

**The WTO AoA Impact on the World Rice Price and Poverty in
Thailand**

An Honors Thesis for the Department of Economics

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Abstract

In September 2003, trade negotiators representing the WTO member countries met in Cancun, Mexico to negotiate a new Agreement on Agriculture (AoA) under the Doha Round. The talk collapsed a few days into the negotiation. The question for Thailand remains, however: as a developing country and the world's largest exporter of rice, should Thailand seek to ensure a successful negotiation of a new AoA? Some argue that the Thai economy may have developed sufficiently that the gain from further agricultural trade liberalization may no longer be significant.

This study is an assessment of the distributional impacts on poverty of the WTO AoA, looking through changes in world rice prices. The study seeks to answer three major questions: 1. How will the Agreement affect world rice prices? 2. Who will gain and lose from a change in world rice price? 3. Who are the poor in Thailand and has the poverty picture in Thailand changed substantially since 1994? My hypothesis is that despite the decreasing importance of the agricultural industry in Thailand, rice-farming is still a major determinant of poverty, and Thailand should still gain from further global agricultural trade liberalization via the second phase of the WTO AoA.

My analysis indicates that further trade liberalization should lead to an increase in world rice price. The major beneficiaries of this rice price increase will be rice-farming households, farm workers, and unskilled labor; assuming that rice-farming households are net producers, and that wages would increase more than the increase in rice price. Due to the impact of poverty eradication programs in Thailand a smaller share of the poor will benefit from further agricultural trade liberalization resulting in an increase in rice price. However, despite this decline, the study finds that the majority of the poor would still gain from a successful negotiation of the AoA under the Doha Round.

Introduction

In September 2003, trade representatives from WTO member countries met in Cancun, Mexico to negotiate a new Agreement on Agriculture (AoA) under the Doha Development Round. The talk collapsed a few days into the negotiation, due partly to the disagreement over further liberalization in the global agricultural trade. While many developing countries were celebrating their “victory” in standing up against the developed countries, free trade proponents argued that the collapse of the agreement was actually a substantial blow to the world’s poor. My initial questions are: Who is right in this debate over the impact of the AoA, and, as the world’s largest exporter of rice, what are the implications for Thailand?

Some economists argue that development in the agricultural sector will have a significant impact on poverty alleviation only when the country is at the low-income level (Hossain, 2001). The first phase of the AoA was implemented in 1995 and prior to its implementation, economists predicted that there would be a positive impact on Thailand and on poverty alleviation. The first phase of implementation proved to have limited impact, however, since although policy trade barriers and subsidies were officially lifted on paper, this was not implemented in practice.

The second phase of the agreement is currently being negotiated under the Doha Round, and in the ten years since the first agreement the Thai economy has substantially developed. Real GDP per capita has grown significantly despite the setback caused by the 1997 Financial Crisis; the poverty rate has declined substantially; and the share of the agricultural sector of GDP has been on the downward trend (Poapongsakorn, 2002). Thus,

the Thai economy may have improved so much that the benefits of poverty alleviation from further agricultural trade liberalization may no longer be significant.¹

The goal of this paper is to analyze the validity of the above claim using empirical analysis. This study will examine the impact of the AoA on world rice price and poverty in Thailand. Changes in rice prices have significant impacts on poverty in Thailand for the following reasons: 1) Thailand is the world's largest exporter of rice; 2) staple diet of the population is rice; 3) the poor tend to spend a larger share of their consumption expenditure on rice relative to those at higher income levels; and 4) a large percentage of the poor are involved in rice-farming. Furthermore, to understand how the Agreement may affect poverty, it is important to answer three questions: 1) How will the Agreement affect world rice prices? 2) Who will gain and who will lose from a change in world rice price? and 3) Who are the poor in Thailand and has the poverty picture in Thailand changed substantially since 1994?

In this study I will use literature from the field to address questions 1 and 2. In addition, to address question 3, I will compare the poverty pictures of Thailand between 1994 and 2002 by constructing poverty profiles and using PROBIT regressions to analyze the determinants of poverty in Thailand. My hypothesis is that despite the decreasing importance of the agricultural industry in Thailand, rice-farming is still a major determinant of poverty, and Thailand should still gain from further global agricultural trade liberalization via the second phase of the WTO AoA.

This paper is divided into eight major sections. The first section provides an overview of the WTO AoA and suggests how further liberalization in global agricultural

¹ For further discussion on the impact of agricultural liberalization on poverty alleviation, see Hossain (2001)

trade will affect international rice prices. More details on the importance of rice in Thailand are given in the second section. The third section explores how a change in world rice price would affect the poor in Thailand, focusing on the price pass-through from the international to domestic level, and on past studies to determine the major beneficiaries and losers from a change in rice price. The fourth section discusses past studies on poverty profiles and determinants of poverty in Thailand. The fifth section elaborates the methodology used in this study. Data used in the study are detailed in the sixth section. The results of the study are then presented and discussed in the seventh section. The last section concludes the paper and suggests policy implications and topics for further studies.

The results of my study confirm my hypothesis that as the Thai economy becomes more developed, the liberalization of agricultural trade has a less significant impact on poverty alleviation. The three major findings are as follows: 1) any further agricultural trade liberalization resulting from the Doha Round should lead to an increase in world rice prices. Further, since the Thai rice market is well-integrated, this price increase at the international level would be transmitted down to the farmgate level. 2) Three major groups would benefit from an increase in rice price: a) rice-farming households, b) farm labor and c) unskilled labor. Moreover, since more than 90 per cent of rice-farming households in Thailand are net sellers of rice, they would benefit most from an increase in rice price. In addition, since a price rise would increase demand for farm and unskilled labor, these groups would also likely gain from an increase in rice price, provided that the increase in wages would outweigh the increase in rice price. 3) The poverty profiles and PROBIT regression results indicate that poverty remains highly pervasive among these

three groups. However, from 1994 to 2002 poverty has been significantly reduced in Thailand, resulting in a smaller share of the poor who would gain from further agricultural trade liberalization. Assuming that wage increases would be higher than the rice price increase, about 62 per cent of Thailand's poor would benefit in 2002, compared to about 70 per cent in 1994. Despite this decline, however, the majority of the poor would still gain from a successful conclusion of the second phase of the WTO AoA.

1. Background of the WTO AoA

Trade in agriculture represents a significant share of world trade. In 2001, world agricultural trade was worth US\$547 billion, accounting for 9.1 per cent of total merchandise trade (WTO, 2004a). Furthermore, agricultural trade plays an important role in many countries as part of domestic agricultural production and employment. In the majority of developing countries, the poor are concentrated in rural areas and are engaged in agricultural employment; thus agricultural trade can play a major role in global poverty (Anderson, 2003). On the other hand, global agricultural trade has been the most distorted sector in the international system, with developed countries providing high level of protection and support to domestic farmers (WTO, 2004b). Given the importance of agricultural trade, much effort has been dedicated to address these distortions. The WTO AoA, created in January 1995, has been the most comprehensive and far-reaching effort to date aimed at introducing market orientation into agricultural trade.

1.1 The Agreement in Theory:

Prior to the AoA, the agricultural trading system was in disarray and world agricultural prices were severely depressed. To address this problem, the Uruguay Round AoA was negotiated and came into effect on January 1, 1995 with the long-term objective of reforming the world agricultural trading system by establishing a fair and market-oriented system. The AoA specifically addressed three principle areas: 1) improvement of market access; 2) reduction of domestic support; and 3) reduction in export subsidies. (WTO, 2004b)

Market Access:

The AoA required member countries to convert non-tariffs barriers (NTBs) to tariffs that would provide an equivalent level of protection. The AoA also called for developed countries to reduce their tariffs by 36 per cent on average on all agricultural products, with a minimum cut of 15 per cent for any product over a six-year period, starting in 1995. Developing countries committed to reducing their tariffs by 24 per cent on average, and 10 per cent minimum over a ten-year period. The least-developed countries were required to bind all agricultural tariffs, but were not required to undertake any tariff reductions. (WTO, 2004b)

The AoA also called for tariff quota and minimum access requirements from member countries. Countries were required to maintain current import access opportunities at the levels of the 1986-1988 base period. Furthermore, countries that imported less than 5 per cent of domestic consumption of a certain agricultural product were required to provide minimum access opportunity. (WTO, 2004b)

Domestic Support:

Under the AoA, domestic support is regulated but leaves governments with enough flexibility to form their own agricultural policies. To achieve this aim, domestic support measures are divided up into two main categories: the “Green Box” and the “Amber Box”.

Domestic support measures that fall under the “Green Box” are required to have no trade-distorting effects or effects on production. These measures are exempted from reduction commitments and can be increased without any limitations from the WTO. On the other hand, support measures that fall under the “Amber Box” are trade-distorting and

are subject to reduction commitments. These measures are expressed as “Total Aggregate Measurement of Support” (Total AMS), which combine product specific and non-product specific supports. Developed countries were required to reduce their total AMS by 20 per cent over a six-year period, and developing countries were required to reduce their total AMS by 13 per cent over a ten-year period. (WTO, 2004b)

Export Subsidy:

Finally, the AoA required developed countries to reduce their export subsidies in equal annual steps over a six-year period. Volume and value of subsidized exports were required to be reduced from the base period by 21 per cent and by 36 per cent, respectively. For developing countries, the corresponding figures were 14 per cent and 24 per cent, with a ten-year implementation period. (WTO, 2004b)

Mechanisms to Affect World Rice Price:

Prior to the AoA, world agricultural trade and prices were adversely impacted by the distortions in consumption and production patterns. Many countries, primarily developed ones, used import access restrictions, domestic subsidies, and export subsidies to create markets or demands for domestic production. This section addresses the theoretical impact of the AoA on rice prices and is followed by a discussion of the actual impacts.

Theoretically the market access provision clause of the AoA should raise international rice prices. This is a direct result of the following: an increase demand and a cut the supply of rice. Import barriers protect domestic producers by restricting imports, leading to higher prices in the domestic market than in the world market. In turn, this leads to surplus resources being devoted to the production of rice. Elimination of import

tariffs would raise the demand for imported rice, while the lower prices would decrease domestic supply, thus placing upward pressure on world agricultural prices. (Diao et al., 2001)

The domestic support clause of the AoA should put an upward pressure on world rice prices primarily through addressing the overproduction problem of rice. Domestic support can be generally categorized into: market price support, payments for production, input subsidies, and income payments (Soledad Bos, 2003). In general, these supports distort market signals, which are the best guide to allocation of resources in the agricultural sector. Since subsidies reduce production costs, they cause farmers to overproduce. Hence, reduction in domestic support would lead to a decrease in returns to farm production factors and thus would raise world rice prices. (Diao et al., 2001)

Similar to the domestic support clause, the export subsidies clause of the AoA should lift international rice prices by addressing overproduction or excess supply in the world market. The effects of this type of subsidy are as follows. Firstly, other agricultural exporters would be adversely affected by these subsidies since their market shares and export earnings would decrease. If the decline in world prices is transmitted to the domestic markets, producers would lose and consumers would gain. However, the effects are worse in the long-run since prolonged depressed prices can undermine investment and growth in the sector. (Pearce & Sharma, 2000)

Predictions of the Effects of AoA on World Rice Price:

Since the world rice market is very thin, with only 4-5 percent of production being traded internationally, small changes in supply and demand patterns can substantially impact the world price. Yap (1996) uses the World Food Model to predict

the effects on world rice production, consumption, trade, and price. Table 1.1 provides a summary of the projections of the model. Most importantly, the model projects that the Agreement would increase world rice price by 8 per cent.

It is useful to also consider projections of other models on the effects of AoA on world rice price. Table 1.2 shows the results of the various models that evaluated the implications of the AoA on international rice market. As the table indicates, various models project different effects of the AoA on world rice price. These variations arise from the different assumptions on specific reduction commitments, practices of tariff reduction, base periods to apply reduction commitments, etc (Sharma, Konandreas, & Greenfield, 1996). Despite the large variations between the projections, all of them project that the AoA would have positive impact on world rice trade and price. These predictions range from 0.7 per cent to 12.5 per cent.

To conclude, the WTO AoA was created in 1995 to address the high levels of distortions in the global agricultural trading system. Economists predicted that the major clauses to regulate import barriers, domestic support, and export subsidies would exert strong upward pressure on the world rice price. Having analyzed the theoretical predictions in this section, the next section will discuss the effectiveness of the Agreement when put into practice and the gaps between theory and reality.

1.2 The Agreement in Practice

As of 2004, the first phase of the implementation period of the AoA for developed countries has been completed. In the following section, I will briefly discuss what measures developed and developing countries have taken, especially in the area of rice prices, in order to analyze whether the AoA has had any of the predicted positive impacts

on the world rice price. Specifically, I will focus on a) market access; b) domestic support; and c) export subsidy provisions as they relate to the global rice market.

A) Market Access:

Most developed countries and most developing countries have complied with their commitments to provide market access to foreign agricultural products. However, these commitments are not as substantial as were originally planned (Sumner & Lee, 2000). For example, reductions in tariff barriers apply to bound rates rather than applied rates of the member countries. In the cases of many developing countries, applied rates are on average already much lower than bound rates. Moreover, many developed countries have selected a base period in which tariff rates were unusually high. Thus, the actual tariff reduction was small. (FAO, 2003)

In addition to tariff reductions, some countries have committed themselves to providing minimum access opportunity. However, in many cases such as Thailand, the Philippines, and Indonesia, the commitments were significant only on paper and were not translated into reality. Japan and South Korea were the only two countries that have any significant effects on the world rice market that actually implemented their commitments to provide minimum access opportunities. (Sumner & Lee, 2000)

To put this in the context of Thailand, Poapongsakorn (2002) investigated whether the market access provision requirement under the AoA was partly responsible for the recent growth in the country's rice export.² His findings indicate that due to the lack of effective enforcement mechanisms, the effect of the AoA on rice exports was not statistically significant. Rather, the author argues that the most important factors

² Thailand had an average growth rate in real export value of 5.1 per cent from 1995 to 2001.

explaining the increase in Thailand's rice export are the El Nino and La Nina climate events and the depreciation of Thai currency in 1997-8. (Paopongsakorn, 2002)

B) Domestic Support:

Since the reduction in domestic support applies to the aggregate level of support for all commodities, and rice is an important staple for many countries, there has been little headway made in terms of reducing domestic support on rice production. Among the OECD countries, the producer support estimate (PSE) for rice was 76 per cent in 1997-99, the highest among agricultural products.(Gulati & Narayanan, 2002)

Furthermore, many countries had simply converted their domestic support programs from the "Amber Box" to the "Green Box", rather than reducing the actual level of support.(FAO, 2003)

C) Export Subsidy:

Since 1994, developed countries, especially the European Union and the United States, have continued to use export subsidies to promote their agricultural exports. The U.S. relies on its export credit guarantee program to promote rice exports, which is not curtailed by the AoA since the program falls under the "Green Box" criteria. The EU also continues to heavily subsidize their rice exports: as much as 65 per cent of EU's total rice exports receive subsidies, which were as high as US\$322 per ton on average from 1995-1998. Furthermore, both the U.S. and the EU continue to use their food aid programs, which do not fall under the AoA, to export their rice surpluses to poor countries. (Gulati & Narayanan, 2002)

Effects of the Agreement on World Rice Price:

There have been very few empirical studies to assess the actual effects of the Agreement on the world rice price even though the implementation period is over. World rice prices had been declining since 1980 and reached a 20-year low in 2001 (Poapongsakorn, 2002). Sumner and Lee (2000) noted in 2000 at the five-year point that there is little data for a period in time when many different events could have impacted the world rice price and trade. These events include: 1) The new 1996 U.S. Farm Act; 2) major El Nino and La Nina climate events; and 3) The Asian Financial Crisis.

However, there is evidence that the world rice price might have declined even further had the AoA not been in place. Sumner and Lee prove this point by looking specifically at the high-quality japonica rice market. Under the AoA, Japan had to allow approximately 0.35 million tons of japonica rice to be imported into the country, accounting for about 25 per cent of total world trade in japonica rice. In theory, such an increase in imports should boost world demand, resulting in a positive effect on the world price. However, Sumner and Lee found that, holding the price of indica rice constant, an increase in 0.5 million tons of imports of japonica rice would raise the price of California high-quality japonica rice by US\$16.50 per ton. (Sumner & Lee, 2000)

Two main conclusions can be drawn from this section. First, despite some progress made under the first phase of the AoA, the world agricultural trading system remains highly distorted. This problem arises from the loopholes and open-ended structure of the Agreement. Secondly, the commitments made by member countries under the AoA have had marginal impact on world rice trade during the first phase of the

implementation period. Thus, the success of the Agreement rests in future negotiations in which further liberalization may be achieved.

1.3 The Doha Round

The ineffectiveness of the Uruguay Round AoA does not necessarily imply the end of agricultural trade liberalization. In early 2000, trade negotiators attempted to address these problems by negotiating a new AoA under the new WTO Doha Round, which is scheduled to be concluded in January 2005. However, despite the recent failure of the Cancun talks, many economists and trade negotiators still have hopes for future negotiation. Therefore, the purpose of this section is to provide an analysis of what further liberalization in the agricultural sector would entail, especially for the world rice market.

The Doha Round is formally called “Doha Development Round,” in which the major focus is reducing the world’s poverty level. As a result, agriculture plays a big role in the negotiations. In the Doha Declaration, member countries reconfirmed their commitments in the further liberalization of the world agricultural trade. The three main areas of focus have remained the same: reduction in trade barriers; reduction and potentially phasing out of export subsidies; and reduction in domestic support. In addition, the Declaration stipulated that “the outcome should be effective in practice and should enable developing countries to meet their needs, in particular in food security and rural development.”(WTO, 2004c) Thus, in theory, the negotiations should bring about a new AoA, in which the shortcomings of the previous Agreement are addressed.

An important issue in this Round is the actual level of commitment that member countries are willing to commit to, but this is beyond the scope of this essay.³ In this next section, thus, I will analyze the impact of further agricultural trade liberalization on the global rice markets. The analysis that follows based on Diao et al (2001), which assesses the effects of liberalization on the world rice market based on two indicators: changes in world rice price and changes in world trade.

Diao et al (2001) ran various simulations to assess the effects of a full reform in tariff barriers, domestic support and export subsidies on the world agricultural market, with rice being a major sector under examination. In addition, the study also provides a break-down of how elimination of each type of policy would affect world prices, thus allowing us to better understand the degree of market distortion of each type of policy. The analysis is based on 1998 levels of applied agricultural tariffs, domestic support, export subsidies, and tariff rate quotas. Table 1.3 illustrates the levels of trade protection and support of the base year (1997). Bound tariff rates are used in the cases where applied rates are not available. The table shows that the world average tariff rate for rice is among one of the highest for agricultural products. Furthermore, within the developed country group, the protection rate for rice is the highest compared to other agricultural products. The average rates of export subsidies and domestic supports are also moderately high for rice. Thus, it can be seen that the rice market remains highly distorted.

³ As the Cancun Talk collapsed in September 2003, many now doubt whether the Agreement will be able to meet its deadline of January 2005. However, important negotiations resumed in March 2004, and members are committed to agree on a framework by July 2004. Successful outcome of the negotiation now largely rests on political commitments of member countries, especially the developed countries that have maintained high level of protection on domestic agricultural industries. (Australian Department of Foreign Affairs and Trade, 2004)

Diao et al noted estimations could be inaccurate due to the following factors: 1) Overestimation because many countries have undergone tariff reductions since 1998 and bound rates tend to be higher than applied rates; and 2) Underestimation due to the various non-tariff barriers that are still in place.

Diao et al found that further liberalization in global agricultural trade would increase the world price of rice by 10 per cent. Figure 1.1 shows the decomposition of the price effects. A few things should be noted. First, 60 per cent of the rise in price is accounted for by the lifting of trade barriers. Meanwhile, elimination of export subsidies has the least effect on world rice price (15 per cent). This is confirmed by Hoekman et al (2002), who find that “tariff reductions generate welfare gains that are a multiple of what can be obtained from reductions in support policies” (Hoekman, Ng, & Olarreaga, 2002). Second, agricultural liberalization in the developed countries accounts for about 80 per cent of the rise in world agricultural prices because developed countries import more agricultural goods than developing countries, and these countries also have more trade-distorting policies (Diao et al., 2001). Thus, based on this evidence, we can conclude that the elimination of trade barriers in developed countries would have the biggest impact on world rice price.

In terms of the impact on world agricultural trade, global agricultural liberalization would increase its value and volume by 29.7 per cent and 14.6 per cent, respectively. The effects are even more pronounced on the world rice trade. In addition to the world rice price increase, the value of rice trade would increase by 78.1 per cent, while the volume would increase by 47.2 per cent. This would have substantial positive

effects on world rice price volatility.⁴ Again, the results suggest that the increase in trade is due mainly to the elimination of agricultural support and trade protection in the developed countries, accounting for 70 per cent of the increase. (Diao et al., 2001)

Two conclusions can be drawn from this section: 1) Further liberalization in the agricultural trade would substantially increase world rice price and trade; and, 2) Most of the increase would come from agricultural liberalization of the developed countries' markets, especially in the lifting of trade barriers. Having explored the linkage between the AoA and an increase in world rice price, it is now important to examine how this rise in rice price will affect the poor in Thailand. In the next section, I will begin by discussing the importance of rice in Thailand.

⁴ The increase in trade will “thicken” the rice market, making prices less vulnerable to small changes in supply and demand.

2. The Importance of Rice in Thailand

Before exploring into how change in rice prices would affect the poor in Thailand, it is important to first examine the role rice plays in the country and her economy. It should also be noted that although rice is still an indispensable factor to the Thai population, its contribution to the country's economy has been constantly declining over the years.

Rice is an essential part of Thai people's livelihood and Thailand's economy. Since rice is the only staple food grain in Thailand, data in 2002 show that over 95 per cent of Thai households consume rice and rice accounts for over 40 per cent of the calorie intake in the Thai diet. (Wiboonponse & Chaovanapoonphol, 2001). Furthermore, the poor also tend to spend a large share of their income on rice. In the same year, poor households in Thailand spend close to 15 per cent of their consumption expenditure on rice. (Isvilanonda, Ahmad, & Hossain, 2000)

In 2002, about 67.4 per cent of the Thai population live in rural areas and of these, almost 30 per cent are engaged in rice-farming. Moreover, poverty in Thailand is generally concentrated in the rural areas: as of 2002, the poverty rate in rural Thailand stood at 15.0 per cent, whereas urban rate was only at 2.0 per cent. (Author's calculations)

Rice cultivation also plays a major role in the Thai labor market. In 1996-7, absolute employment in the rice sector was 10.05 million, translating into 29.06 per cent of total labor force, and 63.81 per cent of total agricultural labor (see Table 2.1) (Isvilanonda et al., 2000). However, the importance of rice farming has been declining in recent years. In 2002, 3.2 million households were involved in rice-farming, a decline from 3.8 million in 1994 (Author's calculations).

As of 2001, rice accounts for about one-third of the total value of crop production, taking up an average of 51.81 per cent of total crop area (Isvilanonda, 2001). Figure 2.1 indicates that rice has always been the most important crop in Thailand in terms of value added, accounting for almost 30 per cent of total value added. However, Figure 2.1 also indicates that the Thai agricultural sector has become more diversified, as the share of rice to total value added from crops has declined over the years.

Rice is also Thailand's major export crop. In the 1998/9 crop year, of the 15.2 million tons of production, 9.1 million tons were for domestic consumption and 5.7 million tons for exports. This accounted for 13.42 per cent of total value of agricultural exports and generating 74 billion baht (US\$ 1.94billion)⁵ in export earnings in 1999. However, as the economy has become more diversified, the rice share of agricultural exports has experienced a declining trend over the years. Rice share of agricultural exports peaked at 33.5 per cent in 1965, but has been decreasing constantly since (Paopongsakorn, 2002). Lastly, Thailand remains to be the world's largest exporter of rice. In 2000, Thailand's volume of rice export was almost twice the export volume of Vietnam, the second largest world exporter. Thus, we can see that changes in price of rice can have significant impact on the Thai economy and Thailand's poor.

⁵ The average exchange rate in 1999 was approximately 38 Baht per US\$

3. World Rice Price and the Poor in Thailand

Considering the possible impact of a new AoA on rice prices and the importance of rice in Thailand, it is important to examine the literature relating to how increase in the world rice price would affect the poor in Thailand. This section will be divided into two parts to consider this issue. The first will investigate the rice price pass-through from the international to the domestic level. The second part will suggest the major beneficiaries and losers of a rice price increase. Specifically, this section will discuss the various approaches that have been used to assess the effects of rice price changes on rice economies and the different parties involved. These studies include: (a) a partial equilibrium approach by Deaton (1989); (b) a general equilibrium approach by Warr (2001); (d) a micro-macro synthesis approach by Hertel et al (2003)⁶. Since further liberalization would primarily entail a rise in world rice price, we can infer from these studies how changes in rice price would affect the poor in Thailand.

First, then, it is important to assess the theoretical impact of changes in rice price on Thailand's poor. Theoretically, an increase in world rice price should have positive effect on the poor, at least for net-exporting country like Thailand. The effects on the poor can be divided into two sides—the consumption side and the income side. On the consumption side, all poor households would see a loss in welfare as they face higher food prices. However, certain groups, such as the producers of rice, would benefit from the higher food prices. Thus, it is important to determine which groups are net consumers and which are net sellers of rice.

⁶Appendix B provides brief explanations and usage of each of these approaches

Anderson argues that as long as the rise in world price is transmitted to the domestic level, a majority of the poor would benefit. This is because most of the poor are involved in agriculture—specifically rice-farming—and are thus net sellers of rice. In addition, landless farm laborers, who are net buyers of rice, would also benefit because of an increase in demand for their unskilled labor. The resulting rise in unskilled wages would be transmitted throughout the economy, thus a gain for unskilled labor. This is under the assumption that the increase in wage would offset the rise in food price. Within the urban area, the only vulnerable group is the under-employed urban poor (Anderson, 2003). However, Anderson argues that “they may not be worse off because the trade reform would be likely to generate a more-than-offsetting increase in the demand for their (often informal sector) services” (Anderson, 2003). Thus, theoretically agricultural trade liberalization should be beneficial to the poor in Thailand, even though the benefits may not be captured equally.

3.1 Price Pass-Through:

To assess the theoretical impact of the changes in world rice price on the poor in Thailand, it is first important to investigate how the change in world price would be transmitted to and throughout the domestic level. This is explored by a study by Vanichjakvong that tests whether the Thai rice market is vertically and spatially integrated: If the market were vertically integrated, the change in price at the export level would be passed on to the retail, wholesale, and farmgate prices. Spatial market integration is the “linkage of prices between the distinct markets that trade among one another.”(Vanichjakvong, 2002) Based on monthly price data from 1986-1995,

Tonpuattana has estimated the price transmission elasticities⁷ between wholesale rice prices and export price to be between 0.80 and 0.97.⁸ Lower grade rice tends to have higher price transmission elasticity because it is not required to be mixed before being exported. Hence, these values indicate that the market is vertically integrated at the export and wholesale level.

Vanichjakvong also found that there is evidence of integration between the wholesale rice market in Bangkok and local paddy market. This meant that in an event of a supply shock, the wholesale price would adjust according to the paddy price, and vice versa for a demand shock. Furthermore, the author also discovered that the rice markets in Thailand are spatially integrated, suggesting that changes in price would be transmitted throughout the central markets for paddy trading across the country (Vanichjakvong, 2002). Thus, we can see that any change in world price would also be experienced at the local level.

3.2 Effects of Rice Price Changes on the Poor:

As discussed above, a change in the international rice price will be passed down to the domestic level in Thailand, and thus, this section will determine the effects of such rice price changes in Thailand. Specifically, I will focus on which groups would be the major beneficiaries and losers as a result of rice price increase. The partial equilibrium approach provides an easily comprehensible map of the effects of rice price changes across different levels of households in Thailand; thus, the first section will discuss this approach using the findings in Deaton (1989). Deaton uses the partial equilibrium approach to examine how rice prices, which are influenced by government policies, affect

⁷ Elasticity of price transmission between price j and price i is defined as a percentage change in price j due to one percentage change in price i .

⁸ as qtd. in Vanichjakvong (2002)

distributions of real income across different households. Moreover, the author is concerned with how supply, demand, and living standards are related to one another. The study uses Thailand's Household Socio-Economic Survey (SES) of year 1981/2 to describe the consumption and production patterns for rice in relation to household characteristics.

On the consumption side, most households—especially the poor—would experience a loss of welfare as a result of rice price increase. Figure 3.1 shows two major findings regarding household rice consumption pattern in Thailand. First, confirming Engel's Law, the poor generally spend a larger share of their income on rice, as can be seen in the downward slopes of the curves. Secondly, given the same level of income, an urban household is more likely to spend a smaller share of its income on food than a rural one.⁹ Thus, poor households located in rural areas will be the group most adversely affected in terms of consumption of a price rise. On the income side, Deaton looks primarily at rice-producing households. Since these households derive their income from profits from rice-farming, they would gain from an increase in rice price.

Since there are two effects in play, it is important to determine which households are net sellers and which are net buyers. To do this, Deaton calculates for each household the *net consumption ratio*, which is defined as “the elasticity of the cost of living with respect to the price of good i ” (A. Deaton, 1989). For net sellers of rice, the ratio will be negative, and positive for net buyers. These net consumption ratios are then used, with respect to household characteristics, to determine the distributional effects of rice price changes. The findings indicate that all urban households are net buyers, since they do not

⁹ Deaton does not give an explanation to why this is the case but suspects that it might be due to lower prices or other factors associated with urbanization.

produce any rice. For rural households, the net ratio varies across households. Figure 3.2 shows the net benefit ratios (opposite of net consumption ratios) across all levels of rural households. It should be noted that the ratios are positive for all rural households, but tend to be the highest for the middle-income households.

Deaton concludes that higher rice prices can be expected to make urban households worse off, while providing immediate direct benefits to rural households at all standards of living. However, the main beneficiaries are not the poorest households, or surprisingly the richest households, but the ones in the middle of the rural income distribution. Thus, while it is true that richer rice farmers produce and sell more than do smaller and poorer farmers, and that richer farmers tend to be net sellers of rice, the study illustrates that higher rice prices would not benefit them disproportionately.

Although this study provides valuable information as to who are the major beneficiaries and losers of a rice price increase, there are certain limitations to its usefulness. First, the assessment is based on data from more than twenty years ago. Thus, a more recent picture of the Thai economy is needed for a better understanding of how further liberalization in agricultural trade would impact the poor households in Thailand. For example, as rice farming has become less important to the Thai economy and fewer rural households are involved in rice-farming, a smaller number of rural households would gain from an increase in rice price. Another drawback to this study is that it does not take into account the effects on wages resulting from a rise in rice price. In Thailand rice farms are heavily dependent on wage laborers. In 1998, depending on different regions, hired labor accounted for 22.5 to 63.3 per cent of total labor used in rice cultivation (Isvilanonda et al., 2000). As mentioned earlier, the group of households

providing farm and other unskilled labor should benefit from a rise in rice price. It is thus useful to turn to the general equilibrium approach, which provides an analysis of the shock on the whole economy, not just rice-producing households.

Warr (2001) uses a disaggregated general equilibrium model to find the optimum export tax for rice in a second-best scenario. Using Thailand's Household SES of 1988, the author estimates a complete consumer demand system and a set of equations determining the incomes of households from their ownership of factors of production. Although the study is not specifically focused on the effect of a rise in price of rice on the rural sector, much can be inferred from the study since one of the simulations that the author runs is a case of an export subsidy. The following are the effects of an export subsidy: 1) an export subsidy will raise domestic producer and consumer prices of rice. So for net sellers, a subsidy should benefit them. For wage laborers, changes in their income would depend on the increased demand for their labor in rice production; and 2) since rice takes up a large part of expenditure of the urban and rural poor, higher price would harm them as consumers (Warr, 2001). Thus, translating into a partial equilibrium, these effects of an export subsidy should have the same effects on rice consumers and producers as an increase in international price.

Next we will assess the effects an increase in rice price would have on the Thai households based on the 1988 data. Before we start however, it is important to note that the simulation does not calculate how much domestic rice price would be affected as a result of a 34-per cent export subsidy, hence limiting the usefulness of the results as they can only provide us with the direction and degree of loss/gain of each type of household.

Thus, to assess the effects an increase in rice price would have on the Thai households based on the 1988 data we will first look at the macroeconomic effects of an increase in rice price. These effects are shown in Table 3.1. There are three important changes that would have effects on the poor. Firstly, the consumer price index would increase as a result of higher food price. Secondly, return to factors used intensively in rice production—mainly land and farm labor—would rise. Lastly, overall wages for unskilled labor would rise. However, it should be noted that the rise in wages across the kingdom rests on the assumption that unskilled labor is perfectly mobile across all industries. Nevertheless, the empirical evidence suggests that the Thai labor market is highly mobile across the agricultural and non-agricultural sectors since wages in the two sectors have moved very closely over time (Coxhead & Plangpaphan, 1998).

At the micro level, the results (Table 3.2) indicate that households in the poorest 20th percent group should stand to gain from the rise in rice price. Real gross incomes would rise for all levels of rural households, with the rise the second largest for the poorest 40 per cent. For urban households, real gross incomes would increase only for the poorest 20 per cent. Thus, the positive income effects on poor households outweigh the negative consumption effects arising from a rise in rice price. This can be explained by two factors. First, a large percentage of poor households in rural areas are rice-farming households, and they are most likely to be net producers of rice. Second, a large percentage of the poor derive their income from farm and unskilled labor; thus, since the returns to these factors have increased, the poor providing these factors would be better off. Therefore, the results from the general equilibrium approach suggest that in addition to rice-farming households, farm labor and unskilled labor are also beneficiaries of an

increase in rice of price, while the rest of the population would experience a loss in their welfare.

The general equilibrium approach is often criticized for the high level of aggregation needed to make the analysis manageable. The micro-macro synthesis approach attempts to overcome this by providing a much more detailed and disaggregated analysis. In the following section, I will be specifically referring to the findings of Hertel et al (2003) in their article in which the objective is to assess how global trade liberalization would impact poverty in a country through the consideration of the structure of poverty. The study is based on fourteen developing countries, including Thailand. The data used for analysis in the case of Thailand is the Household SES of 1996. The authors believe that the poor tend to be much more specialized (> 95 percent) in their income pattern than the rich. In their analysis, households are divided up into five categories of specialization: agriculture, non-agriculture, wage, transfers, and diversified. However, unlike other countries, the majority of the poor in Thailand tend to be concentrated in the diversified group, with the agriculture and labor groups accounting for only 3 and 12 per cent of the poor, respectively.

It is important to note that the study also takes into account trade liberalization across the board, thus also addressing the impact on manufacturing prices and wages. Consequently, the effect on poverty in the labor-specialized group would be significantly different from the effects of a scenario in which only the agricultural sector is liberalized. The simulation points to the same general conclusion that world food prices would rise due to the high protection level. Thus, the consumption side of the effects would be substantial and similar to those of previously mentioned studies. However, the biggest

difference occurs in the income side of the effects, specifically the effects on unskilled labor wages.

As discussed earlier, it is also reasonable to believe that the rise in agricultural prices would apply upward pressure on unskilled labor wages. However, since the study simulates trade liberalization across the board, the effects of the decline in manufactures prices on unskilled labor wages are also taken into account. Moreover, domestic manufactures prices are predicted to fall relative to CPI¹⁰ due to the relative decline in world prices of these products.¹¹ Thus, there are two opposite forces in play. The positive effects on unskilled labor wages from the rise in rice price would be offset by the negative effects due to the decline in manufactures prices. Thus, the two major findings of the study that are useful for this analysis are the effects on rice price increase on consumption and the net effects on the agriculture group.

First, we will look at the consumption side effects. Table 3.4 shows the increase of poverty headcount when the income of all households are assumed to rise by the same level of 1.7 per cent, but these households are assumed to have different spending patterns as income levels vary.¹² The table shows that the consumption effects of a rice price increase are very large in Thailand, with the largest increase in poverty rate occurring in the agriculture group, where poverty rate increases by 18.2 per cent. On the other hand, the rise in poverty rate among the labor group is only 8.6 per cent, a much smaller increase compared to the agriculture group. This difference may be due to the difference in diet between the two groups. On average, poverty rate would increase by

¹⁰ Consumer Price Index

¹¹ In Thailand, the simulated results from Hertel et al (2003) indicate that relative to CPI, food price would rise 2.3 per cent while manufactures prices would fall by 5.2 per cent.

¹² As coined by Engel's Law, the poor tends to spend a larger share of their income on food.

7.6 per cent when only looking at the consumption side of the effects. This is not surprising since almost everyone in Thailand consumes rice, and rice makes up a large share of consumption expenditure, especially for the poor.

Finally, we will look at the net effects of rice price increase on the agriculture group. Table 3.5 demonstrates the impacts on poverty rate when true earnings and spending effects are taken into account.¹³ Here, it is surprising that the net effects on the agriculture group are minimal, with poverty rate decreasing by only 0.2 per cent. Despite the small impact, the agriculture group would still stand to gain from agricultural trade liberalization relative to all the categories of households. However, from these results, we might then speculate that the overall negative effects of a rise in rice price may outweigh the positive income effects.

To conclude, the past studies on effects of rice price change on poverty have indicated that the immediate and major beneficiaries of an increase in rice prices are rice-farming households, provided that they are net sellers of rice; and in the longer term, rural and urban unskilled labor, provided that the increase in wage outweighs the increase in consumption expenditure.¹⁴ The rest of the households would lose from the increase in rice price. Thus, the next step in this analysis is to understand who the poor are in Thailand and to identify the possible causes of why they are poor. Therefore, the next section will provide a brief literature review on studies of poverty profiles and determinants of poverty in Thailand.

¹³ True earning effects mean that variation in income sources is introduced within each stratum. For example, the poor in the labor group tends to derive their income mainly from unskilled labor, not skilled labor.

¹⁴ Millers, wholesalers, retailers, and exporters would also stand to gain from an increase in rice price. However, I have excluded from the analysis as these sub-groups would most like not fall under the poor category.

4. Review of Past Studies on Poverty in Thailand

Poverty in Thailand has been studied quite extensively; however, there are a limited number of analytical works on profiles of poverty and determinants of poverty in Thailand. When studying poverty, there are three major questions: 1) What percent of the population is poor or how bad is the poverty problem? 2) Who is poor? And 3) Why are they poor? (World Bank, 2001a) If we are able to answer these questions, and as we have determined in the earlier section the major groups that will benefit and lose from a rice price increase, much can then be inferred about the distributional impacts on poverty arising from agricultural trade liberalization. To answer the first two questions, a poverty profile of the country can be constructed. Regression analysis can then be used to answer the third question. The first part of this section will discuss the use poverty profiles. The second part will discuss the use PROBIT regression analysis to analyze the determinants of poverty. Findings of past studies will also be reported in both sub-sections.

4.1 Poverty Profile

A poverty profile “sets out the major facts on poverty, and then examines the pattern of poverty, to see how it varies by geography, by community characteristics, and by household characteristics.”(World Bank, 2001c) In other words, a poverty profile provides a comprehensive comparison study of how poverty varies across sub groups of society and over time. The observed characteristics of the poor can include place of residence, geographical location, household size, education levels, etc. This approach is widely used since it uses basic techniques yet can yield easily comprehensible and highly informative results.

Findings from two studies—NESDB (2002) and World Bank (2001d)—will be reported here. NESDB (2002) constructed a poverty profile to describe the characteristics of the poor based on the Household SES of 2001. According to this study, the major characteristics of the poor can be summarized as follows: 1) A majority of the poor resides in rural area; 2) a majority of the poor is involved in the agricultural sector; 3) size of agricultural land holding tends to be negatively correlated with poverty; 4) the poor tend to have a low level of education; 5) poor households tend to be much larger than non-poor ones; 6) poor households tend to have high dependency ratio. (NESDB, 2002)

Results from the World Bank (2001d) have confirmed the above findings and added other characteristics and details regarding the poor in Thailand. The study constructed Thailand's poverty profile based on Household SES from 1988 up to 1999. This long time span allows the study to investigate into how poverty has changed by sub-groups in Thailand over the years. The major findings of this study, in addition to the ones from NESDB (2002), are outlined below.

First, in addition to the large disparity in poverty between urban and rural households, poverty also tends to vary widely by geographical location. Specifically, the study finds that historically, the Northeast has been the poorest region in Thailand, followed by the South, North, Central, and Bangkok. Second, contrary to common belief, poverty incidence is generally less common among female-headed households than among male-headed households. Lastly, poverty problem is the most pervasive among three occupations—farm workers, farm operators¹⁵, and unskilled workers. Moreover, almost 80 per cent of the poor belong to these occupational groups in 1999. In addition,

¹⁵ Farm operators include both owner and tenant farmers. Farm workers are agricultural laborers.

the poverty rate is moderate among economically inactive households, but it is substantially lower among other occupational groups. (World Bank, 2001d)

Although poverty profiles can tell us about the degree of poverty and also provide descriptive characteristics on the poor, it does not allow us to look at the effect of individual household characteristic on poverty. In other words, we cannot control for the effects of other variables and focus specifically on the effect of a single variable of interest. PROBIT regression analysis is commonly used to address this problem, enabling us to analyze the determinants of poverty in a multivariate framework.

4.2 Determinants of Poverty

A PROBIT regression model is simply a model in which a binary variable representing whether a household is poor or not is regressed on a set of explanatory variables. The regression estimates will allow us to see how changes in each explanatory variable will affect the probability of a household being poor, holding all other influences constant. The regression will also allow us to test which explanatory variables have statistically significant effects on poverty. Although a PROBIT model involves loss of information in transforming household income/expenditure into a binary variable (poor or non-poor), it is useful in the sense that it directly gives the probabilistic statement about poverty. (Geda, Jong, Mwabu, & Kimenyi, 2001)

Deolalikar (2002) uses this approach to determine and rank, according to importance, the determinants of poverty in Thailand. The study is based on the Household SES of year 2000. The determinants are divided into two categories: 1) determinants related to characteristics of the poor; and 2) determinants related to public policy. In order of importance, the determinants related to characteristics of the poor are

identified as follows: occupation of household head, gender and household head and members, size of households, community type (urban vs. rural), age of household members, age of household heads, highest education attained by the household head. The three occupations that have the highest probability in being poor are fisheries, forestry, and agriculture. In addition, when only considering the households involved in the agricultural sector, small farm operators (less than 10 rai)¹⁶ are the most likely to be poor. Surprisingly, households with female head and members are less likely to be poor. As the size of households increases, the probability of that household being poor also increases. Community type has only a small explanatory power after variables such as education and occupation of household head of urban households are controlled for. As the proportion of members under the age group of 15-24 increases, the probability of being poor also increases. On the other hand, as the proportion of members over 25 increases, the probability decreases. This is probably because member under the age group 15-24 are not income earners, thus increasing the dependency ratio. As the age of the household head increases, the probability of being poor increases due to the decreased ability to earn income. Lastly, the most important determinant related to public policy is the education level of the household head. (Deolalikar, 2002)

World Bank (2001d) reported similar findings to those mentioned above. Based on Thailand's Household SES of 1998, the findings are generally similar to those of Deolalikar (2002) in that size of land holding, household size, dependency ratio, gender of household head, education, and geographic location are generally important determinants of poverty. However, the study differentiates and compares the determinants of urban and rural poverty. The results of the PROBIT regression are shown

¹⁶ 1 rai = 0.16 hectare

in Table 4.1. The size of land holdings variable is only included in the rural model. First, the study finds that the size of landholding is an important cause of rural poverty. Further, the effect of tenancy is also very high. Holding other variables constant, being a tenant increases the probability of the household being poor by almost 30 per cent. Second, household size and dependency ratio have large influence on poverty in both urban and rural areas. Third, gender of household head has significant effect on poverty in rural areas, but not urban areas. In addition, the effects in rural areas vary according to the age of the female head. When the female head is younger than 55 years of age, the probability of that household being poor is in fact lower than one with a male head. Fourth, education has significant effects on reducing poverty. Furthermore, the effects are more pronounced in rural areas than in urban areas, as education is more widespread in urban areas. Lastly, even after controlling for all the other factors, households located in the rural Northeast are still more likely to be poor. (World Bank, 2001d)

Another study by Isvilanonda, Ahmad, and Hossain (2000) specifically focused on the determinants of rural poverty in Thailand. The objective of the study was to investigate the recent developments in Thai rural household economy. The study surveyed 295 farming households in 1987 and repeated its survey for 273 farming households in 1998. These data are from six villages in rural Thailand, representing different agro ecosystems (Central Plain and Northeast). The authors estimated a PROBIT model, with explanatory variables that include size of landholding, access to irrigation, adoption of modern variety of rice, number of workers, education level of household head, remittance, non-land assets, household size, and ecology (regional dummy). The results (Table 4.2) show that the most important factors influencing poverty

are the accumulation of non-land assets, the household size, the number of earners, relatives working outside of households sending remittance, and access to irrigation. Surprisingly and contrary to findings of Deolalikar (2002), estimated coefficients of landholding and education level of household head are not significant at the 10% level. The authors explain this phenomenon by suggesting that the development of human capital contributes to poverty alleviation through facilitating occupational mobility from agriculture to non-agricultural activities as seen in the significance of the remittance variable. (Isvilanonda et al., 2000)

In conclusion, past studies have found that there is strong evidence to suggest that determinants of poverty in Thailand are substantially different for urban and rural households. Furthermore, the occupation of the household head is one of the most important factors in determining poverty. Lastly, poverty incidence is the most pervasive among farm operators, farm workers, and unskilled labor. These groups also make up the largest share of the poor in Thailand. However, these studies did not look specifically at poverty among rice-farming households. Hence, my study will explore into this topic to provide better understandings of how an increase in world rice price would affect the poor. The next section will discuss the methodology used to achieve this objective and to compare the poverty pictures of Thailand over the years.

5. Methodology

This section will discuss the methodologies used in this analysis. With the objectives of understanding and comparing Thailand's poverty pictures over the years, I have constructed poverty profiles and used PROBIT regressions analysis of the two sample years to determine whether there have been significant changes in the poverty pictures in Thailand between the two years. More specifically, this analysis focuses on whether the three major beneficiaries of rice price increase—rice-farming households, farm workers, and unskilled laborers—were and remain to be groups that have major effects on poverty in Thailand.

This section will cover four issues: first, the establishment of the national and regional poverty lines; second, my choice of welfare measurement; third, the construction of the poverty profile, which includes the *headcount*, *poverty gap*, *poverty and severity indices* as well as the gini coefficient and characteristics of the poor; and fourth, the PROBIT regression model used to find the determinants of poverty.

5.1 Poverty Line

To understand and compare Thailand's poverty pictures over the year, it is first important to defined "poverty" in Thailand. The most common approach is to establish a poverty line and classify household/individual with income/expenditure below this line as "poor". The poverty lines used in this analysis are the official lines of Thailand established by the National Economic and Social Development Board (NESDB). Their establishments can be broken down into four steps. (National Economic and Social Development Board, 1998)

First, the nutritional requirements of individuals are calculated. These are calculated as energy requirement per day by age and gender. This also gives the adult equivalent scale based on the different energy requirement of each household member based on his/her age and gender (Table 5.1).

Second, the food baskets and spatial price indices are determined. Nine different baskets are used—separate baskets for rural and urban areas in the five regions. These baskets include prices and quantities of 321 items of household consumption, 125 of which are food items consumed by the population. Basket components are determined by the Department of Economics, Ministry of Commerce. The spatial price indices can then be computed for the municipal areas and sanitary districts within each region.

Third, the food poverty line is calculated. This is defined as the monthly cost needed to meet the calorie requirements of each household member.

Fourth, the non-food basket is added to the poverty line calculation. The ratios of food to total expenditure at the poverty line are calculated for various years and different regions. The total poverty line is then calculated by dividing the food poverty line by the ratio of food to total expenditure.

The regional/national poverty lines are then calculated by aggregating and taking the average of the poverty line of each individual in the region/kingdom. The calculation is done based on the Socio-Economic Household Survey (SES) conducted by the National Statistics Office. The lines calculated by the NESDB are presented in Table 5.2. Before proceeding, one point should be noted. Although the NESDB differentiated between the urban and rural poverty lines, my analysis does not. This may lead to an overestimation of the number of rural poor and an underestimation of the number of

urban poor. However, since the focus of this study is not to determine the exact number of poor, but to compare the poverty pictures of 1994 and 2002, these estimation errors should not have significant impact on the outcome of the study.

Some experts believe that larger households tend to gain from the economy of scale of consumption.¹⁷ Thus, incorporating this effect might lead to a more accurate identification method of the poor. However, this view is not universally accepted. And it should be noted that while the poverty line calculation takes into account the different composition of each household, it does take into account the economy of scale of each household.

5.2 Choice of Welfare Measurement

Consumption expenditure, not income, is the welfare measure selected for this study for two main reasons. First, variations in expenditure are smaller than in income because households tend to smooth their consumption over short periods. On the other hand, income, especially farm income, can be extremely volatile (Deaton, 1997). Since rice-farming households are a major group under consideration, consumption expenditure is a more robust measure of welfare. Second, although consumption expenditure may also be understated, there is evidence to suggest that income can be severely understated. Income is understated because 1) people forget; 2) people may be reluctant to disclose their total income; 3) people may be reluctant to report income obtained illegally; 4) some parts of income are difficult to observe, for example, how much has animal assets appreciated. On the other hand, households may simply be more able, or willing, to recall their consumption rather than their income.

¹⁷ For further discussion on this topic, please refer to Deaton (1997) and Lancaster and Ray (2002)

The specific consumption measure used is expenditure *per capita* (EXPPC). The *per capita* measure can be used because the adult equivalent scale has already been introduced into the calculation of poverty line by the NESDB (as discussed earlier). Using expenditure per adult equivalent again would be redundant, and would severely underestimate the number of individuals living below the poverty line.

5.3 Poverty Profile

Having defined poverty in Thailand, the next step is the construction of the poverty profiles. The poverty profiles will be constructed for different sub-groups at the kingdom level, the regional level, and the community type level. Doing so will enable us to understand how poverty varies across Thailand.

In this study the following measures of poverty are used: *headcount*, *poverty gap*, and *poverty severity indices*, all of which fall under the family of measures proposed by Foster, Greer and Thorbecke [FGT] (Foster, Greer, & Thorbecke, 1984). The poverty gap (G_n) is defined as the poverty line minus the actual income/expenditure for poor individuals; the non-poor have a gap of zero (World Bank, 2001b). The FGT measure can then be expressed in general form as:

$$\text{FGT: } P_a = \frac{1}{N} \sum_{i=1}^N \left(\frac{G_n}{z} \right)^a$$

$$G_n = (z - y_i) \cdot I(y_i < z)$$

Where

y_i = income or expenditure of the i th individual

z = poverty line

N = Total population

N_p = number of individuals below the poverty line

a is a parameter that measures the depth of poverty

Headcount Index:

When the parameter $a = 0$, the P_0 is the *headcount index*, which measures the proportion of the population that falls below the poverty line. The equation of P_0 can be expressed as

$$P_0 = \frac{1}{N} \sum_{i=1}^N I(y_i \leq z) = \frac{N_p}{N}$$

The *headcount index* is simple to construct and easy to understand but has two major weaknesses. First, the index is calculated at the individual level, not the household level. Since my data is derived from household surveys, it is assumed for the purposes of this study that all household members enjoy the same level of well-being.¹⁸ This weakness cannot easily be addressed, and it also applies to the other two indices discussed below. Second, the *headcount index* does not take the intensity of poverty into account, i.e. it does not say how poor the poor are, and it does not change if the poor become poorer (World Bank, 2001b). To address the second weakness, the *poverty gap index* will be calculated.

Poverty Gap Index:

The *poverty gap index* calculates the intensity of poverty, and it changes as the poor become poorer. It adds up the extent to which individuals fall under the poverty line, and expresses it as a percentage of the poverty line. When the parameter $a = 1$, P_1 becomes the *poverty gap index*, which can be expressed as

$$P_1 = \frac{1}{N} \sum_{i=1}^N \frac{G_n}{z}$$

¹⁸ World Bank (2001b) argues that this assumption may not hold in some situations. For example, some elderly members of a household may be poorer than other members of the same household. This is because consumption is usually not shared equally among the members.

This index calculates the minimum amount of income/expenditure needed to be transferred to bring the incomes/expenditure of the poor up to the poverty line level. Some also think of this measure as the minimum cost of eliminating poverty, given perfect targeting and efficient transfer. This measure also has a weakness in that it does not capture inequality among the poor (World Bank, 2001b). In other words, it does not measure the severity of poverty among the poor. To address this problem, I will also calculate the *poverty severity index*.

Poverty Severity Index:

When there is a redistribution of income from a very poor individual to a less poor person, the *poverty gap index* remains unchanged while it is clear that poverty severity has increased. The *poverty severity index* captures this shortfall by giving weights to the gap between the individual's income/expenditure and the poverty line. The weights are simply the proportionate poverty gaps themselves. Thus, the index is also known as the squared poverty gap index. When the parameter $a = 2$, P_2 becomes the *poverty severity index*, which can be expressed as:

$$P_2 = \frac{1}{N} \sum_{i=1}^N \left(\frac{G_n}{z} \right)^2$$

One drawback of this index is that it lacks intuitive appeal since it is hard to interpret. However, it is useful in cases when poverty pictures are compared over time or across different subgroups in the population (World Bank, 2001d).

In addition to the indices mentioned above, I also calculated the gini coefficient to provide a rough measure of inequality in Thailand and to show how the inequality picture has changed from 1994 to 2002.

Characteristics of the Poor:

Major poverty indicators will be calculated for the poor and non-poor to identify which indicators may be possible determinants of poverty. The characteristics will be reported at the national level, the regional level, and at the community type level. However, the report for each region will not be broken down according to community types. In other words, there will be no distinction between urban and rural Northeast. Making such a distinction may provide a more accurate break-down of Thailand's poverty, but would make the sample size too small. The number of households that falls under each sub-sample would be too small to be representative of the whole sub-population. This issue is more pronounced in the analysis of households in 2002. For example, the number of sampled households that fall under the Central urban poor sub-sample is 62. However, the number of poor households in the whole Central region is 180. Therefore I will only make a distinction between rural and urban poor at the national level.

5.4 PROBIT Regression Model

The PROBIT regression model used in my analysis can be expressed in the following form:

$$y = f\left(a + \sum b_i X_i + e\right)$$

$y = 0$ if household is not poor; $y = 1$ if household is poor

F = cumulative density function for the standard normal curve

B_i = regression coefficient of each explanatory variable

X_i = independent variables

e = error term

The binary variable is regressed on 29 explanatory variables representing the household characteristics; the regression also includes regional and quarter dummy variables. The explanatory variables can be divided into three categories: *property-related*, such as size of landholding; *household characteristics*, such as household size and gender of household head; and *others*, such as community type—urban or rural—or regional differences. The list of the explanatory variables used in the regression model can be found in Table 5.3. These variables are selected based on past studies by the NESDB (2002), Deolalikar (2002), World Bank (2001d) and Isvilanonda, Ahmad, and Hossain (2000) and the availability of each variable in the Household SES.

To analyze the effect of an increase in rice prices on poverty, four explanatory variables are added to the model. These are rice consumption value per capita, household involvement in rice-farming (dummy variable), whether the primary income source of household head is farm wages (dummy variable), and whether the primary income source of household head is non-farm unskilled labor (dummy variable).

These four variables are included for the following reasons: First, Deaton (1989) finds poor households spend a much larger share of their consumption expenditure on rice. I will test whether this is in fact an important correlates of the poor, keeping in mind that the estimated coefficient of this explanatory variable may suffer from endogeneity (discussed below). For example, high rice consumption value may be a major characteristic of poor households, but it is not the cause of their poverty. Second, since a large percentage of households are involved in rice-farming, I will test to determine whether rice-farming is in itself a determinant of poverty.¹⁹ If rice-farming is in fact an important determinant of poverty, then an increase in rice price would most likely help

¹⁹ Rice-farming households is defined as ones that identified their main type of enterprise as rice farming.

alleviate poverty.²⁰ Lastly, I will examine whether the other two beneficiaries of an increase in rice price—farm workers and unskilled laborers—are also important determinants of poverty in Thailand.

The regression will be run at the kingdom level and at the community type level. The reasons behind this breakdown are: 1) to assess the overall picture of poverty at the national level; and 2) to determine whether there are substantial differences between determinants of urban and rural poverty.²¹

The PROBIT regression analysis also has certain limitations, and the results of poverty status regression must be interpreted with caution. The explanatory variables should be, strictly speaking, exogenous of household's poverty status (Baulch & McCulloch, 1998). However, some household characteristics may be endogenous, such as rice consumption value per capita or even household size. These variables are partly determined by per capita expenditure and are not independent. The error term (e) is therefore likely to be correlated with some of the independent variables (X_i), violating the fourth Gauss-Markov condition and making the estimated coefficients subject to simultaneity bias. In addition, the estimated coefficients may not be consistent due to heteroskedasticity. Minot, however, argues that these biases do not pose significant problems to the analysis since “our focus is not the causes of poverty or the magnitude of the coefficients, but rather on developing a descriptive tool to identify poor households” (Minot, 1998). In sum, it is safer to interpret results from PROBIT regression analysis as correlates of poverty or as degrees of association between poverty and certain

²⁰ This is based on the assumption that rice-farming households are net sellers of rice. I will prove that this is a valid assumption in Section 7.

²¹ As discussed in World Bank (2001d), there is evidence to suspect that the determinants would be different depending on the types of community.

characteristics of households, rather than taking these characteristics as the roots or causes of poverty (World Bank, 2001d).

After the regression coefficients are estimated, the next step is to calculate the marginal effect of each explanatory variable on the probability that a household is poor. These marginal effects will be calculated at the means of all variables and expressed in terms of the effect of a unit change in the explanatory variable on the probability that a household is poor.²²

At this point, it is important to acknowledge one major limitation to the methodology used in this study. Although the methodology will enable me to identify the poor in Thailand and compare the poverty pictures over different years, it is not possible to assess the net effect on poverty (i.e. change in poverty measures) resulting from an increase in rice price. One reason behind this limitation is the data used (discussed in more detail in Section 6). Another reason is that I do not have a model to accurately predict the wage response from a certain level of increase in rice price. However, despite these limitations, the results of my study should still be able to show the share of the poor households that would gain from an increase in rice price, and whether this share has changed over the years.

To conclude, the methodology used in this study will enable me to see how concentrated poverty is among the three groups of interest: rice-farming households, farm workers, and unskilled workers. I will also be able to test whether these groups are significant correlates of poverty, after controlling for the effects of other variables. Lastly, the analysis done for household data of 1994 and 2002 will indicate whether the poverty picture in Thailand has changed over these years.

²² For dummy variables, the effect on the probability is from a discrete change in the variables from 0 to 1.

6. Data

In this section, I will discuss in details about the data used in my analysis to construct the poverty profile and determine the correlates of poverty in Thailand. Highly detailed information at the household level is needed for such an analysis, especially details regarding income, consumption expenditure, and household member characteristics. For this purpose, I have selected for my analysis the 1994 and 2002 Household Socio-economic surveys (SES) conducted by the National Statistics Office of Thailand (NSO). The first part of this section will provide more details on the Thailand SES. The second part will discuss the important rice characteristics of Thai households, and specifically whether rice-farming households are net sellers of rice. The last part will provide an overview of other important characteristics of Thai households.

1994 and 2002 were chosen as the reference years due to the following reasons. First, I would like to compare the potential impacts on poverty alleviation of the first and second phase of the AoA. The first phase of the Agreement began in 1995. Although the second phase of the Agreement will not begin until at least 2005, the most recent Household SES available from the NSO is of year 2002. Second, despite the setback caused by the 1997 Financial Crisis, the Thai economy has developed considerably over these two years. Thus, by comparing the household data of 1994 and 2002, it should be possible to determine how the change in the poverty pictures would affect the impact of the Agreement on poverty alleviation in Thailand.

The primary objective of the SES is to collect information on household income and expenditure, household consumption, housing characteristics, and other living conditions. The survey uses a two-stage stratified random sampling process. The primary

sampling units are blocks for municipal areas and villages for non-municipal areas. The secondary sampling units are private households. In the 1994 survey, the households are distributed over three sectors: municipal areas (urban), sanitary districts (semi-urban), and villages (rural). After 2001, however, all sanitary districts were promoted to municipal areas (National Statistics Office, *Personal Communications*). Thus, the households in the 2002 survey are distributed over only two sectors: municipal areas and non-municipal areas. The survey is designed to give each household an equal probability of being selected within each sector, but not between them. Since municipal households are less expensive to survey, they are over-represented. On the other hand, households in villages are under-represented (Deaton, 1989). To make weighting corrections, the following weight, calculated by the NSO, will be used (National Statistics Office, 1994).

$$Weight = \frac{1}{m_{hki}} \cdot \left(\frac{N_{hkij}}{n_{hkij}} \cdot \frac{1}{P_{hkij}} \right) \cdot \frac{H''_{hki}}{H'_{hki}} \cdot \frac{1}{1000}$$

where

N_{hkij} = number of all households in block/village

n_{hkij} = number of sample households

P_{hkij} = probability of household being chosen

H' and H'' = projections of households

For the purpose of comparison, I have defined urban households as those located in municipal areas and sanitary districts, and rural households as ones in villages or non-municipal areas.²³ There are five standard regions: Bangkok, Central, North, Northeast,

²³ This definition was obtained from Deaton (1997).

and South.²⁴ Table 6.1 provides a break-down of the samples of the two surveys. In 1994, there are 25,226 households surveyed, of which 14,067 are urban households, and 11,159 rural households. In 2002, there are 34,785 households surveyed—21,565 are urban, 13,220 are rural.

Consumption expenditure measured in the SES consists of expenditures on food and beverages, tobacco products, and goods and services. The period of measurement for goods and services is one month, and seven days for food and beverages. The monthly value of expenditure on food and beverages is obtained by multiplying the weekly value by a factor of 4.3.

Rice Characteristics of Thai Households:

As mentioned earlier, rice plays an important role in the Thai diet. In 1994 and 2002, 95.3 per cent and 95.0 per cent, respectively, of Thai households consumed rice. Rice consumed in Thailand can be roughly divided into two categories: non-glutinous and glutinous. At the national level, a majority of households consume non-glutinous rice. Looking specifically at poor rice-farming households, however, consumption of glutinous rice is more widespread in this group. In 2002, 45.8 per cent of this group consumed only glutinous rice, whereas 20.5 per cent consume both types of rice. However, to simplify matters, I do not differentiate between the two types of rice in my analysis. In addition, I assume that price changes at the international level and at the domestic level will be uniform for both non-glutinous and glutinous rice.²⁵

²⁴ The 1994 survey separates three provinces, Nonthaburi, Pathumthani, and Samutprakan, around Bangkok as a separate region. This region is labeled as Nont. The reason for doing so is because although they are located in the Central region, their characteristics are somewhat similar to that of Bangkok. However, no differentiation was made for the 2002 survey. Thus, for reason of comparison, I have merged the Nont region to the Central region in the 1994 survey.

²⁵ This may or may not be a valid assumption. More details should be paid to this topic in further studies.

In addition to the widespread consumption of rice across the kingdom, rice consumption pattern in Thailand tends to vary by community type and by geographical locations. Data presented in Tables 6.3a-6.3b demonstrate this pattern. On average, households in Thailand spend about 7.5 per cent and 6.0 per cent of their total consumption expenditure on rice in 1994 and 2002, respectively. However, rural households tend to spend more on rice than their urban counterparts, both in absolute terms and as a share of income. In both years, the shares of rural households are more than twice that of urban households. In addition, the nominal value of rice consumption of the poorest region (Northeast) is more than twice that of Bangkok. Great disparity can also be seen in the large gap between the rice shares of consumption in the two regions. However, this may be influenced by a third factor—income—as rice is believed to be an inferior good.²⁶ Tables 6.3a-6.3b show that expenditure per capita in urban areas is much higher than that in rural areas, and the same applies to Bangkok and other regions of Thailand. The income factor is also reflected in the decline in real rice consumption value as real income/expenditure increased over the two years.

Having looked at the consumption side, it is important to look at whether rice-farming households, especially the poor ones, are net buyers and net sellers of rice. Unfortunately, due to limitation of the data, I am not able to calculate the net benefit ratio similar to that in Deaton (1989).²⁷ However, it is possible to quite accurately predict if a household is a net buy or seller based on the source of rice consumed by each household. If a certain household consumes home-produced rice and does not purchase any rice

²⁶ For further discussion on the topic of rice as an inferior good, refer to Ito, Wesley, Peterson, and Grant (1989) and Huang, David, and Duff (1991).

²⁷ Production value of rice for each household was not recorded by the NSO for both 1994 and 2002. These values were asked in the original questionnaires, but were not recorded in the dataset.

during the survey period, it is likely that this household is a net producer of rice. To control for any seasonal variations in sources of rice of rice-farming households, the collection period of each surveyed household should be distributed randomly.²⁸ Fortunately, this seems to be the case in the SES of 1994 and 2002. The surveyed households are divided into twelve groups, with each group being conducted over a period of one month (National Statistics Office, 2004). Table 6.2 provides the distribution of surveyed rice-farming households over the quarters of 1994 and 2002. It can be seen that the surveyed households are quite evenly distributed over the quarters of the years. Thus, even though there may be seasonal variations in the source of rice for rice-farming households, these variations should be controlled for.

In 2002, of the poor rice-farming households that consume non-glutinous rice, 91.8 per cent consume only home-produced rice. As for the ones that consume glutinous rice, 95.5 per cent consume only home-produced products. Of the 20.5 per cent of households that consume both types of rice, 91.4 per cent of them consume rice that are home-produced. Furthermore, these households did not purchase any rice during the period of survey. This pattern also applies to poor rice-farming households in 1994. Hence, it would be safe to conclude that most poor rice-farming households in Thailand are net sellers of rice, and would gain from an increase in rice price.

Other Characteristics of Thai Households:

Tables 6.3a-6.3b provide the weighted characteristics of Thai households in 1994 and 2002. A few points need to be noted. First, average real expenditure per capita has

²⁸ It is reasonable to suspect that there might be seasonal variations in sources of rice among the rice-farming households since these households may consume home-produced rice during the months after harvest. However, due to lack of storage space and other factors, these households may have to purchase rice from the market during other time of the year.

increased by almost 15 per cent, despite the setback due to the financial crisis of 1997.²⁹ However, there remains a great disparity between urban and rural households. In both years, expenditure per capita of urban households is much higher than that of rural households.³⁰ In fact, the ratio worsened between 1994 and 2002. In addition, there are great disparities in levels of expenditure per capita across regions in Thailand. In 2002, the expenditure per capita of Bangkok is almost four times that of the Northeast. Second, size of rural households tends to be larger than that of urban households, although the gap is smaller in 2002 than in 1994. Third, household heads of rural households tend to be much older than those of urban households.

Fourth, comparing the two years, human capital of household heads have improved at the national level, which can be seen in how more household heads have secondary education as the highest level of education attained. Fifth, the percentage of households involved in the agricultural sector has declined by almost 7 percentage points between the two years. This is not surprising as the economy continues to become more developed. Following the same trend, there is a smaller percentage of households involved in rice farming in 2002 as compared to in 1994. However, in the rural area, the majority of households is still in the agricultural sector, and almost one out of every four households is involved in rice farming. Lastly, the distribution of population across the five regions has been pretty much the same over the two sample years.

Having discussed the methodology and data used in my analysis, we will now turn to see what the results of this study has to suggest about the poverty pictures of

²⁹ Price index obtained from Bank of Thailand (Bank of Thailand, 2004). The index used is the core consumer price index.

³⁰ Expenditure per capita was not deflated at the regional level or community type level. However, it is still clear that there are great disparities in income/expenditure across regions and community types.

Thailand in 1994 and 2002. More specifically, we should be able to draw some conclusions regarding the distributional and overall impacts of an increase in rice price on poverty in Thailand.

7. Results

In this section, I will discuss the results from the poverty profiles and the PROBIT regressions, which will answer the questions posed earlier in the Section 5: How bad is poverty in Thailand? Who are the poor? And what are the major correlates of poverty? Having determined that rice-farming households, farm workers, and unskilled labor would gain from an increase in rice price, identifying the poor in Thailand will enable me to understand better how this increase in price would affect poverty in the kingdom. The first section will discuss the results from Thailand's poverty profiles and how they have changed from 1994 to 2004. For the sake of comparison, I have reported indices estimated both by income per capita and expenditure per capita. The results from this section will identify who the poor are, and will determine the share of the poor that belong to the three groups that would benefit from an increase in rice price. The second part will discuss the important correlates of poverty in Thailand using the results from the PROBIT regression analysis. Specifically the results should demonstrate whether rice-farming, farm labor, and unskilled labor had any significant relationships with poverty in 1994 and in 2002.

7.1 Poverty Profile

Using the poverty lines discussed earlier, I have estimated the *headcount index*, *poverty gap index*, and *poverty severity index* of Thailand in 1994 and 2002. These estimates were calculated at the national level, the community type level, and the regional level. They are reported in Tables 7.1a-7.1b. Firstly, it should be noted that there is a substantial difference between the estimates obtained based on income per capita and expenditure per capita, especially in 1994. At the national level, Thailand's *headcount*

index is 20.4 per cent when income is used and 14.0 per cent when consumption expenditure is used. This discrepancy is also present in the estimates of the *poverty gap* and *poverty severity indices*. This may be because there is more inequality in income distribution than in consumption distribution. In other words, consumption is higher at the lower end of the distribution while income is higher at the upper end of the distribution. (World Bank, 2001d)

As a benchmark, my estimates were compared to the figures estimated by the NESDB. Using income per capita as a measure of welfare, the *headcount index* estimated by the NESDB is 16.3 per cent for 1994 and 9.79 per cent for 2002 (National Economic and Social Development Board, 2004). The discrepancy between my estimates and these estimates must have arisen from the fact that NESDB differentiated between urban and rural poverty lines, while I did not.³¹ Although my approach might have overestimated the gap between urban and rural poverty, the results indicate that the gap would still be very large despite the overestimation. In addition, since NESDB did not report the poverty estimates based on consumption expenditure, and given the advantages of consumption expenditure as a measure of welfare over income, my results are useful in that they have used a more accurate measure of welfare to study poverty in Thailand. Thus, from this point on, the discussion will be based on estimates obtained from using consumption expenditure per capita.

Looking at the overall change in the poverty in Thailand between 1994 and 2002, the decrease in all three major poverty indices implies that the degree of poverty in Thailand has decreased quite substantially. At the national level, the *headcount index* has

³¹ See Section 5.1 for the validity of this approach.

decreased from 14.0 per cent to 11.1 per cent³² (Figures 7.1); *poverty gap index* from 3.0 per cent to 2.1 per cent³³; and *poverty severity index* from 1.0 per cent to 0.7 per cent.³⁴ The gini coefficient has also decreased slightly over the two years, from 0.518 to 0.509, indicating a lesser inequality in the country.

However, poverty in Thailand, similar to most developing countries in the world, was and is still a rural phenomenon. Looking at the whole kingdom of Thailand in 1994, the *headcount index* in rural areas is almost six times higher than in urban areas. *Poverty gap* and *poverty severity indices* are also substantially higher in rural areas than in urban areas. This trend is also true for 2002. Meanwhile, the *headcount index* has decreased for both types of community from 1994 to 2002. The index for urban areas has declined from 3.4 per cent to 2.0 per cent³⁵, and from 18.2 per cent to 15.0 per cent for rural areas.³⁶

In addition, there are great regional disparities in the poverty landscape of Thailand, and this trend remains to be true throughout 1994 and 2002 (Figure 7.2). In 2002, there are no households living under the poverty line in Bangkok, whereas all three of the poverty indices indicate that the Northeast is still the poorest region in Thailand. However, these indices have decreased significantly from 1994 to 2002.³⁷ More importantly, rice-farming is very widespread in this region. In 2002, almost 40 per cent of all households located in the Northeast are involved in rice farming. Moreover, rice-farming households account for 56.1 per cent of the poor households in the Northeast in 2002.

³² Statistically significant at 1% level

³³ Statistically significant at 1% level

³⁴ Statistically significant at 1% level

³⁵ Statistically significant at 1% level

³⁶ Statistically significant at 1% level

³⁷ Statistically significant at 1% level

Having looked at the overall picture of poverty in Thailand, it is important to turn to the more specific characteristics of the poor. I will investigate the main characteristics of the poor, and how these characteristics might have changed from 1994 to 2002. Tables 7.2a-7.2d provide the average values of major poverty indicators for poor and non-poor at the national, regional, and community type level.³⁸

The major characteristics of the poor in 1994 can be briefly summarized as follows. Most of the results here confirm the findings of NESDB discussed earlier in Section 4.1. First, poor households tend to be much larger in size and have a higher dependency ratio than non-poor ones. Second, poor households tend to have older household heads than non-poor ones. Third, surprisingly, a larger percentage of households headed by female fall under the non-poor category, rather than the poor category. Fourth, heads of poor households tend to have lower education level. Fifth, poor households tend to spend a much larger share of their consumption expenditure on rice consumption. For example, in 1994 share of rice consumption for rural poor households spend is almost 10 percentage points higher than their non-poor counterparts. Lastly, poverty tends to be concentrated in the agricultural sector.

The most striking feature about poverty in Thailand is that the poverty incidence is highly pervasive among rice-farming households, farm workers, and unskilled labor—the three groups that would gain from an increase in rice price. Figures 7.3a-7.3c show that the poverty indices for rice-farming households are among the highest in the

³⁸ It should be noted that the results of Bangkok should be interpreted with caution. In 1994, only three of the surveyed households in Bangkok fell under the poverty line. This is too small of a sample size to be representative of the regional population. However, since poverty is relatively less pervasive in Bangkok, it would be safe to skip the analysis on this region.

kingdom.³⁹ More importantly, a very large proportion of poor households are involved in rice farming. Figure 7.4 shows the breakdown of poor households by type of enterprise in 1994 and in 2002. It can be seen that rice-farming households constitute the largest share of the poor households, although this figure has declined from 55.6 per cent to 45.6 per cent from 1994 to 2002.⁴⁰ Since I have already demonstrated that these households are net sellers of rice, an increase in rice prices would have positive effects on this large group of the poor.

Next, I will look into the pervasiveness of poverty among farm labor and unskilled labor. As reported by the World Bank (2001d), when households are broken up by occupational sub-groups, poverty is most severe among households providing farm labor. Figures 7.5a-7.5c show that all three of the poverty indices are highest among this group, both in 1994 and 2002. What is even more striking is while the *headcount index* has decreased for most of the major occupational sub-groups, the index has in fact risen from 25.2 per cent to 29.8 per cent for households providing farm labor. The *headcount index* among the unskilled labor sub-group is not as alarming, but is still the fourth highest among all the occupational sub-groups. The same statement applies to the *poverty gap* and *poverty severity indices*. More importantly, the farm labor and unskilled labor sub-groups altogether account for 30 per cent of the poor in 1994, and has increased to 35 per cent in 2002 (Figure 7.6). As found in Warr (2001), these two groups would likely gain from an increase in rice price, provided that wages increase more than rice price.

Lastly, I have calculated the percentage of the poor households that would gain from an increase in rice price. This means that these households fall under the rice-

³⁹ Although the headcount index is much higher for the forestry and hunting sub-group, they only make up 2.8 and 1.0 per cent of agricultural poor households in 1994 and 2002, respectively.

⁴⁰ Statistically significant at 1% level

farming, farm labor, or unskilled labor group. It should be noted that rice-farming households also take on other occupations, since in the majority of the cases, rice can be harvested only once during the year. After calculating the share of farm and unskilled labor that are also involved in rice-farming, I have estimated that as of 2002, 62.7 per cent of the poor would gain from a rice price increase, a decline from 69.5 per cent in 1994.⁴¹ This statement is conditional on the assumption that the increase in wages would outweigh the increase in rice consumption value. Nevertheless, the negative consumption effects on the farm labor and unskilled labor groups would at least be offset by an increase in their wages. Thus, a more conservative estimate suggests that in 2002, 40.5 per cent of the poor would certainly gain from a rice price increase, 22.2 per cent may be better off or would not experience any significant impact, and 37.3 per cent would be worse off.⁴² The corresponding values in 1994 are 50.4 per cent, 19.1 per cent, and 30.5 per cent. Thus, it can be seen that the share of the poor that would certainly gain from further agricultural trade liberalization has declined substantially from 1994 to 2002.

To conclude, by looking at the poverty profile, the poverty picture of Thailand has improved from 1994 to 2002, with all the poverty indices declining substantially. However, poverty still tends to be largely concentrated among the three groups that would benefit from an increase in rice price—rice-farming households, farm workers, and unskilled labor. More importantly, these three groups account for a very large share of the poor. Of these, the rice-farming households, which account for 68.1 per cent, are certain to gain as they are net sellers of rice; while impact on farm and unskilled labor is

⁴¹ These figures were calculated under the condition that 90 per cent of the rice-farming households are net sellers of rice.

⁴² 55.6 per cent is the share of the poor households involved in rice farming. 19.1 per cent are farm workers and unskilled labor not involved in rice farming. 24.9 per cent are the rest of the poor households.

less certain. Assuming the increase in wage rates outpaces the increase in rice price, the share of the poor that would gain from further agricultural trade liberalization is 62.7 per cent in 2002, a decline from almost 70 per cent in 1994.

Having compared Thailand's poverty profiles of 1994 and 2002, I will now turn to discuss the results of the PROBIT estimates to further investigate the correlates of poverty in Thailand. More specifically, the results should show whether rice-farming households, farm labor, and unskilled labor are important correlates of poverty in Thailand.

7.2 PROBIT Regression Results

Poverty Status: Kingdom Sample

Table 7.3 provides the results from the PROBIT regression analysis at the national level of year 1994 and 2002. The three columns of each year represent the estimated coefficient, t-statistics, and marginal effects of each variable on the probability of a household being poor. The estimation results can be briefly summarized as follows. The discussion that follows for each variable will be done based on the *ceteris paribus* condition. Large households and households with higher dependency ratios are more likely to be poor in both years. Households with older heads are also more likely to be poor. Interesting, in 2002, households with female heads are less likely to be poor. Furthermore, the education level of the household head tends to have the biggest association with poverty.

Confirming the findings in the poverty profile, households involved in the agricultural sector are more likely to be poor compared to households in other sectors. It is interesting to note that the marginal effect of the household head being a farm worker

on the probability that the household is poor has increased substantially from 1994 to 2002.⁴³ Additionally, the relationship between poverty and unskilled labor is not statistically significant in 1994, but is significant at the 5-per cent level in 2002. However, the marginal effect of unskilled labor on the probability of a household being poor remains to be small.

Lastly, even after controlling for all of the above factors, geographical location is still highly influential on poverty status, with the most pronounced effect being in the Northeast. In addition, the type of community that the household is located in is still an important correlate of poverty. Even after all the other variables are controlled for, households located in the rural areas are more likely to be poor in both years, suggesting that the correlates of poverty may be different for urban and rural households. The next section will compare the PROBIT regression results from the urban and the rural sub-samples.

Poverty Status: Urban and Rural Sub-samples

The PROBIT regression results shown in Table 7.4 have confirmed the possibility that the correlates of poverty are different for urban and rural households. The biggest difference is found in the explanatory power of education level of the household head on poverty. Although statistically significant, education level of the household heads has a much smaller marginal effect on poverty in the urban setting. There are also discrepancies between other explanatory variables for the urban and rural poverty; however, the marginal effects of the variables in an urban setting are small and are not worth further discussion. In addition, urban poverty is relatively less pervasive in

⁴³ Statistically significant at 1% level.

Thailand; thus, from this point on, the focus will be on the change in correlates of rural poverty between 1994 and 2002.

The discussion on correlates of rural poverty will specifically focus on the three major variables of interest—rice-farming, farm labor, and unskilled labor. Even after controlling for other variables such as education level, size of farmland, and tenancy; rice-farming is still an important correlate of rural poverty. However, the marginal effect of rice-farming on rural poverty has decreased from 4.1 per cent to 2.9 per cent from 1994 to 2002⁴⁴. This smaller marginal effect might be due to the fact that rice-farming households have become more diversified in terms of their income (Table 7.5)⁴⁵. On the other hand, farm labor has become more strongly associated with rural poverty. The marginal effect of farm labor has almost doubled over the two years.⁴⁶ In 2002, the probability of a household being poor increases by 11.9 per cent if the household head is a farm laborer. Lastly, unskilled labor's relationship with rural poverty is not statistically significant in 1994, but has become so at the 10-per cent level in 2002.

The findings from the PROBIT regressions confirmed that rice-farming and farm labor are indeed important correlates of poverty in Thailand. The marginal effect of unskilled labor on rural poverty status remains weak, but has become more strongly associated from 1994 to 2002. Furthermore, the results have shown that the correlates of poverty in Thailand have changed substantially from 1994 to 2002. Although rice-farming remains to be an important correlate of poverty in 2002, its relationship with poverty has declined in strength over the years. On the other hand, farm labor has become

⁴⁴ The difference in the marginal effects is statistically significant at the 10% level.

⁴⁵ Isvilanonda et al (2000) found that rural households have become much more diversified in terms of their income sources. The biggest difference can be seen in the drop in rice cultivation share of total income from 45.1 to 26.8 per cent from 1985 to 1998.

⁴⁶ The difference in the marginal effects is statistically significant at the 1% level.

a highly significant correlate of poverty in Thailand. Lastly, the effect of unskilled labor has become marginally more important but remains small. Thus, the results indicate that at least two of the three groups that would benefit from an increase in rice price are important correlates of poverty in Thailand, while the rice price is becoming increasingly important in the third group. Hence, an increase in rice price should have positive impacts on the Thai poor households.

To conclude, the results from my study have shown that the poverty picture in Thailand has significantly improved between 1994 and 2002, as indicated by the decline in the three major poverty measurement indices. In addition, the poverty profiles from the two years also show that poverty remains highly pervasive among the three groups that would gain from an increase in rice price—rice-farming households, farm workers, and unskilled labor. The results from the PROBIT regression models have confirmed that although the significance of rice farming in explaining poverty status of a household has declined over the years, these characteristics are still important correlates of poverty in Thailand. Assuming that all these three groups would gain from an increase in rice price, the share of the poor that would benefit stands at 62.7 per cent in 2002, a decline from almost 70 per cent in 1994. Thus, as poverty has become less pervasive in the kingdom and as rice farming's marginal effect on poverty status has declined, the potential benefits of the AoA on poverty alleviation in Thailand have decreased. Despite this decline, however, as of 2002, the majority of the poor are still likely to gain from further agricultural trade liberalization via the WTO AoA.

8. Conclusion and Policy Implications

The objective of this study is to assess the impact of the WTO AoA on poverty in Thailand through rice price changes. The three main questions posed at the beginning of the study are: How will further agricultural trade liberalization affect the international rice price? Who will gain and lose from an increase in rice price? Who are the poor in Thailand and how has the poverty picture changed from 1994 to 2002? I hypothesized that despite the substantial improvement in the Thai poverty picture from 1994 to 2002, the AoA can still have significant impacts on poverty alleviation in Thailand, although the benefits may have decreased.

My research has indicated that despite the ineffectiveness of the first phase of the Agreement, further trade liberalization would lead to an increase in world rice price, holding everything else constant. Furthermore, since the Thai rice market is vertically and spatially integrated, this price increase would be experienced at the domestic level. The major beneficiaries of a rice price increase are rice-farming households, farm workers, and unskilled labor; provided that rice-farming households are net producers, and wages would increase more than the increase in rice price. My analysis has confirmed that rice-farming households are indeed net sellers of rice. The increase in wages was assumed to outweigh the increase in rice price based on the findings of Warr (2001).

The results of my study have confirmed my hypothesis that the poverty picture of Thailand has improved substantially from 1994 to 2002. In addition, rice-farming remains to be a major correlate of poverty, but its significance in explaining poverty has decreased from 1994 to 2002. The change and improvement in the poverty picture have led to a smaller share of the poor that would gain from further agricultural trade

liberalization. As of 2002, only about 62 per cent of the poor would gain from an increase in rice prices as opposed to about 70 per cent in 1994. Nevertheless, despite the smaller share, provided that my assumption over wages holds, the majority of the poor would still gain from a successful negotiation of the AoA under the Doha Round.

Talk about further studies on wage impact. If can be proven that wage increase will outweigh the rice price increase, then government should try to ensure a successful Doha Round for the interests of the poor.

Thus, based on the findings of this study, it may be beneficial for the Thailand's poor if the Thai government ensures that the Doha Round Agreement on Agriculture is negotiated successfully. The benefits to be reaped by the poor will decrease if the deadline is pushed back further. Furthermore, given that the gain for poor is derived from an increase in rice price, the Agreement should entail maximum level of liberalization in the world agricultural trade with effective enforcement mechanisms over the implementation process. Lastly, while rice-farming has become less influential on poverty status, education and size of farm land remain to be dominant. Thus, the poor would benefit greatly from specific policies targeting these two areas.

Finally, my study has provided a preliminary assessment on the impact of agricultural trade liberalization on poverty alleviation in Thailand. The findings suggest that the majority of the poor would gain, but are unable to provide conclusive statement about the net impact on poverty in Thailand. Thus, further studies are required for the following areas. Firstly, providing there is sufficient data, the net benefit ratio of each household should be calculated to determine the various degrees of the impact of an increase in rice price across different types of households, which will enable us to study

the net effect on poverty in Thailand. As rice price increases, it is possible that the losses faced by the smaller share of the poor may outweigh the gains experienced by the majority of the poor.

Secondly, more study should be done to provide a more accurate estimation of the increase in wages resulting from an increase in rice prices. This will provide a more accurate picture of where farm workers and unskilled labor would stand in the longer run when both the consumption and income effects are taken into account. Moreover, this will enable a better estimation of the share of poor households that would gain from an increase in rice price.

Finally, further work is required to explore the possibility that rice price changes may not be experienced uniformly across all levels of households, especially among the country's rice producers. Factors such as lack of storage space, lack of information, lack of bargaining power, and cultivation of different types of rice may result in smaller and poorer rice farmers not experiencing the price increase at the same level as larger rice producers. If such scenarios are true, effective government interventions will be necessary to ensure that the poor households of Thailand will capture a share of the benefits from further agricultural trade liberalization.

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Tables and Figures:

Table 1.1 Growth in Production, Consumption, Imports and Exports of Rice (per cent per annum)

	Production	Consumption	Imports	Exports
World				
1978-1988 (actual)	2.6	2.6	1.9	1.7
1988-2000 (base)	1.8	1.87	3.2	2.6
1988-2000 (UR)	1.8	1.8	3.8	3.2
Developed Countries				
1978-1988 (actual)	-0.5	0.7	3.8	0.6
1988-2000 (base)	0.7	0.9	2.3	-0.2
1988-2000 (UR)	0.2	0.9	4	-0.3
Developing Countries				
1978-1988 (actual)	2.8	2.8	1.3	2.2
1988-2000 (base)	1.9	1.9	3.5	3.6
1988-2000 (UR)	1.9	1.9	3.7	4.4

Note: "base" refers to projected growth rates in the absence of the Uruguay Round, while "UR" takes its effects into account.

Source: Yap (1996)

Table 1.2 International Market Price Effects of WTO AoA

Model Projection of Changes in World Rice Price

T&A	WFM	ATPSM	RUNS	ABARE	USDA	FAPRI
4.1	7.3	0.7	0.8	7	12.5	3

Mean	5.057143
Std Dev.	4.212227
Range	11.8

Note: T&A: Tyers and Anderson (1992).
WFM: World Food Model, FAO (1995)
ATPSM: Agricultural Trade Policy Simulation Model, UNCTAD (1995)
RUNS: Rural-Urban North-South Model, Goldin and Van der Mensbrugge (1995)
ABARE: Australian Bureau of Agricultural and Resource Economics, Vanzetti, et al. (1994)
USDA: United States Department of Agriculture, USDA, Office of Economics (1994)
FAPRI: Food and Agricultural Policy Research Institute, Helmar, Meyers, and Hayes (1994)

Source: Sumner and Tangermann (1998)

Table 1.3 Summary of agricultural supports and protection data in 1997

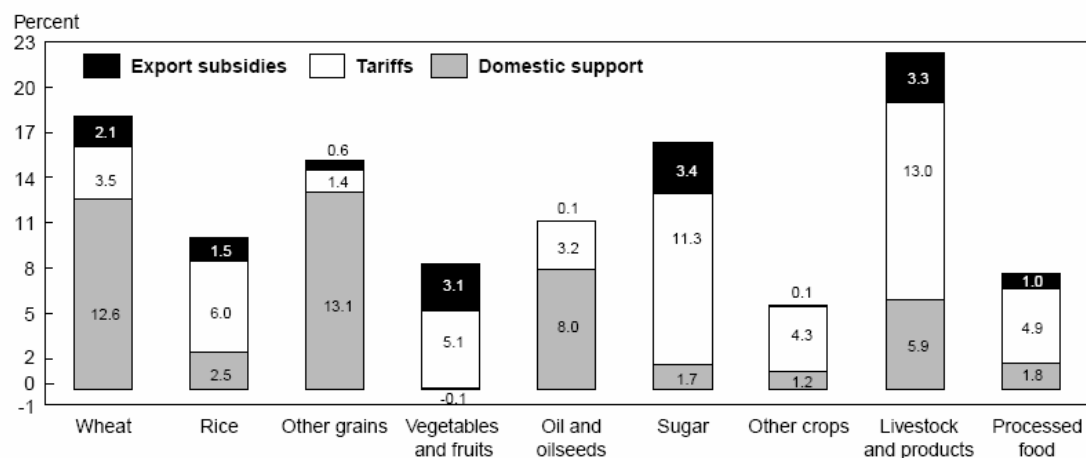
	Rate of tariffs ¹	Rate of export subsidies ²	Rate of domestic supports ³
	Percentage		
World sectoral average			
Wheat	22.75	2.78	
Rice	45.08	2.23	
Other grains	8.68	0.69	
Vegetable and fruits	12.13	1.01	
Oil and oilseeds	12.57	0.00	
Sugar	33.95	6.97	
Other crops	11.57	0.05	
Livestock and products	48.79	7.03	
Processed foods	14.90	0.00	
Developed country group			
Wheat	68.18	2.99	31.55
Rice	73.34	3.79	2.05
Other grains	11.02	0.84	21.84
Vegetable and fruits	10.22	1.92	0.00
Oil and oilseeds	9.50	0.00	9.94
Sugar	59.14	21.27	2.19
Other crops	9.85	0.17	2.75
Livestock and products	68.45	8.78	3.31
Processed foods	9.11	0.00	0.00

Notes: 1. Rates of tariffs for sector, country, region, and the world are weighted average rates and the weights are values of sectoral or country's imports.
 2. Rates of export subsidies for sector, country, region, and the world are weighted average rates and the weights are values of sectoral or country's exports.
 3. rates of domestic supports for sector, country, region, and the world are weighted average rates and the weights are values of sectoral or country's outputs.

Source: Diao, Somwaru, and Roe (2001)

Figure 1.1 Decomposition of price effects of global agricultural liberalization

Percent change in selected world commodity prices from the base year in the model



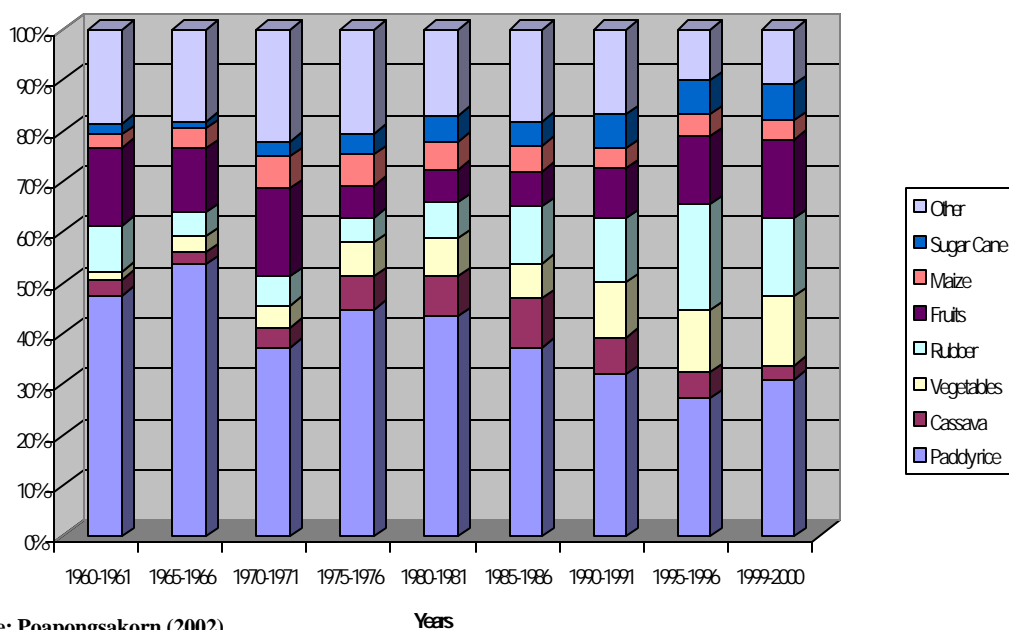
Source: Diao, Somwaru, and Roe (2001)

Table 2.1: Total Agricultural and Rice Labor Forces and Their Shares, 1971-97

Year	Total labor force (million) (1)	Agr. Labor force (million) (2)	Rice labor force (million) (3)	Share of agr. Labor to total labor (%) (2)/(1)	Share of rice labor to total labor (%) (3)/(1)	Share of rice labor to agr.labor (%) (3)/(2)
1971-75	20.13	14.45	10.44	72.28	51.19	71.15
1976-80	25.27	16.44	11.34	65.06	44.88	68.98
1981-85	28.95	17.76	11.83	61.35	40.86	66.61
1986-90	31.43	17.06	10.89	54.28	34.65	63.83
1991-95	32.00	15.81	11.76	50.30	31.40	63.56
1996-97	32.34	14.73	10.05	45.54	29.06	63.81

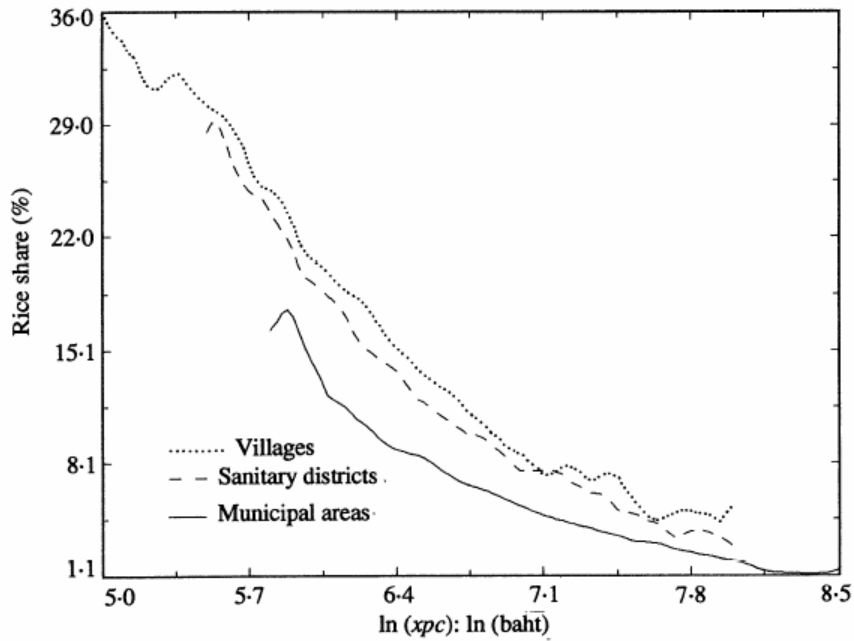
Source: Isvilanonda (2001)

Figure 2.1 Share of Crops in Value Added Originating from Crops



Source: Poapongsakorn (2002)

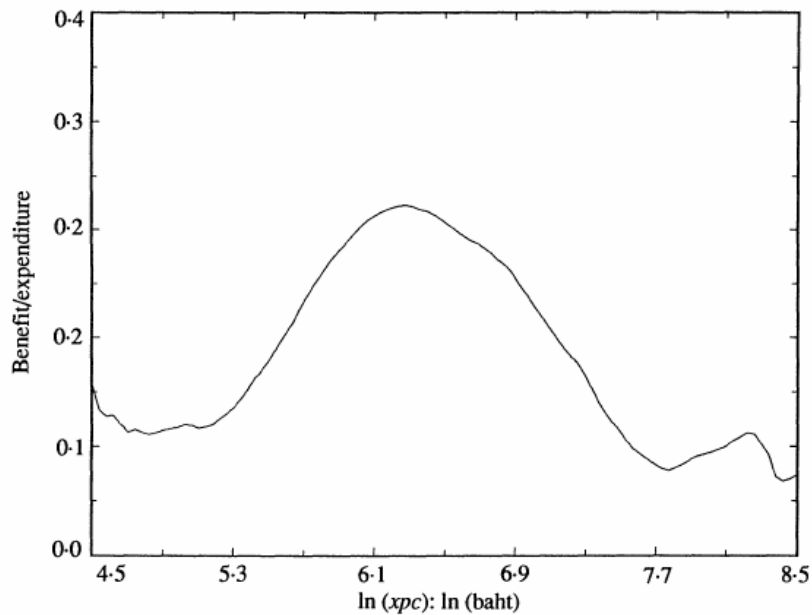
Figure 3.1 Rice Share Regressions (1981/2)



Note: Expenditure per head (xpc) is total households expenditure (in baht) on non-durable goods per month divided by the number of persons in the households.

Source: Deaton (1989)

Figure 3.2 Welfare Effects: All Village Households



Source: Deaton (1989)

Table 3.1 Simulated Macroeconomic Effects of a Rice Export Tax/Subsidy (Percentage Change)

Simulation	A	B	C	D
Export Demand Elasticity	-2.5	-2.5	-5	-2.5
Export Tax Rate (%)	42	80	42	-34
Overall economy				
Gross domestic product				
Nominal (local currency)	-0.62	-5.72	-4.29	-0.72
Real	-0.09	-2.75	-1.88	-0.73
Consumer price index	-1.47	-6.07	-3.43	0.69
GDP deflator	-0.54	-2.97	-2.42	0.00
Wage (nominal)				
Skilled	3.83	12.24	5.47	-2.76
Unskilled	-9.37	-33.80	-17.11	5.69
Returns to variable capital (nominal)				
Nonagriculture	0.14	-0.74	-0.95	-0.30
Agriculture	-10.11	-33.11	-16.79	7.65
External sector (foreign currency)				
Export revenue	0.78	14.08	8.42	2.82
Import Bill	0.59	10.55	6.41	2.26
Government budget (local currency)				
Revenue (local currency)	-10.62	-32.68	-2.26	18.05
Corporate	0.48	0.58	-0.15	-0.64
Tariff	0.63	2.52	1.04	-0.36
Excise	-0.03	-1.09	-0.94	-0.35
VAT	0.27	-0.30	-0.65	-0.55
Personal	-94.54	-120.71	12.15	133.94
Business	-0.19	-0.99	-1.00	-0.02
Other	-2.85	-11.09	-6.10	1.50
Expenditure				
Nominal (local currency)	-10.54	-32.17	-2.01	12.78
Real	-10.95	-32.47	-1.76	13.40
Household sector				
Consumption				
Nominal (local currency)	-0.85	-7.75	-5.81	-1.00
Real	0.63	-1.65	-2.39	-1.68

Note: All results are expressed in percentage changes. Simulation B describes a subsidy at the rate of 51%.

Source: Warr (2001)

Table 3.2 Simulated Distributional Effects of a Rice Tax/Subsidy (Percentage Change)

Simulation		A	B	C	D
Export Demand Elasticity		-2.5	-2.5	-5	-2.5
Export Tax Rate (%)		42	80	42	-34
Nominal gross incomes					
Rural	RQ1 (poorest)	-6.59	-22.90	-11.75	4.42
	RQ2	-6.51	-22.44	-11.55	4.44
	RQ3	-5.60	-19.54	-10.12	3.74
	RQ4	-4.41	-15.42	-8.09	2.96
	RQ5 (richest)	-2.56	-9.04	-4.98	1.75
Urban	UQ1 (poorest)	-3.30	-12.41	-6.63	1.90
	UQ2	-1.52	-6.32	-3.63	0.71
	UQ3	-0.39	-2.42	-1.72	-0.03
	UQ4	0.24	-0.27	-0.67	-0.46
	UQ5 (richest)	0.71	1.37	0.14	-0.75
Real gross incomes (deflated by household-specific CPI)					
Rural	RQ1 (poorest)	-3.88	-12.46	-6.16	2.96
	RQ2	-4.13	-13.18	-6.54	3.19
	RQ3	-3.49	-11.24	-5.59	2.67
	RQ4	-2.64	-8.30	-7.70	2.09
	RQ5 (richest)	-1.49	-4.33	-2.22	1.33
Urban	UQ1 (poorest)	-1.25	-4.28	-2.16	0.87
	UQ2	0.08	0.24	0.05	-0.04
	UQ3	1.00	3.40	1.60	-0.65
	UQ4	1.43	4.84	2.30	-0.95
	UQ5 (richest)	1.45	4.87	2.30	-0.97
Real consumption expenditures (deflated by household-specific CPI)					
Rural	RQ1 (poorest)	-3.82	-12.82	-6.45	2.68
	RQ2	-4.10	-13.54	-6.81	2.97
	RQ3	-3.49	-11.58	-5.83	2.51
	RQ4	-1.81	-7.57	-4.45	0.77
	RQ5 (richest)	0.40	-2.14	-2.56	-1.45
Urban	UQ1 (poorest)	-0.95	-4.03	-2.28	0.39
	UQ2	0.94	1.32	-0.06	-1.26
	UQ3	2.58	5.51	1.45	-2.84
	UQ4	4.23	8.60	2.02	-4.81
	UQ5 (richest)	7.00	12.26	1.69	-8.66

Note: All results are expressed in percentage changes. Simulation D describes a subsidy at the rate of 34%. RQ1 denotes the poorest rural quintile, UQ1 the poorest urban quintile, and so forth.

Source: Warr (2001)

Table 3.3 Impact of Per Capita Earnings and True Spending Effects on Poverty (Change in Number of Poor, Relative to Total Population, in Percent)

Country	Total	Agr	Nagr	Labor	Transf	Diverse
Bangladesh	-0.2	-0.2	-0.3	-0.1	-0.1	-0.2
Brazil	0.1	0.1	0.2	0.1	0.1	0.1
Chile	1.5	2.7	1.6	1.5	0.7	1.6
Columbia	-0.1	-0.1	-0.1	-0.2	-0.1	-0.1
Indonesia	0.2	0.2	0.2	0.2	0.2	0.2
Malawi	-0.5	-0.3	-0.2	-1.4	-0.2	-0.7
Mexico	-0.4	-0.3	-0.3	-0.6	-0.2	-0.5
Peru	1.4	3.0	1.1	2.4	0.6	1.8
Philippines	0.0	0.0	0.0	0.0	0.0	0.0
Thailand	7.6	18.2	12.3	8.6	6.9	6.9
Uganda	-0.7	-0.5	-0.8	-0.7	-0.2	-0.7
Venezuela	0.1	0.2	0.1	0.1	0.1	0.2
Vietnam	-13.8	-6.6	-14.8	-8.9	-3.8	-14.8
Zambia	-0.3	0.0	-0.3	-0.5	0.0	-0.5

Source: Hertel et al (2003)

Table 3.4 Impact of True Earnings and Spending Effects on Poverty (Change in Number of Poor, Relative to Total Population, in Percent)

Country	Total	Agr	Nagr	Labor	Transf	Diverse
Bangladesh	-0.1	-0.4	-0.4	0.1	-0.1	-0.1
Brazil	-2.4	-11.4	2.9	1.2	0.1	-2.2
Chile	-3.9	-25.0	3.4	2.3	0.7	-2.4
Columbia	-2.2	-8.9	0.5	1.0	-0.1	-2.1
Indonesia	-1.5	-2.8	1.8	-1.6	0.2	-1.4
Malawi	-2.0	-2.6	0.4	-0.7	-0.2	-2.5
Mexico	-0.2	2.5	-0.8	-0.7	-0.2	0.2
Peru	1.4	2.2	1.1	3.9	0.6	1.8
Philippines	-3.1	-5.2	1.1	-0.9	0.0	-3.0
Thailand	5.7	-0.2	13.6	8.8	6.9	4.9
Uganda	-0.5	-0.2	-0.8	-0.7	-0.2	-0.5
Venezuela	0.3	-9.1	0.6	0.8	0.1	0.5
Vietnam	-5.6	10.9	-16.0	-11.1	-3.8	-6.1
Zambia	0.0	0.0	-0.1	0.2	0.0	-0.1

Source: Hertel et al (2003)

Table 4.1: Estimated Maximum Likelihood PROBIT Equations for the Probability of Being Income-poor, by Rural and Urban Areas, 1998

Independent Variable	Villages (Rural areas)			Municipal and Sanitary Districts		
	Marginal effect (dF/dX)	Elasticity at mean	Robust std. error	Marginal effect (dF/dX)	Elasticity at mean	Robust std. error
Household size	0.0404	1.075	0.0041	0.0034	0.425	0.0008
Number of earners	-0.0203	-0.292	0.0051	-0.0005	-0.033	0.0010
No of members aged 25-44 yrs in household	-0.0008	-0.210	0.0002	-0.0002	-0.318	0.0001
No of members aged 45-59 yrs in household	-0.0014	-0.126	0.0003	-0.0003	-0.127	0.0001
No of members aged 60 yrs and older in household	-0.0019	-0.125	0.0004	-0.0002	-0.070	0.0001
<i>Whether highest-educated member of household has:</i>						
Primary schooling	-0.1283	-0.740	0.0251	-0.0015	-0.043	0.0061
Lower secondary schooling	-0.1147	-0.662	0.0148	-0.0086	-0.254	0.0040
Upper secondary schooling	-0.1318	-0.761	0.0112	-0.0115	-0.339	0.0031
Vocational education	-0.1415	-0.817	0.0084	-0.0145	-0.426	0.0040
University education	-0.1543	-0.890	0.0049	-0.0237	-0.698	0.0048
Age of household head	0.0005	0.154	0.0005	0.0001	0.145	0.0001
Whether household head female?	-0.1210	-0.698	0.0233	-0.0068	-0.199	0.0070
Whether household head female X Age of head	0.0022		0.0007	0.0001		0.0002
Dummy for second quarter	-0.0029	-0.016	0.0120	-0.0003	-0.010	0.0025
Dummy for third quarter	0.0077	0.044	0.0121	0.0000	0.000	0.0024
Dummy for fourth quarter	0.0101	0.058	0.0124	0.0044	0.130	0.0028
Owned area (rai)	-0.0018	-0.096	0.0004			
Whether tenant cultivator?	0.0513	0.296	0.0170			
Dummy for Bangkok				-0.0270	-0.795	0.0029
Dummy for Central region	-0.0687	-0.396	0.0112	-0.0089	-0.261	0.0023
Dummy for North	-0.0360	-0.208	0.0121	-0.0037	-0.109	0.0023
Dummy for Northeast	0.0965	0.557	0.0132	0.0116	0.341	0.0040
Proportion of sample income-poor	0.1733		-226.1948	0.0340		
Log likelihood ratio	-4,226			-1,527		
Weighted number of observations	16,189			7,359		
Wald chi-square statistic	606.47			297.81		

Notes: Coefficients in bold are significant at the 5 percent or lower level.

Source: World Bank (2001d)

Table 4.2 Determinants of rural poverty: Estimates of a PROBIT Model, 1998.

Variables	Regression coefficient	Asymptotic 't' value	Level of significance (Probability)
Land holding	0.042	1.35	0.178
Irrigation	-0.70	-2.21	0.027
Technology	-0.45	-1.89	0.059
No. of workers	-0.17	-2.31	0.021
Education	-0.087	-1.54	0.124
Remittance	-0.46	-2.24	0.025
Non-land Assets	-0.036	-3.16	0.001
Household size	0.170	2.85	0.004
Ecology (Northeast dummy)	0.476	-1.76	0.078
Constant	0.73	1.67	0.095

Log Likelihood ratio = -147.13; Chi-square 71.3

Source: Isvilanonda et al (2000)

Table 5.1 Thailand's Adult Equivalent Scale

Males and Females	
1 to 3	0.434
4 to 6	0.524
7 to 9	0.578
Males	
10 to 12	0.668
13 to 15	0.831
16 to 19	0.867
20 to 29	1.007
30 to 59	1.000
60+	0.712
Females	
10 to 12	0.614
13 to 15	0.723
16 to 19	0.668
20 to 29	0.729
30 to 59	0.750
60+	0.632

Source: NESDB (1998).

Table 5.2 Poverty Lines (Baht *per capita*)

Year	Kingdom	Bangkok	Central	North	Northeast	South
1994	636	658	622	581	611	624
2002	922	1021	930	830	898	890

Source: NESDB (2004)

Table 5.3 Definition of Variables Used in the Estimated Equations

Definitions of Variables used in the Estimated Equations						
Variables	Definition	Symbols				
Dependent Variable	P =1 if poor, 0 otherwise Poverty estimate based on expenditure per capita	POOREXPPC			1994	2002
Explanatory Variables			Mean	Std. Dev.	Mean	Std. Dev.
Household size	number of members	size	3.8	0.02	3.5	0.02
Dependency ratio	ratio between number of non-earning members to number of earners	DEPEND	0.94	0.01	0.90	0.01
Age of head	years	HEADAGE	47.2	0.21	48.6	0.17
Age of head squared	years ²	HEADAGESQ				
Gender of head	Sex = 1 if female, 0 male	HEADSEX	0.24	0.01	0.28	0.00
Highest level of education attained	=1 if in Primary, 0 otherwise	PRIMARD	0.73	0.01	0.68	0.01
	=1 if in Lower Secondary, 0 otherwise	LSECONDD	0.06	0.00	0.08	0.00
	=1 if Upper Secondary, 0 otherwise	USECONDD	0.03	0.00	0.04	0.00
	=1 if Higher than Secondary, 0 otherwise	HIGHD	0.08	0.01	0.13	0.01
Household receives remittance	=1 if receives remittance, 0 otherwise	REMIT	0.32	0.01	0.38	0.01
Rice consumption value per capita	Baht	RCPC	7.5	0.18	6.0	0.13
Access to electricity	=1 if household has access to electricity, 0 otherwise	ELECTRICITY	0.95	0.00	0.99	0.00
Water Source	=1 if household uses water from tap, 0 otherwise	TAP	0.43	0.02	0.72	0.01
Type of tenureship	=1 if owns dwelling and land, 0 otherwise	TENTYPE	0.78	0.01	0.77	0.01
Main enterprise of household	=1 if in Agriculture, 0 otherwise	AGRI	0.46	0.02	0.40	0.01
Main enterprise is rice farming	=1 if main enterprise is rice-farming, 0 otherwise	RICE	0.28	0.01	0.20	0.01
Small farmers	=1 if farmland is smaller than 19 rai, 0 otherwise	SMALL	0.02	0.00	0.04	0.00
Farm workers	=1 if primary occupation of head is farm worker, 0 otherwise	FLAVOR	0.07	0.00	0.07	0.00
Unskilled wage	=1 if primary occupation of head is	LABOR	0.19	0.01	0.14	0.00

laborers						
Economically Inactive	unskilled laborer, 0 otherwise =1 if household is economically inactive, 0 otherwise	INACTIVE	0.13	0.00	0.16	0.00
Tenant	=1 if primarily renting land, 0 otherwise	FARMOPRENT	0.03	0.00	0.03	0.00
Community type	=1 if lives in rural area, 0 otherwise	COMTYPE	0.69	0.03	0.67	0.03
Period of Collection Dummies:						
Second Quarter	=1 if surveyed in second quarter, 0 otherwise	SNDQTR				
Third Quarter	=1 if surveyed in third quarter, 0 otherwise	THQTR				
Fourth Quarter	=1 if surveyed in fourth quarter, 0 otherwise	FTHQTR				
Regional Dummies:						
Bangkok	=1 if Bangkok, 0 otherwise	BKK				
Central	=1 if Central, 0 otherwise	CENTRAL				
North	=1 if North, 0 otherwise	NORTH				
Northeast	=1 if Northeast, 0 otherwise	NORTHEA				

Note: South region acts as the reference category

Source: Calculated from Thailand Socio-Economic Surveys of 1994 and 2002

Table 6.1 Structure of the Sample

	Community Type		Total
	Urban	Rural	
Regions			
1994			
Bangkok	1905	0	1905
Central	3266	3309	6575
North	2984	2624	5608
Northeast	3703	3325	7028
South	2209	1901	4110
Total	14067	11159	25226
2002			
Bangkok	1946	0	1946
Central	6036	4331	10367
North	4657	3314	7971
Northeast	5931	3112	9043
South	2995	2463	5458
Total	21565	13220	34785

Source: Calculated from Thailand Household Socio-economic Surveys of 1994 and 2002

Table 6.2 Distribution of Surveyed Rice-farming Households, by Quarters

1994		2002	
Quarters	Percent	Quarter	Percent
1	27.57	1	24.89
2	25.2	2	24.95
3	24.61	3	23.98
4	22.6	4	26.17

Source: Calculated from Thailand Household Socio-Economic Surveys of 1994 and 2002

Table 6.3a Descriptive Characteristics of Thai households

Indicator:	1994			2002		
	Kingdom	Urban	Rural	Kingdom	Urban	Rural
Real Income per capita (1998 Baht)	3200.3	5421.4	2193.0	4267.1	7058.2	2919.5
Real Expenditure per capita (1998 Baht)	2627.6	4097.6	1960.9	3004.6	4676.4	2197.5
Household size	3.8	3.4	3.9	3.5	3.3	3.6
Age of head of household	47.2	43.9	48.7	48.6	45.8	49.9
Rice consumption value (1998 Baht)	405.7	310.3	449.1	343.6	247.6	389.9
Rice share of total consumption	0.075	0.040	0.091	0.060	0.029	0.074
Percentage using tap water	43.4%	77.4%	27.9%	71.6%	88.2%	63.5%
Percentage with to electricity	95.2%	98.7%	93.5%	98.5%	99.7%	98.0%
Percentage in agricultural sector	46.1%	11.5%	61.8%	39.6%	8.1%	54.8%
Percentage farming rice	28.4%	6.4%	38.4%	20.0%	4.0%	27.7%
Percentage of farm workers	6.5%	2.0%	8.6%	6.8%	1.7%	9.2%
Percentage of unskilled laborer	18.6%	20.2%	17.9%	14.3%	15.0%	14.0%
Percentage of living in rural area	68.8%	-	-	67.4%	-	-
Percentage living in Bangkok	11.3%	36.1%	0.0%	12.4%	38.2%	0.0%
Percentage living in Centre	22.9%	23.9%	22.5%	22.7%	23.6%	22.2%
Percentage living in North	20.8%	14.4%	23.7%	19.5%	12.4%	22.9%
Percentage living in Northeast	31.8%	16.2%	38.9%	32.3%	16.6%	39.8%
Percentage living in South	13.2%	9.4%	14.9%	13.1%	9.2%	15.1%

Source: Calculated from Thailand Socio-Economic Surveys of 1994 and 2002

Table 6.3b Regional Descriptive Characteristics

Indicator:	1994					2002				
	Bangkok	Central	North	Northeast	South	Bangkok	Central	North	Northeast	South
Real Income per capita (1998 Baht)	8839.8	4621.5	3368.4	2581.4	3812.4	11294.0	6363.0	4106.0	3560.4	4787.4
Real Expenditure per capita (1998 Baht)	7110.8	3629.2	2602.6	1999.6	2955.3	9071.0	5026.4	3205.6	2752.2	3704.9
Household size	3.1	3.7	3.5	4.1	4.1	3.3	3.4	3.2	3.7	3.8
Age of head of household	39.1	48.1	48.6	48.8	46.6	43.9	47.6	50.7	49.6	49.1
Rice consumption value (1998 Baht)	221.7	348.8	423.1	519.6	359.6	185.1	266.7	337.3	468.7	328.0
Rice share of total consumption	2.0%	5.1%	8.9%	11.0%	5.9%	1.5%	3.5%	7.3%	9.2%	4.6%
Percentage using tap water	96.8%	47.8%	39.9%	32.2%	22.4%	97.0%	75.3%	69.9%	71.9%	42.8%
Percentage with to electricity	99.5%	95.6%	94.2%	96.6%	88.7%	100.0%	98.7%	97.6%	98.9%	97.3%
Percentage in agricultural sector	0.9%	31.8%	50.8%	66.4%	53.2%	0.6%	23.2%	44.6%	61.5%	43.6%
Percentage farming rice	0.3%	14.8%	28.9%	55.7%	9.7%	0.1%	9.0%	22.8%	39.6%	5.5%
Percentage of farm workers	0.4%	7.5%	9.0%	4.7%	10.7%	0.2%	6.1%	10.2%	5.9%	11.3%
Percentage of unskilled laborer	25.4%	23.0%	20.4%	14.6%	12.2%	17.3%	21.0%	13.1%	10.8%	10.3%
Percentage of living in rural area	0.0%	67.5%	78.4%	84.1%	77.8%	0.0%	66.1%	79.3%	83.3%	77.3%

Source: Calculated from Thai Socio-Economic Household Survey of 1994 and 2002

Table 7.1a Poverty Profiles of Thailand 1994

		Headcount		Poverty Gap		Poverty Severity		Gini Coefficient
		Income-based	Consumption-based	Income-based	Consumption-based	Income-based	Consumption-based	
Kingdom		20.4%	14.0%	5.9%	3.0%	2.4%	1.0%	0.518
	Urban	6.1%	3.4%	1.7%	0.6%	0.7%	0.2%	0.474
	Rural	26.0%	18.2%	7.6%	3.9%	3.1%	1.3%	0.458
Bangkok		0.6%	0.3%	0.2%	0.0%	0.1%	0.0%	0.406
Central		8.5%	3.8%	2.3%	0.7%	0.9%	0.2%	0.461
North		16.7%	10.0%	4.5%	2.2%	1.8%	0.7%	0.469
Northeast		31.3%	22.2%	8.5%	4.6%	3.3%	1.4%	0.470
South		20.2%	12.4%	6.7%	2.7%	3.1%	0.9%	0.499

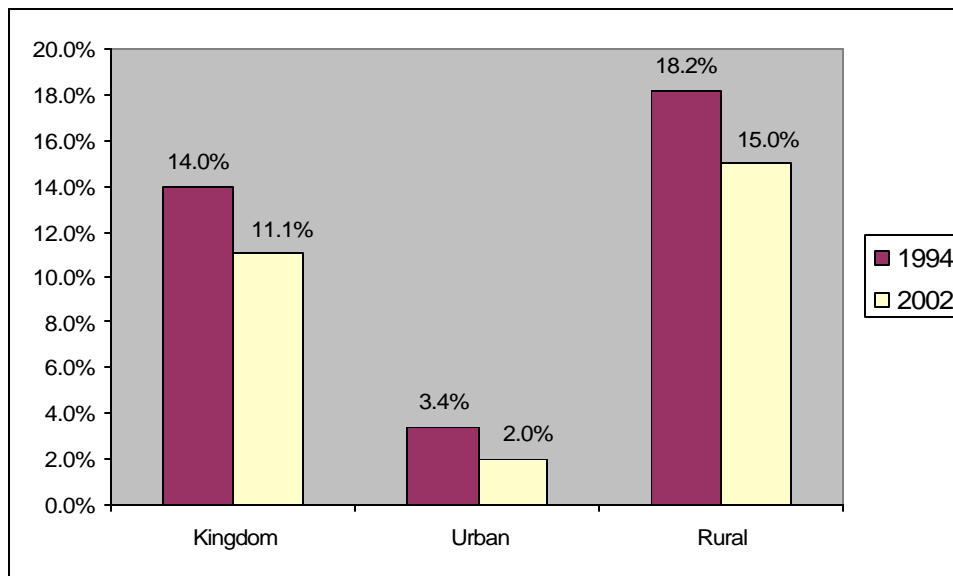
Source: Calculated from Thailand Household Socio-Economic Survey 1994 and 2002

Table 7.1b Poverty Profile 2002

		Headcount		Poverty Gap		Poverty Severity		Gini Coefficient
		Income-based	Consumption-based	Income-based	Consumption-based	Income-based	Consumption-based	
Kingdom		12.6%	11.1%	3.3%	2.1%	1.3%	0.6%	0.509
	Urban	3.1%	2.0%	0.7%	0.3%	0.3%	0.1%	0.473
	Rural	16.7%	15.0%	4.4%	2.9%	1.7%	0.9%	0.444
Bangkok		1.3%	0.0%	0.4%	0.0%	0.2%	0.0%	0.406
Central		4.7%	3.4%	1.1%	0.6%	0.4%	0.2%	0.438
North		11.9%	10.4%	3.2%	2.4%	1.3%	0.9%	0.467
Northeast		19.6%	17.3%	5.1%	3.1%	1.9%	0.8%	0.462
South		11.4%	7.2%	2.7%	1.4%	1.0%	0.4%	0.459

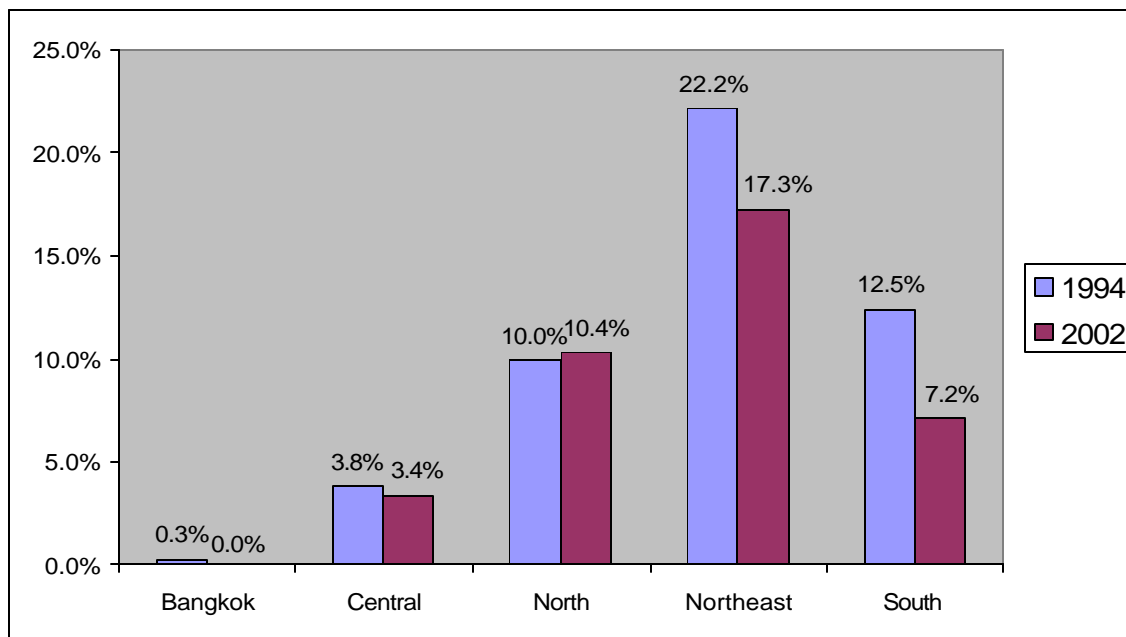
Source: Calculated from Thailand Household Socio-Economic Survey 1994 and 2002

Figure 7.1 Poverty Headcount of 1994 and 2002



Source: Calculated from Thailand Household Socio-Economic Surveys of 1994 and 2002

Figure 7.2 Poverty Headcount of 1994 and 2002, by Region



Source: Calculated from Thailand Household Socio-Economic Surveys of 1994 and 2002

Table 7.2a Poverty Indicators: Kingdom and Community Type 1994

Indicators	Kingdom		Urban		Rural	
	Poor	Non-Poor	Poor	Non-Poor	Poor	Non-Poor
Size	5.0	3.6	5.0	3.4	5.0	3.7
Dependency	1.3	0.9	1.6	1.0	1.2	0.9
Single Parents (%)	7.7%	7.8%	8.5%	7.6%	7.6%	7.9%
Head age	49.0	47.0	51.8	43.7	48.8	48.7
Female Heads (%)	20.9%	24.0%	24.7%	27.8%	20.7%	22.0%
Primary Edu (%)	79.8%	72.7%	77.4%	58.1%	80.0%	80.3%
Lower Secondary Edu (%)	1.1%	7.0%	1.9%	12.5%	1.0%	4.1%
Upper Secondary Edu (%)	0.3%	2.9%	1.5%	5.6%	0.2%	1.5%
Higher Edu (%)	0.2%	8.9%	0.1%	17.8%	0.2%	4.3%
Remittance (%)	37.7%	31.4%	33.7%	21.5%	38.0%	36.5%
Rice consumption value (1998 Baht)	502.6	394.4	437.0	307.2	507.6	439.4
Rice share of cons (%)	16.3%	6.5%	14.0%	3.8%	16.5%	7.9%
Electricity (%)	88.0%	96.0%	90.7%	98.9%	87.8%	94.5%
Tap water (%)	20.9%	46.0%	29.3%	78.5%	20.3%	29.2%
Tenure Type(%)	91.4%	76.1%	80.9%	49.2%	92.2%	89.9%
Agri Sector (%)	74.7%	42.8%	48.1%	10.7%	76.6%	59.4%
Rice Farming (%)	55.6%	25.3%	35.9%	5.7%	57.1%	35.4%
Small Farmers (%)	4.0%	2.2%	2.6%	0.6%	4.1%	3.0%
Farm Workers (%)	12.6%	5.8%	10.3%	1.8%	12.7%	7.9%
Unskilled Labor (%)	17.4%	18.8%	30.1%	20.0%	16.5%	18.2%
Inactive (%)	14.7%	12.9%	13.4%	10.3%	14.8%	14.2%
Tenant (%)	4.6%	2.9%	1.2%	0.9%	4.9%	3.9%
Rural (%)	93.0%	66.0%	-	-	100.0%	100.0%

Source: Calculated from Thailand Household Socio-Economic Survey 1994

Table 7.2b Poverty Indicators: Regions 1994

Indicators	Bangkok		Central		North		Northeast		South	
	Poor	Non-Poor	Poor	Non-Poor	Poor	Non-Poor	Poor	Non-Poor	Poor	Non-Poor
Size	4.4	3.1	5.1	3.7	4.8	3.4	5.1	3.9	5.6	3.9
Dependency	1.2	0.9	1.6	1.0	1.3	0.8	1.1	0.8	1.9	1.1
Single Parents (%)	34.7%	6.2%	7.0%	7.8%	6.1%	7.7%	9.3%	8.9%	4.4%	6.8%
Head age	45.1	39.1	50.7	48.0	48.2	48.6	49.3	48.7	48.2	46.5
Female Heads (%)	53.4%	27.7%	25.5%	27.2%	17.8%	21.7%	23.3%	23.1%	17.5%	18.8%
Primary Edu (%)	81.3%	53.4%	72.3%	73.0%	61.6%	73.0%	87.8%	83.0%	67.1%	68.4%
Lower Secondary (%)	0.0%	13.6%	1.4%	7.8%	0.8%	4.7%	1.0%	4.6%	0.6%	7.7%
Upper Secondary (%)	0.0%	6.5%	0.0%	3.1%	0.2%	1.6%	0.3%	1.7%	0.0%	3.3%
Higher Edu (%)	0.0%	21.5%	0.6%	7.8%	0.0%	6.6%	0.0%	5.4%	1.0%	9.4%
Remittance (%)	34.7%	14.3%	25.0%	25.3%	29.5%	36.1%	45.7%	45.7%	22.7%	20.5%
Rice consumption value (1998 Baht)	233.5	221.7	408.8	347.1	503.5	416.8	539.3	515.4	374.2	358.1
Rice share of cons (%)	7.6%	2.0%	12.7%	4.9%	18.8%	8.1%	17.6%	9.5%	11.5%	5.4%
Electricity (%)	100.0%	99.5%	76.8%	96.1%	75.6%	95.7%	92.5%	97.5%	82.6%	89.3%
Tap water (%)	100.0%	96.8%	27.1%	48.4%	27.9%	40.8%	20.5%	34.7%	9.6%	23.7%
Tenure Type(%)	0.0%	28.9%	82.5%	72.8%	87.9%	85.9%	93.6%	91.4%	89.1%	79.0%
Agri Sector (%)	0.0%	0.9%	53.3%	31.2%	67.6%	49.5%	82.1%	63.0%	63.0%	52.2%
Rice Farming (%)	0.0%	0.3%	27.8%	14.5%	38.8%	28.1%	72.5%	52.0%	20.7%	8.6%
Small Farmers (%)	0.0%	0.1%	1.9%	2.1%	8.7%	4.3%	3.1%	1.3%	5.4%	2.9%
Farm Workers (%)	0.0%	0.4%	29.1%	6.9%	17.6%	8.3%	6.9%	4.2%	23.8%	9.4%
Unskilled Labor (%)	100.0%	25.2%	23.9%	23.0%	19.8%	20.4%	15.8%	14.3%	16.9%	11.7%
Inactive (%)	0.0%	7.1%	7.3%	11.7%	11.1%	14.4%	18.4%	18.1%	6.8%	6.9%
Tenant (%)	0.0%	0.3%	6.9%	4.4%	10.0%	5.6%	3.0%	1.9%	3.4%	0.7%
Rural (%)	0.0%	0.0%	88.4%	66.8%	90.0%	77.5%	95.2%	81.7%	93.4%	76.2%

Source: Calculated from Thailand Household Socio-Economic Survey 1994

Table 7.2c Poverty Indicators: Kingdom and Community Type 2002

Indicators	Kingdom		Urban		Rural	
	Poor	Non-Poor	Poor	Non-Poor	Poor	Non-Poor
Size	4.8	3.4	4.7	3.2	4.8	3.5
Dependency	1.2	0.9	1.5	0.9	1.2	0.9
Single Parents (%)	9.2%	11.3%	12.4%	11.4%	9.0%	11.2%
Head age	52.3	48.3	54.4	45.7	52.2	49.6
Female Heads (%)	20.6%	28.5%	25.5%	31.4%	20.3%	27.0%
Primary Edu (%)	78.4%	66.9%	81.0%	49.4%	78.3%	76.3%
Lower Secondary Edu (%)	2.1%	8.6%	1.8%	12.2%	2.1%	6.6%
Upper Secondary Edu (%)	0.3%	4.6%	0.7%	7.6%	0.3%	3.0%
Higher Edu (%)	0.4%	14.0%	0.5%	26.4%	0.3%	7.4%
Remittance (%)	45.0%	37.3%	46.7%	26.6%	44.9%	43.0%
Rice consumption value (1998 Baht)	467.9	332.6	410.5	245.2	471.4	379.5
Rice share of cons (%)	14.1%	5.3%	12.2%	2.8%	14.2%	6.6%
Electricity (%)	93.6%	99.0%	95.9%	99.7%	93.4%	98.5%
Tap water (%)	55.1%	73.0%	54.3%	88.7%	55.1%	64.6%
Tenure Type(%)	92.9%	75.7%	87.4%	50.2%	93.2%	89.4%
Agri Sector (%)	70.6%	36.9%	44.9%	7.6%	72.2%	52.6%
Rice Farming (%)	44.6%	17.9%	30.4%	3.6%	44.3%	25.6%
Small Farmers (%)	9.9%	3.0%	9.2%	0.6%	10.0%	4.2%
Farm Workers (%)	19.7%	5.7%	13.3%	1.5%	20.1%	7.9%
Unskilled Labor (%)	14.5%	14.3%	22.1%	14.9%	14.1%	14.0%
Inactive (%)	15.5%	16.5%	16.8%	12.8%	15.4%	18.5%
Tenant (%)	7.2%	3.1%	5.1%	0.5%	7.3%	4.5%
Rural (%)	94.3%	65.1%	-	-	100.0%	100.0%

Source: Calculated from Thailand Household Socio-Economic Survey 2002

Table 7.2d Poverty Indicators: Regions 2002

Indicators:	Bangkok		Central		North		Northeast		South	
	Poor	Non-Poor	Poor	Non-Poor	Poor	Non-Poor	Poor	Non-Poor	Poor	Non-Poor
Size	-	3.3	4.9	3.4	4.5	3.1	5.0	3.5	5.3	3.7
Dependency	-	0.9	1.5	0.9	1.0	0.8	1.2	0.8	2.1	1.0
Single Parents (%)	-	10.9%	12.1%	11.5%	7.3%	10.2%	9.3%	12.3%	8.3%	10.1%
Head age	-	43.9	55.0	47.5	52.8	50.5	51.6	49.3	52.1	48.9
Female Heads (%)	-	29.5%	27.7%	33.3%	18.7%	28.9%	19.1%	25.8%	18.1%	24.5%
Primary (%)	-	44.5%	76.6%	63.9%	59.4%	69.9%	88.3%	78.6%	66.9%	64.4%
Lower Secondary (%)	-	13.1%	2.6%	10.8%	1.5%	5.9%	1.8%	6.0%	2.8%	9.2%
Upper Secondary (%)	-	8.9%	0.0%	5.2%	0.3%	2.7%	0.3%	3.0%	1.0%	5.0%
Higher Edu (%)	-	29.7%	0.0%	14.5%	0.5%	10.2%	0.5%	8.9%	0.0%	13.0%
Remittance (%)	-	20.8%	51.0%	28.0%	35.7%	41.2%	50.4%	52.2%	35.2%	31.3%
Rice consumption value (1998 Baht)	-	185.1	363.0	264.4	436.9	329.4	523.4	460.6	329.8	327.9
Rice share of cons (%)	-	1.5%	10.4%	3.3%	16.6%	6.5%	15.2%	8.3%	9.1%	4.4%
Electricity (%)	-	100.0%	91.9%	98.9%	81.9%	98.8%	97.1%	99.2%	96.1%	97.3%
Tap water (%)	-	97.0%	60.3%	75.6%	56.0%	71.0%	57.6%	74.1%	22.8%	43.9%
Tenure Type(%)	-	38.5%	85.9%	66.4%	79.1%	87.0%	98.7%	91.4%	92.1%	79.2%
Agri Sector (%)	-	0.6%	53.7%	22.5%	60.9%	43.3%	81.1%	58.5%	38.8%	43.8%
Rice Farming (%)	-	0.1%	29.2%	8.5%	32.9%	22.0%	56.1%	37.1%	9.3%	5.3%
Small Farmers (%)	-	0.1%	15.1%	6.9%	26.0%	12.4%	35.7%	18.0%	14.4%	17.4%
Farm Workers (%)	-	0.2%	30.0%	5.5%	30.1%	8.6%	14.5%	4.6%	31.0%	10.3%
Unskilled Labor (%)	-	17.3%	22.0%	21.0%	12.8%	13.1%	12.4%	10.6%	21.3%	9.7%
Inactive (%)	-	9.6%	15.5%	11.5%	16.6%	19.5%	15.1%	24.4%	10.6%	10.4%
Tenant (%)	-	0.0%	7.1%	4.1%	15.7%	6.3%	4.8%	2.2%	2.4%	2.0%
Rural (%)	-	-	89.6%	65.5%	93.1%	78.2%	95.1%	81.5%	96.3%	76.2%

Source: Calculated from Thailand Household Socio-Economic Survey 2002

Figure 7.3a Headcount Index, by Type of Enterprise

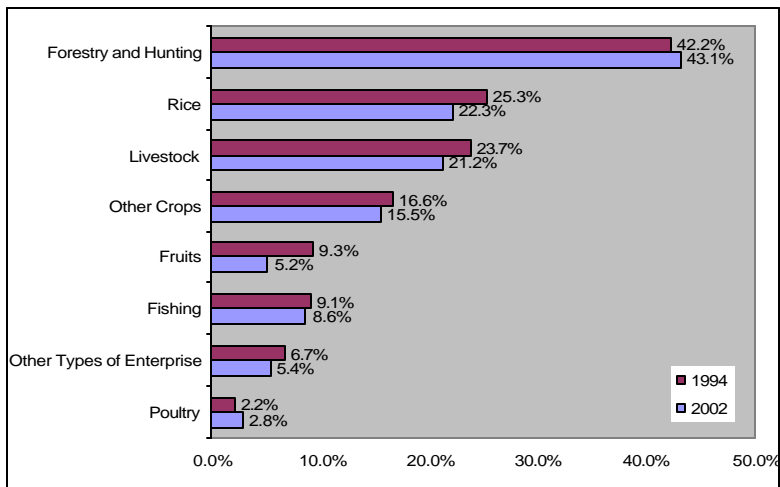


Figure 7.3b Poverty Gap Index, by Type of Enterprise

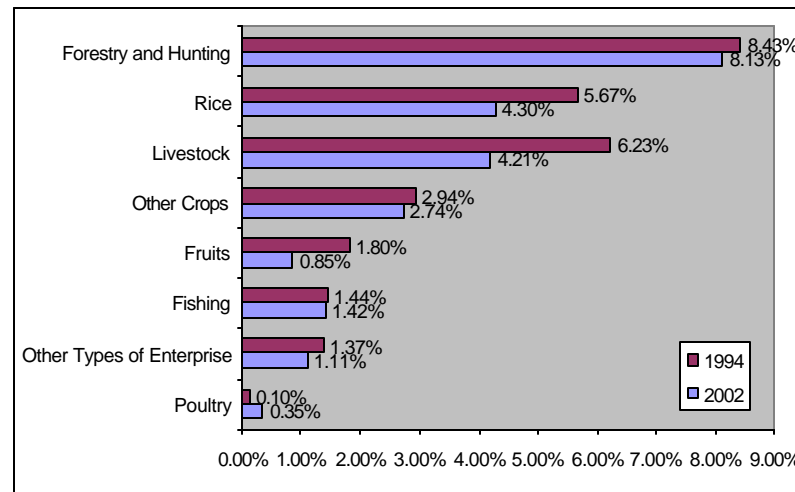
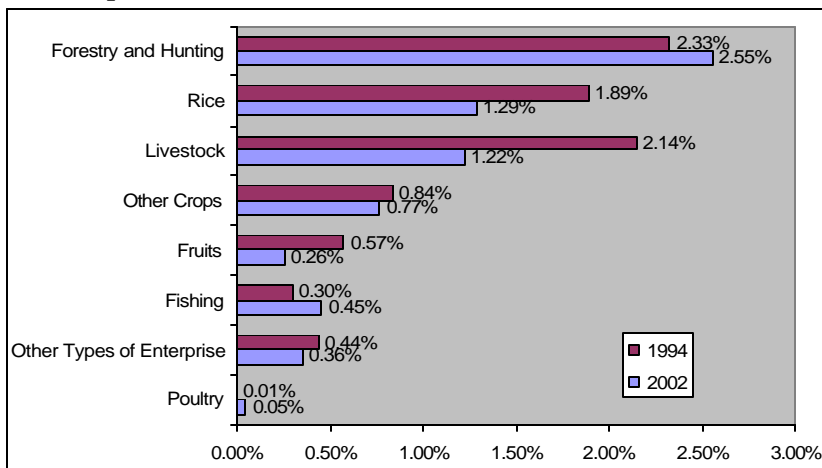
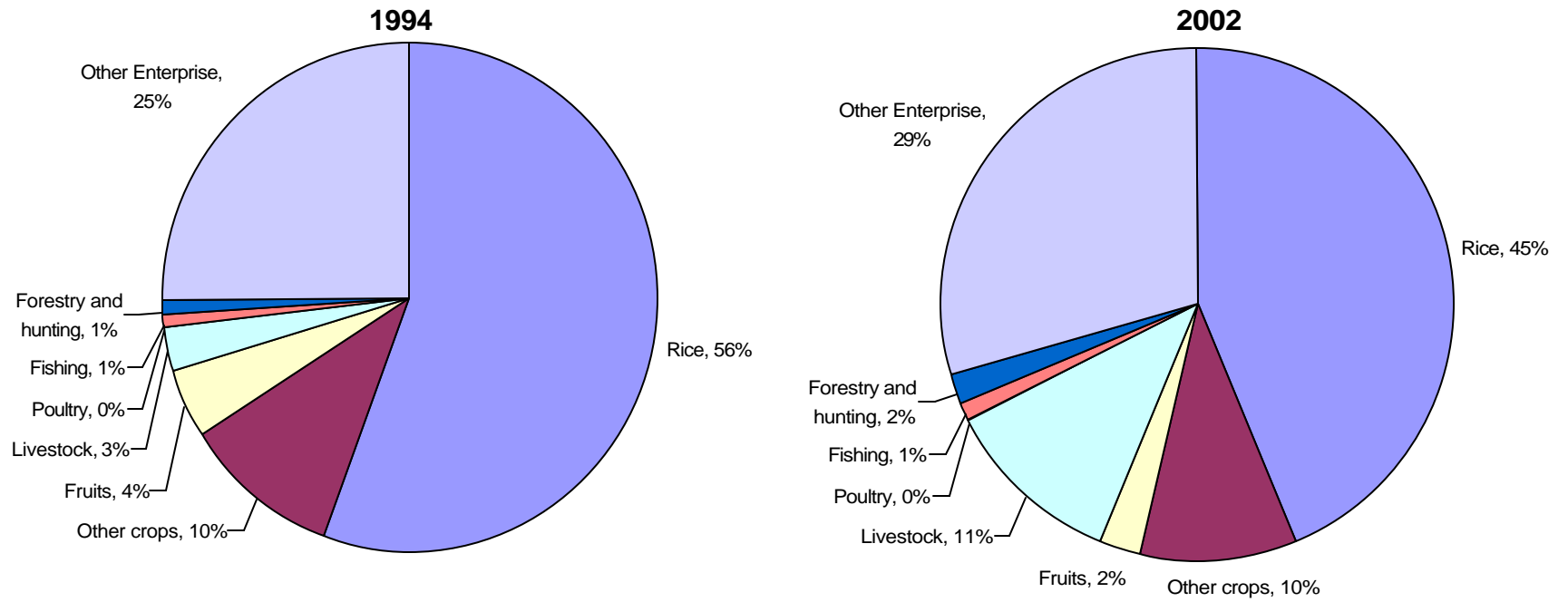


Figure 7.3c Poverty Severity Index, by Type of Enterprise



Source: Calculated from Thailand Household Socio-Economic Surveys of 1994 and 2002

Figure 7.4 Break-down of Poor Households, by Type of Enterprise



Source: Calculated from Thailand Household Socio-Economic Surveys of 1994 and 2002

Figure 7.5a Headcount Index, by Occupational Sub-Group

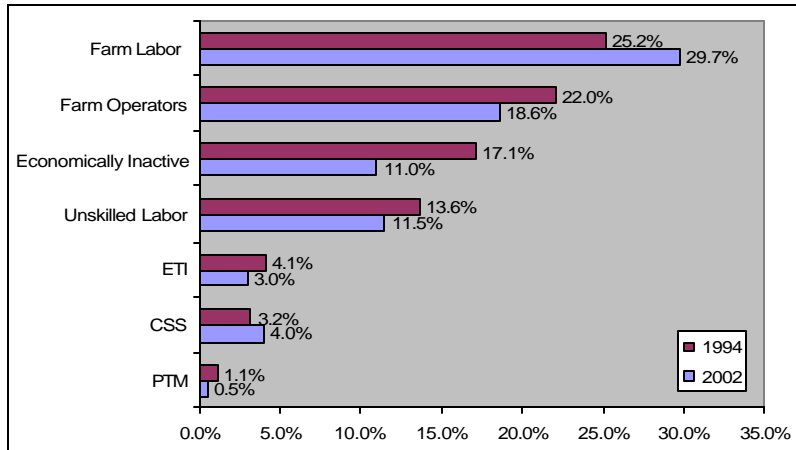


Figure 7.5b Poverty Gap Index, by Occupational Sub-Group

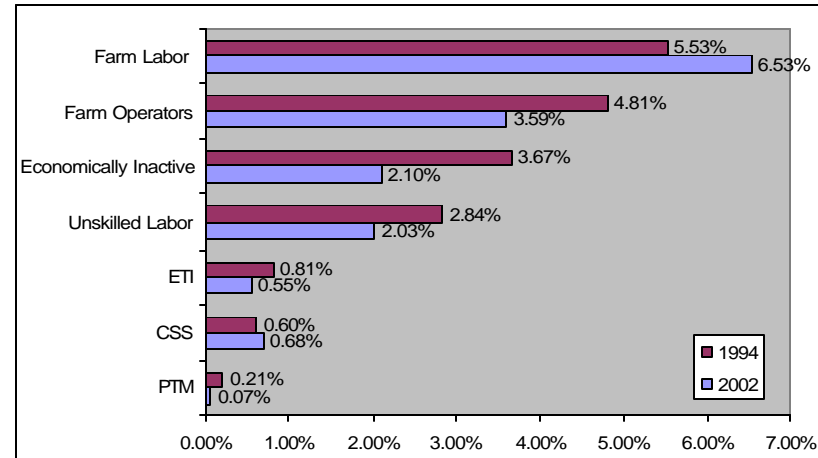
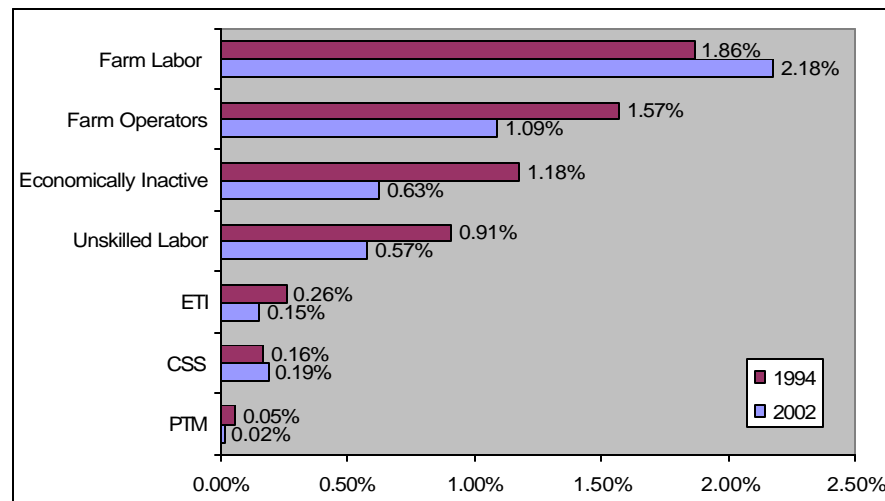
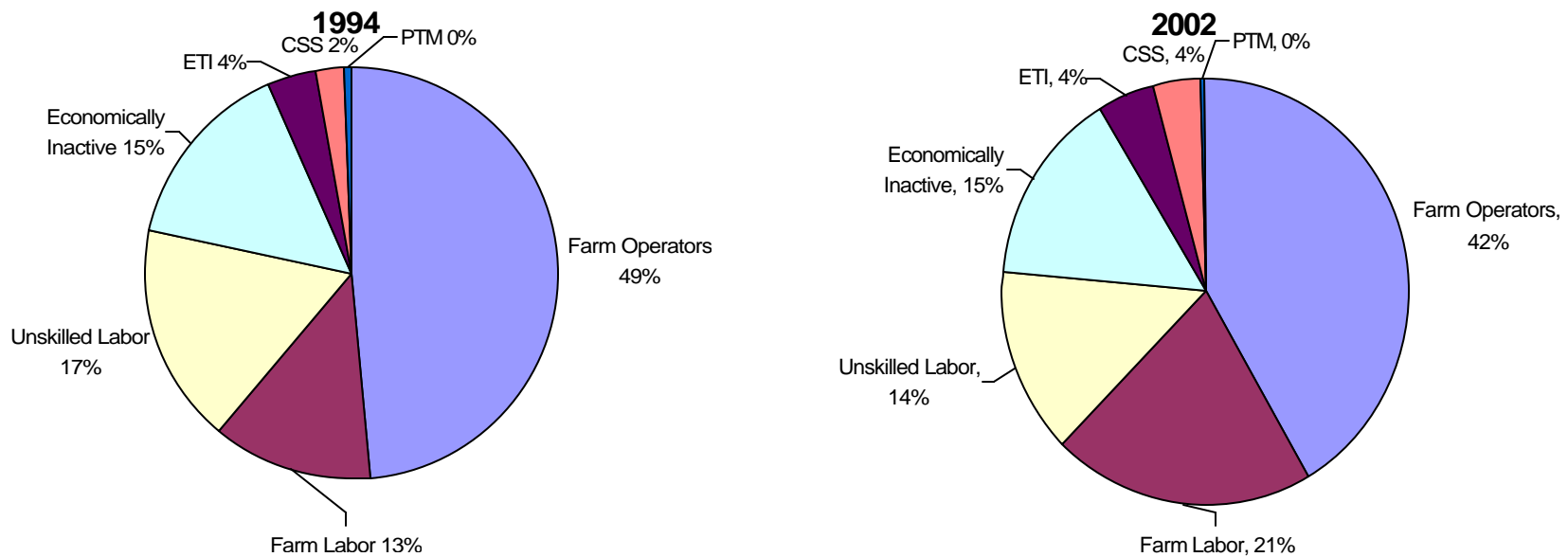


Figure 7.5c Poverty Severity Index, by Occupational Sub-Group



Note: ETI: Entrepreneurs, Trade, Industry ; CSS : Clerical, Sales, Services Workers ; PTM: Professional, Technical, Managerial
Source: Calculated from Thailand Household Socio -Economic Surveys of 1994 and 2002

Figure 7.6 Break-down of Poor Households, by Occupational Sub-Group



Note: ETI: Entrepreneurs, Trade, Industry ; CSS : Clerical, Sales, Services Workers ; PTM: Professional, Technical, Managerial
Source: Calculated from Thailand Household Socio -Economic Surveys of 1994 and 2002

Table 7.3 PROBIT Estimates: Kingdom Sample

Variables	1994			2002		
	Estimated β 's	t-value	Marginal Effects	Estimated β 's	t-value	Marginal Effects
Size	0.23	18.42**	0.013	0.22	16.30**	0.013
DEPEND	0.13	5.70**	0.008	0.11	5.32**	0.007
HEADAGE	-0.04	-5.02**	-0.002	-0.04	-3.64**	-0.002
HEADAGESQ	0.00	4.21**	0.000	0.00	3.72**	0.000
HEADSEX	0.04	0.81	0.002	-0.19	-2.86**	-0.010
PRIMARD	-0.53	-8.00**	-0.039	-0.55	-6.07**	-0.042
LSECONDDD	-1.29	-9.32**	-0.029	-0.99	-6.59**	-0.028
USECONDDD	-1.25	-6.65**	-0.026	-1.57	-6.25**	-0.028
HIGHD	-1.77	-7.04**	-0.033	-1.51	-5.50**	-0.035
REMIT	0.03	0.64	0.002	0.05	0.93	0.003
RCPC	-0.01	-12.59**	0.000	0.00	-7.49**	0.000
ELECTRICITY	-0.60	-6.30**	-0.057	-0.69	-4.87**	-0.076
TAP	-0.22	-4.12**	-0.012	-0.25	-4.78**	-0.016
TENTYPE	-0.18	-1.63	-0.011	-0.07	-0.62	-0.004
AGRI	0.42	8.27**	0.025	0.37	5.93**	0.022
FLABOR	0.49	5.57**	0.042	0.76	11.46**	0.083
LABOR	0.08	1.55	0.005	0.16	2.46*	0.011
INACTIVE	0.09	0.77	0.005	-0.05	-0.57	-0.003
COMTYPE	0.41	6.71**	0.021	0.45	7.73**	0.021
SNDQTR	-0.04	-0.47	-0.002	-0.08	-1.21	-0.005
THQTR	0.17	2.13*	0.010	0.04	0.49	0.003
FTHQTR	0.17	2.15*	0.010	0.01	0.21	0.001
BKK	-0.66	-2.80**	-0.024	-	-	-
CENTRAL	-0.30	-5.20**	-0.015	-0.03	-0.27	-0.002
NORTH	0.33	4.23**	0.023	0.57	6.78**	0.047
NORTHEA	0.90	13.75**	0.075	1.00	11.36**	0.083
_cons	-0.64	-2.84**		-0.89	-3.32**	
	Pseudo-R2:	0.2941		Pseudo-R2:	0.2744	

Note: 1. *, **, ^ significant at 1, 5, 10, per cent level, respectively

2. The Bangkok dummy variable is dropped in the 2002 model since it perfectly predicts that a household is not poor.

Source: Calculated from Thailand Household Socio-Economic Survey 1994 and 2002

Table 7.4 PROBIT Estimates: Community Type Sub-samples

Variables	1994						2002					
	Urban			Rural			Urban			Rural		
	Estimated β 's	t-value	M.E.	Estimated β 's	t-value	M.E.	Estimated β 's	t-value	M.E.	Estimated β 's	t-value	M.E.
Size	0.17	9.49**	0.001	0.24	17.95**	0.030	0.14	6.71**	0.001	0.25	16.90**	0.022
DEPEND	0.11	3.23**	0.001	0.12	4.29**	0.014	0.12	4.57**	0.001	0.09	3.68**	0.008
HEADAGE	-0.01	-0.73	0.000	-0.04	-5.22**	-0.005	-0.03	-2.23*	0.000	-0.04	-3.32**	-0.004
HEADAGESQ	0.00	0.64	0.000	0.00	4.35**	0.000	0.00	2.03*	0.000	0.00	3.41**	0.000
HEADSEX	0.01	0.16	0.000	0.03	0.66	0.004	-0.19	-2.46*	-0.001	-0.20	-2.72**	-0.016
PRIMARD	-0.41	-3.29**	-0.002	-0.54	-7.59**	-0.085	-0.50	-3.73**	-0.005	-0.53	-5.54**	-0.062
LSECONDD	-1.15	-5.51**	-0.002	-1.32	-8.12**	-0.065	-1.36	-5.88**	-0.004	-0.91	-5.35**	-0.042
USECONDD	-0.93	-5.33**	-0.002	-1.34	-4.85**	-0.062	-1.48	-3.50**	-0.004	-1.55	-5.01**	-0.045
HIGHD	-2.13	-7.88**	-0.005	-1.72	-6.17**	-0.069	-1.89	-7.62**	-0.010	-1.45	-4.76**	-0.050
REMIT	0.01	0.12	0.000	0.04	0.69	0.005	0.17	2.64**	0.002	0.05	0.86	0.004
RCPC	-0.01	-7.70**	0.000	-0.01	-11.87**	-0.001	0.00	-4.18**	0.000	0.00	-7.48**	0.000
ELECTRICITY	-0.90	-5.84**	-0.017	-0.60	-5.96**	-0.106	-0.85	-4.08**	-0.023	-0.66	-4.55**	-0.100
TAP	-0.63	-8.08**	-0.005	-0.15	-2.66**	-0.018	-0.46	-7.50**	-0.006	-0.24	-4.19**	-0.023
TENTYPE	0.10	1.07	0.000	-0.22	-1.71^	-0.030	0.25	2.26*	0.002	-0.07	-0.49	-0.006
RICE	-	-		0.32	5.35**	0.041	-	-	-	0.29	4.30**	0.029
FLABOR	-	-		0.43	4.98**	0.068	-	-	-	0.79	10.77**	0.119
LABOR	0.29	4.06**	0.002	0.00	0.00	0.000	0.21	2.97**	0.002	0.14	1.82^	0.014
FARMOPRENT	-	-		0.16	1.46	0.021	-	-	-	0.33	3.00**	0.037
SMALL	-	-		0.59	6.20**	0.106	-	-	-	0.73	8.36**	0.113
INACTIVE	0.01	0.06	0.000	0.10	0.90	0.013	-0.08	-0.68	-0.001	0.01	0.10	0.001
SNDQTR	-0.08	-0.53	0.000	-0.02	-0.20	-0.002	-0.12	-1.17	-0.001	-0.08	-1.13	-0.007
THQTR	0.03	0.25	0.000	0.20	2.31*	0.027	0.00	0.00	0.000	0.03	0.33	0.003
FTHQTR	0.03	0.24	0.000	0.20	2.28*	0.026	-0.10	-0.83	-0.001	0.02	0.21	0.001
BKK	-0.48	-2.25*	-0.002	-	-		-	-	-	-	-	-
CENTRAL	-0.36	-4.11**	-0.001	-0.39	-6.27**	-0.041	0.13	0.92	0.001	-0.12	-0.89	-0.010
NORTH	0.41	5.31**	0.003	0.21	2.34*	0.028	0.65	5.60**	0.010	0.51	5.50**	0.058
NORTHEA	0.73	8.33**	0.008	0.80	11.19**	0.113	0.96	7.89**	0.018	0.98	10.46**	0.110
_cons	-0.86	-2.73**		0.09	0.35		-0.69	-1.55		-0.44	-1.46	
	Pseudo-R2:	0.316		Pseudo-R2:	0.2479		Pseudo-R2:	0.26		Pseudo-R2:	0.257	

Note: *, **, ^ significant at 1, 5, 10, per cent level, respectively

Source: Calculated from Thailand Household Socio-Economic Survey 1994 and 2002

Table 7.5 Changes in the structure of household incomes, 1985 to 1998.**(Figures at 1998 constant prices)**

Sources of income	1987		1998		Annual rate of growth (Percent)
	Average income (Baht)	Percent of total income	Average income (Baht)	Percent of total income	
Rice cultivation	38,070	45.1	35,556	26.8	-0.6
Non-rice agriculture	17,316	20.5	45,844	34.5	8.4
Agriculture	55,386	65.7	81,401	61.3	3.2
Non-farm income	26,648	31.6	45,518	34.2	4.5
Remittances	2,309	2.7	5,982	4.5	8.3
Non-agriculture	28,957	34.3	51,500	38.8	4.9
Total income	84,343	100.0	132,901	100.0	3.9
Household size	6.42		4.98		-2.1
Per capita income	13,138		26,687		6.0

Source: Isvilanonda et al (2000)