_j}{C_j} \right) \theta_i^{1-h}$$

$$= \theta_i^{1-h} \left( p - \sum_{j=1}^{m} \frac{w_j}{C_j} \beta_j \right)$$

$$= \theta_i^{1-h} \left( p - \sum_{j=1}^{m} \frac{w_j}{w_j/p} \beta_j \right)$$

$$= \theta_i^{1-h} \left( p - \sum_{j=1}^{m} \beta_j p \right)$$
\[
I_i^* = p(1-h) \theta_i^{1-h}
\]

Thus, equations (4.24), (4.25) and (4.26) yield the optimal level of output, \( j \)th variable input and profit for the \( i \)th farm household.

In addition, two useful indices follow from the above framework for determining the efficiency of the farm household in production. Firstly, dividing the actual profit \( \Pi \) given in equation (4.12) by the maximum profit shown in equation (4.26), the degree to which the farm household is attaining the maximum profit possible can be determined by the profit index:

\[
\frac{\Pi}{\Pi^*}
\]

Secondly, the allocative efficiency index of each variable input across all production activities and for each farm household can be derived. According to the behavioural assumption of profit maximisation under imperfect market conditions, the allocative efficiency \( (AE_{ij}) \) of the farm household can be derived from equation (4.17), and in the Cobb-Douglas case from equation (4.19) which is re-specified as:

\[
AE_{y} = \omega_{ij} = \beta_j \frac{pY_i}{x_{ij}} - w_j
\]

If \( AE_{ij} = 0 \) then farmers are allocatively efficient, if \( AE_{ij} > 0 \) farmers are allocatively inefficient and under-estimating the MPP\(_{ij}\) of the concerned input, and if \( AE_{ij} < 0 \) farmers are over-estimating MPP\(_{ij}\). Furthermore, it is quite possible from the specification of equation (4.17) that if \( AE_{ij} \neq 0 \), then this result may indicate that there are measuring and statistical errors present, as earlier discussed in section 4.3.1 (page 118).

Alternatively an index of allocative efficiency \( (k_{ij}) \) can be derived when equation (4.24) is divided by the MFC of the \( j \)th input:

\[
k_{ij} = \beta_j \left[ \frac{pY_i}{x_{ij}} \right] = \beta_j \frac{pY_i}{w_j x_{ij}}
\]

where \( k_{ij} = 1 \) implies allocative efficiency; \( k_{ij} > 1 \) implies under-use of the \( j \)th input, and \( k_{ij} < 1 \) implies over-use of the \( j \)th input, or statistical and measuring errors.

Lastly, in order to evaluate the household's economic efficiency with respect to each crop, the marginal cost of production to marginal revenue of production ratio is
The marginal cost of production is the incremental cost incurred for increasing production by one unit, and its derivation in the case of the Cobb-Douglas production function is given by equation (E.8) in Appendix E. The marginal revenue of production is the incremental revenue received by the farm household for increasing production by one unit. Since farm households are price-takers, the marginal revenue of production is simply the market price. Therefore, dividing equation (E.8) by the market price yields the economic efficiency ratio associated with producing each crop by the \( i \)th farm household:

\[
K_i = \frac{C_i}{p} = \frac{1}{h} \left[ Y_i^{1-h} \Lambda_i^{1-h} \right] p \\
i = 1,2,3,...,n \tag{4.30}
\]

When the farm household is allocatively efficient in allocating all variable inputs it will equate the marginal cost of production of the relevant output with the price of that output, which yields a ratio of unity (\( K_i = 1 \)). Any other ratio (\( K_i > 1 \) or \( K_i < 1 \)) implies that the household is misallocating one or all of its variable inputs, which results in the marginal cost of production deviating from the observed market price for each crop. In this regard, equation (4.30) or (\( K_i \)) is a good proxy to the aggregation of equation (4.29) or the allocative efficiency index across all variable inputs.

### 4.3.3 Limitations of the specified profit maximisation model

The profit maximisation model specified above is limited in two ways. Firstly, in the averaging problem encountered in the estimation of the production function and, secondly, in that the framework does not allow us to measure technical efficiency.

#### 4.3.3.1 The averaging problem associated with the estimation of the coefficients in the production function

Yotopolous and Nugent (1976:73-76) point out that the averaging problems stem from a logical inconsistency inherent in the neo-classical concept of economic efficiency. If all firms (farm households) were economically efficient then they would all operate at the same point on the production function, producing the same level of output and utilising the same bundle of inputs. For such an ideal state to occur a number of conditions are necessary for all households: (i) the same production function, that is, the same technical knowledge and identical endowments of fixed factors (i.e., access to perfect knowledge and information); (ii) households facing the same input and output prices in the market; and (iii) instantaneous and perfect maximisation of profits (ibid.).

Real-life household production data, such as that used in this study, are unlikely to observe this ideal state. Instead, households produce a homogenous product with different factor intensities and average factor productivities. The consequence of the uniformity of production operations between households is to make redundant the need
to estimate a production function since all households are economically efficient. Conversely, the presence of variations in household production data is the element allowing the estimation of the production function and at the same time indicating that one or more of the above conditions is being violated, or that there are measurement problems in the data. If the first condition is violated then comparing the relative success of achieving either technical or allocative efficiency of households using different technologies becomes useless. If the second condition is violated then national and rural markets do not operate perfectly and the observed variation in output and inputs between households are due to the different prices they face rather than their relative efficiencies. If the third condition is violated then households are partially or completely unsuccessful in maximising their profits.

Therefore, a major drawback of the average production function methodology is that the estimated parameters of the production function do not correspond with the neo-classical definition of a production function. The neo-classical production function requires that the function exhibit a technological relationship that yields the maximum possible output for a given level of input. In contrast, the average production function exhibits the average level of output obtained at given input levels. The latter approach to understanding household economic behaviour suggests then that based on the parameters of the production function for a particular set of household data, the only feasible test of an economic hypothesis is to evaluate whether their input use on average corresponds to the level at which the MVP of variable inputs equate with their MFC, that is, that the household is allocatively efficient (equation 4.19). Although the concept of averaging recognises the fact that different households may obtain varying output for given input levels, without considering the manner in which different input levels are applied, it implies that technical efficiency differences between households cannot be measured. This brings us to the second limitation of the profit maximisation model considered in the following sub-section.

4.3.3.2 Inability to determine technical efficiency

Technical efficiency can be defined as the maximum level of output possible with a given bundle of inputs, given the range of technologies available to the household.\(^{64}\) In contrast, having already chosen the technology, allocative efficiency refers to the adjustment of inputs and outputs to relative prices. Kalirajan and Shand (1988b, 1994) have asserted that the causality between the two efficiencies runs from technical to allocative. This suggests that because technical efficiency facilitates allocative efficiency, then it is necessary to achieve the former before the latter. Achieving both

\(^{64}\) The converse also applies, that is, for a given level of output, technical efficiency should imply that the household uses the minimum possible bundle of inputs.
efficiencies, however, provides the sufficient condition to ensure economic efficiency (see Farrell 1957).

An underlying assumption in the neo-classical theory of the firm is that firms (farm households) are operating on the outer-bound production function, that is, along the most technically advanced production function available to the firm. Such an assumption overlooks the kind of inefficiencies that are related to inferior production technologies. The profit maximisation model specified in section 4.3.2 implicitly assumes an outer-bound production function and, therefore, focuses on the allocative aspect of efficiency only. In practice, technical efficiency differences between groups of farming household are ignored, since the profit maximisation model does not allow a comparison of actual household-specific production levels with the unobservable potential outer bound production function in order to measure the true level of technical efficiency.

Although a quantitative measure of allocative and technical efficiencies is possible based on the use of a sophisticated frontier production function model (see Aigner et al. 1977; Meeusen and Van den Broeck 1977; Battese and Corra 1977; Kalirajan and Flinn 1983; Schmidt 1986), the use of such a model for a formal analysis of the efficiency of the farm households in Quoc Tuan was not possible in this study due to data limitations. The major problem was multi-collinearity in the estimation of the production parameters using production data from Quoc Tuan, which prevented the solving of a production matrix using a system of primal production function and factor demand equations, with the production function assuming the translog and quadratic functional forms. Although the theoretical model developed in the last section does not formally derive a measure of technical efficiency this limitation does not impede our analysis of the efficient behaviour of the farm household. It is possible to arrive at an opinion of technical efficiency by evaluating technical factors in line with the allocative efficiency of the farm household.65 This evaluation is provided in section 5.4 of chapter 5.

4.3.4 The empirical model for evaluating the economic efficiency of farm households

In analysing a suitable production function technology for Quoc Tuan, several general specifications were tested. In the case of the transcendental production function the results were inadequate because of the size of the standard errors of the explanatory variables. In the cases of the translog and quadratic production functions, the degree of multi-collinearity between the explanatory variables land and labour resulted in a near

65 Based on the finding that allocative efficiency is influenced by technical efficiency (Kalirajan and Shand 1988b) it can be expected that when allocative efficiency is not equal to unity for a particular household technical efficiency may be one factor impeding the households ability to allocate scarce resources effectively.
singular variance-covariance matrix (see also sections 4.3.2 page 121 and 4.3.3.2 page 125). As a consequence, the system of equations based on these functional forms could not be estimated. These results of these general functional forms when compared to those obtained from the Cobb-Douglas production function were not as statistically significant. Accordingly, the Cobb-Douglas production function was adopted as the most suitable functional form for the production function.

The system of equations specified by equations (4.11) and (4.17) can be estimated simultaneously after assuming the Cobb-Douglas functional form (see equation 4.18). For empirical purposes equation (4.11) is transformed into logs:

$$\ln(Y_i) = \alpha + \beta_0 \ln(x_0) + \sum_{j=1}^{m} \beta_j \ln(x_j) + u_i$$  

where $\alpha$ is a constant, $\beta_0$ the production parameter of the fixed factor of production assuming only one fixed factor, and $\beta_j$ are production parameters of the variable factors. These production parameters have the following properties: $0 < \beta_0, \beta_j < 1$, and $\sum_{j=1}^{m} \beta_j < 1$. The derived first order profit maximising conditions for the Cobb-Douglas production function can be easily manipulated to yield the marginal productivity conditions, which can be written as follows:

$$C_{ij} = \beta_j + \sigma_i$$  

where

$$C_{ij} = \frac{w_j x_j}{p_i Y_i}$$  
is the factor share of the $j$th variable input for each respective crop;

$Y_i = Y$ can be the separate production output of spring rice, main rice, non-rice food crops (corn and tuber crops expressed in paddy equivalent), or cash crops (garlic and onions expressed in garlic equivalent) for the $i$th household;

$w_j = price of the $j$th variable input;

$p = price of the output for each crop;

$x_0 = is the amount of land (square metres) used in the production of each crop;

$x_1 = is the amount of labour (workdays) used in the production of each crop;

$x_2 = is the amount of urea (in kilograms) used in the production of each crop;

$x_3 = is the amount of phosphate (in kilograms) used in the production of each crop;

$x_4 = is the amount of organic fertilisers (in kilograms) used in the production of each crop;
\[ x_5 = \text{are other farm inputs (in dong value) used in the production of each crop - these are primarily seed costs and irrigation and their values have been added together;} \]

\[ C_1 = \text{the factor share of labour for the respective crop;} \]

\[ C_2 = \text{the factor share of urea for the respective crop;} \]

\[ C_3 = \text{the factor share of phosphate for the respective crop;} \]

\[ C_4 = \text{the factor share of organic fertilisers for the respective crop;} \]

\[ C_5 = \text{the factor share of other farm inputs for the respective crop.} \]

Note too, that equation (4.31) specifies land as a fixed input, since the equation specifies the short-run profit function. Labour, urea, phosphate organic fertilisers and other farm inputs are variable inputs. Hence, five factor share equations are incorporated into the system of equations (4.31) and (4.32): labour; urea; phosphate; organic fertilisers; and other farm inputs, since land is assumed fixed. Furthermore, the production coefficients of each crop (spring rice, main rice, non-rice food crops, and cash crops) are estimated as separate systems of equations, since the two rice crops are grown in different times of the year while cash and non-rice food crops are grown in the same seasons (see section 4.4.2.1, page 130). Hence four systems of equations are estimated and their results are presented and discussed in section 4.5, below (page 135). Lastly, each variable input coefficient is restricted to its respective factor share constant, that is, the \( \beta_j \)'s in equations (4.31) and (4.32) are the same. This imposed restriction was tested, the results of which are presented in Appendix G, and is also discussed in section 4.5.1 (page 135). However, no restriction was imposed on the system of equations for each crop that the estimated production functions estimated in section 4.5.2 exhibit “constant-return-to-scale”.

Since a short-run profit maximisation model is used in this study, the fixed input – land- is assumed to be a predetermined variable and variable inputs and output prices are (by assumption) exogenous. As such, no simultaneous equation bias is encountered when equations (4.31) and (4.32) are estimated by Zellner's Seemingly Unrelated Regression (SUR) method. This method gives asymptotically efficient results. Zellner's SUR procedure as implemented in Shazam Version 7.0 was used in this study to simultaneously estimate the stochastic production function and factor share (demand) equations for each of the four crops observed.
4.4 FARM HOUSEHOLDS IN QUOC TUAN AGRICULTURAL COMMUNE

4.4.1 About the farm household production and price data

The farm household production data employed in this study to evaluate the efficiency of farm households in agricultural production was collated by researchers from the Vietnamese National Institute of Agricultural Science (VNIAS). Production data was collected over the agricultural year - February 1990 to January 1991 - from 100 farm households in Quoc Tuan agricultural commune in Nam Thanh district of Hai Hung province in the RRD. The commune is situated about 65 kilometres from Hanoi. The data set provides a survey of production activities and income structures for the 100 farm households.

Overall, the quality of the production data from Quoc Tuan agricultural commune is satisfactory for measuring farm households' production, as well as their economic efficiency. However, as noted in section 1.5.3 of chapter 1, acquiring farm household level data was extremely difficult at the time of fieldwork in Vietnam in 1991 and 1992. Because I did not participate in the survey design, the quality and nature of the data was not as good as I had hoped. Much information is missing. As it is cross-sectional data, determining the economic behaviour of agricultural producers over time was not possible. And because the farm household data focused on production, and lacked information about households' consumption and expenditures, as well as their risk preference, it does not allow for an evaluation of attitudes concerning risks and utility maximisation using a formal model. As a result, the Quoc Tuan household production data is not robust enough to lend itself to more rigorous analysis other than the Cobb-Douglas profit maximisation model employed in this chapter, which was discussed in section 4.3 (page 118). Nevertheless, based on the statistical evaluation of the profit maximisation model, the results were sufficient to allow an evaluation of farm households' efficiency in agricultural production.

Moreover, because the data set focuses on only one agricultural commune in Vietnam, which in relation to other communes in other parts of rural Vietnam is well endowed with infrastructure, agricultural support and social services, it is difficult to generalise the results of this study of efficiency to the rest of rural Vietnam. Nevertheless, with these qualification aside, the following sections provide a description of the physical, infrastructure, market and socio-economic conditions facing agricultural producers in Quoc Tuan agricultural commune in the early 1990s, around the time the production data was collected. In the absence of specific information on Quoc Tuan, information more general to this part of Vietnam is provided. These factors provide a snapshot of the effectiveness of a rural development programme in the locality of Quoc Tuan and its environs, while the overall effectiveness of this programme is assessed in chapter 5.
Lastly, and as earlier mentioned in chapter 1, I did not observe or record neither the expected or actual prices faced by farm households in Quoc Tuan in relation to the production of the various crops. Resurveying the same farm households, for which the production was collected, with the hope of eliciting the actual prices they had incurred or faced was not possible (or more appropriately permissible) for me at the time of fieldwork. Instead, I was able to obtain input and output prices, roughly corresponding to the agricultural period being analysed and facing each crop season, through my host institute the VNIAS.

According to the provider of this information, the prices were recorded in markets of the provincial capital of Hai Duong. Output and variable input prices for each crop were averaged over the period in which the crops were cultivated. A discussion of this is presented in Appendix F. It is important to note that land prices were not observed. In fact, during the period in question, any observation of market prices in agricultural land was virtually absent. Despite the fact that farmers had the right to farm land the way they wished, selling agricultural land was another matter that was not entertained by the authorities. At the time of research, land was allocated by the village and commune authorities on the basis of family headcount. In spite of not being able to observe a price or even a shadow price for land, this limitation does not restrain the analysis as I have stipulated a short-run profit maximisation model with which to estimate the production parameter of each crop, and such a model holds land as a fixed input.

Therefore, it should be noted that the estimated coefficients from the above system of equations (4.31 and 4.32) will reflect the assumption that all farm households face the same variable input price and output price for each related crop production season and, therefore, may not reflect possible differences in performances that may have eventuated if data on the differences in prices faced by different households were available.

In summary, the price data used in each factor share equation (4.32) for each crop (see section 4.3.4), as the production data used in equation (4.31), were obtained researchers at VNIAS, and although I was told that they had collected it from the GSO, in turn, I was never able to ascertain its true authenticity. Therefore, it was, like all of the data in this analysis, taken in “good faith”. This was the best available information that I had at the time of research.

4.4.2 Physical, infrastructure and market conditions facing farmers

4.4.2.1 Physical and agricultural conditions

Quoc Tuan agricultural commune is located in Nam Thanh district, Hai Hung province, 65 km Northeast of Hanoi, and only 15 km north of the provincial capital, Hai Duong. The district town of Nam Thanh lies 10 km to the Southeast.
The climate in Quoc Tuan is typical of the northern part of Vietnam and the RRD with its hot humid summers, dry autumns, cool winters and warm humid springs. The average yearly temperature is between 23° and 27°, the summer average maximum is 39° and the winter average minimum 6°. The average yearly rainfall is 1500mm, most of which falls over monsoon season between June and October.

The total land area of the village in 1992 was 560 hectares. Seventy six per cent of this area was classified as agricultural area and the remainder comprised residential areas (including gardens) (8.2%), and roads, canals and public works (15.7%). The fertile alluvial soils of the arable land are of medium acidity and in the medium to poor range in phosphorus and humus content. Most of the arable land is suitable for cultivation year round.

The population of Quoc Tuan was 7,208 in 1992, comprising some 1,728 households, with an average of 4.2 members per household. The local authorities have reported a population growth rate of around two per cent per annum. By comparison, the national average in 1992 was 2.3 per cent (GSO 1993). The population density of Quoc Tuan was 1,286 inhabitants/km², and the average arable land per capita was about 450m². (The average population density for the Red River Delta in 1992 was 802 inhabitants/km²).

The cropping pattern in Quoc Tuan is based mainly on the requirements of rice cultivation. That is, rice is grown in successive seasons with little interval, except where soil or climatic conditions make it impossible to do so. Fields are cultivated during the two rice seasons or with a third (winter) crop season, which is characteristic of the Red River Delta and most parts of northern Vietnam. The first crop is a rice crop known as the spring rice crop and is grown between late January - February and May. The second crop is another rice crop known as the main (season) rice crop and is grown between late May and early October. Lastly, a third crop of vegetables, winter maize or tuber crops is grown in the winter between October and early February. (See section D.1.4 in Appendix D.)

4.4.2.2 Infrastructure development

Transport infrastructure in Quoc Tuan and adjoining areas was reasonably developed. Access to sealed roads, which at the time of research were being upgraded, gave the inhabitants of Quoc Tuan access to markets in the province’s capital Hai Duong, or to other provincial capital such as Hanoi, Hai Phong and Quang Ninh. Smaller unsealed roads within and outside of Quoc Tuan gave access to many districts.

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66 In comparison to the average size of households in Southeast Asia, which is generally high, the figure for Vietnam appears somewhat low probably because of the definition of household which follows the administrative unit set by the commune.
adjoining Quoc Tuan. Buses, trucks, vans, motorbikes and bicycles represented the popular forms of transport to smaller district markets as well as to the provincial market in Hai Duong. The Thai Binh river which is also close by allowed the use of river transport.

Furthermore, electrification and irrigation infrastructure seemed reasonably developed in 1991/1992. All households appeared to have access to electricity for domestic or production use, and were also served by the commune irrigation and drainage facilities. For example, Quoc Tuan agricultural commune had four pumps - with a total capacity of 6,500m³/ha - capable of irrigating about 333 hectares or almost 80 per cent of all their agricultural land (see "Background on Farm Households in Quoc Tuan Agricultural Commune" in Appendix D).

This combination of medium fertility soils, favourable topography, and reasonable access to transport routes, public transport, electricity and irrigation infrastructure meant that some of the conditions for good agricultural productivity in Quoc Tuan were present. Therefore, Quoc Tuan farmers had better access to rural infrastructure and markets in the early 1990s than the average farmer (see table 3.13 in chapter 3).

4.4.2.3 The level of product market and labour market development

In general, a first outlet for agricultural output is the village market, then the larger market in the provincial town of Hai Duong, from where products are ferried to Hanoi or Hai Phong. As noted earlier, communications between Quoc Tuan and Hai Duong as well as with Hanoi and Hai Phong were reasonably good. Farmers’ access to most agricultural inputs were readily available from these markets (see Appendix D), and the price of most agricultural inputs and outputs in these provincial markets were on par with prices in Hanoi, thanks to proximity and reasonable road communications.

However, this situation cannot be generalised to all rural regions in Vietnam where very few of its inhabitants were able to access a combination of roads, public transport and an established market, as depicted by table 3.13 in chapter 3. The fact remains that inadequate infrastructure development (roads and communication), as discussed in section 3.5.1 of chapter 3, hinders the development of markets in rural communities that are remote in comparison to Quoc Tuan. Therefore, the government at all levels (national, provincial, district and local) has a role to play in the provision of public goods which lessens the remoteness of these agricultural communes in the more isolated areas.

67 Electricity for the pumping stations and production and household usage was supplied at a cost of 500 dong/kilowatts by the district electrical grid connected to the village by a 180 kilovolt power line.
In nearby Hanoi, an active informal labour market offers seasonally unemployed or underemployed farmers, drawn from the countryside of the RRD, employment as manual labourers for part of the year, despite the high numbers of urban unemployed (Hiebert 1993b:60). Although such markets were visibly seen in a number of locations around Hanoi, the government in the early 1990s did not officially condoned their existence. In Quoc Tuan in 1991/1992 there was no day labour market comparable to what exists in the city; households hire labour from within the village only, and there was, as of 1993, no permanent class of agricultural labourers. Daily wages for agricultural labourers stand at around 7,000 dong per day in August 1993. By comparison, a skilled worker such as a carpenter, would earn 10,000 dong.

As a result of the proximity of major markets, such as Hanoi and Haiphong to Quoc Tuan, village level markets seem to be reasonably integrated into national markets. Therefore, it is evident that the typical Quoc Tuan farm household had reasonable access to the market.

4.4.3 Access to agricultural support services

As indicated in chapter 3, a breakdown of the agricultural cooperative system since 1988 has meant that agricultural support services traditionally offered by the cooperative diminished. These included services such as ploughing, application of fertilisers and pesticides, irrigation and, most importantly, extension and technical services.

Despite the government's effort to provide rural credit to farm households under Resolution Number 10, chapter 3 indicated that the provision of formal credit up to 1992 was effectively weak. Although a state-sponsored credit fund to "eradicate hunger and eliminate poverty" was active in Quoc Tuan, only about 30 per cent of households were involved with it because the formalities required to access these funds were so complicated. The state allocated a certain fixed amount to the cooperative, for instance 100 million dong in 1993, which the cooperative leaders were responsible for lending out to the most needy families. The people's committee and cooperative identified potential borrowers to whom the funds were offered. The money, however, usually ended up in the hands of the more wealthy and well-connected villagers.

It was also pointed out in chapter 3 that because of the demand for credit in the rural sector, Vietnamese farmers found it necessary to rely on the informal credit sector to access funds for financing agricultural and rural enterprises and other ventures. A

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68 Labour markets were growing rapidly in Vietnam's urban centres in 1992/1993, despite restrictions. This underdeveloped factor market was the result of the government's policy on controlling rural-urban drift and keeping unemployment and underemployment out in the countryside. According to politburo member Vu Oanh (1994:3), urban unemployment amounted to about 10 per cent of the total work force in early 1994, while as much as 50 per cent of the rural work force were underemployed.
common source of credit for many purposes were mutual lending schemes, where farmers pool cash or rice and take turns using the accumulated capital, based on a bidding system (a participant offers the others an interest payment of so much for the right to use the money first), or in a fixed order. Such schemes exist for production and investment purposes, as well as social purposes such as weddings or funerals. They seem to be especially popular among women (probably because it was harder for them to borrow from other sources). However, the amounts collected were small, and the highly publicised, spectacular losses incurred by some of the large credit circles in 1989 and again in 1993 underline the fact that these were risky ventures based entirely on mutual trust (see for example, Hiebert 1993a). Farmers therefore prefer to lend to family members; a large proportion of these loans were interest free. Neighbours and other community members were also a source of credit, but usually charge high interest on the loans (Nguyen Duc Truyen 1990:35).69 However, for some households access to the informal credit market was much more problematic because of the usurious rates charged to borrowers.

A major impediment to the development of a freely functioning capital market has been the difficulty of securing collateral on loans, a problem which the new Land Law solves by allowing households to use their "land-use rights certificates" to borrow from state-accredited institutions, while residential property can serve as collateral for personal loans. This supposes a greater availability of credit from the VBA. However, there were opposing views to the emergence of land market that are linked to credit markets. In many cases, informal credit becomes a key mechanism for land concentration (Rutherford 1992). There is a possibility that this problem may eventuate within the region if formal access to credit by needy farmers is hindered. But in the early 1990s, it did not appear to be problematic in Quoc Tuan.

4.4.4 Access to social services

Social services indicators such as adult literacy and infant mortality rates were not available for Quoc Tuan at the time of research. However, in order to get an understanding of what these indicators might be for Quoc Tuan, I compared certain statistics for Hai Hung (the province in which Quoc Tuan is situated) with Hanoi (the urban province and capital of Vietnam. Table 4.1 indicates that the number of students per teacher in Hai Hung and Hanoi were comparable to each other.

69 Nguyen Duc Truyen (1990) reports survey results from several communes that show a high correlation between the share of loans from family (75%) and the high proportion of interest free loans (67%). The author notes that this occurs in, Dinh Bang (Ha Bac province), the commune with the highest integration in the market, and a weak cooperative. In contrast, in the catholic community of Hai Van (Ha Nam province), 23 per cent of loans are provided by neighbours, and only 19 per cent by family (59% are interest free).
Table 4.1 Education indicators in Hai Hung province

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Hai Hung</th>
<th>Hanoi</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education Indicators in 1990-91:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of primary school students to every teacher</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Number of lower secondary school students to every teacher</td>
<td>36</td>
<td>38</td>
</tr>
<tr>
<td>Repeat rate in primary school</td>
<td>6.9%</td>
<td>5.2%</td>
</tr>
<tr>
<td>Drop out rate in primary school</td>
<td>4.6%</td>
<td>3.6%</td>
</tr>
<tr>
<td>Number of people per medical doctor</td>
<td>5817</td>
<td>3558</td>
</tr>
</tbody>
</table>

**Source:** Ministry of Education (1992); Ministry of Health (1994)

However, a greater level of students repeated or dropped out of primary schools in Hai Hung than in Hanoi, which suggests that education resources were less adequate in the countryside. Similarly the number of people to doctors working in district and commune level hospitals was much higher in Hai Hung than in Hanoi. These observations are in line with the observation made in section 3.5.1.4 that such social indicators were better in the urban regions than rural regions. Therefore, it can be expected that the level of education and health in Quoc Tuan was inadequate compared to the urban regions.

4.5 Estimation, results and diagnostics

4.5.1 Suitability of the profit maximisation model to Quoc Tuan farm household production data

Before the system of equations based on the Cobb-Douglas functional form was estimated, the individual production function for each crop was first estimated using the Ordinary Least Squares (OLS) estimation procedure and then evaluated for their relevant diagnostics. The results for each crop were tested for autocorrelation, heteroscedasticity and the adequacy of functional form specification. The relevant test statistics are reported in Appendix G. An evaluation of each crop revealed that autocorrelation was not present and the Cobb-Douglas functional form specification was acceptable based on the Ramsey's (1969) RESET test. An evaluation of heteroscedasticity, however, revealed that it was present only in the estimation of the main rice and cash crop data. As heteroscedasticity affects the efficiency of the estimated parameters, the main rice and cash crop data was transformed using a two-stage Weighted Least Squares heteroscedasticity correction procedure (see for example, Stewart and Wallis 1986: 254-256). Re-estimating the main rice and cash crop

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70 In the two stage Weighted Least Squares heteroscedasticity procedure the error term was regressed on the explanatory variable "land". This was chosen after evaluating the relationship between output and land which on a scattergram indicates a non-constant variation in their relationship.
production functions using the transformed data of each crop, and then retesting for heteroscedasticity indicated that it was no longer present (see Appendix G). The transformed data are incorporated in all subsequent system estimations.

Since the profit maximisation procedure imposes the restriction that the estimated variable input coefficient ($\beta_j$) in equation (4.31) be the same in each factor share equation, the restriction can be tested by carrying out a likelihood ratio (LR) test between the restricted and unrestricted system of equations for each crop. In the unrestricted system of equations the restriction imposed on the $\beta_j$'s in equations (4.31) and (4.32) is relaxed. The systems of equations are again simultaneously estimated using Zellner's Seemingly Unrelated (SUR) method and the LR test was carried out using the estimated log of likelihood (see Maddala 1977:43-44). The test statistics reported in Appendix G indicate that the profit maximising restriction is valid for each crop with a high degree of confidence. Consequently, only the estimated parameters of the restricted system of equations are reported in table 4.2, page 136.

4.5.2 Production parameters

The simultaneous estimation of the Cobb-Douglas production functions and the factor share equations (4.31 & 4.32) for each crop yielded acceptable results. Table 4.2 shows that, for each crop, the coefficients for all significant inputs possess the correct expected sign, thereby satisfying the Cobb-Douglas condition that the MPP$_j$ of the $j$th input be positive, and were significant at the one per cent (1%) confidence level. The following discussion of the regression results refers to table 4.2.

<table>
<thead>
<tr>
<th>Crops:</th>
<th>Intercept Term</th>
<th>Land</th>
<th>Labour</th>
<th>Urea</th>
<th>Phosphate</th>
<th>OF</th>
<th>OFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring Rice</td>
<td>-0.08</td>
<td>0.54</td>
<td>0.26</td>
<td>0.08</td>
<td>0.04</td>
<td>0.02</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>(0.40)</td>
<td>(21.15)*</td>
<td>(54.83)*</td>
<td>(33.46)*</td>
<td>(9.59)*</td>
<td>(15.01)*</td>
<td>(34.23)*</td>
</tr>
<tr>
<td>Main Rice</td>
<td>-0.34</td>
<td>0.60</td>
<td>0.30</td>
<td>0.10</td>
<td>0.02</td>
<td>0.01</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>(-1.71)</td>
<td>(22.10)*</td>
<td>(54.57)*</td>
<td>(21.88)*</td>
<td>(8.76)*</td>
<td>(6.72)*</td>
<td>(2.68)*</td>
</tr>
<tr>
<td>Non-Rice food crops</td>
<td>-0.36</td>
<td>0.29</td>
<td>0.44</td>
<td>0.15</td>
<td>0.05*</td>
<td>0.05</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>(-1.15)</td>
<td>(4.15)*</td>
<td>(14.38)*</td>
<td>(9.23)*</td>
<td>(7.75)*</td>
<td>(7.00)*</td>
<td>(10.12)*</td>
</tr>
<tr>
<td>Cash crops</td>
<td>-2.71</td>
<td>0.36</td>
<td>0.22</td>
<td>0.08</td>
<td>0.03</td>
<td>0.03</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>(-4.49)*</td>
<td>(4.34)*</td>
<td>(8.71)*</td>
<td>(6.27)*</td>
<td>(5.52)*</td>
<td>(2.56)*</td>
<td>(8.75)*</td>
</tr>
</tbody>
</table>

Note: OF = Organic Fertilisers
OFI = Other Farm Inputs
The figures in brackets refer to t-statistics and are marked by an asterisk if significant at the one per cent level.
4.5.2.1 Land

Increasing land in all rice crop production equations increases output by a sizeable amount. The impact of adding land to both spring rice (0.54) and main rice (0.60) production is very large and similar in magnitude. These results are consistent with the a priori expectation, since most, if not all the available arable land area is devoted to rice production in both the spring and the main seasons. It is highly probable that if extra land were available in these seasons it would be cultivated with rice.

The expectation holds when both rice crops are compared to non-rice food crops and cash crops. Non-rice food crops and cash crops are both cultivated during the winter season. The total area of land cultivated under both crops in the 1990/91 winter season was 47 per cent of all available arable land. This indicates, that up to 53 per cent of the arable land was kept fallow and in readiness for the subsequent spring season rice crop. Moreover, the lower factor elasticity of land in the winter season reflects the relative availability of land in that season. Empirically, it is observed that bringing more land into non-rice food crop production (0.29) and cash crop production (0.36) results in a lower increase to their respective output relative to rice cultivation. The range of the factor elasticities for land, especially for food crops, are within an acceptable range.71

4.5.2.2 Labour

The average labour requirement per unit land (workday/sao) in Quoc Tuan for crop production ranges from 14.9 workday/sao for main rice, 15.6 for spring rice, 16.1 for non-rice food crops, and to 19.2 for cash crop indicating highly intensive labour production. (A sao is a common unit of land in Vietnam measuring 360 square metres.) The factor elasticity of labour in rice production is 0.26 for spring rice and 0.30 for main rice. Compared to non-rice food crop production (0.45) they are lower, but higher than cash crop production (0.22). Rice production requires less labour intensity than non-rice food and cash crop production. However, because more land is utilised in rice production, and hence more workdays are required, a lower marginal productivity of labour and consequently a lower factor elasticity is expected. This appears to be consistent with the high level of labour availability and labour use in agriculture in the RRD which would imply a very low marginal product for labour and consequently a lower factor elasticity. This is also evident in cash crop production which is the most intensively cultivated crop per unit land in Quoc Tuan, thereby resulting in the lowest factor elasticity to output with respect to land. The magnitude of the factor elasticities for labour in food crop production are acceptable, within the range 0.20-0.45.

71 In other empirical studies on rice and cash production, the estimated factor elasticities are slightly higher. In the case of South Asia, which has similar population demands and water availability, the factor elasticity for land, labour and fertiliser in rice production was between 0.46-0.52, 0.18-0.21, and 0.06-0.12 respectively (Kalirajan and Shand 1988a; Islam and Quilkey 1993) for small size farms.
4.5.2.3 Urea

In general, all varieties of food crops cultivated in the RRD are modern varieties that respond positively to chemical fertilisers and, as such under or over use will be associated with a non-optimal situation. The results portrayed in table 4.2 (page 136) shows that urea is the most important fertiliser contributing to the production process in all crops. The factor elasticity of urea in the production of both rice crops are very similar, and there is not a great deal of difference between them and cash crop. However, the factor elasticity of urea for non-rice food crop was slightly higher at (0.15) compared to the other crops which ranged from 0.08 to 0.10. One possible explanation for this latter observation is that the urea may have been under applied in non-rice food crop production compared to the other crops. This remark follow that one could expect that with urea application beyond an optimal level, that there would be diminishing marginal productivity in that input’s use. I will further investigate this in section 5.2 of chapter 5 (see table 5.1) when I compare actual use against optimal use of each variable input.

Furthermore, the lower impact of urea in the production of rice and cash crop may not only be reflecting the level of application of the input but also manner in which it is applied. That is to say, the technical efficiency associated with the variable input’s application, which is further explored in sections 5.2 and 5.4 of chapter 5. If urea is not applied at the critical moment in the beginning of the season and followed by a second or third application in periods shortly after the first application, then the organic response of the crop and its output will be affected. Although more detailed data on the application of fertiliser was not available, other information from the area in proximity to Quoc Tuan\textsuperscript{72} suggests that some farmers do not follow a best practice approach based on three applications of fertiliser at regular intervals. A best practice approach is not just dictated by recommended usage from some advisory / extension organisation, but is also based on the farmer's compensatory and dynamic behaviour in response to perceived circumstances, such as changes in technology and market, as they reveal themselves.

4.5.2.4 Phosphate

Phosphate is a long-acting fertiliser with lagged effects, and hence the response in one year does not reflect that year's application. Although data on past years application would have been useful in determining this, the general results which show a very small but significant factor elasticity across all crops indicate that phosphate application was small in previous years. In spring and main rice the elasticity is 0.04 and 0.02 respectively, and in non-rice food and cash crops it is 0.05 and 0.03 respectively. Similarly as argued in the previous section, the small factor elasticity could indicate that

\textsuperscript{72} Based on household data from Cong Hoa in 1991 (a cooperative nearby to Quoc Tuan) (VNIAS 1991).
there is an element of over use associated with the application of phosphate in each respective crop’s production. Furthermore, it is possible that the way phosphate is being applied in production could be influencing the factor elasticity of the input with respect to each crop. The actual usage of phosphate for the average farm household is compared to its optimal level in section 5.1 of chapter 5.

4.5.2.5 Organic Fertilisers

Despite the extremely small contribution of organic fertilisers in production of spring rice (0.02) and main rice (0.01), both elasticities are highly significant. By contrast, however, the factor elasticity of organic fertilisers has a slightly larger and significant marginal contribution to the production of non-rice food crops (0.05) and cash crop (0.03). The favourable response to organic fertiliser use in non-rice food and cash crops production may be possibly explained by the cooler weather of the winter season which means that organic fertilisers break down more slowly, thereby retaining nutrients in the soil far longer than the rice crop seasons, when climatic conditions are warmer.

4.5.2.6 Other Farm Inputs

Other farm inputs include primarily the cost of seed stocks, irrigation and miscellaneous expenditures. This variable is treated as a working capital expenditure for all crops. On average, the value of other farm inputs per sao for each crop is as follows: spring rice 172 dong/sao; main rice 176 dong/sao; non-rice food crops 347 dong/sao; and cash crops 2,384 dong/sao (see table D.13 in Appendix D). Clearly cash crop production represents the most capital intensive crop production activity. Table 4.2 indicates that the magnitude of the marginal contribution of an incremental increase in other farm inputs in the production of the rice crops and non-rice food crops is small compared to cash crops. As a result of the smaller working capital needed for rice and non-rice food crop production, the smaller factor elasticities for these crops indicate that financing their production is not a significant constraint on the process. In contrast, the large factor elasticity for other farm inputs in cash crop production reflects the sizeable capital outlay that is required in cultivating cash crops; and the scarcity of such funds raised through savings, revenue derived from the sale of the main rice harvest preceding the sowing of the cash crops, or borrowed from the informal or formal credit markets.

73 No information was available on the breakdown of the cost of these separate item; however, it should be pointed out that irrigation is subsidised in Vietnam. Therefore the cost of water resources does not reflect its marginal value product.
4.6 CONCLUSION

This chapter provided a theoretical exposition of the economic behaviour of the farm household following Nakajima’ s exposition, which was presented in section 4.2. Following the justification of my choice of the profit maximisation model for this study, the formal empirical model, based on the Cobb-Douglas production function form, was presented in section 4.3 as a system of two equations. In section 4.4, I discussed the quality and shortcomings of the production and price data utilised in the empirical model, as well as presenting background information on Quoc Tuan agricultural commune.

Using the empirical model developed in section 4.3, I estimated four systems of equations in section 4.5 in order to derive the relevant production parameters for spring rice, main rice, non-rice food crops, and cash crop production. Each system of equations based on the profit maximisation model using the Cobb-Douglas production form was evaluated for statistical adequacy. Firstly, data used in each production function, without the profit maximisation restrictions, were evaluated for autocorrelation, functional form adequacy, normality and heteroscedasticity and data was adjusted accordingly if the function fail the diagnostic tests (this information was presented in Appendix G), before data were incorporated into each respective system of equations. Secondly, the ensuing profit maximisation models were evaluated for their adequacy. The results showed very convincingly that the profit maximising restrictions imposed on each system of equations for each crop were statistically significant with 99% confidence. Most importantly, the resulting estimated production coefficients presented in table 4.2 exhibited high levels of statistical significance for the functional form and profit maximisation model using production and price data from Quoc Tuan.
CHAPTER 5

A MEASUREMENT OF FARM HOUSEHOLD PRODUCTION EFFICIENCIES IN QUOC TUAN AND AN ACCOUNT OF THE FACTORS INFLUENCING IT

5.1 INTRODUCTION

In this chapter I will evaluate the efficiency of the average farm household in Quoc Tuan in crop production. In section 5.2, I measure the allocative and economic efficiencies of the average farm household using the estimated production coefficients for each crop presented in table 4.2 of section 4.5 in chapter 4. In addition, I calculate the average optimal level of inputs and optimal level of output for each crop implied by the estimated production coefficients, and compare these calculations to the actual average level of input used and output for each crop. Another important comparison is to consider the ratio of actual to maximised profit for each crops. Following these calculations, a number of observations, which characterise the economic behaviour of the average farm household, can be made and these are presented in the conclusion of section 5.2.

In the remainder of the chapter, I attempt to determine why the average farm household behaved in the manner it did by postulating a number of factors which may have influenced its economic efficiency. I approach this question in two ways. Firstly, in section 5.3, I analyse the impact of various factors on the economic efficiency of the average Quoc Tuan farm household, with respect to each of the crops produced using multivariate regression analysis. Secondly, in section 5.4, I complement the analysis in section 5.3 with a qualitative assessment of all the possible factors influencing the farm household's allocative and economic efficiency. Finally, in section 5.5, I provide a summary of the findings of this chapter.
5.2 WERE FARM HOUSEHOLDS OPERATING EFFICIENTLY, AND TO WHAT DEGREE?

5.2.1 Evaluating efficiency

In order to evaluate the efficiency of the average farm household in Quoc Tuan, let us consider the economic efficiency and the allocative efficiency indices. The ratio of the marginal cost of production of each crop to its respective market price, or the economic efficiency index as specified by equation (4.30) - $K_i$ in section 4.3 of chapter 4, is calculated to determine the economic efficiency of the average farm household in Quoc Tuan. Recall that the derivation and form used for the calculation of the marginal cost of production of each crop is presented in Appendix E and was earlier discussed in section 4.3.2 of chapter 4. In the case where the farm household's marginal production cost is greater than the output price (i.e., $K_i > 1$) the household is economically inefficient in agricultural production because it is over-producing the crop and it needs to respond by decreasing production in order to achieve the profit maximising level of production. Households in this category may be incurring a loss as it is usually implied that some or all variable inputs are over-allocated (i.e., MVP < MFC). If $K_i = 1$, then the farm household is economically efficient as it is producing that level of output that optimises profits; in this case production should be left unchanged. Lastly, if $K_i < 1$, then the farm household is economically inefficient as it is under-producing the crop and it needs to respond by increasing production in order to achieve the profit maximising level of production. Households in this category may not be realising their full profit potential as it is usually implied that some or all variable inputs are under-allocated (i.e., MVP > MFC). In summary, the household producing efficiently will have a ratio equal to unity, and those households producing inefficiently will have a ratio either greater or less than unity.

In addition to the average farm household's economic efficiency index for each crop, the allocative efficiency index can be examined to provide us with information on how the average household allocates variable inputs. If $k_{ij} = 1$ in equation (4.29) (see section 4.3.2 of chapter 4), then this implies that the household is allocatively efficient with respect to the variable input in use. That is, the household allocates the variable resource up to the point where the marginal value product of the resource is exactly equal to its cost in the market. If $k_{ij} > 1$, this implies that the farm household over-estimates the marginal productivity of the $j$th variable input and, as a consequence, over-values the MVP of the variable input which leads the household to under-utilise the input relative to the profit maximising outcome. The converse holds when $k_{ij} < 1$, that is, the farm household under-estimates the marginal productivity of the $j$th variable input.

74 Note that this outcome is dependent on the assumed prices used.
input and, as a consequence, under-values the MVP of the variable input which leads the household to over-utilise the input relative to the profit maximising outcome.

Lastly, as a confirmation of the results derived from equations (4.29) and (4.30), I also derive the optimal short-run profit (see equation 4.26, section 4.3.2 of chapter 4), optimal output (equation 4.24) and optimal input use (equation 4.25) associated with each crop based on the derived production parameters presented in table 4.2 of section 4.3.5 of chapter 4 and the original input and output data of all farm households, as well as the price data presented in Appendix F. Having calculated these optimal levels for the average farm household, I then compare them with the actual profit, production and inputs used, in order to better understand the economic behaviour of the average farm household. I would expect the ensuing results to confirm the calculated economic and allocative efficiency indices.

5.2.2 The economic performance of the average farm household

Table 5.1, below, shows the economic efficiency of the average farm household in Quoc Tuan in association with each crop produced. Based on the results of the calculation of equation (4.30), the price data, and estimated production coefficients (see table 4.2), the average farm household was economically inefficient in producing all of the crops analysed. The analysis suggests that the average farm household is under-producing each crop and would need to respond by increasing production in all crops, but to varying degrees. As the first row of table 5.1 (page 144) illustrates, the economic efficiency ratio for the different crops produced by the average farm household fell between 0.198 at worst for non-rice food crops, followed by 0.283 for spring rice, 0.294 for cash crops and 0.383 at best with main rice.

In analysing the economic efficiency indices associated with each crop, recall the theoretical explanations given in section 4.3.2 of chapter 4 and above in section 5.2.1, households in this category are exhibiting two inefficiencies: i) they may not be realising optimal profits because they are economically inefficient in their production, which implies in the case of \((K_i < 1)\) for the average Quoc Tuan farm household that output should be increased in order to realise the optimal profit associated with production; and ii) that some, if not all, variable inputs are misallocated, which implies that inputs be appropriately allocated to the extent that their allocation is either reduced or increased until the mix of inputs yields the optimal output for given prices. As concerns the first inefficiency, the second row of table 5.1 shows that the ratio of actual profit to maximised profit for each crop is less than one, which implies that the average farm household would need to increase output. This latter remark is also confirmed by the ratio of the actual to optimal output shown in row 3 of table 5.1, which clearly shows that the average farm household is under-producing each crop, and as a result not realising the maximum profit possible.
Table 5.1 Efficiency Ratios

<table>
<thead>
<tr>
<th>Crop</th>
<th>Spring Rice</th>
<th>Main Rice</th>
<th>Other Food Crop</th>
<th>Cash Crop</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. of Households producing the crop</strong></td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1 Economic Efficiency (Ki = MVC/MFC)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marginal Cost of Production</td>
<td>136.9</td>
<td>252.1</td>
<td>172.9</td>
<td>793.1</td>
</tr>
<tr>
<td>Price of the Crop</td>
<td>483.2</td>
<td>657.6</td>
<td>871.0</td>
<td>2,700.0</td>
</tr>
<tr>
<td>Economic Efficiency Ratio (Equation 4.30)</td>
<td>0.283</td>
<td>0.383</td>
<td>0.198</td>
<td>0.294</td>
</tr>
<tr>
<td>2 Ratio of Actual to Maximised Profit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual Profit (1000 dong)</td>
<td>265.3</td>
<td>265.4</td>
<td>44.0</td>
<td>367.4</td>
</tr>
<tr>
<td>Maximised Profit (1000 dong)</td>
<td>287.1</td>
<td>299.6</td>
<td>2,320.0</td>
<td>1,110.9</td>
</tr>
<tr>
<td>Ratio ofActual to Maximised Profit (Equation 4.27)</td>
<td>0.924</td>
<td>0.886</td>
<td>0.019</td>
<td>0.331</td>
</tr>
<tr>
<td>3 Ratio ofActual to Optimal Output</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual Output</td>
<td>1,038.9</td>
<td>829.9</td>
<td>128.4</td>
<td>264.8</td>
</tr>
<tr>
<td>Profit Maximising Output (Equation 4.26)</td>
<td>1,110.6</td>
<td>838.5</td>
<td>15,652.8</td>
<td>1,430.3</td>
</tr>
<tr>
<td>Ratio of Actual Output to Profit Max Output</td>
<td>0.935</td>
<td>0.990</td>
<td>0.008</td>
<td>0.185</td>
</tr>
<tr>
<td>4 Allocative Efficiency (ki = MVP/MFC - Equation 4.29)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour</td>
<td>1.025</td>
<td>1.009</td>
<td>1.420</td>
<td>1.469</td>
</tr>
<tr>
<td>Urea</td>
<td>1.008</td>
<td>0.902</td>
<td>1.262</td>
<td>1.501</td>
</tr>
<tr>
<td>Phosphate</td>
<td>0.653</td>
<td>0.543</td>
<td>1.111</td>
<td>1.415</td>
</tr>
<tr>
<td>Organic Fertiliser (OF)</td>
<td>0.864</td>
<td>0.510</td>
<td>1.271</td>
<td>1.221</td>
</tr>
<tr>
<td>Other Farm Inputs (OFI)</td>
<td>1.052</td>
<td>0.448</td>
<td>1.320</td>
<td>1.467</td>
</tr>
<tr>
<td>5 Ratio of Actual to Optimal Allocation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour Actual Allocation (mandays)</td>
<td>129.6</td>
<td>122.6</td>
<td>18.1</td>
<td>53.7</td>
</tr>
<tr>
<td>Labour Profit Maximising Allocation (mandays)</td>
<td>142.0</td>
<td>125.0</td>
<td>3,146.0</td>
<td>426.5</td>
</tr>
<tr>
<td>Ratio of Actual to Optimal Allocation - Labour</td>
<td>0.913</td>
<td>0.981</td>
<td>0.006</td>
<td>0.126</td>
</tr>
<tr>
<td>Urea Actual Allocation (kgs)</td>
<td>58.3</td>
<td>43.4</td>
<td>8.2</td>
<td>25.2</td>
</tr>
<tr>
<td>Urea Profit Maximising Allocation (kgs)</td>
<td>62.8</td>
<td>39.6</td>
<td>1,264.2</td>
<td>204.3</td>
</tr>
<tr>
<td>Ratio of Actual to Optimal Allocation - Urea</td>
<td>0.928</td>
<td>1.097</td>
<td>0.007</td>
<td>0.123</td>
</tr>
<tr>
<td>Phosphate Actual Allocation (kgs)</td>
<td>85.5</td>
<td>45.0</td>
<td>11.0</td>
<td>38.1</td>
</tr>
<tr>
<td>Phosphate Profit Maximising Allocation (kgs)</td>
<td>63.1</td>
<td>34.1</td>
<td>1,764.6</td>
<td>299.8</td>
</tr>
<tr>
<td>Ratio of Actual to Optimal Allocation - Phosphate</td>
<td>1.356</td>
<td>1.321</td>
<td>0.006</td>
<td>0.127</td>
</tr>
<tr>
<td>OF Actual Allocation (kgs)</td>
<td>1,765.5</td>
<td>874.8</td>
<td>600.5</td>
<td>2,027.2</td>
</tr>
<tr>
<td>OF Profit Maximising Allocation (kgs)</td>
<td>1,745.2</td>
<td>637.2</td>
<td>94,108.5</td>
<td>13,367.6</td>
</tr>
<tr>
<td>Ratio of Actual to Optimal Allocation - OF</td>
<td>1.012</td>
<td>1.373</td>
<td>0.006</td>
<td>0.152</td>
</tr>
<tr>
<td>OFI Actual Allocation (dong)</td>
<td>38,654.3</td>
<td>39,333.2</td>
<td>11,010.4</td>
<td>173,526.8</td>
</tr>
<tr>
<td>OFI Profit Maximising Allocation (dong)</td>
<td>43,453.8</td>
<td>17,814.1</td>
<td>1,776,993.3</td>
<td>1,375,022.9</td>
</tr>
<tr>
<td>Ratio of Actual to Optimal Allocation - OFI</td>
<td>0.890</td>
<td>2.208</td>
<td>0.006</td>
<td>0.126</td>
</tr>
<tr>
<td>6 Variable inputs as a proportion of total variable cost in production</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour</td>
<td>0.532</td>
<td>0.577</td>
<td>0.539</td>
<td>0.308</td>
</tr>
<tr>
<td>Urea</td>
<td>0.156</td>
<td>0.210</td>
<td>0.176</td>
<td>0.115</td>
</tr>
<tr>
<td>Phosphate</td>
<td>0.105</td>
<td>0.049</td>
<td>0.062</td>
<td>0.040</td>
</tr>
<tr>
<td>Organic Fertiliser (OF)</td>
<td>0.041</td>
<td>0.021</td>
<td>0.065</td>
<td>0.045</td>
</tr>
<tr>
<td>Other Inputs</td>
<td>0.167</td>
<td>0.143</td>
<td>0.158</td>
<td>0.493</td>
</tr>
</tbody>
</table>

An interesting observation at this juncture, is that the extent of economic inefficiency associated with each crop and its resultant profit and output ratios, bear no resemblance to their respective magnitude. For example, in rice production it is obvious that main rice ($K_{\text{main rice}} = 0.383$) relative to spring rice ($K_{\text{spring rice}} = 0.283$) is produced by the average household more efficiently; however, the average farm household’s ratio
of actual to maximised profit (row 2, table 5.1) is closer to unity for spring rice (0.924) than main rice (0.886) suggesting that the average farm household produced spring rice more profitably (closer to the maximum profit) than main rice. However, looking at the actual output to profit maximising level of output (row 3 table 5.1) for main rice (0.990) clearly indicates that the average farm household produced that crop closer to its optimal level of output compared to spring rice (0.935), and this is confirmed by the relatively better economic efficiency ratio observed for the average farm household in the production of main rice. This seemingly inconsistent observation, might be better explained by the level and manner in which inputs were used, which I explore below, as it is conceivable that if farm households were able to calculate reasonably accurately an optimal level of output for rice based on a “predetermined” output price, then it would suggest that the control of variable input prices and variable input application is essential to producing close to the optimal level of output as well as actually producing profitably at the profit maximising level. Clearly, though, the results in rows 2 and 3 of table 5.1 suggests that the average farm household was producing as a profit maximiser, with respect to spring and main rice, but was not economically efficient in that production. This discrepancy is explained below in section 5.4.1 (page 154).

On the other hand, the evidence for non-rice food crops and cash crops, as shown in table 5.1, does not indicate a discrepancy between the results of economic efficiency for these crops and their respective ratio of actual to optimal levels for profit and output in the production. These observations indicate that the average farm household did not produce non-rice food and cash crops anywhere near their implied optimal levels, and to the degree that the (same) average farm household produced spring and main rice (see rows 2 and 3 of table 5.1). However, concerning the average farm household’s calculated economic efficiency for cash crop, it is clear that the efficiency with which it produces this crop is no worse than spring rice, but worse than main rice, whereas, non-rice food crops are the least efficient of all crops produced by the average farm household. In fact, the calculated average ratio of actual to optimal output for non-rice food crops seems to suggest that the average farm household is virtually not producing the crop relative to the optimal outcome. Indeed, in the actual observed data, 29 farm households were registered as not participating in non-rice food crop production, which no doubt would have influenced the economic efficiency results for the average farm household. Again these latter observations might be better explained by investigating the way in which variable inputs were allocated, which follows in section.

Recall that the second inefficiency exhibited by the average farm household, as mentioned earlier in this section, is that it may be misallocating some, if not all, variable inputs. The results shown in row 4 in table 5.1, which depicts the allocative efficiency index of each crop with respect to the five variable inputs used in its respective production, and in rows 5 to 9, which shows the ratio of the actual to optimal level of
input allocated, indicate that the farm household on average tended to under-allocate variable inputs relative to the optimal level of input use necessary to achieve profit maximisation, based on the derived results and available data.

Evaluating the allocation of some of the most important inputs, such as labour and urea, by looking at the level of their allocative efficiency indices (row 4) and the ratio of actual to optimal level of input use (rows 5 to 9), indicates that these inputs were reasonably well allocated in spring and main rice crops production compared to their allocation in non-rice food and cash crops production. In both spring and main rice production, despite labour being marginally under-allocated, the average farm household allocated labour close to its optimal level (where MVP = MFC). In this respect, the average household was reasonably efficient in allocating labour, and the reasons for this could be well explained in the fact that farm households have much experience in rice farming and should be reasonably efficient in allocating their labour efforts to that activity. Urea was marginally under-allocated in spring rice and marginally over-allocated in main rice, but like labour, the average farm household allocated this input close to its optimal level. Again the long experience that farm households have in cultivating rice would suggest that the average households can allocate urea relatively efficiently. Elsewhere in rice production, phosphate and organic fertiliser were over-allocated, with the degree of over-allocation tending to be greater in main rice than spring rice. In other farm inputs (OFI), the calculated allocative efficiency index suggests that the average farm household tended to exaggerate the allocation of this variable input in main rice relative to the optimal level and to the level employed in spring rice. An important point to note, as indicated in row 10 of table 5.1, is that the aggregated cost of both labour and urea as a proportion of total variable costs for the average farm household represent the most important cost in rice production. This was nearly 69 per cent in spring rice (53 per cent for labour alone) and nearly 79 per cent in main rice (58 per cent for labour). Thus, it is important to note that the most important inputs in rice production were relatively well allocated compared to the other inputs which were not as efficiently allocated.

In the production of non-rice food crops and cash crops, the magnitude of the allocative efficiency index (see row 4 of table 5.1) indicates that the average farm household under-allocated all variable inputs, and the extent to which it did so is clearly evident in the ratio of actual to optimal input use (see, rows 5 to 9 of table 5.1). Concerning non-rice food crops, the evidence seems to suggest that the average farm household misallocated resources so badly that their allocation did not even constitute one per cent of the calculated optimal allocation. In cash crop production, the average household also under-allocated all variable inputs but not to the extent that it did in non-rice food crops. Comparing the average farm household’s allocation of variable inputs in non-rice food crops and cash crops with that of spring and main rice highlights the
extent to which these crops were inefficiently produced. Consequently, it would appear
that either farmers are grossly mismanaging resources and production, or that there are
other factors that are unaccounted for in the data, but that shape the production
coefficients of these crops and ultimately influence the production parameters and the
calculation of the optimal levels. On the other hand, it may be that the production and
price data used in this study were incorrect or inconsistent with farmers’ expected
prices. Still another possibility is that all these factors are present and influencing the
efficiency of farmers.

I will again return to these factors influencing the average farm household’s
economic efficiency with respect to their agricultural production process in sections 5.3
and 5.4, below. However, before starting that analysis, it would be instructive to
conclude this section with a number of general observations based on the foregoing
examination of the average farm household’s efficiency measures with respect to the
crops considered:

- the average farm household was not economically efficient in the production of all
crops;
- the average farm household was closer to achieving profit maximisation in the
  production of rice crops than in non-rice food crop and cash crops;
- the average farm household under-produced all crops, but was closer to achieving
  the optimal level of output in rice crops than in non-rice food crop and cash crops;
- in relative terms, the average farm household was more efficient in the production of
  rice crops than in the production of non-rice food and cash crops;
- the average farm household allocated labour and urea relatively efficiently in rice
  production compared to other crops;
- the average household over-allocated phosphate and organic fertiliser in the
  production of both rice crops; and
- the average household was inefficient in the allocation of all variable inputs when it
  came to producing both cash and non-rice food crops, with a clear tendency to
  under-allocate inputs and, thus, grossly under-produce the crop.

These observations raise two very important questions:

1. What can explain the seemingly inconsistent result for the average farm household
that it produced both rice crops with a low level of economic efficiency and, at the
same time, showed that it was: operating close to the maximum profit level;
producing both crops close to their optimal levels; and allocating some of the most
important variable inputs close to their optimal levels?
2. Although the average farm household’s economic efficiency indices for rice production were low, why was rice more efficiently produced relative to the other crops produced? And, correspondingly, why were variable inputs relatively better allocated in rice production than in other crops?

I believe that the results mentioned above were very likely influenced by the state of the crop and factor market facing farmers in Quoc Tuan; technical factors influencing technical efficiency; deviations between observed prices and “unobserved” expected prices; and the risk attitude of farm households. I will first attempt to demonstrate this quantitatively in section 5.3 using multivariate regression analysis. However, the weakness of the data that I am working with makes this a somewhat academic exercise. Secondly, the extraneous factors that likely affected production efficiency but were not quantified in the data will be discussed qualitatively, in the context of my observations of the state of development in the area of Quoc Tuan during 1990-1991 in section 5.4.

5.3 Multivariate Regression Analysis of the Factors Influencing the Economic Efficiency of the Farm Household

5.3.1 The broad factors considered

Ideally, the data collected by the VNIAS in Quoc Tuan would have included information such as: use of market information for production decisions; use of credit to finance production; formulation of expected prices used in production decisions; the farmer’s use of extension services; number of visits received by agricultural extension service workers; demonstrations in new crop techniques and application of fertilisers; and farm households’ attitude to risk. Unfortunately this was far from being the case. As mentioned in section 1.5.3 of chapter 1 and section 4.4.1 of chapter 4, the study was conducted for the purpose of evaluating production activities of farm household and not for evaluation the economics of production. Notwithstanding its limitations the data allows me to at least postulate four factors, which may have influenced the economic efficiency of the average farm household. These factors are: the level of technical efficiency of the farm household; the degree of crop production diversification; the level of consumer demand in the household; and the level of food availability, and are described as follows.

5.3.1.1 The level of technical efficiency

Following the empirical study of Kalirajan and Shand (1988b, 1994) where the authors showed that there is a uni-directional relationship moving from technical to allocative efficiency (see section 2.4.3.4 in chapter 2), I postulate that households with a high level of technical efficiency, as proxied by a geometric mean of the yields of all crops produced (see section 5.3.2 – page 151), should be associated with higher levels of
economic efficiency, thereby reflecting a strong relationship between the yield proxy to technical efficiency and economic efficiency.

5.3.1.2 Diversification of household production

Norman (1977) argued that adopting a risk avoidance production strategy, such as crop diversification, does not necessarily produce indications in conflict with those obtained only using the profit maximisation principle (see section 2.4.3.2). Following Norman's argument, I postulate that greater diversification of the farm household's production base is associated with higher levels of economic efficiency. Therefore, expanding the farm household's production base improves economic efficiency. The reasoning behind this hypothesis is that if markets are expanding (developing) then the more extensive development of markets provide farm households with more information that allow them to be more efficient in their production decisions, to which they respond by expanding their production base, thus diversifying into profitable areas. In contrast, if market development is weak, and the signals and information farm households receive are weak, then there is unlikely to be a relationship between an expanding production base and improved economic efficiency. Using this rationale, I hope not only to show that there is a relationship between the amount of time (measured in days) that workers in a farm household spend outside of agricultural as proportion of total workdays in a year to economic efficiency, but also to imply that this relationship can be extended to suggest that market development in the Quoc Tuan area has allowed farm households to expand their production base and improve economic efficiency.

5.3.1.3 The level of consumer demand in the household

It is postulated that as consumer demand increases within the household, the level of efficiency with which resources, especially labour, are allocated will increase if they are not being used efficiently. Consumer demand is proxied by the ratio of consumers to workers (CW). The concept derives from Chayanov (1966:78-79) who asserted that as the number of consumers relative to the number of workers in a household increases, the level of labour effort necessary to meet the increased demand for food consumption would also rises. Using the neo-classical concept of the marginal utility curves, Chayanov (ibid.:81-84) asserted that a worker will, however, cease working when the marginal disutility of labour equals the marginal utility of output produced (ibid.:6). Since labour effort is determined by the pressure of household needs, workers are required to work harder and more efficiently when providing for more consumers. In general, the household data from Quoc Tuan supports Chayanov's assertion that farm households spend more labour effort as the CW ratio or consumer demand increases (see Appendix H).
Based on this reasoning, it can be expected that the farm household will seek to find ways to improve their economic efficiency when CW increases, in order to raise output or income to meet the increased consumption needs. One possibility is that farm households seek new knowledge and information that allow them to use their available resources and technology more efficiently, and to produce on their production possibility frontier. As such, an increase in CW implies that the degree of allocative and economic efficiency improves and, consequently, agricultural productivity increases. Therefore, I would expect that there may be a relationship between CW and economic efficiency.

5.3.1.4 Food security

The trend in the allocation of variable inputs reported in section 5.2.2 indicated that the average farm household under-allocated farm inputs, especially in the production of cash and non-rice food crops. There is a possibility that this behaviour is associated with an aversion to risk in the farming of such crops for the average farm household in Quoc Tuan, quite apart from other factors which may have influenced economic efficiency, such as imperfect markets (state of market development), institutional constraints (availability of agricultural extension services and credit systems), etc. In order to verify this, recall the argument of Lipton (1968) and Bell (1972) that low-income households are concerned with the need to meet the security of the household before satisfying other motives; and the argument of Hamal and Anderson (1982) that higher rural incomes are associated with lower levels of risk-averse behaviour (see sections 2.4.3.2 and 2.4.3.3 in chapter 2). These arguments suggest that high-income farm households will be less risk-averse therefore they are likely to produce crops with greater efficiency (from the profit maximisation viewpoint) than low-income households.

In order to capture this reasoning in an empirical sense I use a food balance ratio, rather than the level of income. Although an income variable would be a better proxy than the food balance ratio, estimates of equations 5.1 using the average monthly income per household member yielded insignificant results in all cases, thereby suggesting that there is no direct relationship between income and the economic efficiency of the particular crop. This outcome is difficult to explain although it could be due to low variability of the income variable. However, it does not rule out the possibility of an indirect relationship. Nevertheless, since the share of crop income to the total income of the average farm household in Quoc Tuan in 1990/1991 represented a high proportion, on average 75 per cent of total income (see table D.16 in Appendix D), and the average household consumed part of what it produced, the food balance ratio should indirectly capture the impact of risk-averse behaviour on economic efficiency.
The food balance ratio is measured as the level of production over the level of food required for consumption during the year for the $i$th household. I have used an amount of 250 kilograms per adult equivalent as the amount consumed in a given year. This amount is the paddy equivalent (FAO 1995). A food balance ratio of less than one indicates that the farm household produced less than it consumed, which affects the household's income since less income is derived from crop production and income from other sources will have to be used to fund consumption expenditure. The converse is that households with a food balance ratio greater than one are likely to have higher income; thus, as the food balance ratio increases, which implies that incomes are also increasing, the level of economic efficiency associated with producing the crop increases. Therefore, I hypothesise that a high food balance ratio (greater availability of food) is associated with greater economic efficiency in production.

5.3.2 Methodology

The functional form of the factors affecting the economic efficiency of the average farm household with respect to the production of each crop can be specified as the following ad hoc formulae:

$$K_i = \delta_0 + \delta_1.TE_i + \delta_2.DHP_i + \delta_3.CD_i + \delta_4.FA_i + \mu_i$$  \hspace{1cm} (5.1)

where:

- $K_i$ is equation (4.30) in chapter 4 - the economic efficiency of the $i$th household for each crop: spring rice; main rice; non-rice food crops; and cash crops.
- TE is the level of technical efficiency of the $i$th household, which is proxied by the average yield of the four crops produced by the farm household, with yield defined as the kilograms of output per hectare. Average yield was estimated by geometric mean method: $\left(\frac{y_{sr} \cdot y_{mr} \cdot y_{cc} \cdot y_{of}}{4}\right)^{0.25}$, where $y_{sr}$ is the yield of spring rice; $y_{mr}$ is the yield of main rice; $y_{cc}$ is the yield of cash crops; and $y_{of}$ is the yield of non-rice food crops (see section 5.3.1.1, page 148).\(^{75}\)
- DHP is the diversification of household production, which is proxied by the proportion of workdays the household spent outside of crop production. This was measured by the ratio of the non-crop production workdays of the

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\(^{75}\) The measure to use depends on the purpose of the study. If, for a farmer, and for a number of crops, it is desired to establish a typical productivity index, which will be independent of the amount of area operated or of the total production of the farm, then the geometric mean may be useful (Blalock 1960).
CD is the level of consumer demand of the \(i\)th household, which is proxied by the ratio of consumers to workers in the household (see section 5.3.1.3, page 149).

FA is the food availability of the \(i\)th household, which is measured as the total volume of food crop produced relative to the level of food crop required for consumption by the household measured in paddy rice equivalent (see section 5.3.1.4, page 150). The estimated volume of paddy rice required for consumption each year per adult equivalent is 250 kilograms (FAO 1995).

\(\mu_i\) is the error term, which is normally and independently distributed.

It follows from the discussion in section 5.3.1 that the coefficients of equation (5.1) have the following expected signs: \(\delta_0 \geq 0\); \(\delta_1 < 0\); \(\delta_2 < 0\); \(\delta_3 < 0\); and \(\delta_4 < 0\). That is, the expected coefficients can be interpreted as follows: a negative sign indicates that an increase in any one of the independent variables decreases economic inefficiency. In other words, economic efficiency improves with increasing levels of technical efficiency, greater diversification of household production, an increase in consumer demand and an increase in the availability of food in the household. In contrast, a positive sign indicates the converse.

### 5.3.3 Application and statistical diagnostics

The preceding empirical specification yielded four functions for the measure of economic efficiency indices of spring rice, main rice, cash crops, and non-rice food crops. All equations were estimated by ordinary least squares method using the SHAZAM Version 7.0 econometric package (White 1993). Diagnostic tests were carried out for the classical assumptions of regression in all equations (see Stewart and Wallis 1981:111-112). These were heteroscedasticity (chi-square test), appropriateness of functional form (Ramsey Reset test), and normality of distribution of the error terms (Jarque-Bera test). Table 5.2 reports these diagnostic tests for each equation.

In general, the statistical diagnostics for all equations was not supportive of the factors hypothesised in section 5.3.1. As table 5.2, below exhibits, all equations reported extremely low \(R^2\). Heteroscedasticity was present in the economic efficiency equation for spring rice but not for other crops. This problem was relatively easy to correct for by reestimating the equations using White corrected variance-covariance matrix. However, because the exact form of heteroscedasticity was unknown, the economic efficiency equation for spring rice was reestimated using White's (1980) heteroscedasticity-consistent estimation procedure, which corrects coefficients for an unknown form of...
heteroscedasticity. This procedure provides correct standard errors with which to evaluate the significance of the estimates.

Table 5.2: Diagnostics test of the economic efficiency equations

<table>
<thead>
<tr>
<th>Diagnostic Tests</th>
<th>Economic Efficiency of</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spring rice</td>
<td>Main rice</td>
<td>Non-rice</td>
<td>Cash crops</td>
</tr>
<tr>
<td>R2 - Adjusted</td>
<td>0.25</td>
<td>0.27</td>
<td>0.02</td>
<td>0.22</td>
</tr>
<tr>
<td>HETEROSCEDASTICITY</td>
<td>0.33</td>
<td>6.16*</td>
<td>22.67*</td>
<td>10.63*</td>
</tr>
<tr>
<td>RAMSEY RESET TEST F(3,92) = F Value</td>
<td>0.05*</td>
<td>0.49</td>
<td>10.63</td>
<td>1.26</td>
</tr>
<tr>
<td>JARQUE-BERA</td>
<td>3.83</td>
<td>3.49</td>
<td>21.53</td>
<td>115.49</td>
</tr>
</tbody>
</table>

Notes:
Values with asterisks indicate that the test passed the relevant statistical test at the 5% significance level.

More problematic, however, the Ramsey specification test for each economic efficiency equation indicated that the functional form was not acceptable. Moreover, the Jarque-Bera test for normality of the distribution of the residuals of each equation indicated that residuals did not behave normally, as the test for each equation was not significant at the five per cent confidence interval. A final observation is that each equation showed a very low $R^2$ indicating that the dependent variable (economic efficiency) had a very poor correlation with the postulated factors affecting the farm household’s economic efficiency. This indicates that the available data, from which the explanatory factors were derived, explained only a very small proportion of the variation in the economic inefficiency of farm households.

Taking the analysis a step further and looking at the derived coefficients of the postulated factors in each regression in table 5.3 shows that all coefficients had the expected signs. In general, the coefficients for economic efficiency in rice production were significant between 5 and 10 per cent. However, in non-rice food and cash crop production the measured coefficients were not significant even at the 10 per cent level. Most importantly insignifying the poor statistical results of the coefficients, however, is that the constant term in all estimated equations was significant at the one per cent level, thereby indicating, as confirmed by the very low $R^2$ (see table 5.2), that the postulated factors were not really important in explaining the variations witnessed in the economic efficiency of the farm household.
Table 5.3: Estimated coefficients of the economic efficiency equations

<table>
<thead>
<tr>
<th>Economic Efficiency Ratio</th>
<th>Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Technical Efficiency</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring rice</td>
<td>-0.027 (-3.443)*</td>
</tr>
<tr>
<td>Main rice</td>
<td>-0.034 (-3.460)*</td>
</tr>
<tr>
<td>Non-rice food crops</td>
<td>-0.026 (-0.791)</td>
</tr>
<tr>
<td>Cash crops</td>
<td>-0.253 (-4.789)*</td>
</tr>
</tbody>
</table>

Note: (t-statistics) * = significant at 1%, ** = significant at 5%; and *** = significant at 10%.

This statistical analysis unfortunately produces no reliable results and, therefore, brings us no closer to an explanation of the relative inefficiencies observed. The poor quality of, and limitations in, data that I had to work with makes it difficult for us to gain much meaningful insights in factors influencing the economic behaviour of the average farm household using this quantitative approach. Nevertheless, these limitations do not prevent a qualitative assessment of the factors influencing the average farm households economic efficiency, which follows in the next section.

5.4 A QUALITATIVE ASSESSMENT OF THE FACTORS INFLUENCING THE AVERAGE FARM HOUSEHOLD'S ECONOMIC EFFICIENCY

Given the limitations of the foregoing analysis, this section provides a qualitative assessment of various factors affecting the ability of the farm household to operate efficiently. It does this by linking these factors with the observed patterns in the economic and allocative efficiencies of the average farm household in Quoc Tuan.

5.4.1 Question One

In the conclusion of section 5.2.2 (see page 143) two questions were asked. The first of these questions was: What can explain the seemingly inconsistent result for the average farm household that it produced both rice crops with a low level of economic efficiency and, at the same time, showed that it was: operating close to the maximum
profit level; producing both crops close to their optimal levels; and allocating some of the most important variable inputs close to their optimal levels?

This seemingly inconsistent result has a very simple explanation for both rice crops. The fact that we observed that the economic efficiency of both spring rice and main rice were low, but that the average farm household was producing both crops close to their optimal levels, suggests that this may be the “pseudo optimal level” discussed in section 2.4.3.4 of chapter 2. I argued then that this is the point where the farmer’s actual “observed” production function intersects the price plane, and that the actual production function need not be the outer bound production frontier, which implies farmers are using the best techniques, methods and inputs available to them. Thus, if we are observing the actual production function, which is somewhere underneath the outer bound production frontier, it implies that the average farm household is “technically inefficient” but not necessarily allocatively efficient, as is certainly the case for labour and urea, which constitute the greatest share in the average farm households' expense in producing both rice crops.

In section 2.4.3.4 it was also argued that economic efficiency is a product of both technical and allocative efficiencies, and that the former influences the latter as farmers move to the outer bound production function. Unfortunately, owing to the poor quality of the data I was not able to measure the economic efficiency and its breakdown of technical and allocative efficiencies, using Kalirajan and Shand’s (1988b) methodology (see section 4.3.2 of chapter 4). Nevertheless, this argument suggests that if we could observe technical efficiency in aggregate for these inputs it would be very low in order to yield the economic efficiency indices that we observed for spring and main rice in table 5.1 (page 144)

Note, that non-rice food crops and cash crops did not show an inconsistency in the results of the various indices and ratios. Their results, as reported in table 5.1, clearly indicate that the average farm household was economically inefficient in their production, as well as allocatively inefficient in input use. Thus, the same argument holds for these crops as for rice namely that the average farm household must have been very technically inefficient in the allocation of all inputs.

5.4.2 Question Two

The second question asked in the conclusion of section 5.2.2 (see page 143) was: Although the average farm household’s economic efficiency indices for rice production were low, why were they better than the other crops produced? And, correspondingly, why were variable inputs relatively better allocated in rice production than in other crops? A number of causes that could explain the pattern of allocation and production we observed for various crop production. These include the state of market
development, credit support, agricultural extension services, differences in actual and expected prices and farmers attitude to risk.

5.4.2.1 The state of market development

Quoc Tuan enjoys relatively good access to local and regional markets as it is well situated to major transport routes, has public transport and is close to Hanoi. As a result, farmers have good access to permanent markets and, in general, to current market information on the price of crops and inputs (see section 4.4.2.2 of chapter 4 and section D.1.5.4 of Appendix D). This is especially true for rice, which is a product that has both a domestic and international market. Non-rice food crop, as earlier mentioned, is mainly used directly in animal feed and had therefore weaker markets. Meanwhile, cash crop (garlic) was a relatively new crop produced predominantly for an international market (see section D.1.4.2 Appendix D). Furthermore, cash crop was purchased by state export agencies from farmers at predetermined fixed price, whereas rice crops would command the prevailing market price at a variety of outlets from local to regional to national markets (see Figure 3.10 chapter 3).

Consequently, it is quite likely that relevant information about supply and demand conditions was not readily available from markets and thus may have prevented farmers from obtaining full information and making efficient production decisions. The fact that cash crops were generally produced for purchase by state agencies at fixed prices implies that farmers hardly had proper market conditions to steer their allocation of scarce variable inputs. The contrast is large with the availability of market information for rice, which was generally well served by public notice boards, extension services and relatively better developed markets. All these locales provided farmers with information about rice, and about their supply and demand conditions, with which to make production decisions.

In general, inputs in rice cultivation was less mis-allocated compared to non-rice crops by the average farm household in Quoc Tuan; specifically farmers tended to marginally mis-allocating urea and over-allocating phosphate in rice production. This observation may be explained by the relative availability of the two inputs between 1990 and 1991. I mentioned in section 3.5.1.3 that urea supplies in Vietnam were affected as a result of Soviet aid cuts. The supply cuts, as well as the high inflation of 1990 and 1991 both contributed to price increases for urea. In Hai Duong (capital of Hai Hung) market prices were pushed upwards of 200 per cent from 650 dong/kg to 2000 dong/kg (Le Quoc Doanh 1992). In comparison, the price of phosphate, which did not suffer from supply cuts, went up by 100%, half the increase for urea. Therefore, as a result of the relative prices between the two inputs, farm households may have simply substituted more phosphate for urea, which could explain why the average farm household exceeded the optimal application of phosphate in rice production (see table 5.1, page
This behaviour would also suggest that farmers lack the necessary technical information about modern inputs, because substituting phosphate for urea has very little marginal effect. Farmers could have achieved the same results with a smaller application of phosphate, as well as save their scarce capital funds. The under-allocation of these inputs to the non-rice crops on the other hand probably had less to do with input prices, and more with factors such as credit availability, technical knowledge, and price differentials among other things.

5.4.2.2 The availability of formal credit

The structure of production costs between crops in Quoc Tuan gives a clear idea of why the lack of credit could have led to under-allocation of variable inputs in non-rice food and cash crops, and consequently non-optimal and economically inefficient production. Production costs per sao (360 m² of land) were smallest in producing spring rice (US$4.00/sao), followed by main rice (US$4.80/sao), non-rice food crops (US$8.55/sao) and cash crops (US$18.05/sao) (see also table D.15 in Appendix D). Production costs for non-rice food crops were thus double that of rice, and cash crops required double again this expenditure. It is easy to infer from this that faced with a lack of funds to invest, the average farm household in Quoc Tuan would have under-allocated inputs to the more capital intensive non-rice food and cash crops as observed in the data reported in table 5.1. Furthermore, it is interesting to note that farmers did not utilise all their available arable land during this cropping season (winter season), which may have been due to a lack of finance. Only 47 per cent of the total arable land was used for cultivating non-rice food crops (13.5%) and cash crops (33.5%) (see table D.12 in Appendix D). A second point of interest, is that nearly 50 per cent of the production cost in cash crop production was accounted for by “other inputs” (or capital) as indicated in row 10 of table 5.1. Thus cash crop was very capital intensive relative to rice and non-rice food crops, for which other inputs (capital) accounted for about 15 per cent.

As earlier argued the VBA was very slow to distribute loans to farmers during 1990 and 1991, the time frame of this study (see section 3.5.1.3). According to one Vietnamese observer of farm households in the same province where Quoc Tuan is situated, the lack of capital and a shortage of funds to invest in agricultural production was often cited as the main factor affecting the livelihoods of farmers (Nguyen Van Tiem, 1993:19-26). Indeed as reported in section D.1.5.3 of Appendix D, farm households in Quoc Tuan found it difficult to access formal credit. Thus, it is not too difficult to imagine that getting credit to finance the production of non-rice food crops and, especially, the capital intensive production of cash crops was probably one of the factors leading to the under-allocation of resources in that activity, whereas relatively cheaper rice production placed less demand on production finance.
5.4.2.3 Extension services and technical knowledge

Quoc Tuan farmers, in the early 1990s, certainly had better access to information on rice cultivation and were more experience in rice cultivation than in the other crops. Indeed, as argued in chapter 3, rice production was the priority during central planning, a bias which was evident up to the early 1990’s: even after sweeping agricultural reforms, agricultural research and the extension services remained geared towards rice cultivation. Consequently, one would expect a relatively better level of technical efficiency associated with rice production compared to other crops. Indeed the results shown in table 5.1 imply that the average farm household in Quoc Tuan was relatively more technically efficient in the use of inputs in rice production compared to the production of non-rice food crops and cash crops. This line of reasoning follows from the discussion provided above (section 5.4.1).

One possible explanation for the relatively less technically efficient input-use observed in non-rice food and cash crop production is that agricultural extension services did not reach farmers in production areas outside of rice cultivation. Another is that private agricultural extension services (outside of the cooperative structure) were too under-developed or non-existent to make an impact on farmer decision and production process. As discussed in section 3.5 of chapter 3, the fall in the share of state investment in agriculture and the contracting role of the cooperative after 1989 seriously curtailed the level of technical services that could be offered by this sector. As also earlier mentioned (sections 4.4 and 4.5 of chapter and section D.1.5 of Appendix D) modern varieties of non-rice food crops and cash crops cultivated for commercial purposes were recent introductions in comparison to rice and, therefore, required specific technical knowledge and practices in cultivation of these crops (elevated beds, specialised fertiliser application, etc.). In contrast, the relatively more efficient pattern observed in labour and urea allocation in rice production is a result of the average farm household’s experience in applying these important inputs. Given the focus of extension services and technical advice on rice up to the early 1990s and the relatively novelty of non-rice food and cash crops being farmed for commercial purposes, it is certain that the average farm household lacked the necessary technical knowledge and experience for cultivating these crops efficiently.

If farmers did indeed have access to technical information for rice cultivation, this does not help much in explaining why the average farm household was technically inefficient in rice production as well as discussed earlier, despite the fact that agricultural services were aimed primarily at rice cultivation. Perhaps such extension services as existed were not very efficient at disseminating information to farmers; or farmers were not using the information to the best of their abilities; or farmers could not afford extension services; or farmers simply did not wish to incur this expense.
Unfortunately the limited information collected prevents me from determining which of these factors is most relevant.

5.4.2.4 The formulation of expected prices

Yet another possible cause of the inefficiencies observed across crops, and in particular in the non-rice and cash crop production is the divergence of actual prices from expected prices. I consider three factors that influence farmers' formulation of expected prices: macro-economic stability and level of inflation; exogenous shocks; and the development of markets. The impact of these factors on rural development was discussed in chapter 2 (section 2.4.4); here I consider how they might have affected producers in Quoc Tuan and explain the observed results.

The prices used in the estimation of the average farm household's efficiency indices were based on the actual observed prices, and not the farmer's expected prices. If the resulting allocative and economic efficiency indices were not equal to unity, then, in relation to price expectations, *ceteris paribus*, this situation could indicate that the average farm household formulation of *ex-ante* expected prices deviated from the *ex-post* actual price for each crop. If actual prices are greater than expected prices then the household is probably under-allocating resources and under-producing the crop; if actual prices are lower than expected prices then the converse is true. When actual prices equal expected prices the farm household will be efficient in its allocative and economic decisions.

Following this interpretation, the efficiency measurements reported in table 5.1 (page 144) and the observations made in section 5.2, suggest that the average farm household may have under-estimated expected prices in comparison to actual prices, since the average farm household under-allocated farm inputs and under-produced crops. However, in rice production, especially main rice, the average household produced the crop close to its optimal output. If for main rice production, the prices of some of the variable inputs used in this study were actual lower than expected prices, this could have led to the result that farmers over-produce the crop. But since labour and urea were well allocated and since they represent the major share of expenditure in main rice production, then it is possible that the average of the two effects results in an outcome that appears to be very close to the optimal outcome. This line of reasoning also applies to spring rice where both phosphate and manure (OF) were over-allocated but the remaining three inputs: labour, urea and other farm inputs (which comprise 85 per cent of the costs) were reasonably well allocated, thus producing an average output close to the optimal outcome, and profit close to the maximum level, for the actual production function. Conversely, we observed that all the variable inputs associated with non-rice food crop and cash crop production were under-allocated, which resulted
in a sub-optimal outcome in output, suggesting that the prices used in this study were actual greater than the assumed expected prices. Could this have happened?

In order to answer this latter question is important to ask: How might have macro-economic balances influenced the results observed in Quoc Tuan? Earlier (section 2.4.6 of chapter 2) I pointed out that maintaining a stable economy is crucial to the development process, because it provides the conditions and signals for decision makers to make good decisions. In particular, an economy with volatile inflation rates can affect farmers’ price expectations which in turn hampers the effectiveness of their economic decisions. In addition, if we assume that the average farm household in Vietnam formulates their price expectations rationally, then only external factors such as exogenous shocks - an unexpected shortfall in production due to climatic factors or an unexpected increase in the money supply causing high inflation - will influence the ability of farmers to match their expected prices with actual prices.

In the years immediately preceding the Quoc Tuan study, the high inflation caused by macro economic instability of the 1980s had subsided to a more manageable but still high level following economic reforms introduced from 1989. Inflation dropped sharply from about 400 per cent in 1989 to about 67 per cent in 1991 (table A.4, Appendix A). A rapid fall occurred from 1988 to 1990, and farmers may have expected the trend to continue at a similar rate into 1991. In actuality, however, inflation in 1990 and 1991 remained high. As a result, it is likely that the average farm household’s ex-ante price expectations for all crops could have been lower than the actual ex-post prices used, thus leading them to under-allocate resources and under-produce the crop.

Only spring rice seems to have been affected by exogenous shocks in 1991. In particular, poor weather conditions contributed to a fall in the production of spring rice by 5.2 per cent in the northern provinces of Vietnam, and in Hai Hung province (where Quoc Tuan is situated) it fell by 13.8 per cent (GSO 1992a). This sharp fall in the supply of spring rice drove the real market price of rice in Hai Hung up by 25 per cent (GSO 1992e). Therefore, if farm households were expecting an increase in production as in previous years, then the exogenous shock of poor weather caused an unexpected supply shortfall, which led to higher ex-post prices compared to ex-ante expected prices.

In non-rice food crops, which were very inefficiently produced, exogenous factors may have also contributed to a divergence between actual and expected prices. The output of non-rice food crops fell by 4.5 per cent in 1990 (GSO 1992a:102). In addition, as non-rice food crops is usually a source of animal feed, an increase of 3.4 per cent in the swine population in Hai Hung in 1990 could have increased demand for animal feed

76 On the other hand, it should be noted that if the farm household forms its price expectations adaptively, then we could expect in the short-run that expected prices may deviate from the actual observed prices by a smaller or greater amount. Hence, in this case a divergence will be consistent with this price expectation model.
A simultaneous fall in supply and rise in demand of non-rice food crops would be sufficient to lift actual prices above their expected prices, thereby causing households to under-allocate resources.

Yet another factor influencing the ability of agricultural producers to match expected prices with actual prices is the quality and reliability of the market information with which they formulate their expected prices. Since a national market in Vietnam was at a low level of development in the early 1990s, I would expect that the quality and reliability of market information was variable from one commodity to the next, and from one region to another (see the price differential of milled rice and urea in Figure 3.10 of chapter 3).

Rice markets have evolved over a longer period than the market for new crops. As such, it can be assumed that farm households have relatively more market information in order to formulate their price expectations, and are better able to make efficient economic decisions concerning the allocation of resources in the production of rice, but such decisions may be specific to local market conditions as shown in Figure 3.10. Product markets in non-rice food and cash crops, on the other hand, were extremely underdeveloped at the time of this study, and the cultivation and marketing of cash crops was a very recent development, the average household most certainly had far less information with which to formulate price expectations on these commercial crops compared to rice. Furthermore, the relative novelty of the product market in cash crops would have made price and technical information on the crops more difficult to attain by the average farm household compared to information on rice. Both the price and technical information barriers could have resulted in a divergence between actual and expected prices.

Though one cannot point conclusively to one factor or another as the defining cause of under-allocation in inputs and under-production of crops in Quoc Tuan, the continued high inflation of 67 per cent in 1990-91 appears to be a very likely factor. Spring rice was most certainly affected by weather conditions, while underdeveloped markets contributed to allocative inefficiency in the relatively new non-rice food crop production, due to a lack of price information.

5.4.2.5 Risk-aversion

Lastly, another factor quite likely influencing the allocation of farm inputs is risk-aversion. Risk-aversion can emanate from uncertainty and lack of information (see section 2.4.3.3). Contributing to uncertainty are: incomplete or fragmented factor and product markets, macro economic instability, weak agricultural support services and extension system, and decreases in the share of public investment allocated to agriculture as discussed earlier. These factors were likely to create a great deal of uncertainty for the average farm household as to their access to goods and services.
through the market and about the prices they could expect. Thus, the average risk-averse low-income household facing such economic uncertainty was likely to be concerned about allocating resources in such a way as to meet its security first (see, Lipton 1968, Wolgin 1975).

The security-first argument implies that households may have tried to economise on allocating costly inputs to non-rice food crops and cash crops, which are both cultivated in the winter season, in order to guarantee sufficient funds to buy inputs for spring rice in the following crop season, which they valued more highly for their food security. In addition, as discussed earlier, lack of technical information and market and price information for these new crops would have certainly contributed to uncertainty. Consequently, in the presence of scarce information and under-developed product markets for these commodities, the risk-averse farm household according to its security and efficiency criteria would have under-allocated resources relative to the profit maximisation optimal outcome (see Norman 1977). On the other hand, it is conceivable that certain inputs such as irrigation, chemical fertilisers and pesticides might be risk-reducing, however, the data at hand did not indicate that this might have explained the patterns observed.

Lastly it was noted that the average farm household in Quoc Tuan was not consistently inefficient in the allocation of all inputs. On the contrary, the average household allocated labour and urea more efficiently in the production of rice crops, probably as a result of relatively better developed markets for that crop, greater level of experience by the average farmer and relatively better access to technical knowledge and support for rice (see sections 5.4.2.1 and 5.4.2.3). These same conditions probably gave rise to better information about rice production and marketing, which was relatively more complete for production decisions compared to the information available on non-rice food and cash crops. Consequently, the average farm household was likely to have attached different risk preferences to different crops and to different inputs. That is, in allocating labour and urea in rice cultivation, the average farm household in Quoc Tuan was likely to be less risk-averse, and therefore operated closer to its optimal point because its experience in allocating these inputs and the market information it had about these were better in comparison to the other inputs in rice production and all inputs in non-rice food and cash crops.

5.5 CONCLUSIONS

In this chapter I evaluated the efficiency of the average farm household in Quoc Tuan. In section 5.2, I calculated the allocative and economic efficiencies of the average farm household, and determined the ratio of actual to optimal profit, output and inputs for all crops, using the derived estimates of the production coefficients and the available data. According to the calculated economic efficiencies, the results indicated that farm
households in Quoc Tuan were economically inefficient in the production of spring rice, main rice, non-rice food crops and cash crops. A further examination of the ratios revealed that the inefficiencies were associated with an under-production of all crops. However, this sub-optimal outcome was more evident in non-rice food crops and cash crops than it was in rice crops. Furthermore, an examination of average farm household’s allocative efficiency for different inputs and crop production indicated that the average household was more efficient in allocating labour and urea in the rice production process, compared to phosphate, organic fertiliser, and other farm inputs, which were inefficiently allocated. It was also observed that the average household was more efficient in resource allocation for rice production, especially spring rice, compared to non-rice food and cash crops. Lastly, in non-rice food and cash crops, all inputs were grossly under-allocated according to the production parameters and data used in this study.

In section 5.3, I explored a number of possible factors explaining why the average farm household's allocative and economic efficiency indices deviated from the optimum. The analysis in section 5.3 was intended to show that a strong relationship existed between variations in economic efficiency and a number of factors, which included technical efficiency, diversification of the household's production base, consumer demand within the household and improvements in the availability of food. However, estimates of equation (5.1) for each crop yielded poor statistical results in the measurement of heteroscedasticity, functional form error and normally distributed residuals, which indicated that the coefficients were not reliable and that other explanatory variables were missing from the specification. Therefore, no specific conclusions could be drawn about how these factors may have explained variations in the average farm household’s economic efficiency. Unfortunately, the poor data I had to work with, and lack of data on specific details likely to influence farmers’ economic efficiency, prevented the analysis I had hoped for.

The qualitative discussion in section 5.4 shed some light on the factors that likely contributed to the pattern of uneven economic and allocative inefficiency across crops. I argued that the level of efficiency in rice production could have been explained by the relatively better market information for rice compared to other crops, deeper experience and technical knowledge of rice production and the focus of available extension services on rice production. The more inefficient allocation of inputs in non-rice food and cash crops was probably caused by weaker markets in those crops, lack of technical expertise and almost inexistent technical services for these new crops, as well as poor access to credit for these capital intensive crops. Furthermore, I argued that uncertainty and lack of information may have led the average household to behave in a risk-averse manner, privileging the production of rice over the less familiar and more expensive cash crops, which reduced the efficiency of its resource allocation from the profit maximisation.
viewpoint. Another important factor on the observed patterns of input misallocation was deviations between actual and assumed expected prices facing the average farm households. Due to unexpectedly high inflation in 1990/91 farmers probably underestimated prices, which would result in under-allocation of resources.

The discussion in this chapter supports the earlier contention that the greatest limitation on agricultural development in Vietnam is the lack of a coherent, extensive and well focused rural development programme. While a community like Quoc Tuan benefited from many of the elements of such a programme – proximity to permanent markets, roads, transportation, basic social services – the inefficiencies of production clearly suggest that producers were handicapped by the lack of a number of other crucial elements: access to good quality market information, comprehensive and far-reaching extension services, and production finance, all of which should ideally be provided by a rural development programme.
CHAPTER 6

POLICIES FOR REALISING VIETNAM'S POTENTIAL IN AGRICULTURE AND ACCELERATING ITS ECONOMIC DEVELOPMENT

6.1 INTRODUCTION

In this final chapter, I summarise the findings and observations made in this study of the impact of economic policy changes on Vietnam's agricultural economy during the market transition period (see section 6.2), and make policy recommendations for realising Vietnam's potential in agriculture and establishing the conditions to accelerate its economic development (see section 6.3).

6.2 A REVIEW OF THE EMPIRICAL FINDINGS AND OBSERVATIONS

The underlying question of this thesis, posed in section 1.2 of chapter 1, asked: How effective were the economic policy changes, since 1988, in facilitating agricultural growth during the period of transition to the market? The empirical evidence and analysis provided in chapter 3 showed that Vietnam's economic liberalisation policies were successful in facilitating agricultural growth. Following the hypothesis presented in section 1.3 of chapter 1, I argued in chapter 3 that the main reasons for the growth and development witnessed in the agricultural sector and the economy during the transition to the market were: i) the return to private household farming as a result of the decollectivisation process; and ii) the macroeconomic stability and outward-oriented market economy secured through a stabilisation and structural adjustment programme. These policies provided the economic stimulus for greater agricultural production. At the same time, however, I provided evidence in chapter 3 to support the contention that because the level of public investment allocated to Vietnam's rural development programme was low, such a programme did not significantly contribute to agricultural growth during the market transition period. As argued in section 3.5 of chapter 3 and section 5.4 of chapter 5, the main reason for this was that a weak rural development programme did not efficiently mitigate the factors constraining farmers from achieving greater efficiency and productivity in agricultural production, factors such as weak rural infrastructure, inadequate agricultural support services and poor social services.

Despite the limitation of weak infrastructure and services that was observed during the transition to the market period, the setting is now emerging for long run
sustainable growth in Vietnam. Land laws that are more encouraging of private investment in land improvements have been implemented, there is greater availability of credit to the private (farming) sector that will allow for investment in land and a strong market mentality on the part of economic agents is now emerging.

I set out with a model of development based on a comparative focus of other Asian countries (see chapter 2), and contrasted the strongly inward-oriented economic development model that Vietnam followed under central planning with the moderate outward-oriented economic development model it followed from 1989 during the transition to a market economy (see chapter 3). This model holds that agriculture should ideally be developed as the engine of economic growth at the early stages of economic development through an outward-oriented economic development strategy that places emphasis on increasing agricultural productivity. As discussed in sections 2.4.5 and 2.4.6 of chapter 2, to achieve this, other Asian countries starting their development process through agriculture, such as South Korea and Taiwan, devoted a large share of national investment to the rural sector, especially rural roads, irrigation and agricultural research and extension services, in order to accelerate productivity in the agricultural sector, while also putting in place sound economic policies that maintained macro economic stability and encouraged international trade.

The problems with inward-orientation as a development model were made obvious by the analysis of the Vietnamese economy during the central planning period, presented in section 3.2 of chapter 3. Not only was economic growth constrained by an unstable macro economy and a large dependence on imports, but also by the weak economic performance of the agricultural sector (relative to other economic sectors) as a result of the clear set of policies that were biased against agriculture. This study found that during inward-oriented central planning (1958-1988) inflation increased by 61 per cent each year on average, and the average share of imports in GDP was 36 per cent compared to 9 per cent for exports (table A.4, Appendix A). Compared to the industrial and service sectors which grew by 8.3 and 6.7 per cent respectively, the agricultural sector only managed to post an annual average growth rate of 2.8 per cent during inward-orientation (table A.1, Appendix A). The outcome is not surprising, considering the bias held against the agricultural sector in an inward-oriented economic development strategy: 19 per cent of total government expenditure was allocated to agriculture and irrigation on a yearly average while over 50 per cent was allocated to the industrial sector and government services (table A.3, Appendix A); policy makers maintained a stable price policy that turned the terms of trade against agriculture; and farmers lost control over all inputs except their labour effort, which they preferred to allocate to their private farm plots.

These central planning policies had a negative impact on farmer incentives. In fact, so strong was this impact in 1978 (following the application of the inward-oriented
centrally-planned economic development model to the whole of Vietnam after reunification) that agricultural productivity in land declined by almost 13 per cent (table A.2, Appendix A). By the end of the 1970’s the situation of food supply was so critical due to both the micro-level disincentives and the macro economic problems, that the government was forced to review its policy and institute sectoral reforms, first in agriculture and then in other sectors of the economy, including adjusting its price policy (see section 3.2 of chapter 3).

I argued in section 3.2.4 (page 75), that these sectoral reforms were limited, and although agricultural production did increase in the early 1980s, the attempts by government policy makers to quickly patch up systemic problems failed to address the fundamental economic problems inherent in an inward-oriented centrally-planned economic development strategy, as discussed in chapter 2. The macro economic crisis of the mid-1980s, when the budget deficit climbed to 20 per cent of GDP (1985), inflation soared to almost 800 per cent and imports as a share of GDP reached almost 70 per cent (1987), bears out the argument that the problem was one of economic development strategy. Indeed the discussion in section 3.4 of chapter 3, which centred on the switch to farm household farming from 1988 and the switch to an outward-oriented market-led economic system from 1989, together with the adoption of macro economic stabilisation reforms, are at the root of the startling improvement to macro economic indicators and growth recorded during the transition to the market period (1989-95). As elaborated in section 3.4 of chapter 3, compared to the central planning period, inflation fell during the market transition period to an average of 32 per cent (15 per cent by 1995), the budget deficit as a share of GDP declined to 3.5 per cent, and exports as a share of GDP climbed to 26 per cent on average.

Attesting to the positive impact of economic policies on the economy is the fact that economic growth reached 7.7 per cent on a yearly average, while per capita incomes grew by 5.4 per cent, during the market transition period. As a consequence, growth in all economic sectors increased, with agriculture climbing to 4.3 per cent, but still lagging behind the industrial (9.0 per cent) and the services (10.6 per cent) sectors, as in the central planning period.

In section 3.5 of chapter 3, I also presented a critical appraisal of the main factors constraining farmers in the agricultural sector from achieving higher growth, and from making a greater contribution to economic growth. I showed that investment in the sectors that cover the elements of a rural development programme fell as a share of total public investment, down from 47 per cent during the central planning period to about 40 per cent during the market transition period, when in fact it should have increased compared to the level allocated to the industrial sector alone (28 per cent) and compared to the level (50 per cent) allocated in Taiwan at an early stage of economic development.
As a reminder of the data presented in section 3.5.1 of chapter 3 (page 80), consider that given the low level of public investment in the elements of a rural development programme during the market transition period:

- only 5 per cent of the roads in the countryside were paved in 1994;
- Vietnam had a paved road density of 0.04 (kilometres of road per square kilometre of land) in 1994;
- only 33 per cent of all agricultural land was irrigated in 1995;
- only 50 per cent of VBA loans reached farm households in 1994, up from 7 per cent in 1991 and 26 per cent in 1992;
- agricultural extension services were poorly developed and geared towards rice farming;
- 85 per cent of those living in the countryside were literate; and
- 43 per cent of children under the age of five received vaccination against diseases;

These findings exemplify the relatively low state of rural development in Vietnam, if one considers further that access to a combination of the most basic elements of a rural development programme (passable road, public transport, permanent market, agricultural extension, schools, hospitals and clinics) was limited to only 5 per cent of all Vietnamese rural inhabitants, and a third of the people in the countryside could only access a combination of a passable road, public transport and a permanent market (see table 3.13 of chapter 3).

The evidence presented in chapter 3 clearly suggests that a weak rural development programme, especially rural infrastructure and agricultural support services, had little to contribute to agricultural growth, while the positive environment created by a return to private farming (decollectivisation) and macro economic stability (including greater outward-orientation), which were discussed in sections 3.5.2 (page 103) and 3.5.3 (page 104), had much to contribute to agriculture during the market transition period.

The result of the policies - decollectivisation and macro economic stabilisation combined with the weak rural development programme - are also evidenced in the analysis of the production data from Quoc Tuan farmers provided in chapters 4 and 5 for the period 1990-1991. As described in section 4.4 of chapter 4, the agricultural commune of Quoc Tuan was reasonably well-endowed with several of the elements of rural development programme: it had good irrigation, good rural roads, and by inference, access to markets for inputs and production, price information and relatively good social services. Using the profit maximisation model developed in chapter 4, I derived the production coefficients, which were statistically valid. Then following the profit maximisation model and using the derived coefficients, I was able to calculate the
economic efficiency, allocative efficiency, ratio of actual to optimal output, ratio of input-use and ratio of actual to optimal profit. Evaluating these indices and ratios for the average farm household revealed a number of important characteristics about the pattern of farm production, which recorded in section 5.2.2 (page 143):

- the average farm household was not economically efficient in the production of all crops;
- the average farm household was closer to achieving profit maximisation in the production of rice crops than in non-rice food crop and cash crops;
- the average farm household under-produced all crops, but was closer to achieving the optimal level of output in rice crops than in non-rice food crop and cash crops;
- in relative terms, the average farm household was more efficient in the production of rice crops than in the production of non-rice food and cash crops;
- the average farm household allocated labour and urea relatively efficiently in rice production compared to other crops;
- the average household over-allocated phosphate and organic fertiliser in the production of both rice crops; and
- the average household was inefficient in the allocation of all variable inputs when it came to producing both cash and non-rice food crops, with a clear tendency to under-allocate inputs and, thus, grossly under-produce the crop.

These observations, I pointed out, raise two very important questions:

3. What can explain the seemingly inconsistent result for the average farm household that it produced both rice crops with a low level of economic efficiency and, at the same time, showed that it was: operating close to the maximum profit level; producing both crops close to their optimal levels; and allocating some of the most important variable inputs close to their optimal levels?

4. Although the average farm household’s economic efficiency indices for rice production were low, why was rice more efficiently produced relative to the other crops produced? And, correspondingly, why were variable inputs relatively better allocated in rice production than in other crops?

I set forth in section 5.2 of chapter 5 to empirically show that a relationship existed between economic efficiency and the state of the product and factor markets facing farmers in Quoc Tuan; technical factors influencing technical efficiency; deviations between observed prices and “unobserved” expected prices; and the risk attitude of farm households. However, as I argued in that section, the lack of data (see sections 1.5.3, page 15, and 4.4.1, page 129) used in that analysis was not of sufficient
breadth and quality to provide quantitative corroboration to the links between these elements and the pattern of low economic efficiency observed amongst farmers.

Not discouraged by this limitation, I proceeded to explore the patterns of inefficiency qualitatively in section 5.4. This discussion shed some light on the factors that likely contributed to the pattern of uneven economic and allocative inefficiency across crops. I argued that the level of efficiency in rice production could have been explained by the relatively better market information for rice compared to other crops, deeper experience and technical knowledge of rice production and the focus of available extension services on rice production. The more inefficient allocation of inputs in non-rice food and cash crops was probably caused by weaker markets in those crops, lack of technical expertise and almost inexistence technical services for these new crops, as well as poor access to credit for these capital intensive crops. Furthermore, I argued that uncertainty and lack of information may have led the average household to behave in a risk-averse manner, privileging the production of rice over the less familiar and more expensive cash crops, which reduced the efficiency of its resource allocation from the profit maximisation viewpoint. Another important factor on the observed patterns of input misallocation was deviations between actual and assumed expected prices facing the average farm households. Due to unexpectedly high inflation in 1990/91 farmers probably under-estimated prices, which would result in under-allocation of resources.

The discussion in chapter 5 supports the contention presented in chapter 1 that the greatest limitation on agricultural development in Vietnam is the lack of a coherent, extensive and well-focused rural development programme. While a community like Quoc Tuan benefited from many of the elements of such a programme – proximity to permanent markets, roads, transportation, basic social services – the inefficiencies of production clearly suggest that producers were handicapped by the lack of a number of other crucial elements: access to good quality market information, comprehensive and far-reaching extension services, and production finance, all of which should ideally be provided by a rural development programme.

6.3 Policy recommendations for sustaining agricultural and economic growth

Given the outcome emerging from Vietnam’s agricultural economy up to 1995, it could be asked which policies should be put in place in order to stimulate further increase in agricultural efficiency, productivity and production, thereby allowing Vietnamese farmers to make a greater contribution to economic growth and development at this early stage of Vietnam’s economic development?

Much of this thesis has concentrated on Vietnam’s rural development programme simply because, as argued in chapter 2, an effective rural development programme is the basis for lifting agricultural productivity. In turn, a sustained increase in agricultural
productivity as Oshima (1987) and Hayami and Ruttan (1985) have argued preceded the economic development of some of Asia's most successful countries (Japan, South Korea, and Taiwan). These countries, as repeatedly argued in chapter 3, allocated significant proportions of public investment to the elements of a rural development programme discussed in section 3.5, and maintained low inflation to induce private investment in agriculture.

Table 6.1 A rural development programme matrix

<table>
<thead>
<tr>
<th>Elements of an effective rural development programme</th>
<th>Rural Infrastructure</th>
<th>Agricultural services</th>
<th>Social services</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Good roads</td>
<td>Public transportation</td>
<td>Permanent markets</td>
</tr>
<tr>
<td>What the elements of a rural development programme allows:</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Access to markets</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Access to information</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Access to &amp; adoption of new technology</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Access to &amp; purchase of modern inputs</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Access extension and technical advice</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Access to schools and hospitals for improvement to human capital</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Knowledge of better application and utilisation of technology and modern inputs</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Good health and ability to conduct manual work</td>
<td></td>
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</table>
chapters 2, 3 and 5, are presented in table 6.1 in a matrix form. The matrix presents a picture of selected areas of policy and investment interventions and how they allow farmers to access certain information, infrastructure and services that improves their ability to be efficient; thereby increasing their agricultural productivity.

For example, good passable roads improves farmer’s access to permanent markets, which also allow them to gain access to important price information, observe which agricultural produces are in demand, access new technology and modern inputs. Access to agricultural extension services provide farmers with information about new technology, new techniques and efficient methods in applying fertilisers. Access to schools allow the children of farmers to become literate, in order to read the application instructions on a fertiliser package for instance, while access to clinics and hospital allow farmers to maintain good health or to seek treatment for illnesses in order to remain productive.

Thus the idea of the rural development policy matrix is to suggest linkages between specific areas of investment and how they improve farmer’s access to the elements that will allow them to become more efficient and productive in agriculture.

However, effecting a comprehensive rural development programme in Vietnam is not the only role for government in policy and investment intervention. Clearly, the achievements made in the agricultural sector through improved incentives created by better defined property rights, especially in land, and a return of the decision-making power to the farmer, as well as Vietnam’s improved macro economic stability and greater outward-orientation are other important areas of policy intervention that need to be further defined and maintained.

Table 6.2 presents an overall development programme matrix for the agricultural sector. The table is not meant to be exhaustive, but is meant to illustrate some of the most important areas of intervention based on the findings of this thesis. For example, the positive impact on agriculture due to a return to farm household production and decision-making power over the factors of production (1989) and the issuance of the land law (1993) call for continued improvements in defining farmers’ property rights. Recall that only the state owns land in Vietnam, while individuals have the “right” to use land and to sell those rights in the form of a land-use certificate, but do not own the land. Therefore, government policy could go further in improving the definition of property in land. In addition, policy makers need to pay attention when they formulate policies and regulations aimed at the agricultural sector that they do not attenuate the decision-making power of farmers.

In the area of macro economic management, the government needs to continue to add to the achievements made during the 1990s. Continued practice of fiscal and monetary policy restraint is required in order to keep the budget deficit and inflation...
under control. In addition, Vietnamese policy makers will need to build up their arsenal of monetary policy instruments to fight inflation, especially as the Vietnamese economy moves down the path of outward-oriented market-led economic development. Banking and finance reforms will also need to go further to both deepen Vietnam’s nascent capital market and improve access to capital by all economic agents. In particular, greater prominence should be given to allowing more private credit institutions to establish in order to fund the capital needs of the rural regions. It was explained in chapter 3 that very little state funding got to farmers. The efficiency of the existing formal and informal credit market could improve if this sector were opened up. In line with these reforms, policy makers need to concentrate on maintaining international competitiveness in the exchange rate and keep a low tariff structure that is conducive to agricultural produce and labour-intensive goods exports at this early stage of Vietnam’s economic development.

Table 6.2 An overall development programme matrix

<table>
<thead>
<tr>
<th>GOVERNMENT POLICY ACTION</th>
<th>Improves agricultural incentives</th>
<th>Maintains macro and outward orientation</th>
<th>Establishes an effective rural development programme</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Farmers decision making powers:</strong> Better definition of property rights (through land titling, enforcement of rights)</td>
<td>X</td>
<td></td>
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<tr>
<td>No interference in farmer decision making process</td>
<td>X</td>
<td></td>
<td>X</td>
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<tr>
<td>Total freedom in resource allocation</td>
<td>X</td>
<td></td>
<td>X</td>
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<tr>
<td><strong>Macro economic stability and openness:</strong> Fiscal control and manageable budget deficit</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Prudent monetary policy management</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Internationally competitive exchange rate</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Low tariff structure conducive to agricultural and labour intensive goods</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Financial and banking reforms to develop capital markets and improve access to capital</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Investing in a rural development programme:</strong> Increase public investment in rural infrastructure</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Increase public investment in the agricultural support services</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Increase public investment in the social services in the countryside</td>
<td></td>
<td></td>
<td>X</td>
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</table>

Note that a bold cross denotes a direct relationship, and a light cross denotes an indirect relationship.

The last area of government policy action in table 6.2 is related to public investment in the three broad areas of a rural development programme: rural
infrastructure; agricultural support services; and social services. The specific areas of investment was discussed above (see table 6.1). At least 50 per cent of the total public investment programme needs to be directed to rural infrastructure, agricultural services and social services in the countryside. The present amount of 40 per cent (even less, if one considers that the amount allocated to transport, communication and social services also includes the urban areas) is clearly not enough given the extent of underdevelopment in the rural regions. Apart from finding economically prudent means of allocating a greater share of investment to the elements of a rural development programme through government borrowings from foreign sources, directing official development assistance to the rural sector and encouraging both private domestic and foreign direct investment to the rural sector, economic planners could start immediately by diverting some of industry’s public investment to the agricultural and rural sectors.

Although much of the emphasis in this thesis has been placed on the role for government in agricultural development, it will be up to the private sector to provide the real engine of growth and development in the rural sector over the coming decades. As discussed in chapter 2, small rural enterprises in extension services, food processing, transport, animal husbandry, handicraft or labour-intensive rural based industries will increasingly provide off-farm employment as farmers become more productive. Therefore, the objective for government intervention is to provide the necessary conditions for this transformation to occur: through the provision of an effective rural development programme, and by maintaining a positive macroeconomic environment.
**APPENDIX A**

**ECONOMIC INDICATOR TABLES 1958-1995**

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Table A.1 Economy and Sector Indicators
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Table A.3 Public Investment Indicators
Table A.4 Macro Economic Stability Indicators
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Sources of the data used
Table A.1 Economy and sector indicators 1958-1995

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<thead>
<tr>
<th>Year (a)</th>
<th>Real Economic Growth (b)</th>
<th>Real Growth in the value-added of each economic sector (1989 constant prices)</th>
<th>Sectoral shares in PNV/GDP by economic sectors (current prices)</th>
<th>The amount of real economic growth accounted for by each economic sector (c)</th>
<th>Real per capita Economic Growth</th>
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Period and Sub-Period Averages:

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### Table A.2 Agricultural sector indicators 1958-1995

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<th>Land (b)</th>
<th>Productivity (a)</th>
<th>Share of agricultural output (a): production paddy rice / kg for paddy rice to market</th>
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<th>Non-Agriculture</th>
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NOTES ON THE CONSTRUCTION OF THE DATA SERIES

Notes Table A.1


b From 1958-1985 is PNI = produced national income; from 1986-1995 is GDP = gross domestic product. All values for each sector of the economy were worked back into time from the 1995 period. The PNI in constant 1989 prices were calculated using the following equation: \[ A(t-1) = A(t) - [a(t) \times S(t-1) \times V(t-1)] \]. Where, \( A(t-1) \) is the real value of the sector output for the previous period; \( A(t) \) is the value of present period; \( S(t-1) \) is the previous period's share of total economic output; and \( V(t-1) \) is last period's economic output. Moreover, the constant price values for PNI from 1957-1975 were estimated using the general price index as a proxy for changes in the PNI deflator. Using this PNI deflator on the current value of PNI a constant value was estimated.

c Based on constant 1989 prices.

d Based on real sector growth in year (t) times the real sectoral share in year (t-1). The national average absolute poverty line for Vietnam is 1,090,000 dong (see World Bank 1995a:7). The absolute poverty line was deflated by the GDP deflator to bring it back to 1989 prices. This resulted in a value of 312,785.8235 dong for the national average poverty line.

e The national average absolute poverty line for the rural regions of Vietnam is 1,040,000 dong (see World Bank 1995a:7). The absolute poverty line was deflated by the GDP deflator to bring it back to 1989 prices. This resulted in a value of 298,437.85 dong for the rural poverty line.

Notes on Table A.2

a Labourers are proxied by the agricultural population.

b Hectares are the arable land area in Vietnam.

c Food crop comprise of cereals and tuber crops.

d Other crops include legumes, vegetable and fruits.

e Livestock include bovines, pork, poultry and aqua-products.

Notes on Table A.3

a See Appendix B for a description of PNI and GDP measurements in Vietnam.
Notes on Table A.4

a From 1957 - 1985 official inflation is a combination of both the organised and free market. From 1986 onwards, inflation measurements are based on the change in retail prices in the free market.

b Budget deficit is reported on cash basis.

c In current prices.

d Includes errors and omissions.

e The shares of total trade, exports and imports to total PNI or GDP are based on the current value of the trade items reported in table A.1 of Appendix A. The data is also reported in a combination of US$ and transferable roubles (converted into US$). In order to get estimates of the shares, I converted the value of the trade item to dong value using the official exchange rate between 1957 and 1988, then following 1989 I used a market rate of exchange. These current dong values for the trade items were then compared with the current value of produce national income up to 1988, and the current value of GDP from 1989. As I have some reservations about the quality of the currency exchange data I used, the reported shares are not intended to give the reader the absolute but, instead, when compared between the different period, give the reader the underlying trend of the effect of an inward oriented development strategy on trade.

SOURCES OF THE DATA SERIES

Sources for Table A.1

For population figures

1956-1959, GSO (1970:55)

For constant price PNI and GDP figures

1957-1975, Current values deflated by GPI.

**For current price PNI and GDP figures**
- 1957-1960, SLTK 1959; 1961:38
- 1983-1984, NGTK 1985:40,41

**For price changes**
- 1975 GSO (1977:309)
- 1976 - DRV only GSO (1978:212)
- various, GSO (1992e)
- 1995, estimate

**Sources for Table A.2**

**Arable land figures**
- 1974, GSO (1977:186)
Agricultural labour force figures
1956-1959, GSO (1970:58)

Labour employment figures
1977, GSO (1979:78)
1978, GSO (1980:409)
1979, 1982, GSO (19983:40)
1983, GSO (1985:19)
1986, GSO (1990a:9)
1987, GSO (1991a:9)
1988, GSO (1992a:9)
1989, GSO (1993:12)

Sources for Table A.3

Public investment figures
1971, GSO (1971:264)
1972, GSO (1973:267)
1986-1994, World Bank (1995c: Table 5.5 in statistical appendix)
1995, MOF 1996

Public investment in agriculture figures
1960-1975, GSO (1980:122)
1985, GSO (1987:123)
1987, GSO (1989:198)
1988, GSO (1990a:163)
1990, GSO (1992a:159)
1991, GSO (1993a:146)
1960-1990, GSO (1992f)

Current expenditure in education and health figures
1986-1995, GSO cited in World Bank (1995c:Table 5.3)

Sources for Table A.4

Inflation rate
1975 GSO (1977:309)
1976 - DRV only GSO (1978:212)
1960-1990, GSO (1992e)

Government budget balances

External balances

Source of financing the budget

Trade figures:

Exchange Rate figures:
1956-1975, Rouble rate at 5.6/1, Dang Dam Duc et.al. 1991
1981-1982, estimates
1990-1994, World Bank (1995:Table3.1)
1995, estimated.

The system of national accounts in Vietnam up to 1995 was based on the Material Product System (MPS). In contrast to the United Nation System of National Accounts (UNSDA), used in most developed countries, the MPS has been designed to measure even a centralised planned economic system. In 1995, Vietnam adopted the UNSDA for national accounting. Under the MPS, production destined for private domestic consumption (PDC), in contrast to gross domestic product (GDP) as a measure of economic activity, includes the value of market and non-market production.

The MPS is based on the Marxist concept of production. That is, if commodities are produced in the process of consumption, these commodities are included within the production boundary. For example, goods and services produced in production but passed for personal consumption are included but the same services to households are not included, such as banking, housing, insurance, education, and health services. Goods and services produced and not sold domestically are also services, are excluded by the MPS from the production boundary. However, the MPS includes production in which non-domestic sales are made and includes additional income generated by all economic units. Production goods and services such as export-determined export production, and only in part to the MPS. Therefore, the UNSDA provides all economic activities that are not included in the MPS as they are not considered to be economic activity.

The 1981-1995 data employed for Vietnam's national accounts are based on the system of National Accounts of Vietnam and are prepared by the Vietnam National Accounts Office of the General Department of Statistics. This system is based on the United Nation System of National Accounts (UNSDA), which is the basis for national accounts throughout the world.

Moreover, until the late-1970s, the data for Vietnam's national accounts were not available for the period before 1982. In 1982, the national statistics office was established. However, the data for the period before 1982 have been estimated strongly.
A NOTE ON VIETNAMESE NATIONAL ACCOUNTS STATISTICS

The system of national accounting in Vietnam up to 1992 was based on the Material Product System (MPS). In contrast to the United Nations System of National Accounts (UNSNA) used in non-socialist countries, the MPS has been favoured in countries with a centrally planned economic system. In 1993 Vietnam adopted the UNSNA for national accounting. Under the MPS, *produced national income* (PNI), in comparison to *gross domestic product* (GDP) as a measure of economic activity, excludes non-material services and depreciation.

The MPS is based on the Marxist concept of production. That is, it considers material production as the source of income. Therefore, only service activities directly related to material production are included within the production boundary. For example, goods transport is included in production but passenger transport is not, postal and communication services serving production are included but the same services to households are not. Services, such as banking, housing, insurance, education and health services, national defence, cultural and arts service, are excluded by the MPS from the production boundary.

In contrast, the UNSNA defines production as any activity which produces goods and services available for consumption by all economic units. Produced goods and services may or may not enter market transactions, and may or may not be legal. Therefore, the UNSNA includes all economic activities that are not recorded by the MPS, with the exception of activities that by their nature are difficult to value. These largely revolve around household activities that are generally unpaid (e.g., maintenance, childcare, cooking, cleaning, etc).

The PNI figures employed in Vietnamese national accounting not only excludes non material production services and depreciation but many other economic activities. They do not capture private sector activities, including private sector construction and artisanal and informal sectors, as well as such loosely regulated state activities as defence production and sideline activities of state enterprises, the volume of which has been growing strongly since 1989.

Moreover, until the base-year of prices used in Vietnamese national accounts was changed from 1982 to 1989 in 1992, the reported statistics left out important
information. Rapid inflation from 1985-88 is certainly not captured in the 1982 base year data. In addition, 1982 prices are based on the dual track pricing system which was strongly biased toward industry and against agriculture, primarily because of the procurement system still in place at the time, in national accounts.

Despite these limitations in the MPS growth figures in PNI, the value of agricultural output, state investment and so forth, do reveal general trends in the economy. Thus, if less emphasis is placed on the actual value of economic activity, as compared to their growth rate and relative proportions, the data provide useful information concerning the underlying trends in the economy.
Following the argument presented in this section, I estimated three equations: agricultural (labour) productivity; agricultural (land) productivity and economic output per capita, in order to ascertain the relationship between the factors I presented as influencing agricultural productivity and, in turn, economic growth. In specifying the three equations I have followed a standard production function. The equation are specified as follows:

Agricultural (labour) productivity:

\[ Y_L = C + \theta_1AL + \theta_2KLA + \theta_3KLT + \lambda_1COL + \lambda_2GB + \lambda_3TB \]  
(C.1)

where,

\( Y_L \) = log of gross value of agricultural product (in real 1989 prices) divided by agricultural labour force (proxied by rural population);

\( C \) = constant;

\( AL \) = log of arable agricultural land divided by agricultural labour force;

\( KLA \) = log of public investment in agriculture (in real 1989 prices) divided by the agricultural labour force;

\( KLT \) = log of public investment in transport and communication (in real 1989 prices) divided by the agricultural labour force;

\( COL \) = the percentage of farm households whose production decision are affected by the collective system, as proxied by the percentage of households in the cooperatives;\(^1\)

\( GB \) = the size of government budget balances as a share of GDP; and

\( TB \) = the size of the trade balance as a share of GDP.

\(^1\) Note I have assumed that after the implementation of Resolution No 10 in 1988, all households make their own production decision, and are therefore not affected by the cooperative. As such the \( COL \) factor is equal to zero (0).
Agricultural (land) productivity

\[ Y_A = C + \theta_1 \cdot L_A + \theta_2 \cdot K_{AA} + \theta_3 \cdot K_{AT} + \lambda_1 \cdot C_{OL} + \lambda_2 \cdot G_B + \lambda_3 \cdot T_B \]  
(C.2)

where,

- \( Y_A \) = log of gross value of agricultural product (in real 1989 prices) divided by total arable agricultural land;
- \( C \) = constant;
- \( L_A \) = log of agricultural labour force (proxied by rural population) divided by total arable agricultural land;
- \( K_{AA} \) = log of public investment in agriculture (in real 1989 prices) divided by total arable agricultural land;
- \( K_{AT} \) = log of public investment in transport and communication (in real 1989 prices) divided by total arable agricultural land;
- \( C_{OL} \); \( G_B \); and \( T_B \) as above.

National Productivity (Economic output per capita)

\[ Y_P = C + \theta_1 \cdot Y_A + \theta_2 \cdot K_L + \lambda_1 \cdot C_{OL} + \lambda_2 \cdot G_B + \lambda_3 \cdot T_B \]  
(C.3)

\( Y_P \) = log of the national economic output (in real 1989 prices) divided by the population;
- \( C \) = constant;
- \( Y_A \) = log of gross value of agricultural product (in real 1989 prices) divided by total arable agricultural land;
- \( K_L \) = log of total public investment (in real 1989 prices) divided by the population;
- \( C_{OL} \); \( G_B \); and \( T_B \) as above.

The data reported in table C.1 presents the diagnostic test results for the validity of each equation to the data used. The test results clearly indicates that the data does not support estimation of the three equations. Although the adjusted regression coefficient value of each equation indicates a strong relationship between agricultural productivity and the factors affecting agricultural productivity, the diagnostic tests on all three equations indicates a violation of one or more of the assumption of “best linear unbiased estimates” (see, Stewart and Wallis 1986). Each equations exhibited serial correlation, functional form error and normality problems (see table C.1). As such, the derived coefficients from the equations are not useful for making interpretation of the
relationship as the equation violates BLUE, and because of this I have not reported the coefficient of each equation.

Table C.1 Diagnostic results on the productivity equations

<table>
<thead>
<tr>
<th>Period and Diagnostic Tests</th>
<th>Diagnostic Tests</th>
<th>Agricultural (labour) Productivity</th>
<th>Agricultural (land) Productivity</th>
<th>Economic Output per capita</th>
</tr>
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<tbody>
<tr>
<td>Period 1958-1995 Corrected for:</td>
<td>AR(1)</td>
<td>AR(1)</td>
<td>AR(1)/AR(2)</td>
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<tr>
<td>R2-Adjusted</td>
<td>0.90</td>
<td>0.88</td>
<td>0.91</td>
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<td>F-stats of regression</td>
<td>48.89</td>
<td>41.1</td>
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<td>Serial Correlation F-stat (Breush-Godfrey)</td>
<td>3.18</td>
<td>3.12</td>
<td>3.80*</td>
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<tr>
<td>Normality Jarque Bera</td>
<td>6.47*</td>
<td>6.62*</td>
<td>6.72*</td>
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<tr>
<td>Stability Break point test (Chow)</td>
<td>5.58**</td>
<td>5.56**</td>
<td>6.89**</td>
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<tr>
<td>Functional Form F-stat (Ramsey)</td>
<td>14.94**</td>
<td>14.20**</td>
<td>19.64**</td>
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<tr>
<td>Period 1958-1975 Corrected for:</td>
<td>AR(1)/AR(2)</td>
<td>AR(1)/AR(2)</td>
<td>AR(1)/AR(2)</td>
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<tr>
<td>R2-Adjusted</td>
<td>0.84</td>
<td>0.85</td>
<td>0.93</td>
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<td>F-stats of regression</td>
<td>11.83</td>
<td>11.95</td>
<td>31.54</td>
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<tr>
<td>Serial Correlation F-stat (Breush-Godfrey)</td>
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<td>6.81*</td>
<td>0.12</td>
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<td>Normality Jarque Bera</td>
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<td>0.61</td>
<td>0.39</td>
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<tr>
<td>Functional Form F-stat (Ramsey)</td>
<td>31.32**</td>
<td>31.51**</td>
<td>2.58</td>
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<tr>
<td>Period 1976-1995 Corrected for:</td>
<td>AR(1)</td>
<td>AR(1)</td>
<td>AR(1)</td>
<td></td>
</tr>
<tr>
<td>R2-Adjusted</td>
<td>0.91</td>
<td>0.96</td>
<td>0.97</td>
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<tr>
<td>F-stats of regression</td>
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<td>60.00</td>
<td>94.75</td>
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<tr>
<td>Serial Correlation F-stat (Breush-Godfrey)</td>
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<td>0.91</td>
<td>1.46</td>
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<tr>
<td>Normality Jarque Bera</td>
<td>1.21</td>
<td>1.21</td>
<td>1.71</td>
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</tr>
<tr>
<td>Functional Form F-stat (Ramsey)</td>
<td>12.87**</td>
<td>12.25**</td>
<td>6.50*</td>
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</tbody>
</table>

Moreover, using the chow breakpoint test, each equation was tested for a structural break from 1976 (the year Vietnam was reunified). Following the test result confirming a structural break at this point, I re-estimated two subset periods for each equation: 1957-1975 and 1976-1995. Although the equation estimates improved with respect to serial correlation and normality, they continued to show functional form error.

As such these results indicate the weakness of the data: they are not robust, they need lots of organisation, there are (I suspect) many errors in their measurement. Nevertheless, while I believe that the quality of data has improved since 1990, with the shift to the United Nation System of National Accounts (see Appendix B), the limited time period between 1989-1995 does not offer a long enough time period to estimate the relationship between the dependent and independent variables. Therefore, much
reservation and qualification must be attached to all interpretation of the data even outside of econometric analysis.
APPENDIX D

BACKGROUND ON THE FARM HOUSEHOLDS OF QUOC TUAN AGRICULTURAL COMMUNE

D.1 PHYSICAL ATTRIBUTES

D.1.1 Location

Quoc Tuan commune is located in Nam Thanh district, Hai Hung province, 65 km south-east of Hanoi, and only 15 km north of the provincial capital, Hai Duong. The district town of Nam Thanh lies 10 km to the south-east. Quoc Tuan lies within easy access of route 185, which is sealed and was in the process of being upgraded (figure D.1) and was the area's major communication artery to markets in Hanoi, Hai Phong and Quang Ninh (during the time of research).

The village consists of four distinct hamlets, whose residential areas are adjacent to each other. This village structure is a result of the amalgamation of several villages and their small-scale cooperatives into larger administrative units and cooperatives during the late 1960's. The hamlets, An Xa, Dong Thon, Luong Gian, and Truc Tri, share one market place, located in the largest of the four, An Xa. This small market meets only in the late morning, and serves the needs of the villagers. Villagers from Quoc Tuan also travelled to similar markets in the neighbouring villages of Thanh Quang and Chi Linh to sell their goods.

2 My sincere thanks to Mr Nguyen Van Linh and Dr Nguyen Manh Hung who assisted me in Vietnam in collecting information for this background on Quoc Tuan.
Figure D.1 Map of Nam Thanh District
D.1.2 Population

The population of Quoc Tuan numbered 7,200 in 1992, comprising some 1,728 households, with an average of 4.17 members per household. The population density of Quoc Tuan was 1,286 inhabitants/km², and the average arable land per capita was about 450m². (The average population density for the Red River Delta in 1992 was 802 inhabitants/km²). The local authorities reported a population growth rate of around 2 per cent per annum. By comparison, the national average was 2.3 per cent in 1992 (GSO 1993a). The size of the adult labour force in 1992 was 2,997 persons, or 41.6 per cent of the total population. Approximately 300 inhabitants were invalids or pensioners. The average full adult worker per household was 1.7; each worker therefore supported an average of 1.4 dependants.

D.1.3 Climate, geography and physical infrastructure

The climate in Quoc Tuan is typical of the general pattern of the northern parts of Vietnam and the RRD with its hot humid summers, dry autumns, cool winters and warm humid springs. The average yearly temperature is usually between 23° and 27°, the summer maximum is about 39° and the winter minimum about 6°. The average yearly rainfall is 1500mm, most of which falls over 90 to 100 days between June and September, a season when typhoons have a tendency to occur with a frequency of two or three storms per year.

The total land area of the village was 559.6 hectares; 76 per cent of this area was classified as agricultural area, of which waterways and ponds accounted for four per cent, the remainder were taken up by residential areas (including gardens) (8.2%), and roads, canals and public works (15.7%).

Most soils are of medium acidity and in the medium to poor range in phosphorus and humus content; however, these alluvial soils are quite fertile by regional standards. Most of the arable land is suitable for cultivation year round, thanks to the absence of extreme variations in altitude: 58 per cent of the arable land area cultivated to annual crops lie between 0.7 and 1 metre above sea level. In addition, 22 per cent is low-lying

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3 In comparison to the average size of households in Southeast Asia, which are generally high, the figure for Quoc Tuan appeared somewhat low probably because of the definition of household which follows the administrative unit set by the commune.

4 There are two different definitions of the adult worker in Vietnam: a male between 16 and 60 year old and a female between 16 and 55 years old (GSO 1988:348) or a male between 18 and 60 and a female between 18 and 55. The latter definition was followed in this appendix.

5 Up until 1989, the method of computing the labour force included children and elderly, each accounting for 0.5 adults. The household survey data from 1990 retained this definition of the total labour force although it has since been abandoned. The advantage is that it accounts for the sizeable labour contribution of both these age groups, albeit in a very approximate way.
and more prone to water logging while the remaining 20 per cent is high land requiring more irrigation.

Furthermore, a good irrigation infrastructure contributes greatly to the productivity of the fields: the cooperative had four pumps, with a total capacity of 6500 m$^3$/ha; each pump was capable of irrigating about 333 hectares. The irrigation of fields themselves from the main irrigation ditches was done manually, using gravity and a variety of other means. Electricity for the pumping stations and for production and household usage was supplied at a cost of 500 dong/kilowatts by the district electrical grid connected to the village by a 180 kilovolt power line. This combination of medium fertility soils, favourable topography, good irrigation infrastructure, and reliable power supply places Quoc Tuan in the higher range land fertility and productivity relative to the RRD as a whole.

### Table D.1 Land area and its use in Quoc Tuan (1993)

<table>
<thead>
<tr>
<th>Land Classification</th>
<th>Area (ha)</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total land area</td>
<td>559.6</td>
<td>100.0</td>
</tr>
<tr>
<td>1 - Agricultural land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a - annual crop</td>
<td>392.5</td>
<td>70.1</td>
</tr>
<tr>
<td>b - perennial crop</td>
<td>9.1</td>
<td>1.6</td>
</tr>
<tr>
<td>c - ponds</td>
<td>22.6</td>
<td>4.0</td>
</tr>
<tr>
<td>2 - Agricultural land</td>
<td>425.9</td>
<td>76.1</td>
</tr>
<tr>
<td>3 - Residential land</td>
<td>47.0</td>
<td>8.4</td>
</tr>
<tr>
<td>4 - Others:</td>
<td>87.6</td>
<td>15.7</td>
</tr>
<tr>
<td>a - public works</td>
<td>9.9</td>
<td>1.8</td>
</tr>
<tr>
<td>b - transportation routes</td>
<td>19.2</td>
<td>3.4</td>
</tr>
<tr>
<td>c - irrigation canals</td>
<td>50.6</td>
<td>9.0</td>
</tr>
<tr>
<td>d - cemetery</td>
<td>7.0</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Source: Vietnamese National Institute for Agricultural Science (1991)

### D.1.4 Agricultural characteristics

#### D.1.4.1 Cropping patterns

The cropping pattern in Quoc Tuan is based mainly on the requirements of rice cultivation. That is, rice is grown in successive seasons with little interval, except where soil or climatic conditions make it impossible to do so. Fields are cultivated during one, two or all three of the cropping seasons characteristic of the RRD and most parts of northern Vietnam. A spring season, summer season and winter season present the three main cropping seasons in Northern Vietnam. The summer season is also the main rice cropping season, because traditionally the rice harvested in this season provides the
subsistence crop in most parts of the RRD. However, the dependence on this crop as a mainstay is breaking down with emergence of a market system and better access to markets. Table D.2 presents the year round cropping calendar for each category of land, and indicates the crop cultivated.

Table D.2 Cropping pattern and crop variety in Quoc Tuan in 1992/1993

<table>
<thead>
<tr>
<th>Type of Land</th>
<th>Spring</th>
<th>Summer</th>
<th>Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>One season land</td>
<td>Rice</td>
<td>Rice</td>
<td>Rice</td>
</tr>
<tr>
<td></td>
<td>Transplant</td>
<td>Transplant</td>
<td>Transplant and Potato</td>
</tr>
<tr>
<td></td>
<td>25 January-10 February</td>
<td>10-15 June</td>
<td>Transplant</td>
</tr>
<tr>
<td></td>
<td>Harvest</td>
<td>Harvest</td>
<td>1-5 December</td>
</tr>
<tr>
<td></td>
<td>5-20 May</td>
<td>1-5 December</td>
<td>25 January-10 February</td>
</tr>
<tr>
<td>Two season land</td>
<td>Rice</td>
<td>Rice</td>
<td>Corn, Sweet Potato, and Potato</td>
</tr>
<tr>
<td></td>
<td>Transplant</td>
<td>Transplant</td>
<td>Transplant</td>
</tr>
<tr>
<td></td>
<td>25 January-10 February</td>
<td>20-30 June</td>
<td>25 September-30</td>
</tr>
<tr>
<td></td>
<td>Harvest</td>
<td>Harvest</td>
<td>October</td>
</tr>
<tr>
<td></td>
<td>5-20 May</td>
<td>23 September-10 October</td>
<td>25 January-10 February</td>
</tr>
<tr>
<td>Three season land</td>
<td>Rice</td>
<td>Rice</td>
<td>Garlic and Onion</td>
</tr>
<tr>
<td></td>
<td>Transplant</td>
<td>Transplant</td>
<td>Transplant</td>
</tr>
<tr>
<td></td>
<td>25 January-10 February</td>
<td>20-30 June</td>
<td>25-30 September</td>
</tr>
<tr>
<td></td>
<td>Harvest</td>
<td>Harvest</td>
<td>Harvest</td>
</tr>
<tr>
<td></td>
<td>5-20 May</td>
<td>23 September-10 October</td>
<td>25-30 January</td>
</tr>
<tr>
<td></td>
<td>25-30 September</td>
<td>Harvest</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25 January-10 February</td>
<td>25 January-10 February</td>
<td></td>
</tr>
</tbody>
</table>


The calendar for rice growing was essentially the same for all households. Seedlings were sown, transplanted, and crops harvested at almost the same time on all plots. The implication is that the small, contiguous plots required a high level of coordination between farmers (to irrigate fields at the same time, for instance) and, due to the intensity of farming, there was little time between one crop and the next. The most labour intensive periods of the farming year are those during which crops are harvested and the fields prepared for the next crop. From early January to mid-February, May to July and mid-September to mid-October, this usually represents about 140 days of very manual work, since all ploughing, transplanting, irrigation, harvesting and
threshing was carried out without mechanisation, and with only very rudimentary implements (buffalo-driven ploughs, hoes, pedal-driven threshers, and so on). The hard work was offset by the relative leisure (or underemployment, as the case may be) of the mid-season.

D.1.4.2 Crop varieties and yields

Land suitable for one crop during the spring season is cultivated primarily to the V14 rice variety, commonly known as moc tuyen (see table D.2). Two season land is also cultivated to rice crops only. On the other hand, farm households cultivate two seasons of modern rice varieties (notably CR203, NN8, VN10 and DT10) on three-season land, as well as a cash crop or non-rice food crop during the relatively dry winter season.

The variety of non-rice crops cultivated in Quoc Tuan during the winter season include garlic, onion, irish potato, sweet potato, corn, soybean, vegetables and cucumbers. Sweet potatoes and corn were grown as animal feed, while the remainder of subsidiary crops, including irish potatoes, were grown as cash crops. In 1991, the state offered incentives for farm households to grow garlic for export, with disastrous results in 1992 when the state stopped buying the garlic at fixed prices. Garlic was still grown in 1993, but the total area was reduced by at least 40 per cent, and the produce is destined mainly for the domestic market.

<table>
<thead>
<tr>
<th>Crops</th>
<th>1990</th>
<th>1991</th>
<th>1992</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring Rice (b)</td>
<td>4.7</td>
<td>4.7</td>
<td>5.0</td>
</tr>
<tr>
<td>Summer Rice (b)</td>
<td>3.9</td>
<td>3.8</td>
<td>4.1</td>
</tr>
<tr>
<td>Non-rice food crops:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweet Potato</td>
<td>10.6</td>
<td>11.1</td>
<td>11.0</td>
</tr>
<tr>
<td>Irish Potato</td>
<td>11.5</td>
<td>11.1</td>
<td>11.0</td>
</tr>
<tr>
<td>Cash Crops:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garlic</td>
<td>4.1</td>
<td>4.2</td>
<td>4.0</td>
</tr>
<tr>
<td>Onion</td>
<td>6.3</td>
<td>6.9</td>
<td>7.5</td>
</tr>
</tbody>
</table>

Note: (a) Yields are tons/hectare. (b) Paddy
Source: Vietnamese National Institute for Agricultural Science (1991)

Sweet potato was consumed by households as an alternative to rice, only in the case of food shortage.
The average yields for rice and selected non-rice crops are presented in table D.3. In general rice yields have increased slowly over the past few years. The small growth in the yield of non-rice food crops and cash crops probably indicates the relative slowness of the adoption of modern varieties in this sector, or technically inefficient methods of farming.

D.1.5 Market access and conditions

The availability of markets for land, labour, credit and product is an essential factor in the development of agriculture. The level of development and accessibility of these markets constitutes a major constraint on the development of agriculture for Quoc Tuan.

D.1.5.1 Land markets

The concept of a market in land itself is problematic, not only for legal but also for cultural reasons. The northern and central areas retain a strong communalist tradition, and there is some opposition to, or at least deep concern about the consequences of trading in land for the livelihood of the rural population (see White 1984; Fforde 1983). This egalitarian orientation is evidenced in the reversal from a economically more efficient system of land distribution to a more egalitarian, albeit less efficient, like the one adopted in Quoc Tuan. The only land sold and bought freely in Quoc Tuan was residential land. This contrasts with the Mekong delta, where an active market in agricultural land preceded the official sanction of the July 1993 Land Law by several years.

D.1.5.2 Labour markets

Labour markets were growing rapidly in Vietnam's urban centres, despite their poor state of development. The underdevelopment of this market was the result of the government's policy on controlling rural-urban drift and keeping unemployment and underemployment out in the countryside. According to politburo member Vu Oanh (1994:3), urban unemployment amounted to about 10 per cent of the total work force in early 1994, while as much as half of the rural work force was unemployed. However, due to some relaxation of this tight measure, informal day-labour markets have sprung up in many of the country's urban centres since 1990/91 and were rapidly increasing.

In Hanoi, an active informal labour market in the early 1990s offered seasonally unemployed or underemployed farmers, drawn from the nearby countryside of the RRD, employment as manual labourers for part of the year, despite the high numbers of urban unemployed (Hiebert 1993b:60). Although such markets were visibly seen in a number of locations around Hanoi, the government did not officially condoned their existence.
Up to June 1994, the government was still debating on passing a draft labour law that would insure Vietnam's first step towards an open labour market. In Quoc Tuan there was no day labour market comparable to what existed in the city; households hire labour from within the village only, and there was, as of 1993, no permanent class of agricultural labourers. Daily wages for agricultural labourers stand at around 7,000 dong per day in August 1993. By comparison, a skilled worker such as a carpenter, would earn 10,000 dong.

D.1.5.3 Credit markets

In spite of the government's effort to provide rural credit to farm households under Resolution Number 10, the provision of formal credit up to 1992 was effectively weak. Although a state-sponsored credit fund to "eradicate hunger and eliminate poverty" was active in Quoc Tuan, only about 30 per cent of households could access it because the formalities required were so complicated. The state allocated a certain fixed amount to the cooperative, for instance 100 million dong in 1993, which the cooperative leaders were responsible for lending out to the most needy families. The people's committee and cooperative identify potential borrowers to whom the funds would be offered; the money, however, usually ended up in the hands of the more wealthy and well-connected villagers.

Growing with the market economy at the village level is the emergence of an informal credit market. An important characteristic of wealthier households is their ability to mobilise capital from a variety of sources; such resourcefulness is necessary because of the lack of formal credit institutions. A common source of credit for many purposes are mutual lending schemes, where farmers pool cash or rice and take turns using the accumulated capital, based on a bidding system (a participant offers the others an interest payment of so much for the right to use the money first), or in a fixed order. Such schemes exist for specific purposes like weddings or funerals, or are organised to mobilise capital for investment. They seem to be especially popular among women (probably because it is harder for them to borrow from other sources). However, the amounts collected remain small, and the highly publicised, spectacular losses incurred by some of the large credit circles in 1989 and again in 1993 underline the fact that these are risky ventures based entirely on mutual trust (see, for example, Hiebert 1993a). Farmers therefore prefer to lend to family members; a large proportion of these loans are interest free. Neighbours and other community members are also a source of credit, but usually charge interest on the loans (Nguyen Duc Truyen 1990:35).

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7 Nguyen Duc Truyen (1990) reported survey results from several communes that show a high correlation between the share of loans from family (75%) and the high proportion of interest free loans (67%). The author notes that this occurs in, Dinh Bang (Ha Bac province), the commune with the highest integration in the market, and a weak cooperative. In contrast, in the catholic community of Hai Van (Ha...
A major impediment to the development of a freely functioning capital market was the difficulty of securing collateral on loans, a problem which the 1993 Land Law solved by allowing households to use their "land-use rights certificates" to borrow from state-accredited institutions, while residential property could serve as collateral for personal loans. This supposes a greater availability of credit from the VBA. However, there are opposing views to the emergence of land market that are linked to credit markets. In many cases, informal credit becomes a key mechanism for land concentration (Rutherford 1992). There is a possibility that this problem may eventuate within the region if formal access to credit by needy farmers was hindered. However, it did not appear to be a major concern in 1993.

D.1.5.4 Regional product markets

The proportion of goods marketed was high: an estimated 20-30 per cent of total crop production was disposed of on the market, as well as 45 per cent of the animal production (mainly pork). A first outlet for produce was the village market, which convenes in the morning, before the noontime meal, and caters exclusively to the needs of the community. In the typical village markets, the main items sold for immediate consumption were: vegetables and other garden produce, pork, eggs, rice, and small consumer goods. Consumer goods like soap, cloth, matches, etc. are 5-10 per cent more expensive in the village than in Hai Duong because of the cost of transportation. Nearby was the larger market of Hai Duong, from where products were ferried to Hanoi or Hai Phong; several households also engaged in trading further afield, buying rice locally and transporting it to the large markets.

As noted earlier communications between Quoc Tuan and Hai Duong as well as with Hanoi and Hai Phong were good. A twice-daily bus service to Hai Duong allowed residents to travel easily to these markets. Privately owned lambrettas, tractors, and motorcycles also provided transportation services. Villagers also rode the short distance to the province capital Hai Duong on their bicycles, heavily ladened with rice or vegetables.

Agricultural inputs were readily available from these same markets more cheaply than through the cooperative; farm households did not have to depend on the cooperative for this service. The high level of usage of fertiliser inputs by households in Quoc Tuan, reaching recommended application for most crops, is an indication of the availability of both materials and information. For example, the actual to recommended usage ratio of urea amongst the surveyed households for various crops were as follows: spring rice (0.99); main rice (1.12); non-rice food crops (0.83); and cash crops (0.97).

Nam province, 23 per cent of loans are provided by neighbours, and only 19 per cent by family (59% are interest free).
These ratios indicate that households were either achieving recommended inputs levels, or in the case of main rice over-applying urea. In addition, prices of inputs and of production in most provincial markets within the delta were on par with prices in Hanoi, thanks to the proximity and generally good road communications.

The comparatively high proportion of farm produce marketed suggests that the households were increasingly integrating into the market. Analysis of data from Quoc Tuan and other villages in the region has allowed Dao The Tuan (1993:4-5) to identify three groups of households differentiated by their production objectives. The first group produce for "consumption only", that is they aim only to be self-sufficient, while in reality they may either be food deficient, or self-sufficient but making income loss, or self-sufficient and making an income profit; the second produce for consumption and for market; the third produce for the market exclusively. In Quoc Tuan, out of 100 households Dao The Tuan identified 13 households whose production objective was the market, while 26 produce for consumption and the market. The majority of households therefore were content with marketing whatever available surplus they had, but at least 39 were well integrated in the market.8

Given the proximity of major markets to Quoc Tuan and the relative ease with which Quoc Tuan villagers access necessary products and services in these markets, the dependence of farm households on the cooperative to provide similar products and services was certainly being replaced by emerging markets in the countryside. However, this factor cannot be generalised to Vietnam rural regions. As argued in chapter 3, the fact remains that inadequate infrastructure development (roads and communication) hinders the development of markets in rural regions, which in comparison to Quoc Tuan, are remote. Therefore, agricultural cooperatives in relatively remote regions have an important role to play, in terms of making available to households necessary farm inputs and services that the private sector may otherwise find difficult to provide as a consequence of constraints such as lack of access to credit, lack of commercial experience by farmers, poor extension services, etc.

D.2 SOCIO-ECONOMIC CHARACTERISTICS AND ACTIVITIES OF THE SURVEYED HOUSEHOLDS

This section focuses on the 100 households surveyed in Quoc Tuan in the RRD. It provides a detailed analysis of household structure, labour and land allocation, household incomes, expenditure and standard of living.

D.2.1 Family size and labour capacity

8 While it is unclear whether Dao The Tuan is implying that the degree to which farm households participated in the market was connected to their production strategy, the argument suggests that despite the production strategy of the farm household, all households were dependent on access to markets.
The sample of 100 households contains 516 persons. The mean size of the household is 5.16 members, with a mode and median of 6 and 5 respectively, while the largest household had nine members and the smallest three. These figures however contrast noticeably with the village average of 4.17 persons per household. Whereas the village count follows an administrative measure as noted earlier (see section D.1.2), the data from the farm household survey does not follow such a strict definition but, instead, operates on the actual numbers of people co-habitating under a single roof or compound. Hence, farm households are likely to include elderly members such as grandparents or other relatives, not just the administrative family unit.

The total number of persons surveyed in the 100 households converts to 287 adult labour equivalents, resulting in an average adult labour equivalent of 2.87 workers per household and a mode and median of 2.0 and 2.6, respectively. In Quoc Tuan, adult labour equivalent was, until 1990, computed by counting children above a certain age and the elderly as equivalent to between 0.25 and 0.75 full workers. This recognised the contribution of children and elderly to household production, notably in housework, gardening, animal husbandry, and in the fields during peak seasons. An indication of the significance of the elderly and children to the labour capacity is provided by data from Nguyen Xa village in Thai Binh, (Le Trong Cuc and Rambo 1993:44) where 16.9 per cent of the labour force is constituted by either elderly (8.4%) or children (8.5%). Since the reported method of weighting labour equivalence is different, these statistics can only be taken as a very rough measure.

Furthermore, when the number of 2.3 workers per household in the survey data is compared with the number of 1.7 workers per household reported in the village level data, the former seems a little high. This apparent discrepancy is due to a bias in the selection of the households towards "full households" and a deliberate focus on agricultural households. Since the smallest household in the sample households has three members, the survey probably excluded from the sample households headed by invalids, pensioners and widows, who are allocated only subsistence plots, and single-person or dual-person households.

Table D.4 provides a tabulation of households by size: small (3-4 members), medium (5-6 members) and large (7-9 members). Table D.5 provides a tabulation of labour capacity of each household by size: low (1.0-2.9 workers) and high (above 3.0 workers). Table D.6 cross tabulates household size with its labour capacity. These three

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9 The exact criteria used for calculating labour equivalence in the survey was not available.

10 While the above-cited authors report that the definition of an adult labourer was a female between the ages of 18 and 50 and a male between 18 and 55 years, in the villages studied by Hy Van Luong (1993:263) the definition concorded with the one followed here. There also appears to be a lack of consistency in the method used to account for the labour contribution of children and elderly: Le Trong Cuc and Rambo (1993) report it to be 1/3 or 2/3 of a full labourer. Both methods were encountered in the household survey data for Quoc Tuan in different years.
tables together show that 34 per cent of households are small with 3 to 4 family members, of which 68 per cent have low labour capacity and 32 per cent have high labour capacity. The largest proportion of households (53%) are medium size with 5 to 6 family members. Of these households, 45 per cent have low labour capacity and 55 per cent have high labour capacity. Lastly, 13 per cent of all households are large households with 7 to 9 family members, of which the majority have a high labour capacity.

**Table D.4 Household (HHD) size**

<table>
<thead>
<tr>
<th>Group</th>
<th>HHD Size (persons)</th>
<th>Average Size (persons)</th>
<th>Number of Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>3.0-4.0</td>
<td>3.7</td>
<td>34</td>
</tr>
<tr>
<td>Medium</td>
<td>5.0-6.0</td>
<td>5.5</td>
<td>53</td>
</tr>
<tr>
<td>Large</td>
<td>7.0-9.0</td>
<td>7.5</td>
<td>13</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>5.2</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Vietnamese National Institute for Agricultural Science (1991)

**Table D.5 Labour capacity (workers)**

<table>
<thead>
<tr>
<th>Group</th>
<th>Labour Capacity (workers)</th>
<th>Average Size (workers)</th>
<th>Number of Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>1.0-2.9</td>
<td>2.1</td>
<td>48</td>
</tr>
<tr>
<td>Large</td>
<td>Above 3.0</td>
<td>3.6</td>
<td>52</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>2.9</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Vietnamese National Institute for Agricultural Science

**Table D.6 Cross tabulation of household size with labour capacity by observations**

<table>
<thead>
<tr>
<th>Household Member Size</th>
<th>Labour Capacity (No. of workers)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small (1-3)</td>
<td>Large (≥3)</td>
<td></td>
</tr>
<tr>
<td>Small (3-4)</td>
<td>23</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Medium (5-6)</td>
<td>24</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Large (7-9)</td>
<td>1</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

Source: Vietnamese National Institute for Agricultural Science

The cross tabulation of household size against labour capacity for the survey sample (table D.6) allows a rough guess at the age structure of the household: it can be expected that young families have smaller labour capacity than families in the mid-life cycle, as young children do not provide a major source of labour especially while they...
are attending school. Similarly, mature families with a greater proportion of adults over 55-60 years will have a smaller labour capacity as elderly members become too weak to take on heavy farming work. Thus, the data allows us to infer that for the majority of households which fall in the medium range, there are about as many young families (smaller proportion of full workers) as families in the mid-life cycle. Small households, on the other hand, are predominantly poor in labour capacity, which would indicate that they are young or mature. Finally, the larger families have a high labour capacity, as would be expected for a family reaching the peak of its life-cycle with many adult unmarried children providing the bulk of the labour.

D.2.2 Socio-economic differentiation of farm households

Quoc Tuan is an affluent village, compared to villages in less fertile and more disaster prone areas of the delta (such as the low lying regions west of the Day river in Ha Nam and Ninh Binh provinces). The general standard of living was high, for instance almost all houses have their own water well, quite a luxury for many Vietnamese households; even poor families keep at least a few pigs, which were an easily converted source of cash; and ownership of consumer goods was high. Nevertheless, a clear pattern of socio-economic differentiation emerged. Working from the basis of estimated monthly incomes, cooperative leaders in Quoc Tuan have established the following breakdown of households according to wealth (in current prices):

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor (less than 40,000d)</td>
<td>25%</td>
<td>23%</td>
<td>20%</td>
<td>15%</td>
</tr>
<tr>
<td>Average (40,000-70,000d)</td>
<td>60%</td>
<td>60%</td>
<td>62%</td>
<td>65%</td>
</tr>
<tr>
<td>Rich (more than 70,000d)</td>
<td>15%</td>
<td>17%</td>
<td>18%</td>
<td>20%</td>
</tr>
</tbody>
</table>

According to the estimates of table D.7, in the past years, the proportion of poor villagers decreased rapidly. In the largest village of the commune, An Xa, the rich accounted for 25 per cent of households, average households for 65 per cent and poor for only 10 per cent, making this the most prosperous of the four villages, probably because of the wider diversification of activities among residents. The village market is

[^11]: Almost 92% of children in rural Vietnam attend some form of schooling. In Hai Hung province the average number of years of school attendance is 5.6 years (GSO 1991a:50). The primary school in Quoc Tuan has 1040 pupils, and 400 children are attending the three years of lower secondary school after completing the 6 years of primary education, which indicates that a high proportion of children enrolled in school go on to complete the 9 years of compulsory education.
also located in An Xa thus allowing villagers greater opportunity to engage in commerce.

The causes for differentiation of incomes can be found first of all in the characteristics of households in each group, which include factors of personal ability, demographics, and extent of market integration.\textsuperscript{12} Interviews with households in each group yielded the following observations.

D.2.2.1 Rich households

(i) had the essential numerical skills and business acumen allowing them to manage their farm efficiently;

(ii) had a head of household between the ages of 35 and 60 years old;\textsuperscript{13}

(iii) attached special importance to accumulating capital, and economised on daily living expenses and food. They also borrowed different forms of capital;\textsuperscript{14}

(iv) were involved in both crop production and animal husbandry, which they combined with artisanal industries and trade;

(v) allocated family labour efficiently, distributing work according to strengths and abilities of each worker, and weather conditions.

D.2.2.2 Average households

(i) had the necessary numerical skills to manage the household economy;

(ii) had a head of household between the ages of 50 and 60 years old;

(iii) also saw the importance of accumulating capital, but did not pursue this aim with as much determination;

(iv) were involved in crop production and animal husbandry but had not fully engaged in trade and artisanal industries;

(v) did not allocate family labour as efficiently as rich households.

\textsuperscript{12} A socio-economic group which falls outside the scope of this thesis but deserves special mention is the emerging class of rural entrepreneurs. These people engage in commerce, trades, services, and money-lending, and though they may still own farm land, differ in their economic organisation and values from the majority of agricultural households. They are more oriented towards an "urban" pattern of consumption, seeking to acquire status-symbol consumer goods and houses. (Nguyen Duc Truyen 1992:127-128).

\textsuperscript{13} The observation that the head of rich households are likely to be between 35 and 60 years of age, that is in the mid-life cycle, therefore these households are also probably larger and with higher labour capacity than the younger or mature households that make up much of the poor group.

\textsuperscript{14} For example, rich households can buy goods to trade with on credit, and have an easier time borrowing from institutions such as the bank and from individuals.
D.2.2.3 Poor households

(i) lacked business skills, or have the ability but lack the experience and opportunities to realise this potential;

(ii) had heads of household between the ages of 20 and 30 years old or over 60;

(iii) had little capital because their parents were also poor, or because of misfortune, were often short of food, and consequently found it impossible to accumulate any capital;

(iv) had low returns (and yields) from crop production, animal husbandry is underdeveloped and they do not engage in other production activities;

(v) inefficiently used family labour.

Given these characteristics, it is evident that the higher the income grouping of the household the more diversified its economic activities. This observation was evident in the 1990 and 1991 national household survey data (see Nguyen Van Tiem 1993). Furthermore, households with elder heads of households also appeared to be a characteristic of richer households.

Inherently connected to the well-being of the household was its ability to engage in productive employment, both on-farm and off-farm. In Quoc Tuan, cooperative leaders place the level of unemployment in the commune at around 30 per cent, noting that most of this is in the form of underemployment. Family labour, especially young school-leavers, were employed in farming but for very low returns on their labour. In particular, this problem was aggravated by the demobilisation of soldiers since Vietnam withdrew its army from Cambodia in 1989. An over supply of labour for agriculture is general to the RRD, and explains the very high labour input in rice growing, comparatively to other south-east Asian countries, noted by other researchers as well (Le Trong Cuc and Rambo 1993:109): households in Nguyen Xa, Thai Binh reported on average an input 233 labour days/ha/crop (8.4 days/sao). In Quoc Tuan, on the other hand, the average time spent in rice cultivation by the surveyed households in 1990 was 15.3 days/sao, almost double that of farmers in Nguyen Xa. Labour is the "preferred way to increase production" only so long as no other activities are available - once they are, labour can be subtracted from rice-growing with little impact on production (ibid.).

D.2.3 Household income pattern

Table D.8 classifies all households according to three income groups. There were 23 households within the poor income group, 59 households within the average income group, and 18 households within the rich income group. Gross income in Quoc Tuan seemed evenly distributed with a mean income of 54,129 dong per person per month, and ranged from the lowest monthly income of 13,667 dong to the highest monthly
The average income of 54,129 dong per person per month compared marginally favourably with the national average of 48,084 dong (GSO 1992b: 109), which indicated that Quoc Tuan was relatively prosperous compared to the rest of Vietnam.

### Table D.8 Average gross household monthly income by income group

<table>
<thead>
<tr>
<th>Group</th>
<th>Gross Income Structure (dong/p/m)*</th>
<th>Number of Households</th>
<th>Gross Income per month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>0-40</td>
<td>23</td>
<td>30156</td>
</tr>
<tr>
<td>Average</td>
<td>40-70</td>
<td>59</td>
<td>53455</td>
</tr>
<tr>
<td>Rich</td>
<td>above 70</td>
<td>18</td>
<td>86969</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td>54129</td>
</tr>
</tbody>
</table>

Note: * in thousands ('000) dong per month.
Source: Vietnamese National Institute for Agricultural Science (1991)

Another useful pattern to explore was the average level of participation of each income group in various production activities. On average, only 13 per cent of all poor households participated in all production activities as indicated by table D.9. In particular, it was noticeable that a very small proportion of poor households participated in high return activities such as artisan, off-farm work or trade, as a proportion of all poor households. The production participation rate for each income group progressively increased as the household moved from being poor to rich. The information in table D.9 suggests that households in the rich income group participated more fully in high return production activities compared to the other income groups. Subsequently, it follows that the higher the income group of the household the greater arable land holding per worker and the more involved is the household in non-crop production activities (see table D.10).

### D.2.4 Labour use pattern

All households surveyed were engaged in cultivating spring rice, main rice and cash crops; only 71 households grew non-rice food crops such as corn, sweet potato and irish potato (see, table D.9). As both non-rice food crops and cash crops were cultivated in the winter season, this indicates that 29 households specialised in cash crops only. Winter garden vegetables were also grown in the same season mainly for home consumption, but 35 households grew vegetables for commercial purposes. All households engaged in some form of animal production. Only one household did not raise pigs, while nine other households did not practice any cattle, poultry or fish rearing.
In addition to farming, 54 households were involved in some artisanal production within the commune - trades, artisanal production, food processing, and so on. A further 65 households derived some income from off-farm work, such as employment in construction or petty trade.

Analysing the structure of household labour allocation based on the survey data provides an indication of the labour use patterns of the average worker over the year for the sample households. The assumption underlying figure D.2 (above) is that all non-crop production activities were spread evenly over the year. This restrictive assumption, however, does not prevent us from formulating an opinion of labour use patterns. On average, there was a clear difference in the amount of working days spent in various production activities between different income groups. Compared to the average number of days spent working in all income groups, the poor income group spent by far the least amount of total time on the land and in non-crop production activities. It appears that they spent just over half of the year engaged in all production activities. This low rate of work can be partly explained by the fact that poor households tend to be households at the early stages of their life cycle (i.e., young households) and, as a consequence, were only allocated a small parcel of land by the cooperative management. The average allotment of arable land to poor households was 512.5m² of arable land per person (see table D.10). This factor limits the amount of time members of poor households can effectively spend in the field.
### Table D.9 The number and proportion of households engaged in various production activities by income groups

<table>
<thead>
<tr>
<th>Income Group (b)</th>
<th>Number HHD</th>
<th>Non-Rice food crop</th>
<th>Garden</th>
<th>Pig</th>
<th>Other Livestock</th>
<th>Artisanal</th>
<th>Off-farm/Trade</th>
<th>All Activities (c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor (0-40)</td>
<td>23</td>
<td>18 (78%)</td>
<td>7 (30%)</td>
<td>22 (96%)</td>
<td>17 (74%)</td>
<td>8 (35%)</td>
<td>8 (35%)</td>
<td>3 (13%)</td>
</tr>
<tr>
<td>Average (40-70)</td>
<td>59</td>
<td>43 (73%)</td>
<td>23 (39%)</td>
<td>59 (100%)</td>
<td>56 (95%)</td>
<td>30 (51%)</td>
<td>45 (76%)</td>
<td>17 (29%)</td>
</tr>
<tr>
<td>Rich (above 70)</td>
<td>18</td>
<td>10 (56%)</td>
<td>5 (28%)</td>
<td>18 (100%)</td>
<td>18 (100%)</td>
<td>16 (89%)</td>
<td>12 (67%)</td>
<td>11 (61%)</td>
</tr>
<tr>
<td>Average</td>
<td>100</td>
<td>71 (71%)</td>
<td>35 (35%)</td>
<td>99 (99%)</td>
<td>91 (91%)</td>
<td>54 (54%)</td>
<td>65 (65%)</td>
<td>30 (30%)</td>
</tr>
</tbody>
</table>

**Notes:**

(a) The figures in brackets are the number of households observed in a particular activity as a proportion of the number of households in that particular income group.
(b) Household monthly income in thousand dong.
(c) All activities refers to the number of households engaged in all of the specified production activities with the exception of non-rice food crop and garden production.

### Table D.10 Breakdown of income by activities and availability of arable land/person

<table>
<thead>
<tr>
<th>Income Group (a)</th>
<th>Arable Land (m2/person)</th>
<th>Gross Income</th>
<th>Rice</th>
<th>Non-rice crops</th>
<th>Animals</th>
<th>Crafts/Artisanal</th>
<th>Off-farm/Trade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor (0-40)</td>
<td>512.5</td>
<td>30156</td>
<td>19699</td>
<td>10458</td>
<td>6793</td>
<td>2153</td>
<td>1512</td>
</tr>
<tr>
<td>Average (40-70)</td>
<td>609.3</td>
<td>54455</td>
<td>32304</td>
<td>21152</td>
<td>12359</td>
<td>4737</td>
<td>4056</td>
</tr>
<tr>
<td>Rich (above 70)</td>
<td>693.2</td>
<td>86969</td>
<td>45707</td>
<td>41262</td>
<td>21258</td>
<td>14566</td>
<td>5438</td>
</tr>
<tr>
<td>Average</td>
<td>602.1</td>
<td>54129</td>
<td>31817</td>
<td>22312</td>
<td>12681</td>
<td>5912</td>
<td>3719</td>
</tr>
</tbody>
</table>

**Notes:**

(a) Household monthly income in thousand dong.

**Source:** Vietnamese National Institute for Agricultural Science (1991)
Figure D.2 Working days per worker per annum by income groups

(I): All Income Groups (100 hhds)  
(Total workdays = 243)

Spring: 48 days  
Summer: 46 days  
Winter: 29 days

(II): Poor Income Group (23 hhds)  
(Total workdays = 193)

Spring: 43 days  
Summer: 39 days  
Winter: 21 days

(III): Average Income Group (59 hhds)  
(Total workdays = 243)

Spring: 49 days  
Summer: 47 days  
Winter: 30 days

(IV): Rich Income Group (18 hhds)  
(Total workdays = 310)

Spring: 51 days  
Summer: 48 days  
Winter: 37 days

Note:  
- All crop production activities.  
- All noncrop production activities; and  
- Vietnamese National Institute for Agricultural Science (1991)

Spring season runs from February to June.  
Summer season runs from July to September/October.  
Winter season runs from November to January.
In addition, because the poor households’ income from crop production was limited by the availability of arable land, this, in turn, limited the potential for them to finance capital intensive production activities, such as animal, crafts and trade activities. Table D.10 shows that the average level of income derived from non-crop production activities were especially low when compared to the other income groups. This is evident in the breakdown of non-crop income for poor households.

On the other hand, workers in average income households spent noticeably more time in the field and in other production activities, providing them with employment for at least two-thirds of the year. Average income households had more arable land per person, 609.3m², than poor income households (see table D.10). The greater availability of land not only implies that average income households earned more from crop production but also that the increase in income contributed to the ability of households to engage in alternative production activities and, thereby, increase their average monthly incomes.

In contrast, workers in the rich income group spent by far the greatest number of working days in the field and in other activities. This kept them employed for at least 85 per cent of the year (see figure D.2). In line with the above observations, rich households had more arable land per capita which contributed to their capacity to increase crop production income and, in turn, contribute to other incomes.

Overall, the average worker in rich households spent almost twice as much time in non-crop production compared to poor households and 50 per cent more time compared to average income households. Furthermore, the difference between income groups with respect to the time they spent in non-rice crops in the winter season was significantly large across all income groups. However, the difference in working days spent in spring rice and main rice production which occupied the first two cropping seasons respectively was not significantly great across all income groups. These observations, suggest that poor and average income households were largely concerned with producing food for survival, as they were closer to subsistence relative to the rich household. As indicated in table 5.10, only 13 per cent of poor income households and 27 per cent of average income households were engaged in all production activities, while 61 per cent of rich income households were engaged in all production activities.

D.2.5 The allocation of land

The average farm household in Quoc Tuan has around 3,000m² of arable land to cultivate over the year. As mentioned earlier, not all land in the commune was cultivated in all three seasons, but all households cultivated some portion of their arable land in all 15 Self-finance means the ability of the farm household to raise their own capital for production.
seasons. The extent to which arable land was allocated to various crops is given in table D.11.

Table D.11 Land allocation by crops

<table>
<thead>
<tr>
<th>Land Category</th>
<th>Land Area (m²)</th>
<th>As a share of Cultivated Land Area (%)</th>
<th>As a share of Arable Land Area (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arable Land</td>
<td>3005.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cultivated Land</td>
<td>7362.4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cropping Intensity (a)</td>
<td>2.5</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Spring Rice</td>
<td>2990.2</td>
<td>40.6</td>
<td>99.5</td>
</tr>
<tr>
<td>Main Rice</td>
<td>2960.4</td>
<td>40.2</td>
<td>98.5</td>
</tr>
<tr>
<td>All Rice</td>
<td>5950.6</td>
<td>80.8</td>
<td>na (b)</td>
</tr>
<tr>
<td>Non-rice food crops</td>
<td>406.1</td>
<td>5.5</td>
<td>13.5</td>
</tr>
<tr>
<td>Cash crops</td>
<td>1005.7</td>
<td>13.7</td>
<td>33.5</td>
</tr>
<tr>
<td>Garden produce</td>
<td>73.8</td>
<td>1.0</td>
<td>na (b)</td>
</tr>
</tbody>
</table>

Note: (a) Cropping intensity = cultivated land / arable land.
(b) not applicable as this category covers more than one season.

Source: Vietnamese National Institute for Agricultural Science (1991)

On average, the farm household cultivated a total of 7,362m² of land per year implying a cropping intensity of 2.5. The cropping intensity ratio measures the rate at which the arable agricultural land area is cultivated to crops in an agricultural year. The majority of the cultivated land area was farmed to rice, while non-rice food crops and cash crops played a less significant role and garden produce was almost insignificant. Nevertheless, a cropping intensity of 2.5 indicates that the available land was intensively used in food crop cultivation, given that the total area cultivated to rice consisted of 80 per cent of all cultivated land on average.

Furthermore, virtually 100 per cent of the arable land was cultivated to rice production in both the spring and summer seasons. In contrast, the proportion of arable land cultivated to non-rice food crops and cash crops in the winter season amounted to less than the total available arable land area in that season because of colder weather, which prevented farmers from cultivating a third rice crop. In general, more land was devoted to cash crop than non-rice food crop cultivation because of the contract set up between the cooperative (through the government) and farm households to grow cash crops (garlic and onion) for guarantied sales to foreign markets, evident in the 29 households that specialised in cash crop production in the winter season. In the 1990/1991 winter season around 52 per cent of land farmed by the surveyed households was kept fallow.
D.2.6 Farm household production and income structure

D.2.6.1 Production structure

Turning to the production activities of the farm household presented in tables D.12 and D.13, the statistics on the output and input in all production activities indicate the structure of the average farm household, and the structure across income groups. These tables clearly indicate that the average household in Quoc Tuan was mostly engaged in crop production. A notable feature of the data on crop production in table D.12 is that the yield\(^{16}\) for all crops cultivated across household income groups increased progressively with rising incomes, which indicates the means to buy modern inputs necessary with the cultivation of modern variety crops. In addition, the average yield in all crops for households in the rich income group was above the mean for all surveyed households.

However, examining the level of inputs used per unit land (sao) for each crop across income groups did not provide clear information about the performance of farm households. Nevertheless, some remarks can be made about the intra- and inter-crop input usage between income groups. In general, labour usage was even between households in different income groups, and similar for the cultivation of rice and non-rice food crops, and cash crop, although higher for the latter than the former.

The use of chemical and organic fertilisers was less clear-cut. Although fertiliser usage across each income group had no clear pattern, it can be stated that on average urea was more intensively utilised in non-rice food and cash crops than in rice. A more general observation is that rich farm households tended to use less fertilisers and incurred below average extraneous production expenditure compared to the average farm household in rice production.

In table D.13, the average labour productivity for various non-crop output are shown in value terms. Similarly, the average labour productivity for various non-crop production activities (including vegetable cultivation) shows that the richer the household the higher the average productivity. It is also noticeable that the higher productivity across income groups may be explained by greater input use per unit labour, which indicates that richer households had greater labour capabilities (i.e., were able to hire some non-family labour) and had access to capital, either through savings or credit.

\(^{16}\) Two yield measures are presented: Yield1 is the conventional yield in terms of tons per hectare, while Yield2 is the common Vietnamese yield measure of kilograms per sao. One sao equals 360m\(^2\) (see note at the bottom of table D.12).
Table D.12 Average production statistics across surveyed households

<table>
<thead>
<tr>
<th>Crop output and inputs</th>
<th>Unit</th>
<th>Mean</th>
<th>Poor</th>
<th>Average</th>
<th>Rich</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spring Rice:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yield 1</td>
<td>ton/ha</td>
<td>3.5</td>
<td>3.2</td>
<td>3.5</td>
<td>3.6</td>
</tr>
<tr>
<td>Yield 2</td>
<td>kg/sao</td>
<td>125.1</td>
<td>114.7</td>
<td>126.7</td>
<td>131.2</td>
</tr>
<tr>
<td><strong>Inputs per sao (a):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultivated Land</td>
<td>sao (b)</td>
<td>8.3</td>
<td>7.2</td>
<td>8.9</td>
<td>7.9</td>
</tr>
<tr>
<td>Labour (workdays)</td>
<td>wd/sao (c)</td>
<td>15.6</td>
<td>15.8</td>
<td>15.4</td>
<td>16.0</td>
</tr>
<tr>
<td>Urea</td>
<td>kg/sao</td>
<td>7.0</td>
<td>6.3</td>
<td>7.3</td>
<td>6.9</td>
</tr>
<tr>
<td>Phosphate</td>
<td>kg/sao</td>
<td>10.3</td>
<td>9.0</td>
<td>10.9</td>
<td>9.5</td>
</tr>
<tr>
<td>Organic Fertiliser</td>
<td>kg/sao</td>
<td>212.5</td>
<td>181.8</td>
<td>230.5</td>
<td>182.4</td>
</tr>
<tr>
<td>Other Expenditure</td>
<td>dong/sao</td>
<td>1810.1</td>
<td>2321.9</td>
<td>1707.3</td>
<td>1594.3</td>
</tr>
<tr>
<td><strong>Main Rice:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yield 1</td>
<td>ton/ha</td>
<td>2.8</td>
<td>2.6</td>
<td>2.8</td>
<td>2.9</td>
</tr>
<tr>
<td>Yield 2</td>
<td>kg/sao</td>
<td>100.9</td>
<td>93.3</td>
<td>101.7</td>
<td>106.7</td>
</tr>
<tr>
<td><strong>Inputs per sao:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultivated Land</td>
<td>sao</td>
<td>8.2</td>
<td>7.0</td>
<td>8.8</td>
<td>7.9</td>
</tr>
<tr>
<td>Labour (workdays)</td>
<td>wd/sao</td>
<td>14.9</td>
<td>15.0</td>
<td>14.8</td>
<td>15.2</td>
</tr>
<tr>
<td>Urea</td>
<td>kg/sao</td>
<td>5.3</td>
<td>4.9</td>
<td>5.4</td>
<td>5.2</td>
</tr>
<tr>
<td>Phosphate</td>
<td>kg/sao</td>
<td>5.4</td>
<td>5.5</td>
<td>5.2</td>
<td>6.3</td>
</tr>
<tr>
<td>Organic Fertiliser</td>
<td>kg/sao</td>
<td>106.3</td>
<td>80.0</td>
<td>121.8</td>
<td>79.5</td>
</tr>
<tr>
<td>Other Expenditure</td>
<td>dong/sao</td>
<td>1803.5</td>
<td>2542.4</td>
<td>1638.2</td>
<td>1569.3</td>
</tr>
<tr>
<td><strong>Non-rice food crops:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yield 1</td>
<td>ton/ha</td>
<td>3.2</td>
<td>1.6</td>
<td>1.9</td>
<td>2.3</td>
</tr>
<tr>
<td>Yield 2</td>
<td>kg/sao</td>
<td>113.8</td>
<td>75.4</td>
<td>103.6</td>
<td>188.7</td>
</tr>
<tr>
<td><strong>Inputs per sao:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultivated Land</td>
<td>sao</td>
<td>1.1</td>
<td>0.9</td>
<td>1.2</td>
<td>1.1</td>
</tr>
<tr>
<td>Labour (workdays)</td>
<td>wd/sao</td>
<td>16.1</td>
<td>15.0</td>
<td>15.3</td>
<td>20.1</td>
</tr>
<tr>
<td>Urea</td>
<td>kg/sao</td>
<td>7.3</td>
<td>4.3</td>
<td>7.5</td>
<td>9.4</td>
</tr>
<tr>
<td>Phosphate</td>
<td>kg/sao</td>
<td>9.7</td>
<td>7.7</td>
<td>10.1</td>
<td>10.2</td>
</tr>
<tr>
<td>Organic Fertiliser</td>
<td>kg/sao</td>
<td>532.4</td>
<td>549.9</td>
<td>509.4</td>
<td>597.6</td>
</tr>
<tr>
<td>Other Expenditure</td>
<td>dong/sao</td>
<td>716.3</td>
<td>815.9</td>
<td>668.0</td>
<td>793.5</td>
</tr>
<tr>
<td><strong>Cash crops:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yield 1</td>
<td>ton/ha</td>
<td>2.6</td>
<td>1.5</td>
<td>2.9</td>
<td>3.2</td>
</tr>
<tr>
<td>Yield 2</td>
<td>kg/sao</td>
<td>94.8</td>
<td>55.9</td>
<td>99.2</td>
<td>113.9</td>
</tr>
<tr>
<td><strong>Inputs per sao:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultivated Land</td>
<td>sao</td>
<td>2.8</td>
<td>2.0</td>
<td>2.9</td>
<td>3.3</td>
</tr>
<tr>
<td>Labour (workdays)</td>
<td>wd/sao</td>
<td>19.2</td>
<td>20.3</td>
<td>19.2</td>
<td>18.4</td>
</tr>
<tr>
<td>Urea</td>
<td>kg/sao</td>
<td>9.0</td>
<td>7.5</td>
<td>9.3</td>
<td>9.3</td>
</tr>
<tr>
<td>Phosphate</td>
<td>kg/sao</td>
<td>13.6</td>
<td>11.9</td>
<td>14.4</td>
<td>12.6</td>
</tr>
<tr>
<td>Organic Fertiliser</td>
<td>kg/sao</td>
<td>725.7</td>
<td>775.4</td>
<td>727.8</td>
<td>680.4</td>
</tr>
<tr>
<td>Other Expenditure</td>
<td>dong/sao</td>
<td>62116.2</td>
<td>59659.1</td>
<td>63863.4</td>
<td>58906.2</td>
</tr>
</tbody>
</table>

Notes:
(a) Input per hectare was not shown because when the ratio on the very small plots farmed in Quoc Tuan are converted to a per hectare basis, the resulting figures are difficult to interprete. Therefore, the common North Vietnamese land unit known as the "sao" was used.
(b) sao = 360m² of land.
(c) wd = workday.
Source: Vietnamese National Institute for Agricultural Science (1991)
### Table D.13 Average production statistics across surveyed households

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Mean</th>
<th>Poor</th>
<th>Average</th>
<th>Rich</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Crop Production (in value):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garden</td>
<td>dong</td>
<td>42,427</td>
<td>14,348</td>
<td>50,097</td>
<td>53,167</td>
</tr>
<tr>
<td>Garden labour productivity</td>
<td>dong/wd</td>
<td>8,676</td>
<td>5,789</td>
<td>8,771</td>
<td>10,074</td>
</tr>
<tr>
<td>Labour</td>
<td>workday</td>
<td>4.9</td>
<td>2.5</td>
<td>5.7</td>
<td>5.3</td>
</tr>
<tr>
<td>Cultivated Land</td>
<td>m2/wd</td>
<td>15.1</td>
<td>16.8</td>
<td>15.3</td>
<td>13.4</td>
</tr>
<tr>
<td>Other Expenditure</td>
<td>dong/wd</td>
<td>237.3</td>
<td>64.5</td>
<td>286.4</td>
<td>311.7</td>
</tr>
<tr>
<td><strong>Non-crop Production (in value):</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal Production</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pork</td>
<td>dong</td>
<td>519,864</td>
<td>286,757</td>
<td>529,525</td>
<td>786,056</td>
</tr>
<tr>
<td>Pork labour productivity</td>
<td>dong/wd</td>
<td>7,937</td>
<td>6,175</td>
<td>7,624</td>
<td>10,223</td>
</tr>
<tr>
<td>Livestock labour productivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour</td>
<td>workday</td>
<td>66</td>
<td>46</td>
<td>69</td>
<td>77</td>
</tr>
<tr>
<td>Cash Outlays</td>
<td>dong/wd</td>
<td>5,624</td>
<td>4,770</td>
<td>5,489</td>
<td>6,681</td>
</tr>
<tr>
<td>Other Livestocks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Livestock labour productivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour</td>
<td>workday</td>
<td>131</td>
<td>85</td>
<td>142</td>
<td>153</td>
</tr>
<tr>
<td>Cash Outlays</td>
<td>dong/wd</td>
<td>536</td>
<td>470</td>
<td>567</td>
<td>489</td>
</tr>
<tr>
<td><strong>Artisanal Production and Trading:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour productivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash Outlays</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour</td>
<td>workday</td>
<td>141</td>
<td>106</td>
<td>130</td>
<td>219</td>
</tr>
<tr>
<td><strong>Off-farm work:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Cash Outlays</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
</tr>
</tbody>
</table>

Source: Vietnamese National Institute for Agricultural Science (1991)

### D.2.6.2 Farm household income and cost structures

Tables D.14 to D.16 present the structure of gross income, total costs and net income per household member on a monthly basis, respectively. In general, the average household in Quoc Tuan derived the majority of its gross income from crop production, followed by animal production, artisanal production and finally off-farm work (see table D.14). However, the importance of crop production diminished relative to artisanal production, while the proportion of animal production in gross income and off-farm work was fairly stable across income groups. This trend indicates that the

---

17 These amounts are presented on a monthly basis rather than an annual basis in keeping with the income group classification by Quoc Tuan officials followed in this study.
relative importance of food crop diminished in the structure of household income as incomes rose (this issue is discussed further when exploring table D.16, see below).

Table D.14 The structure of the average gross income (per month per household member) across income groups and by production activities

<table>
<thead>
<tr>
<th>Production Activity</th>
<th>Average household Mean GY(a)</th>
<th>Average household as a %</th>
<th>Household by Income Groups Poor</th>
<th>Household by Income Groups as a %</th>
<th>Average as a %</th>
<th>Rich as a %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Income:</td>
<td></td>
<td></td>
<td>Poor GY</td>
<td>Poor GY</td>
<td>Average GY</td>
<td>Rich GY</td>
</tr>
<tr>
<td>Plant</td>
<td>54,129</td>
<td>100</td>
<td>30,156</td>
<td>100</td>
<td>53,455</td>
<td>100</td>
</tr>
<tr>
<td>Spring rice</td>
<td>31,817</td>
<td>59</td>
<td>19,699</td>
<td>65</td>
<td>32,304</td>
<td>60</td>
</tr>
<tr>
<td>Main rice</td>
<td>8,328</td>
<td>15</td>
<td>6,628</td>
<td>22</td>
<td>8,438</td>
<td>16</td>
</tr>
<tr>
<td>Non-rice food crops</td>
<td>9,071</td>
<td>17</td>
<td>7,181</td>
<td>24</td>
<td>9,172</td>
<td>17</td>
</tr>
<tr>
<td>Cash crops</td>
<td>1,769</td>
<td>3</td>
<td>985</td>
<td>3</td>
<td>1,611</td>
<td>3</td>
</tr>
<tr>
<td>Garden</td>
<td>12,001</td>
<td>22</td>
<td>4,655</td>
<td>15</td>
<td>12,358</td>
<td>23</td>
</tr>
<tr>
<td>Animal</td>
<td>647</td>
<td>1</td>
<td>250</td>
<td>1</td>
<td>725</td>
<td>1</td>
</tr>
<tr>
<td>Pork</td>
<td>12,681</td>
<td>23</td>
<td>6,793</td>
<td>23</td>
<td>12,359</td>
<td>23</td>
</tr>
<tr>
<td>Other Livestocks</td>
<td>8,628</td>
<td>16</td>
<td>4,657</td>
<td>15</td>
<td>8,066</td>
<td>15</td>
</tr>
<tr>
<td>Artisanal Industry</td>
<td>4,053</td>
<td>7</td>
<td>2,136</td>
<td>7</td>
<td>4,293</td>
<td>8</td>
</tr>
<tr>
<td>Off-farm work</td>
<td>5,912</td>
<td>11</td>
<td>2,153</td>
<td>7</td>
<td>4,737</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>3,719</td>
<td>7</td>
<td>1,512</td>
<td>5</td>
<td>4,056</td>
<td>8</td>
</tr>
</tbody>
</table>

Note: (a) GY = Gross Income
Source: Vietnamese National Institute for Agricultural Science (1991)

The costs incurred in producing farm output are broken down in table D.15. It is clear that households on average incurred the majority of their production costs in crop production, followed by animal production and then artisanal production, which accords with the sequence in deriving gross income. However, no cost for off-farm work was recorded in the data set. Taken across income groups, the cost incurred in crop production as a proportion of total production costs for all production activities diminished relative to animal and artisanal production the higher the income group. In general, labour costs were the greatest expense in crop farming, followed by fertiliser expenditure and then by other expenses. Only in cash crop, which required good seed stocks did other expenses exceed labour costs.
Table D.15 The structure of the average production costs (per month per household member) across income groups and by production activities

<table>
<thead>
<tr>
<th>Production Activity</th>
<th>Average household</th>
<th></th>
<th>Household by Income Groups</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean TC(a) as %</td>
<td>Mean TC</td>
<td>Poor as %</td>
<td>Poor TC</td>
</tr>
<tr>
<td>Total Costs</td>
<td>32,842</td>
<td>100</td>
<td>22,018</td>
<td>100</td>
</tr>
<tr>
<td>All Crops</td>
<td>15,796</td>
<td>48</td>
<td>12,680</td>
<td>55</td>
</tr>
<tr>
<td>Labour</td>
<td>7,246</td>
<td>22</td>
<td>5,859</td>
<td>27</td>
</tr>
<tr>
<td>All fertilisers</td>
<td>4,099</td>
<td>12</td>
<td>2,928</td>
<td>13</td>
</tr>
<tr>
<td>Other expenditures</td>
<td>4,451</td>
<td>14</td>
<td>3,293</td>
<td>15</td>
</tr>
<tr>
<td>Spring rice</td>
<td>3,967</td>
<td>12</td>
<td>3,372</td>
<td>15</td>
</tr>
<tr>
<td>Labour</td>
<td>2,094</td>
<td>6</td>
<td>1,813</td>
<td>8</td>
</tr>
<tr>
<td>All fertilisers</td>
<td>1,216</td>
<td>4</td>
<td>937</td>
<td>4</td>
</tr>
<tr>
<td>Other expenditures</td>
<td>657</td>
<td>2</td>
<td>622</td>
<td>3</td>
</tr>
<tr>
<td>Main rice</td>
<td>4,724</td>
<td>14</td>
<td>4,025</td>
<td>18</td>
</tr>
<tr>
<td>Labour</td>
<td>2,705</td>
<td>8</td>
<td>2,305</td>
<td>10</td>
</tr>
<tr>
<td>All fertilisers</td>
<td>1,350</td>
<td>4</td>
<td>1,075</td>
<td>5</td>
</tr>
<tr>
<td>Other expenditures</td>
<td>668</td>
<td>2</td>
<td>645</td>
<td>3</td>
</tr>
<tr>
<td>Non-rice food crops</td>
<td>1,105</td>
<td>3</td>
<td>753</td>
<td>3</td>
</tr>
<tr>
<td>Labour</td>
<td>577</td>
<td>2</td>
<td>425</td>
<td>2</td>
</tr>
<tr>
<td>All fertilisers</td>
<td>358</td>
<td>1</td>
<td>201</td>
<td>1</td>
</tr>
<tr>
<td>Other expenditures</td>
<td>171</td>
<td>1</td>
<td>126</td>
<td>1</td>
</tr>
<tr>
<td>Cash crops</td>
<td>5,832</td>
<td>18</td>
<td>3,850</td>
<td>17</td>
</tr>
<tr>
<td>Labour</td>
<td>1,175</td>
<td>4</td>
<td>714</td>
<td>3</td>
</tr>
<tr>
<td>All fertilisers</td>
<td>2,898</td>
<td>9</td>
<td>1,883</td>
<td>9</td>
</tr>
<tr>
<td>Garden</td>
<td>169</td>
<td>1</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td>Labour</td>
<td>111</td>
<td>0</td>
<td>62</td>
<td>0</td>
</tr>
<tr>
<td>Other expenditures</td>
<td>58</td>
<td>0</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>Animals</td>
<td>11,719</td>
<td>36</td>
<td>7,074</td>
<td>32</td>
</tr>
<tr>
<td>Labour</td>
<td>4,449</td>
<td>14</td>
<td>2,885</td>
<td>13</td>
</tr>
<tr>
<td>Other expenditures</td>
<td>7,270</td>
<td>22</td>
<td>4,189</td>
<td>19</td>
</tr>
<tr>
<td>Pork</td>
<td>7,684</td>
<td>23</td>
<td>4,631</td>
<td>21</td>
</tr>
<tr>
<td>Labour</td>
<td>1,555</td>
<td>5</td>
<td>1,056</td>
<td>5</td>
</tr>
<tr>
<td>Other expenditures</td>
<td>6,130</td>
<td>19</td>
<td>3,575</td>
<td>16</td>
</tr>
<tr>
<td>Other Livestocks</td>
<td>4,034</td>
<td>12</td>
<td>2,443</td>
<td>11</td>
</tr>
<tr>
<td>Labour</td>
<td>2,894</td>
<td>9</td>
<td>1,829</td>
<td>8</td>
</tr>
<tr>
<td>Other expenditures</td>
<td>1,140</td>
<td>3</td>
<td>614</td>
<td>3</td>
</tr>
<tr>
<td>Artisanal Industries</td>
<td>5,328</td>
<td>16</td>
<td>2,864</td>
<td>13</td>
</tr>
<tr>
<td>Labour</td>
<td>3,331</td>
<td>10</td>
<td>2,204</td>
<td>10</td>
</tr>
<tr>
<td>Other expenditures</td>
<td>1,997</td>
<td>6</td>
<td>660</td>
<td>3</td>
</tr>
<tr>
<td>Off-farm work (b)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Notes: (a) TC = Total Costs  
(b) No costs were recorded for off-farm work in the farm household production statistics for Quoc Tuan.  
Source: Vietnamese National Institute for Agricultural Science (1991)

Table D.16 presents the structure of net incomes (actual profits). After production costs are considered, the average household derived the bulk of its income from crop production, followed by off-farm work and then by animal and artisanal production. Considering the structure of net incomes across farm household, poor farm households on average incurred losses in non-swine animal production and artisanal production. Consequently, the bulk of their net income was derived from two rice crops.

18 Note that net income is the gross income derived from all production activities presented in table D.14 minus its respective total production costs presented in table D.15. Net income is, therefore, equivalent to actual profit for each production activity.
(79% of total net income) and from off-farm work. In comparison, net income derived from cash crop production was relatively smaller. The relative share of net income derived from crop production diminished sharply for households in higher income groups, and this decline was even more drastic in rice production, while the relative share of cash crop in net income increased sharply. The relative share of net income derived from off-farm work, although unchanged between poor and average income households, diminished for rich farm households. On the other hand, the relative share of net incomes derived from artisanal and animal production increased sharply for rich households.

Table D.16 The structure of the average net income (per month per household member) across income groups and by production activities(a)

<table>
<thead>
<tr>
<th>Production Activity</th>
<th>Average household Mean NY(b)</th>
<th>as a % Mean NY</th>
<th>Household by Income Groups Poor Mean NY</th>
<th>as a % Poor NY</th>
<th>Average Mean NY</th>
<th>as a % Aver NY</th>
<th>Rich Mean NY</th>
<th>as a % Rich NY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Income:</td>
<td>21,287</td>
<td>100</td>
<td>8,138</td>
<td>100</td>
<td>21,088</td>
<td>100</td>
<td>38,741</td>
<td>100</td>
</tr>
<tr>
<td>All crops</td>
<td>16,021</td>
<td>75</td>
<td>7,619</td>
<td>94</td>
<td>16,255</td>
<td>77</td>
<td>25,992</td>
<td>67</td>
</tr>
<tr>
<td>Spring rice</td>
<td>4,361</td>
<td>20</td>
<td>3,256</td>
<td>40</td>
<td>4,415</td>
<td>21</td>
<td>5,597</td>
<td>14</td>
</tr>
<tr>
<td>Main rice</td>
<td>4,348</td>
<td>20</td>
<td>3,156</td>
<td>39</td>
<td>4,403</td>
<td>21</td>
<td>5,687</td>
<td>15</td>
</tr>
<tr>
<td>Non-rice food crops</td>
<td>664</td>
<td>3</td>
<td>232</td>
<td>3</td>
<td>485</td>
<td>2</td>
<td>1,804</td>
<td>5</td>
</tr>
<tr>
<td>Cash crops</td>
<td>6,170</td>
<td>29</td>
<td>804</td>
<td>10</td>
<td>6,412</td>
<td>30</td>
<td>12,232</td>
<td>32</td>
</tr>
<tr>
<td>Garden</td>
<td>479</td>
<td>2</td>
<td>170</td>
<td>2</td>
<td>539</td>
<td>3</td>
<td>673</td>
<td>2</td>
</tr>
<tr>
<td>Animal</td>
<td>962</td>
<td>5</td>
<td>-281</td>
<td>-3</td>
<td>779</td>
<td>4</td>
<td>3,150</td>
<td>8</td>
</tr>
<tr>
<td>Pork</td>
<td>944</td>
<td>4</td>
<td>26</td>
<td>0</td>
<td>651</td>
<td>3</td>
<td>3,074</td>
<td>8</td>
</tr>
<tr>
<td>Other Livestocks</td>
<td>18</td>
<td>0</td>
<td>-307</td>
<td>-4</td>
<td>128</td>
<td>1</td>
<td>76</td>
<td>0</td>
</tr>
<tr>
<td>Artisanal</td>
<td>584</td>
<td>3</td>
<td>-711</td>
<td>-9</td>
<td>-2</td>
<td>0</td>
<td>4,162</td>
<td>11</td>
</tr>
<tr>
<td>Off-farm</td>
<td>3,719</td>
<td>17</td>
<td>1,512</td>
<td>19</td>
<td>4,056</td>
<td>19</td>
<td>5,438</td>
<td>14</td>
</tr>
</tbody>
</table>

Notes: (a) Net Income is equivalent to actual profits for each production activity.
(b) NY = Net Income

Source: Vietnamese National Institute for Agricultural Science (1991)

In general, these trends support the features characterising farm households in different income groups as reported by Quoc Tuan officials (see section D.2.2 above). The relative differences between income groups not only suggest that rich household have relatively greater diversified production, as indicated by the relative share of costs incurred across different production activities, but also that households in this group were capable of deriving large profits relative to the other income groups. The latter point also suggests that rich household have more business acumen and were capable of financing production either through household savings or access to credit and tended to use their labour more productively.

D.2.7 Household food balance and production strategy

Farm households met two demands on their food crop production: state taxes on agricultural production and cooperative fees; and household food consumption needs.
The surplus remaining after satisfying these needs could be disposed on the market. The combined charges for state taxes and cooperative fees was 103 kilograms of paddy per household member per year or 26 per cent of the total annual rice production in 1990 (see table D.17). Based on the assumption that the average household member consumes 250 kilograms\textsuperscript{19} of paddy annually, that consumption needs are met before any surplus rice is marketed and that households fulfil their state tax and cooperative fees obligations, the resulting average surplus per household member amounts to 43.5 kilograms. Although this amount is not substantial for a fertile rice growing region, it must be remembered that not all households attempt to fulfil their consumption needs entirely from rice production.

### Table D.17: Food balance (in paddy equivalent) per capita by income group

<table>
<thead>
<tr>
<th>Income Group</th>
<th>Average Gross Monthly Income</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4=1-2-3</th>
<th>5</th>
<th>6=4+5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>54129</td>
<td>396.7</td>
<td>103.3</td>
<td>250.0</td>
<td>43.5</td>
<td>415.4</td>
<td>458.9</td>
</tr>
<tr>
<td>Poor</td>
<td>30156</td>
<td>309.2</td>
<td>88.6</td>
<td>250.0</td>
<td>-29.4</td>
<td>152.2</td>
<td>122.7</td>
</tr>
<tr>
<td>Average</td>
<td>53455</td>
<td>399.1</td>
<td>103.0</td>
<td>250.0</td>
<td>46.1</td>
<td>404.1</td>
<td>450.3</td>
</tr>
<tr>
<td>Rich</td>
<td>86969</td>
<td>500.8</td>
<td>122.9</td>
<td>250.0</td>
<td>127.9</td>
<td>788.7</td>
<td>916.6</td>
</tr>
</tbody>
</table>

Notes:  
(a) Includes rice and non-rice food crops in terms of paddy equivalent.  
(b) Includes state taxes and cooperative fees expressed in volume of paddy equivalent.  
(c) This value is divided by the average yearly price of paddy (623 dong) in order to express it in a quantity term.

Source: Vietnamese National Institute for Agricultural Science (1991)

In another survey of a 100 farm households in the same community studied by Dao The Tuan (1993), 13 households were identified as primarily market-oriented, that is, pursuing a production strategy based on animal production, non-agricultural activities and vegetables (cash crops), and did not grow rice commercially. For these household the income derived from these high-income activities were more than sufficient to meet the food requirement of household members. On the other hand, households combining a consumption- and market-motive concentrated on rice, animal and non-agricultural activities, while households concentrating only a consumption-motive combined animal, rice and other activities, or rice, animal and vegetable production.

Examining the potential of different income groups to meet their consumption requirement out of own production after taking account of state taxes and cooperative fees, however, produces differences between all groups. Column 4 of table D.17 indicates that only poor households were worse off after meeting the demand on their food production. As a consequence, they had a shortfall of 29.4 kilograms of paddy per

\textsuperscript{19} The figure of 250 kilograms is also close to the figure of 13 kilograms of milled rice per month provided in Nguyen Van Tiem (1993:34) which when converted amounts to 260 kilograms per person per annum based on a 13 month lunar calendar.
capita. The next income group, the average income households, were left with a small surplus after meeting the demands on their food production, while rich households were definitely better off. However, examining column 6 of table D.17, which reports the net food balance (that is the gross food balance plus the non-food net income converted to a paddy equivalent), indicates that even for the poorest household group, income derived from production activities outside of traditional food crop production was sufficient to satisfy various demands on household food crop production; while average and rich group households were capable of generating income well beyond the basic requirements and obligatory payments of the household.

In reality, however, households in Quoc Tuan did not behave as just hypothesised. Given the integration of Quoc Tuan villagers into the strongly emerging market system in Vietnam, selling rice on the market was not a practice that is performed only after putting aside the household's planned food consumption requirement from season to season, active engagement in the market was a dynamic action that farm households resorted to all year round. In fact, whether the household produces entirely for its own needs or whether it produces for the market, both types of household are dependent on the market.
APPENDIX E

DERIVATION OF THE MARGINAL COST OF PRODUCTION

The following is the derivation of the marginal cost of production using the Cobb-Douglas production function specification given in equation (4.18) and defining a total cost of production for the $k$th output.

Let the cost of the $j$th variable input for the $k$th output for the $i$th household be defined as:

$$C_j = w_j x_j$$

and let the total cost of variable inputs for the $k$th output of the $i$th household be defined as:

$$\sum_{j=1}^{m} C_j = \sum_{j=1}^{m} w_j x_j$$

where the total cost of producing the $k$th output is the sum of the $j$th input times its respective price ($w_j$). Rearranging equation (E.2) and raising both sides to the power $\beta_j$ we derive:

$$\sum_{j=1}^{m} \left( \frac{C_{ij}}{w_j} \right)^{\beta_j} = \sum_{j=1}^{m} x_i^{\beta_j}$$

substitute (E.3) into (4.18) to derive:

$$Y_i = A x_0^{\beta_0} e^{u_i} \prod_{j=1}^{m} \left( \frac{C_j}{w_j} \right)^{\beta_j}$$

Now, define: \( \sum_{j=1}^{m} C_j = C_i \) and \( \sum_{j=1}^{m} \beta_j = h \), and rearrange (E.4), we get:

$$Y_i = A x_0^{\beta_0} e^{u_i} C_i^h \prod_{j=1}^{m} \left( \frac{1}{w_j} \right)^{\beta_j}$$

defining \( A_i = A x_0^{\beta_0} e^{u_i} \prod_{j=1}^{m} \left( \frac{1}{w_j} \right)^{\beta_j} \) such that (E.5) can be rearrange to yield:
\[ Y_i = A_i C_i^h \]  \hspace{1cm} (E.6)

Which can be rearranged to express the total cost function:

\[ C_i = \left[ Y_i A_i^{-1} \right]^{1/h} \]  \hspace{1cm} (E.7)

Deriving equation (E.7) with respect to \( Y_i \) yields the marginal cost of production of the \( k \)th output:

\[
\frac{dC}{dY} = \frac{1}{h} \left[ \frac{Y_i^{1-h} A_i^{-1}}{Y_i^{1-h} A_i^{1-h}} \right] 
\]  \hspace{1cm} (E.8)
Since the profit maximisation behavioural assumption is adopted in this chapter, and we are concerned with the household's short-run profit, the variable input and output prices, by assumption, are exogenous. In this study have used the observed monthly market prices for outputs and variable inputs in all estimations. As different crops have different seasonal lengths, their average market price was calculated on the basis of the duration of their season. For spring rice this was from January to June, for main rice from July to October, and for non-rice food crops and cash crops from September to January. Variable input prices for each crops were similarly derived. This procedure was adopted in order to smooth out the fluctuations in prices, especially output prices, that tend to increase before harvest and during and after harvest when prices are falling. Therefore, the smoothing process reflects the average market prices not only influencing the farmers at the time of planting but also at various stages of the cultivation period when agricultural inputs are utilised.

In deriving seasonal prices for variable inputs, a price for labour (wages) in Quoc Tuan was not observed. Wage data are not readily observed because most households usually employ only household labour. However, wage data from a nearby cooperative (Cong Hoa) was available for the 1991 agricultural year. The information provided shows that farmers were paid a wage of 375 dong per hour or 3000 dong per day based on an eight hour working day. In order to substantiate whether 3000 dong per day per adult worker is an acceptable wage rate, it should be more or less equivalent to a subsistence level of rice required for household consumption per day. A general rule of thumb is that an adult consumes about 13-15 kg of milled rice per month or 20-23 kg of paddy (Nguyen Van Tiem 1993). For the average household of 4.5 persons (assuming an adult equivalent of 2.7) as in Quoc Tuan, this should be equivalent to 1.9-2.2 kg of paddy per day. At the prevailing price in 1991 paddy was 1500 dong per kg. Thus a daily wage of 3000 dong per day purchased the average household 2 kg of paddy. Since the daily wage rate in paddy equivalent falls within the calculated subsistence range of 1.9 - 2.2 kg we accept the wage rate as being valid. Therefore, this wage rate was used as the daily wage rate for household labour in Quoc Tuan.
However, it was adjusted to reflect the daily wage of an adult worker for the 1990 agricultural year using following two methods:

- Firstly, using the general price index reported in GSO (1992a:210), the daily wage rate of 3000 dong was discounted for every month of 1990. Following this, the daily wage was calculated in accordance with the duration of the season for each crop.

- Secondly, the wage rate was deflated by a paddy price index in order to derive the equivalent monthly wage rates in 1990. This method fixes the wage rate to a ratio of two kilograms of paddy for one day's work, on average.

The prices and wage rates are reported in table F.1.

Table F.1: Prices used in the profit maximisation model

<table>
<thead>
<tr>
<th>CROP</th>
<th>Output</th>
<th>Urea</th>
<th>Phosphate</th>
<th>OF</th>
<th>Wage Method I</th>
<th>Wage Method II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring Rice</td>
<td>483.2</td>
<td>643.3</td>
<td>299.2</td>
<td>5.5</td>
<td>1923.9</td>
<td>966.3</td>
</tr>
<tr>
<td>Main Rice</td>
<td>657.6</td>
<td>1375.0</td>
<td>318.3</td>
<td>6.6</td>
<td>2260.4</td>
<td>1315.2</td>
</tr>
<tr>
<td>Non-rice food crops</td>
<td>871.0</td>
<td>1600.0</td>
<td>376.7</td>
<td>7.7</td>
<td>2570.7</td>
<td>1950.0</td>
</tr>
<tr>
<td>Cash crops</td>
<td>2700.0</td>
<td>1600.0</td>
<td>376.7</td>
<td>7.7</td>
<td>2570.7</td>
<td>1950.0</td>
</tr>
<tr>
<td>Annual average</td>
<td>622.9</td>
<td>1096.7</td>
<td>318.8</td>
<td>6.3</td>
<td>1245.8</td>
<td>2150.0</td>
</tr>
</tbody>
</table>

Source: Vietnamese National Institute for Agricultural Science (1991)

Both sets of calculated wages were utilised in the estimation of the production parameters in the systems of equations specified in equations (4.31) and (4.32) in Chapter 4. A comparison of the magnitude of the labour coefficient for each crop from the first method which contrasts sharply with the second method suggests that labour in the first method is the most dominant factor in production. As a consequence, the impact of land in the production process is understated in the first method. Furthermore, the magnitudes of the other variable inputs are similar under both methods. As the estimated production parameters from the first method of wage calculation suggest that wages are over-estimated, considering the magnitude of the coefficient on labour and that the results obtained from the second method of wage calculations are more in line with other empirical studies done in countries with similar physical constraints, the second method then appears to be consistent with reality in Quoc Tuan and the RRD.
**APPENDIX G**

**DIAGNOSTICS OF PRODUCTION COEFFICIENT ESTIMATES**

Table G.1: Production function diagnostics

<table>
<thead>
<tr>
<th>CROP</th>
<th>HET</th>
<th>RESET</th>
<th>Corrected HET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring Rice</td>
<td>1.44</td>
<td>0.41</td>
<td>-</td>
</tr>
<tr>
<td>Main Rice</td>
<td>7.50*</td>
<td>0.06</td>
<td>1.45</td>
</tr>
<tr>
<td>Non-rice food crops</td>
<td>2.34</td>
<td>0.39</td>
<td>-</td>
</tr>
<tr>
<td>Cash crops</td>
<td>8.86*</td>
<td>0.04</td>
<td>0.02</td>
</tr>
</tbody>
</table>

**Notes:**
HET=Heteroscedasticity measured as $E=f(\hat{Y})$ and distributed as a chi-square with 1 degree of freedom.
RESET=Ramsey reset specification using powers on $\hat{Y}$ and distributed as a F-test dfl = 1 and df2=92.
*=Production function that rejects the null hypothesis at 5%.

Table G.2: Test of profit maximising restrictions (a)

<table>
<thead>
<tr>
<th>CROP</th>
<th>Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring Rice</td>
<td>0.1255*</td>
</tr>
<tr>
<td>Main Rice</td>
<td>0.2874*</td>
</tr>
<tr>
<td>Non-rice food crops</td>
<td>0.3030*</td>
</tr>
<tr>
<td>Cash crops</td>
<td>0.0455*</td>
</tr>
</tbody>
</table>

**Notes:**
(a) The log-likelihood ratio test was used on the unrestricted and restricted systems of equations. This has a chi-square distribution. See Maddala (1977:43-44).
** The restrictions on all production functions hold at the 1% critical value of 13.28. Therefore, we do not reject the null hypothesis.
APPENDIX H

A STATISTICAL EVALUATION OF CHAYANOV'S ASSERTION ON LABOUR EFFORT

Table H.1: Average workdays spent in various production activities by households across different consumer-worker groups

<table>
<thead>
<tr>
<th>Labour Activities</th>
<th>CW Group</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low (1.0-1.5)</td>
<td>Medium (1.5-2.0)</td>
<td>High (Above 2.0)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>195</td>
<td>255</td>
<td>279</td>
<td></td>
</tr>
<tr>
<td>Crop Production</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring rice</td>
<td>95</td>
<td>121</td>
<td>155</td>
<td></td>
</tr>
<tr>
<td>Main rice</td>
<td>38</td>
<td>47</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Non-rice food</td>
<td>5</td>
<td>8</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Cash crops</td>
<td>14</td>
<td>20</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Garden</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Animal Production</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pig</td>
<td>57</td>
<td>76</td>
<td>69</td>
<td></td>
</tr>
<tr>
<td>Other livestock</td>
<td>18</td>
<td>26</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Artisanal</td>
<td>43</td>
<td>58</td>
<td>55</td>
<td></td>
</tr>
</tbody>
</table>

Testing Chayanov's assertion, table H.1 depicts the relationship between labour intensity measured in the average number of workdays across various production activities for the agricultural year and the CW ratio, which is divided into a low, medium and high groups. It is clear that as we move from one CW group to the next highest, the corresponding number of workdays spent by the average household in all production activities also increases. This relationship is maintained in crop production but not in animal or artisanal production.

In animal and artisanal production, labour intensity increases on average for households in the medium CW group but then declines slightly for households in the high CW group. A closer look indicates that in crop production the intensity of labour increases across all crops with the exception of non-rice food crops, which again follows an inverted "U" shape. In rice, cash crop and garden production the intensity of labour increases consistently for the average household across all CW groups. In animal production, labour intensity in pig production increases consistently across all CW
groups but in other livestock production declines sharply for households in the high CW group. These trends suggest that the high CW households are spending relatively more working days in crop production, especially rice production, because such households are more concerned with achieving subsistence through rice cultivation relative to the other production.
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