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DISCUSSION PAPER No. 63
Agricultural Policies and Development of
Myanmar's Agricultural Sector
: An Overview

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Abstract

This paper reviews the development of the agricultural sector in Myanmar after the transition to an open economy in 1988 and analyzes the nature as well as the performance of the agricultural sector. The avoidance of social unrest and the maintenance of control by the regime are identified as the two key factors that have determined the nature of agricultural policy after 1988. A major consequence of agricultural policy has been a clear difference in development paths among the major crops. Production of crops that had a potential for development showed sluggish growth due to policy constraints, whereas there has been a self-sustaining increase in the output of those crops that have fallen outside the remit of agricultural policy.

Keywords: Agriculture, Transition, Myanmar

JEL classification: P20, Q11, Q17, Q18

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Introduction

Myanmar's economy before 1988 was best characterized by isolation from the outside world. This paper aims to review the development process of the agricultural sector after 1988, with special reference to the extent to which the economy has been involved with, and influenced by, the international markets. This involves exploring how Myanmar succeeded in making the best of the sub-sectors in which it enjoyed comparative advantage, and the extent to which it overcame, or failed to overcome, the demerits of the sub-sectors in which there was no comparative advantage. An analysis carried out from this perspective makes it possible to examine the significance and the role that the agricultural sector played in the development of Myanmar's economy in transition.

Many analysts agree that the economic policy of Myanmar during the socialist period (1962-88), especially up to the early 1970s, was essentially a policy of agricultural exploitation, with heavy emphasis on rice production (Tin Soe and Fisher 1990, Takahashi 2001, Myat Thein 2004).

A policy of agricultural exploitation generally implies the following two elements. First, food prices are repressed and wages are kept at a low level in order to promote industrialization. Second, export crops are purchased at a price lower than the international price, and the resulting revenue is used to promote industrialization. In this sense, the rice policy of Myanmar in the socialist period was a typical policy of agricultural exploitation. Not only did the government introduce a compulsory paddy procurement system at below-market prices and a system of rationing the supply of cheap rice to consumers through people's shops and cooperatives,¹ but it also monopolized rice exports, which became the largest source of foreign exchange earnings at that time.

Meanwhile, however, it should be noted that the existence of a procurement and rationing system of itself does not necessarily indicate an exploitative policy. Consider for example the case of edible oil. The socialist regime adopted a self-sufficiency policy with regard to edible oil production even though Myanmar had no comparative advantage in this sub-sector. It was very likely that the domestic price of edible oil was well above the international price and thus farmers were 'protected' by limiting imports, even though a procurement and rationing system similar to the one applied to

¹ The transportation cost for rice distribution was subsidized by the government, and this resulted in a lower rice price even in border districts far removed from the major rice-producing areas. This nation-wide distribution of rice supported by the government promoted a shift in the consumption pattern of staple food and resulted in a huge increase in rice consumption throughout the country.

rice production was adopted in respect of oilseed crops such as sesame and groundnuts.

As will be described later, imports of edible oil increased dramatically after 1988. As a result, the domestic edible oil price was lowered to a level close to that of the international price. On the other hand, there was a remarkable increase in exports of pulses and beans, and before long, they became Myanmar's largest export item. In due course the domestic price of pulses increased quite rapidly. Pulses and beans underwent a process of rapid adjustment with the international market price. In this sense, the largest change that Myanmar agriculture has experienced since 1988 has been departure from a closed trade regime, which had been isolating the domestic market from the international market.

By contrast, in the case of rice, since 1988 the domestic price has been continuously repressed at about half of the international price, although the disparity narrowed somewhat over time. On the other hand, the indispensable inputs needed for rice cultivation (chemical fertilizer and diesel oil) have strengthened their linkages to the international market, insofar as recently, they have begun to be imported on a purely commercial basis. This means that the rice sector in Myanmar has itself strengthened its linkage with the international market, albeit in a rather asymmetric way, and with the result that in this respect, the sufferings of the Myanmar government and of the farmers have come to converge.

It is true that even after 1988 farmers in Myanmar continued to be controlled by the 'three internal major agricultural systems' inherited from the socialist period, namely the procurement system, the planned cropping system and the state ownership of farmland, a point stressed by Takahashi (Takahashi 2001). It can even be argued that after 1988, the government tightened these systems to control farmers. However, at the same time, Myanmar agriculture is being forced to come to terms with the current wave of internationalization. Given that internationalization is inevitable, how to make the best use of its merits while at the same time minimizing its demerits is the key to successful reform of the domestic control systems. In analyzing trends in the agricultural sector after 1988, this paper attempts to emphasize the transition to an open economy, rather than the transition to a market economy in general. For this very reason, the paper focuses on broader measures rather than simply domestic factors and it is hoped that by doing so, it will fill a gap in previous research.

We group the major agricultural products of Myanmar into the following four categories: export crops, crops for import competition, crops for the domestic market and crops for state-owned

enterprises. We believe that this is the most appropriate classification for analyzing the problems encountered by crop production in Myanmar in the course of internationalization.

Specifically, the categories comprise the following: export crops (rice and pulses), crops for import competition (oilseeds), crops for the domestic market (vegetables, fruits, meat and fishery products), and crops for state-owned enterprises (sugarcane and cotton).²

The contents of the paper are as follows. Section 1 reviews the development of the agricultural sector since 1988 in the context of trends in the national economy as a whole. Section 2 discusses performance, and analyzes the factors that have determined performance for each of the major agricultural products contained in the four main categories of crop production. By way of conclusion, the nature of Myanmar's agricultural policies and the agricultural developments that can be attributed to these policies will be briefly summarized.

1. Performance of the Agricultural Sector in the National Economy

Let us first look briefly at the performance of the agricultural sector and its role in the overall economic development of Myanmar.

Table 1 indicates the changes in the composition of GDP by sector and annual growth rates since the early 1980s. The agricultural sector was surprisingly slow to lose its relative importance in terms of its contribution to GDP, and accounted for more than 40 % of GDP even in recent years (at 1985/86 constant prices). This suggests that the agricultural sector has been growing at a pace equal to those of the other sectors of the economy.

The table also shows that the GDP share of agriculture is significantly higher at current prices than at 1985/86 constant prices. The discrepancy between the two widened very sharply between 1985/86-1990/91 and the divergence increased further until 1994/95. This means that agricultural prices, which in the socialist period had been highly repressed compared to non-agricultural prices, were 'normalized' by the mid 1990s.³ In general, the rate of increase of agricultural retail prices was higher than that of the CPI.

Table 2 shows the differences in the rate of price increase among crops in this respect. First, for

² There are of course exceptions to the categorization that we have employed. For example, sesame is an export crop, and some of the crops that we have classified as crops for the domestic market are also exported (e.g. prawns and fish, and garlic and onions).

³ A similar development also occurred in China between 1978 and the mid-1980s.

export crops, the rate of price increase was generally quite high. Domestic prices, repressed at a very low level, have risen dramatically because of the stimulus provided by international prices, and this has resulted in a sharp increase in production and in exports. Second, the price of import competition crops increased by only a small amount, since the expansion of imports prevented a surge in domestic prices. Third, crops destined for the domestic market underwent a fairly large increase in price. This may well be the result of the high income elasticity of items such as vegetables, meat and fishery products.

In sum, the role of the agricultural sector in Myanmar's economic recovery and growth after 1988 was very important, and remained so until the mid-1990s. This was made possible largely through the price incentives given to the farmers. The agricultural marketing reforms of 1987 were in general quite effective in achieving an adjustment between hitherto highly repressed agricultural prices and international prices. The rate of price increase was very high, not only for a few (but important) export crops but also for a variety of crops intended for the domestic market. Farmers responded quickly to the new economic opportunities.

Increases in agricultural production can be achieved either by an expansion of the sown area or by a rise in crop yields per unit area of land. This being the case, how did Myanmar increase its farm output?

Table 3 sets out the changes in the sown acreage of major crops. The total sown acreage, which was 24 million acres in the late 1980s, has increased rapidly to 40 million acres in recent years.⁴ Since the land frontier disappeared long ago in Myanmar, this expansion of sown acreage can be mostly attributed to the intensification of land use, or in other words to a rise in cropping intensity. The sown acreage expanded in the case of almost every crop, except for oil seeds which are typical crops for import competition. Rice, pulses, vegetables (chilli, onion and garlic), cotton, sugarcane and rubber all merit particular attention in this regard.

Table 4, by contrast, shows the changes in yield for major crops. A notable feature revealed by Table 4 is that except for rice and rubber, yields have not shown any upward trend since 1988. We can conclude that the development of the agricultural sector during the period was achieved through the expansion of the sown acreage and not through improvements in land productivity.

⁴ There is of course the possibility that the rapid increase in the sown acreage in the late 1990s is the result of some statistical adjustment.

Finally, the contribution of agriculture to total exports over the same period is briefly reviewed (Table 5). According to Table 5, in the early years, agricultural exports (here defined broadly to include livestock, fishery products and timber) had a dominant share, and accounted for over 85% of total exports. In particular, the two dominant agricultural exports, rice and teak wood, amounted to more than 65% of all exports. However, after 1988, this mono-culture export structure underwent quite a dramatic transformation.

First, pulses increased markedly as an important export item. Exports of pulses by value overtook exports of rice and teak combined by the mid-1990s, and came to account for between 20 and 25% of total exports. Second, exports of fishery products increased after the mid-1990s, just as the momentum in the increase of pulse exports was beginning to slow down. The main item was prawns. Third, exports of non-agricultural commodities have increased since the late 1990s. The expansion of garment exports in the late 1990s and an increase in natural gas exports in more recent years, have been quite prominent features of Myanmar's changing export structure.

To summarize, the export structure of Myanmar has departed from a mono-culture pattern in which rice and teak wood were dominant, and has diversified, first into a variety of agricultural commodities and more recently into non-agricultural commodities, a category that has become increasingly important in the last few years. It should be noted, however, that exports of non-agricultural commodities are very much dominated by two items, garments and natural gas. Thus, agricultural exports still remain important for Myanmar's economy.

2. The Nature and the Determinants of the Production Performance of Major Crops

This section will analyze and identify the main determinants of the production performance of major crops in Myanmar after 1988.

2.1 Export Crops

Export crops are here defined as the crops in which Myanmar enjoys comparative advantage. Whether Myanmar has always succeeded in exploiting comparative advantage in these categories is of course another issue. Although typical of its agriculture, rice is a crop whose production potential Myanmar has failed to exploit. By contrast, cultivation of pulses and beans has been a notable success story. The critical difference between the two is that rice is a staple food and has a significant

position in the people's diet and any price hike therefore affects consumers badly. This is not the case for pulses in Myanmar.

(1) Rice

Rice is the key crop in the agriculture of Myanmar and has great significance for the national economy. Since several observers have already undertaken research on rice cultivation in Myanmar (Takahashi 2000, Garcia et.al. 2000, Fujita and Okamoto 2000, Fujita 2003, and Kurosaki et.al. 2004), we will here try to avoid overlap with existing studies, and will confine ourselves to a concise summary.

A. Changes in rice price

Changes in the rice price will be examined first. A sharp increase in the rice price, far exceeding the rise in the CPI, occurred just after the liberalization of the agricultural market in 1987 (Table 2). Figure 1 indicates trends in the rice price and in the CPI. The rice price was 1.77 times higher than the CPI in 1989 and 1.75 times higher in 1993, a serious situation that caused considerable anxiety for the government. A widespread sense of crisis forced the government to take measures such as the exclusion of rice from marketing liberalization in 1988⁵ and the introduction of the summer paddy program, initiated in 1992/93, for boosting rice production. Secondly, however, despite such measures, the rice price was kept at a relatively high level until 2001, when it finally converged with the CPI. It should be noted that another emergency situation in terms of the rice price level occurred around 1999 (Figure 1).

Let us now examine the surge in the rice price from a different angle. Figure 2 illustrates the ratio of the domestic price to the international price of rice between the mid 1980s and the early 2000s.⁶

According to the figure, the domestic price was between one seventh and one eighth of the international price in 1983/84, which shows that the domestic rice price was repressed at an

⁵ The paddy procurement system was revived. However, surplus paddy could be sold in the market, while entry of the marketing agents (traders and rice millers) was practically free. In this sense, it is more appropriate to say that rice was liberalized only partly. See Okamoto (2005) for further discussion.

⁶ We took the retail price, not the wholesale price, as the domestic price, simply because of the lack of wholesale price data for the socialist period.

extremely low level during the socialist period. However, the ratio thereafter increased rapidly, reaching about 1/3-1/4 by the end of the socialist period. After 1988 it further increased and reached its peak (0.7) in 1989/90. Thereafter, it fell to 0.25 in 1991/92, before again rising to 0.6 in 1993/94. From then on, with wide fluctuations, it averaged around 0.6, meaning that the domestic price was 40% lower than the international price.

To summarize, despite the government's intention and efforts, the rice market in Myanmar could not be protected from internationalization. Though the price disparity has been largely corrected compared to the socialist period or to the early 1990s, the gap still remains large, and the disparity continues to be the main factor hampering the development of the rice sector in Myanmar.

Furthermore, what made the situation even worse for Myanmar rice farmers was the fact that they could not receive the already low domestic market price fully, because of the existence of the government paddy procurement system.

The paddy procurement system was abolished in 1987 but re-introduced, after only one year, in 1988. However, a lowering of the quota to the level of 10-12 baskets per acre (1 basket of paddy equals 20.9 kg) reduced the farmers' burden to a large extent. This improvement was possible because of the reduction in the scale of the rice rationing system; rice came to be provided only to targeted groups including civil servants. In addition, summer paddy was exempted from the procurement obligation in order to provide an incentive to farmers to expand summer paddy cultivation.

Despite the scaling down of the system, however, the paddy procurement system has been a heavy drag for rice farmers. First, the procurement price has been far below the (domestic) market price, and the price disparity can be as large as 50-60% (Okamoto 2005). Second, it is possible that the burden borne by the farmers is even heavier than hinted at by the official statistics. If the yield per acre is about 60 baskets as is claimed in the official statistics, the burden on farmers will be less than 20% of total production. But there is a possibility that the official figures are over-reported.⁷ If this is the case and the actual yield is only 40-45 baskets per acre, the farmers' burden would be more onerous, by as much as 25-30% of production.

For a lengthy period, the system kept the producers' price far below the market price, which

⁷ There are two grounds for authors recognizing this possibility. First, it is reported that there was a huge gap in the yield of rice between the official record and estimates carried out in the field. Second, per capita supply of rice is unrealistically high if we rely purely on official production statistics.

itself was already quite low by comparison with the international price.⁸ However, this procurement system was finally abolished in 2003/04.

B. Changes in rice production

As stated earlier, the main element of rice production policy after 1988 was the summer paddy program initiated in 1992/93.⁹ For promoting summer paddy production, investment in irrigation was indispensable not only in the dry zone in Upper Myanmar but also in Lower Myanmar. In this sense, the program was essentially an irrigation development program.

Let us now look at Table 6. The irrigated area was stagnant at about 2.48 million acres until 1991/92, but then expanded rapidly, reaching 4.55 million acres in 1999/2000. What should be stressed here is that, out of the increase of irrigated area of 2 million acres, the area under pump irrigation, which amounts to no less than 1.65 million acres, accounts for the dominant share.¹⁰ Table 7, which indicates the sown acreage of summer paddy by region, clearly shows that the increase in summer paddy acreage was prominent in the Delta, especially in Ayeyarwaddy Division, where pump irrigation is dominant.

The development of pump irrigation in the Delta area was achieved on the basis of 1) the construction of sluice gates by the Irrigation Department in order to adjust the water level of rivers and canals, 2) the construction of drainage channels (which are used for irrigation in the dry season) using the voluntary labor of village residents, and 3) farmers' private investment in water pumps (Fujita and Okamoto 2000, Fujita 2003). Despite its importance, the government's financial support of pump irrigation remained relatively small.¹¹

By contrast, the government has invested a huge amount in canal irrigation projects, including

⁸ Under the system that quota obligation is uniformly fixed per acre, the average effective price will be lower for the small farmers whose marketable surplus is smaller.

⁹ After the mid 1990s, the policy also stressed self-sufficiency of rice in each locality, including rice deficit areas, such as the mountains and the dry zone. This conflicts starkly with the promotion of production based on the principle of comparative advantage.

¹⁰ The number of irrigation pumps was 46,000 in 1990/91, 72,000 in 1995/96 and reached 155,000 in 2000/01 (CSO 2002). These pumps were mainly imported from China.

¹¹ Some water pumps (especially large pumps that take water directly from the Ayeyarwaddy River) are owned and maintained by Water Resources Utilization Department. However, in this type of irrigation too, there is almost no subsidy to farmers, as opposed to the case of canal irrigation. According to the author's survey in Magway in July 2001, the water charge was 1,500 kyats per acre for summer paddy, 1,200 kyats for monsoon paddy, 750 kyats for monsoon oil seed crops and cotton, and 1,200 kyats for summer oilseed crops and cotton. There is a huge discrepancy between the water charge for canal irrigation which amounts to only 10 kyats per acre.

construction of reservoirs. In addition, by keeping the water charge at a nominal rate (10 kyats per acre), the government has provided a generous *de facto* subsidy for maintenance costs as well. Nevertheless, as shown in Table 6, the contribution of canal irrigation to overall irrigation development has been rather limited.

Table 7 shows that the acreage of summer paddy expanded dramatically until 1995/96 but plunged in 1996/97, recovering only moderately after that. The slow down in summer paddy production was the main cause of the sluggish expansion of paddy production in Myanmar after the mid-1990s. Why was the summer paddy program thwarted? The answer can be found in the deterioration of profitability of summer paddy cultivation. Since pump irrigation has been introduced by private investment and depends on large amounts of expensive diesel oil, farmers are very sensitive to profitability.

Let us look at Table 8, which summarizes the data from various surveys, showing the trend of profitability.

The data for Kyaukse in 1993/94 and Htantabin in 1998/99 relate to a time when the rice price was high. In Kyaukse, the share of operators' surplus increased to as much as 60% of gross revenue. Reflecting amongst other things the low cost of canal irrigation, the high profitability of summer paddy cultivation was at this time a notable feature. Despite its relatively higher cost structure arising from the local usage of pump irrigation, the case of Htantabin, too, shows that high rice prices allowed farmers to obtain reasonably high profits from summer paddy production.

However, once the rice price falls, the intrinsically expensive nature of pump irrigation emerges as a serious drawback for farmers. Let us examine the case of Myaungmya in 2000/01. Here there arose a literally disastrous situation for farmers cultivating summer paddy. The operators' surplus was almost nil. By contrast, in the same year, the profitability of summer paddy production in the canal irrigation area of Kyaukse did not deteriorate to the same extent.¹²

In the context of the vulnerability of pump-irrigated summer paddy production, severe conflict soon broke out between farmers and the government once the rice price declined. It is true that government pressures had penetrated deeply into rural areas, but at the same time, farmers persistently attempted to resist such influences. This was especially evident in 2000-2001, when the

¹² However, it should be noted that the difference in productivity in Myaungmya and Kyaukse is partly because the rice price fell to a lesser extent in Upper Myanmar than in Lower Myanmar.

rice price collapsed.¹³

Generally speaking, rice production became unattractive for farmers after the mid 1990s. This was not just because of low rice prices, but also because of high input prices.

C. Changes in input supply

The deterioration of profitability of summer paddy cultivation is not merely the outcome of sluggish rice prices. Price hikes of inputs such as chemical fertilizer, diesel oil and agricultural machinery also had a serious negative effect. The problem was that farmers had no alternative but to depend on these inputs which are mostly imported on a purely commercial basis. It is here relevant to note that foreign assistance was not provided after 1988,¹⁴ and at the same time the government has also been obliged to abolish subsidies on these inputs.

Figure 3 shows the changes in the supply of chemical fertilizers including both imported and domestically produced fertilizer. The supply of domestic fertilizer declined because of the degradation of producing factories and the difficulty of obtaining raw materials for the fertilizer factories.¹⁵ This fall in supply had to be made good by imports. Consequently, the dependence on imports increased after 1993/94.

The figures for imports are the sum of imports by the government (Ministry of Agriculture and Irrigation and Ministry of Commerce) and by private enterprises. Despite government attempts to boost private imports by providing import duty exemption, private imports failed to increase, and the government continued to be the main importer (Takahashi 2000, p.39-40). Fluctuations in import volume after 1993/94 may possibly be the result of the insufficient allocation of foreign exchange to government agencies for importing fertilizer.

The government has been distributing chemical fertilizers to farmers through Myanmar Agriculture Service (MAS) which has a broad network of agencies in rural areas. Among all crops of Myanmar, rice has a dominant share so far as the receipt of fertilizer is concerned, and even after the 1990s accounted for over 80% of the total volume of fertilizer made available for cultivation

¹³ See Fujita (2003) for further discussion.

¹⁴ After the late 1970s, there was a big flow of chemical fertilizers almost free of cost, mainly through official development assistance (2KR) provided by Japan (Saito 1987).

¹⁵ There are three factories in Myanmar. Two are urea factories constructed in the 1970s, with a production capacity of 200-260 tons per day. One is a urea factory constructed by the official assistance of Germany in 1985 and has a capacity of 1,200 tons per day (FANDINAP 1987, 2-3).

(CSO1997, 2000).

Figure 4 provides an estimate for the volume of chemical fertilizer used for paddy, assuming that 80% of total supply was allocated for paddy cultivation. The fertilizer applied reached 75 kg per hectare in the peak year (1985/86) and went down to 30 kg in the early 1990s, and has been fluctuating widely in the range of between 30 and 60 kg. It is clear from these figures that fertilizer application per hectare is low in Myanmar in comparison with the international average.¹⁶

After the late 1980s, the price of chemical fertilizer increased sharply. As was pointed out earlier, the rice price also increased very steeply after the mid 1980s. Nevertheless, the price ratio of rice/fertilizer deteriorated rapidly (Table 9). This means that fertilizer prices increased at an even faster pace than rice prices.

The government official price of fertilizer was kept low for 15 years until 1987/88 (FADINAP 1987, 14), but after the 1990s, it rapidly increased to a level close to the international price. Since the government was obliged to withdraw subsidies, the official price was raised frequently¹⁷ in accordance with rises in market prices. Because of difficulties in securing a sufficient supply, the government distribution of fertilizer shrank considerably in 2005.¹⁸

Changes in diesel oil supply have also influenced paddy cultivation in Myanmar. As is the case with fertilizer, most of Myanmar's diesel oil is imported and the domestic price has risen quite rapidly. In order to support summer paddy production, the government has been providing diesel oil at a lower cost to those farmers who cultivate summer paddy using pump irrigation. In 2001, for example, the market price per gallon was 350-600 kyats while the official price was 160 kyats. In 2004, the market price was 1,500-1,600 kyats while government price was 760 kyats. However, the supply remains insufficient. According to our surveys,¹⁹ whereas one acre of pump irrigation required 6-10 gallons, government distribution remained around 3.5-4 gallons. It should be noted

¹⁶ Since data for fertilizer input per hectare for rice cultivation only is not available, we have used the average figure in kilograms for the total cultivated area in 2000/01. It was 285 kg in Vietnam, 90 kg in Thailand, 130 kg in the Philippines and 256 kg in China. The increase in fertilizer application in Vietnam is quite prominent: it was only 88 kg per hectare in 1990/91, but jumped by almost 3.2 times over a period of 10 years.

¹⁷ For example, the price was increased from 600 kkyat per bag (1 bag contains 50 kg) to 1,200 kyats in 1995/96 and then to 2,000 kyats in 1996/97. The market price of urea was 2,300 kyats in 1999 and it was almost the same as the government official price which was 2,200 kyats (Fujita and Okamoto 2000, p.37).

¹⁸ The official fertilizer price was kept at 6,000 kyats per bag in 2004/05 (market price was 12,000-15,000 kyats), the same level as in the previous year. However, the distributed amount was reduced to only 1 bag per 4-5 acres (Survey in Bago Division in 2005).

¹⁹ Based on surveys in Ayeyarwaddy Delta in 2001 and 2004 .

that the government's policy of supplying diesel oil at a lower cost is very likely to be abolished in the near future along with the similar policy for chemical fertilizer.

(2) Pulses

The production of pulses in Myanmar underwent a remarkable development in both output and exports after the liberalization of agricultural marketing in 1987.²⁰ It should be emphasized, however, that from the outset, the success of this sector was not really intended by the government. Indeed the government showed relatively little interest and the expansion in the production of pulses was led exclusively by the private sector. The government appreciated the sector's success in later years and attempted to obtain part of the benefit of expansion by introducing a procurement system at the end of 1990s. This, however, did not succeed.²¹

Among the 17 varieties of pulses produced in Myanmar, the three varieties of black gram, green gram and pigeon pea are particularly important. These three pulses account for between 80 and 90% of total exports by value. The main export destination is India (Table 10). The emergence of the large Indian market was a key factor underlying the development of pulse cultivation in Myanmar.

In India, after the Green Revolution in the mid-1960s, production shifted to rice and wheat at the expense of pulse cultivation. The increase of pulse imports from Myanmar was the result of stagnation in domestic production of pulses as well as the relaxation of import regulations by the Indian government after 1991, when economic liberalization got underway (UN 1997, p.41, Rao 1994, p.146). By 2002/03, pulses from Myanmar came to account for about 40% of India's total pulse imports.

Since there is no government regulation for exporting pulses from Myanmar (except for the 10% export tax), the import demand of India was transmitted directly to Myanmar's market, pushing domestic pulse prices in Myanmar upward (Table 2). The close linkage between the domestic and international prices of pulses is clearly shown in Figure 5.

The increase in the acreage sown to pulses has been quite striking. Total acreage under the

²⁰ See Okamoto (2006) for the discussion of marketing liberalization and its effect on the growth of production and export of pulses.

²¹ Though the procurement system for pulses was revived together with sesame in 1999/2000, gathering the required amounts proved difficult. The system was finally abolished after two years of trial (Okamoto 2006).

major three pulses increased by four times in ten years in the 1990s (Table 11). Figures 6, 7 and 8 show the growth of production of black gram, green gram and pigeon pea, by region. The following points emerge from these figures. First, the expansion of the acreage under black gram and green gram first occurred in the Lower Myanmar region, being particularly conspicuous in Ayeyarwaddy and Bago. However, though the production of black gram is still concentrated in Lower Myanmar, green gram cultivation started to increase in Upper Myanmar, too, with Sagaing and Magway becoming important production regions in the mid-1990s. In recent years, these two regions have come to account for a larger acreage of green gram cultivation than Lower Myanmar. Second, pigeon pea is dominant in Upper Myanmar, in regions such as Sagaing, Magway and Mandalay.

In Lower Myanmar, pulses were introduced everywhere as a second crop after monsoon paddy, a new development as there was virtually no second crop produced before 1988. In the dry season, idle land suddenly came to be utilized for the production of pulses. In order to cultivate rice in the dry season, as was noted earlier, irrigation is indispensable. But because irrigation is not necessary for pulses, the introduction of pulses was relatively undemanding.

Table 12 illustrates the profitability of pulses under different cropping patterns, based on various field surveys, and also shows the changes in cropping systems that have come about as a result of the introduction of pulses.

To illustrate trends in Lower Myanmar, the examples of Yangon Division in 1999/2000 and Bago Division in 2000/01 are examined. In both cases, farmers obtained a larger operator's surplus and income from pulses than from monsoon paddy. By comparing the figures in Table 8, it becomes clearly apparent that pulses generally yield a higher profit than summer paddy. It is well known that in monsoon Asia as a whole, the cultivation of un-irrigated second crops following the main rice crop usually yields only a marginal profit. This however is not true for the cultivation of pulses in Myanmar.²² Pulses have made a huge impact on the farm economy.

In sum, the development of pulses in Lower Myanmar in the 1990s can be characterized in terms of the so-called "vent for surplus" (Hla Myint 1971). Upon the sudden emergence of export demand, idle resources (land and labor in the dry season) came to be utilized effectively and

²² The explanation for this lies in Myanmar's rice policy. Since the rice price is repressed far below the international price, the profitability of rice and pulses were reversed at the farmers' level. In this sense, the success of pulses can be regarded as an unintentional fruit of Myanmar's rice policy. See Kurosaki et.al (2004) for further discussion.

production expanded very quickly without substantial large investments (such as irrigation) being necessary.²³

2.2 Crops for Import Competition

Oilseed is the second most important crop after paddy in the diet of the people of Myanmar. The edible oils traditionally consumed are groundnut oil and sesame oil.²⁴ Sesame oil is estimated to account for between 5% and 10% of total edible oil consumption, while groundnut oil accounts for the remaining 90-95%.²⁵

As has already been pointed out, even though Myanmar has no comparative advantage in the production of oilseed crops, imports of oilseeds were strictly regulated and thus it is very likely that during the socialist period, the domestic price was higher than the international price. However, after the 1990s, the full-scale import of edible oils got underway (see Figure 9). Almost all (99%) of the imported edible oil is palm oil, mainly from Malaysia, Singapore and Indonesia.

As can be seen in Figure 9, in some years imports have exceeded domestic production. The private sector began to import edible oils at an early stage, but after 1999, their import came to be a monopoly of Myanmar Economic Holdings (which is closely linked to the government). This suggests that shortage of foreign exchange available to the government, rather than overall foreign exchange constraints, is the main factor restricting the volume of palm oil imports.

The huge quantity of palm oil imports was the main factor that determined trends in edible oil prices (Figure 10). The prices of sesame oil and groundnut oil are repressed in line with the price of imported palm oil²⁶ and consequently they have increased at a lower rate than the CPI.

²³ The increase of rice production through rapid reclamation of the Delta in colonial Burma was also regarded as development by way of the “vent for surplus”. However, strictly speaking, the development of the Delta required investment in flood control and drainage. In contrast, the development of pulses in the 1990s literally did not require any investment, so that it was development in line with the theory of “vent for surplus” in the pure sense of the term.

²⁴ The preference of edible oil differs according to region. In Upper Myanmar, sesame oil is preferred, while groundnut oil is consumed more in Lower Myanmar.

²⁵ This is based on an interview with a large edible oil trader in Yangon in January 2005. Other domestically produced edible oil such as sunflower oil is generally sold after having been mixed with groundnut oil and sesame oil (MOAI 2000a). However, based on the figures from *FAOSTAT*, the market share of edible oil is different from the actual state; sesame oil is about 30%, groundnut oil is 40-50%, and the rest is sunflower oil and others. The reason may be that a large volume of sesame is very likely being exported illegally through cross-border trade.

²⁶ In rural areas where low-income groups predominate, only palm oil is consumed. However, in urban areas, some consumers avoid it because of its taste.

It is hardly surprising that in the absence of technological progress, this weak price trend of edible oil worked against the domestic production of oilseed crops. The sluggish expansion of the sown acreage of sesame and groundnut cultivation, as shown in Table 3, is a clear manifestation of this reality. Self-sufficiency in edible oil supplies is one of the three major goals of the agricultural policy of Myanmar, but although such is the intention of the government, there is as yet no sign of a clear trend towards an increase in production.

Given that the country suffers from serious balance of payment deficits, how best to curb the volume of palm oil imports has come to be a big issue for the government. Figure 11 shows that the import value of edible oil is almost equal to the export value of pulses. The gap between the two after 1995 clearly indicates the pain that Myanmar government has been suffering as the foreign exchange constraint has tightened.²⁷ This point is also evident in Figure 12 which compares the domestic and international prices of palm oil. The price gap widened after the mid-1990s, showing the probability of constraints operating so far as imports are concerned.

Edible oil is quite essential for the people of Myanmar, and any rapid increase in its price could cause the government considerable anxiety, though to a lesser degree than in the case of a rise in the price of rice. The government could attempt to keep the domestic price low by increasing imports. Sometimes surges in the domestic price occur and cause the government considerable disquiet. The high fluctuations in palm oil import volumes in recent years may represent a kind of “swing” in the government’s attempts to deal with the problem.

Rice gives rise to a similar problem in that the stabilization of prices at a low level is regarded as a most important priority. However, rice is the crop in which Myanmar has comparative advantage, and price stabilization can be achieved by various internal ‘regulative’ policies. Such is not the case for oilseed crops in which Myanmar has no comparative advantage. If imports are barred, there is no possibility of compensating by raising efficiency in domestic production.²⁸ The

²⁷ Needless to say, Figure 11 does not indicate that the import of palm oil is constrained by the amount of export earnings obtained from pulses.

²⁸ Since 1998-1999, oil palm plantations have been established by 17 large private companies in Tanintharyi, especially in the Kautung region. Domestic palm oil will be supplied in large quantities in near future, although the cropped area was only 133,000 acres in 2004 and is likely to remain at a low level as would require 500,000 acres to replace all the imports by domestic production. In addition, sunflower production is being vigorously promoted by the Ministry of Agriculture and Irrigation in various parts of Myanmar. Nevertheless, the economic viability of these programs for private companies and farmers remains unclear.

alternative, by which Myanmar's oilseed supplies depend entirely on high-handed policy decisions, is fraught with difficulty.

2.3 Crops for the Domestic Market

In this section, the crops that are produced essentially for the domestic market, such as vegetables, fruits, meat and fishery products, are dealt with briefly. As already noted, the price of these crops has increased at a rate slightly higher than the CPI (see Table 2).

The output of crops that are indispensable for the diet of the Myanmar people, such as garlic, onion, and chilli, has not undergone any significant change, but the production of other types of vegetable and fruit increased quite dramatically after the mid-1990s (Figure 13). The same trend also can be observed for meat (especially chicken and pork²⁹, see Figure 14) and fishery products (Figure 15). Per capita meat consumption doubled from 4.8 kg in 1987/88 to 9.2 kg in 2001/02. So far as fishery products are concerned, the increase rate during the same period amounted to about 50%, from 17.5 kg to 25.9 kg.³⁰

To summarize, production of crops for the domestic market has increased in response to the expansion of the domestic market as part of the process of economic development, especially since the mid-1990s. However, fishery products (especially prawns) are an exception, since the increase was partly led by export demand. In recent years, be applied to the case of onion and chilli production, also, has begun to be stimulated by overseas demand.

In general, the profitability of vegetable and fruit production is high,³¹ and an expansion of these crops has contributed substantially to the stimulation of the rural economy. Though it may sound rather too obvious, a key factor which has allowed the marketing of these perishable crops over a wide area has been improvement in the infrastructure, including the development of the road network. Table 13 clearly shows a sharp increase in the mileage of roads and in the number of trucks during the 1990s. Before the development of the road network, railways and waterways were the most common means of transportation. In those days, transportation was far more time consuming than it is today, and the area that rural commodities (especially perishable ones) could reach was

²⁹ Generally speaking, beef is not preferred by consumers. Thus, the increase was not as evident as in the other categories of meat.

³⁰ Calculated based on CSO (2002).

³¹ On the high profitability of vegetable production, see Kurosaki et.al (2004).

more limited. As this constraint was relaxed over time, it became possible to produce perishable crops even in remote areas far away from the main centers of consumption.

2.4 Crops for State-Owned Enterprises

Cotton, sugarcane, rubber and jute are industrial crops that are procured by the government as raw materials for state-owned enterprises. The sown area of the four crops accounts for only 3% or thereabouts of the total (average of 1987/88-2000/01). However, industrial crops are important as their production and marketing affects not only farmers and traders but also the management of state-owned enterprises and national fiscal conditions. In this section, the examples of sugarcane and cotton are briefly discussed.

(1) Sugarcane³²

In 1994, state sugar factories under the Ministry of Industry (I) were transferred to the Ministry of Agriculture and Irrigation. The state-owned institution Myanma Sugarcane Enterprise (MSE) became responsible for the management of these factories. Furthermore, in 1997, it was decided to construct nine new sugar factories supported by foreign aid.³³ Since 1998, some 17 factories have come into operation, and total production capacity has doubled from 8,600 tons to 17,500 tons per day.

One of the characteristics of sugarcane is that the sugar content decreases rapidly unless the crop is processed soon after harvest. Furthermore, a modern sugar processing factory generally requires very substantial capital investment, and it follows that its performance is heavily influenced by the rate of capacity utilization. What this means in practice is that to ensure their supplies, the state-owned sugar factories prescribe procurement zones surrounding the mills, and require farmers in those zones to sell all their sugarcane output to the factory within whose zone they are located.

The problem lies not in the physical procurement of the crop but in the price prescribed by the government, which for long was far lower than the market price. For example, the market price in 2000 was 5,270-6,100 kyats per ton while the government procurement price was 2,500 kyats (Kudo 2003, p.41). By contrast, since sugarcane farmers outside the procurement zones could sell freely in

³² For further discussion of sugarcane and sugar production, see Takahashi (2002) and Kudo (2003).

³³ Among 9 factories, 8 were constructed with Chinese assistance while the remaining one was constructed with Thai assistance.

the market, whether or not a sugarcane farmer's fields were prescribed as part of a procurement zone determined his fate.

Figure 16 indicates changes in the total sown acreage of sugarcane and shows changes in acreage in procurement and non-procurement zones. Sugarcane procurement zones began to expand in 1996/97 and then further increased in 1998/99 at a time when the new factories mentioned above were coming into operation.

It should be noted here that non-procurement zones became more extensive from around 1996/97 onwards. Underlying this trend were two background factors. First was the indirect effect of the expansion of the procurement zones. Because of the establishment of new state factories, private sugar processors in the area began to find it difficult to purchase raw materials, and the price of sugarcane increased accordingly. This in turn stimulated sugarcane production in other areas (Kudo 2003, 40, Tin Htut Oo and Kudo eds. 2003, p.262-263). Second, there was a general increase in domestic sugar demand. Since about the mid-1990s, the diet of the Myanmar people has become increasingly more diversified, and this has caused sugar demand to increase, in much the same way as demand for vegetables, fruit, meat and fishery products.

(2) Cotton

Cotton needs to undergo the cotton ginning process before yarn can be made by spinning. There are 20 state-owned spinning mills run by the Ministry of Industry (I). State-owned cotton ginning factories that supply raw material to the spinning mills used to be run by the Ministry of Industry (I) as well, but in 1994/95, some factories were transferred to the Ministry of Agriculture and Irrigation, and the Myanma Cotton and Sericulture Enterprise (MCSE) was established. MCSE became responsible for procuring the cotton procurement required for state enterprises as well.

MCSE procures cotton either directly from farmers or from cotton traders. Cotton traders used to supply cotton exclusively for the private cotton ginning factories (the number reached 370 in 2000/01), but after 1998 they were required to sell part of their cotton to the government (50% in 1998, and 25% after 1999).

Figure 17 indicates the trends in cotton supply, classified by governmental and private procurement. The big jump in production in 1995/96 was the result of an aggressive policy for expansion of the sown acreage of cotton just after the transfer of the responsible authority, as

described above. The objective was, needless to say, to ensure the supply of raw material for the state-owned cotton industry. However, as the graph indicates, the increase took the form of a steep rise in private procurement. It is obvious that MCSE did not succeed in procuring the planned amount. The application of the procurement system to cotton traders in 1998 was a last resort in the drive to ensure adequate supplies, but it failed to have any significant result. On average, the state sector succeeded in procuring only 52% of its needs during 1998/99-2000/02 (Tin Htut Oo and Kudo eds. 2003, p.323).

The problem is, obviously, the low level of the procurement price. For example, in the case of 2001/02, the market price was 370-375 kyat per viss (1.6 kg), whereas the government procurement price was 180 kyats (Tin Htut Oo and Kudo eds. 2003, p.315).

Conclusion

How can we best characterize agricultural policies in Myanmar after 1988? In the light of the narrow technical definition of the concept of an agricultural exploitation policy (that is, a policy that absorbs the surplus from agriculture and uses it as a base for economic development through industrialization), it would be inappropriate to state that an agricultural exploitation policy has been pursued, even after 1988. Rather, if it is examined dispassionately, the genuine policy objective of the government seems to consist of the following two elements: avoidance of social unrest and sustenance of the regime.

These two main objectives have required agricultural policy to accord with the following two subordinate aims. One aim is to stabilize prices at a low level for the commodities that are indispensable for the people's diet. The other is to sustain state enterprises in an agro-processing sector which depends for its raw materials on domestically produced agricultural commodities.

The stabilization of essential agricultural prices at a low level conforms with the main objective, which is to avoid social unrest. This explains why agricultural policies in Myanmar have a strong inclination towards production increases for their own sakes while paying rather less attention to farmers' income and welfare. The impact of such policies on the performance of the agricultural sector is summarized below.

The key crops that are the most important for the people's diet are rice and oilseeds. When the present regime was established in 1988, the first challenge they faced was a surge in the rice price.

However, for the government, a wholesale return to the system of the socialist period was not an option. Instead, they have adopted two measures. One is to restrain agricultural marketing reforms with respect to rice. The rice procurement and ration systems were maintained, although on a smaller scale than before, and rice exports continued to be a government monopoly. The other measure is an aggressive policy aimed at the stimulation of rice production, as exemplified in the summer paddy program.

As has been fully discussed above, even though it slowed down half way through, the summer paddy program was successful overall. Further, thanks to the restrictions on rice exports, the regime almost succeeded in controlling rice prices. The domestic rice price continued to be about 40% lower than the international price. As Myanmar has comparative advantage in rice production, it was possible for it to achieve price stabilization, simply by strengthening the “inward” policy.

It should be noted here that the same phenomenon can also be observed with regard to crops other than rice. Recently, onions and maize have provided good examples. In January 2004, exports of these commodities were suddenly prohibited so as to prevent the rise of domestic prices.

By contrast, for another important crop, namely oilseeds, the government has stepped into the import of cheap edible oil (palm oil). That said, since the mid-1990s, imports have been somewhat constrained by strict foreign exchange conditions. A later policy introduced by the government was the promotion of new oilseed crops. Good examples are the attempt to introduce sunflower and the development of private large oil palm plantations in the southern part of the country. This policy, however, is a somewhat aggressive initiative, and one that is not entirely rational in economic terms. Moreover the policy has not always been welcomed by farmers or by private companies, and the prospects for it becoming a self-sustaining success seem rather remote. Above all, it remains the case that without the benefit of comparative advantage, achieving self-sufficiency in crops is a difficult task.

The cultivation of sugarcane and cotton, meanwhile, has inevitably been heavily influenced by the government’s policy of making farmers and traders sell their produce at low prices so as to meet the goals of the state-owned processing enterprises.

In summary, in recent years, rice, oilseed crops, industrial crops, onions and maize have been the crops on which the present government has placed a strong priority with the sustenance of the regime in mind. In this regard, the avoidance of social unrest and the maintenance of the state

enterprises have been two key imperatives. Farmers, traders and processors dealing with these crops are daily struggling to find a way of avoiding, or of reducing, the negative impact of government policy. The effect of the government's role has been to limit exports (for example of rice, onions, and maize) and to promote the cultivation of crops under disadvantageous conditions (rice, oilseed crops, industrial crops).

On the other hand, for those crops which lie outside the objectives of the state (in other words crops that have no role to play in the avoidance of social unrest or the maintenance of state enterprises), the government has been quite indifferent. Particularly surprising has been the government's low interest in pulses which have become a most important export crop for Myanmar. Even in the major pulse-producing areas, the main task of government officials has been to take care of the politically important crops, especially rice.

The same tendency can be observed as regards some of the crops, profitable for the farmers, which have been grown for the domestic market. Examples include tomatoes in the Inle Lake area, and chilli production in Kyaukse. In these areas, too, the agricultural administration have focused mainly on rice, whether with respect to the expanding the area under rice and or achieving an increase in yields, and have paid less attention to the cultivation of tomatoes or chilli.

In fact, the agricultural development of Myanmar since 1988 has owed a lot to self-sustaining growth pioneered by the private sector, in crop categories that have fallen outside the main concerns of the government. In this respect, the role of the government has been minimal. Another notable feature is that development has not been supported by improvements in productivity. In particular, the success of pulses was due to the existence of a area that had formerly lain unused during the dry season. In this sense, the development pattern has been a typical example of the "vent for surplus".

The Myanmar government has been highly fortunate in that Myanmar has had room for development under the "vent for surplus" process. At the same time, however, a challenge will inevitably occur once the development potentiality of this path has been exhausted.³⁴ Needless to say, opening up a development path through improvements in productivity would have been a far more difficult task.

Finally, mention must be made of recent changes in rice policy in Myanmar. There can be no

³⁴ According to interviews held at the Union of Myanmar Federation of Chambers of Commerce and Industry in January 2005, pulses can be expanded up to 10 million acres from the present sown acreage, which is 8 million.

doubt that the policy of keeping the rice price substantially lower than the international price has operated as one of the major constraints on the development of the rice sector in Myanmar. However, as the historical experience of Thailand and Vietnam shows, a low rice price policy can be adopted for a substantial period, while encouraging rice exports.³⁵ At the initial stage of economic development when the majority of the people remain poor, the risks that accompany a policy of exporting the staple food should not be underestimated. Liberalization of rice exports, even if unavoidable, should be conducted very cautiously.³⁶

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³⁵ For example, according to Choeun et al. (2004), the domestic rice price in Thailand was 40% lower than the international price until the mid 1980s. It was only after the mid-1980s that the gap was narrowed to about 10%.

³⁶ The rice marketing reforms announced by the Myanmar government in April 2003 included the bold decision to move towards export liberalization. But this initiative was suddenly shelved on 1st January 2004 and at the time of writing no further decision has been made. Traders and rice millers, who have been preparing for export liberalization, were shocked by the sudden halt in policy since their expectations were quite high. If we review the whole process, we can see that the preparations were very insufficient, taking into account that such a drastic reform could have quite a huge social impact.

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Table 1. Agriculture in Myanmar: Contribution to GDP and Growth Rates, 1980-2001

		1980	1985/	1990/	1991/	1992/	1993/	1994/	1995/	1996/	1997/	1998/	1999/	2000/
		/81	86	91	92	93	94	95	96	97	98	99	2000	01
Contribution to GDP (at 1985/86 constant price)	Agriculture	47.9	48.2	48.0	46.5	47.3	46.7	46.0	45.1	44.4	43.6	43.0	43.2	42.3
	Crop	39.4	39.7	38.7	37.5	38.4	37.9	37.6	37.1	36.2	35.2	34.5	34.4	33.1
	Livestock and Fishery	7.0	7.1	7.9	7.2	7.3	7.2	7.1	6.8	7.2	7.3	7.5	7.9	8.3
	Forestry	1.5	1.4	1.3	1.9	1.6	1.6	1.2	1.1	1.1	1.0	1.0	1.0	0.9
	Manufacturing	9.6	9.9	7.7	9.1	8.9	9.1	9.2	9.3	9.1	9.1	9.1	9.4	10.1
Contribution to GDP (at current price)	Agriculture	46.5	48.2	57.3	58.8	60.5	63.0	63.0	60.0	60.1	58.9	59.1	59.9	57.3
	Crop	38.8	39.7	46.3	48.4	50.6	54.1	55.2	53.2	53.2	52.1	52.3	52.2	48.8
	Livestock and Fishery	6.3	7.1	9.2	8.8	8.5	7.7	6.8	6.0	6.1	6.2	6.3	7.2	7.9
	Forestry	1.5	1.4	1.8	1.6	1.5	1.2	1.0	0.8	0.8	0.6	0.5	0.5	0.6
	Manufacturing	9.5	9.9	7.8	7.0	6.9	6.8	6.2	6.9	7.1	7.1	7.0	6.5	7.2
Real Growth Rate	GDP	7.9	2.9	2.8	-0.6	9.7	6.0	7.5	6.9	6.4	5.7	5.8	10.9	13.6
	Crop	12.6	2.2	2.0	-3.9	12.4	4.7	6.7	5.5	3.8	3.0	3.5	10.5	9.5
	Livestock and Fishery	4.0	2.0	-0.6	5.7	4.5	4.8	6.0	3.0	11.9	7.1	9.3	16.8	18.9
	Forestry	1.9	-0.1	8.3	-1.7	-3.3	1.0	-14.3	-4.5	2.1	2.8	3.2	4.6	3.3
	Manufacturing	6.9	2.9	0.1	-4.0	10.8	9.4	8.5	7.6	4.6	5.0	6.2	14.5	23.0

Sources: CSO, *Statistical Yearbook* (1997, 2002) .

Table 2: Changes in Price of Major Agricultural, Livestock and Fishery Products, 1987-2001 (1986=100)

	Crop	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
1 Export Crops	Rice (Emata)	112	191	339	266	306	503	864	796	1132	1286	1389	1907	2817	2548	2489
	Pegion Pea	100	859	895	1286	2308	2677	2969	3693	6459	7049	7186	14643	15787	10355	13614
	Black Gram	100	463	579	699	1480	1547	1065	2154	3578	3390	3434	6157	7060	9773	13227
	Prawns	158	138	193	241	364	410	539	731	1121	1919	2444	4168	3926	3936	3943
2 Crops for Import Competition	Sesame Oil	127	135	143	165	232	365	328	434	585	572	912	1572	1772	1474	1904
	Groundnut Oil	130	144	144	170	228	365	325	422	552	545	875	1472	1620	1487	1795
	Palm Oil	100	100	100	125	174	296	250	332	404	399	650	1114	1185	936	1373
	Sesame	121	145	145	193	260	354	337	520	657	655	1010	1397	1499	2435	2677
	Groundnut	112	139	148	150	198	304	382	460	661	598	1075	1498	1848	1683	1893
3 Crops for the Domestic Market	Chilli	202	128	159	298	444	386	598	587	1072	1861	1434	2031	2854	2923	4243
	Onion	131	178	119	313	340	319	612	515	514	1646	1296	1762	1278	1156	3608
	Garlic	228	189	143	201	594	613	385	561	779	1406	1098	1473	2214	1977	2772
	Potato	163	209	255	361	466	469	739	898	1017	1222	1396	2589	2460	2571	2730
	Fish	137	129	173	238	304	325	459	638	787	821	1179	1328	1543	1974	2624
	Chicken	135	141	195	281	348	399	645	781	966	1051	1303	1583	1702	1937	2709
	Pork	127	137	162	280	331	336	487	663	704	705	1064	1638	1675	1990	2826
	Beef	221	149	177	281	363	386	478	565	615	619	696	1217	1603	1763	2063
4 Crops for State-Owned Enterprises	Sugar	183	198	198	248	395	458	432	631	930	1024	1003	1458	1638	1877	3163
CPI		127	155	192	234	302	369	493	604	736	883	1182	1578	1825	1794	2422

Note: 1-3 are calculated based on the prices in Yangon. Rice is the retail price and the rest are wholesale price.

The palm oil is also the retail price, but was also the official price until 1989.

For pegion pea and black gram, as there was no domestic demand for these pulses, official price was used here.

Sources: CSO, *Statistical Yearbook* (1993,1995, 2001, 2002).

Table 3: Major Agricultural Crops: Changes in the Sown Acreage, 1970-2002 (Unit: thousand acres)

	1 Export Crops		2 Crops for Import Competition		3 Crops for the Domestic Market				4 Crops for State-Owned Enterprises			Total Sown Acres
	Rice	Pulses	Sesame	Groundnut	Vegetable	Chilli	Onion	Garlic	Cotton	Sugarcane	Rubber	
1970/71	12,294	1,576	2,510	1,735	186	145	47	18	466	108	217	22,338
1980/81	12,668	1,995	3,231	1,271	301	170	47	21	546	118	200	24,805
1987/88	11,531	1,863	2,933	1,327	391	146	46	26	425	133	193	23,870
1988/89	11,807	1,642	2,994	1,355	342	179	64	27	443	123	192	23,802
1989/90	12,057	1,934	3,158	1,380	342	182	57	27	379	113	190	24,344
1990/91	12,220	2,281	3,271	1,369	343	170	57	26	386	118	191	25,024
1991/92	11,935	2,945	3,184	1,261	391	202	60	28	424	136	188	25,426
1992/93	12,684	3,500	3,379	1,220	389	220	65	33	416	187	193	27,200
1993/94	14,021	3,553	3,211	1,204	391	194	57	30	356	154	205	28,134
1994/95	14,643	4,117	3,288	1,252	416	172	62	28	505	130	220	30,005
1995/96	15,166	4,808	3,153	1,303	445	158	66	29	937	165	259	31,837
1996/97	14,518	4,584	2,830	1,184	463	203	60	29	824	204	294	30,422
1997/98	14,294	4,967	2,430	1,111	514	190	69	35	659	266	333	30,336
1998/99	14,230	5,729	2,738	1,241	524	169	115	34	804	311	369	32,882
1999/2000	15,528	6,209	3,173	1,400	657	220	146	41	842	333	419	36,582
2000/2001	15,713	6,725	3,308	1,458	732	249	145	46	801	343	446	38,177
2001/2002	15,940	7,372	3,210	1,405	740	280	139	47	730	402	460	39,153

Statistics (2001), CSO, Statistical Yearbook (2002).

Table 4: Major Agricultural Crops: Changes in Yields, 1970 – 2002 (Unit: tons per acre)

	1. Export Crops				2 Crops for Import Competition		3 Crops for the Domestic Market	4 Crops for State-Owned Enterprises			
	Rice	Black Gram	Green Gram	Pigeon Pea	Sesame (Rain)	Groundnut (Dry)	Chilli	Onion	Cotton	Rubber	Sugarcane
1970/71	0.69	0.18	0.11	0.17	0.07	0.38	0.16	1.80	0.19	0.56	11.61
1980/81	1.13	0.29	0.13	0.16	0.07	0.44	0.19	2.37	0.25	0.67	15.50
1985/86	1.25	0.39	0.23	0.26	0.10	0.50	0.22	4.20	0.31	0.73	21.53
1990/91	1.19	0.29	0.23	0.26	0.07	0.46	0.19	3.05	0.28	0.72	15.50
1992/93	1.19	0.29	0.26	0.26	0.10	0.44	0.21	2.80	0.33	0.74	15.50
1993/94	1.23	0.29	0.26	0.26	0.10	0.48	0.22	2.79	0.29	0.75	15.50
1994/95	1.27	0.33	0.29	0.26	0.10	0.50	0.20	2.75	0.31	1.03	15.50
1995/96	1.21	0.33	0.29	0.23	0.12	0.56	0.22	2.87	0.24	1.04	17.23
1996/97	1.23	0.33	0.29	0.26	0.15	0.55	0.22	3.19	0.27	1.11	17.23
1997/98	1.23	0.36	0.33	0.29	0.15	0.56	0.24	3.30	0.31	1.11	17.23
1998/99	1.27	0.36	0.29	0.26	0.10	0.54	0.26	4.15	0.25	0.95	15.50
1999/2000	1.32	0.33	0.26	0.26	0.10	0.52	0.23	3.26	0.25	0.99	14.64
2000/2001	1.38	0.36	0.29	0.36	0.12	0.58	0.23	4.09	0.24	1.13	15.50
2001/2002	1.38	0.33	0.29	0.36	0.10	0.59	0.26	4.66	0.26	1.15	14.64

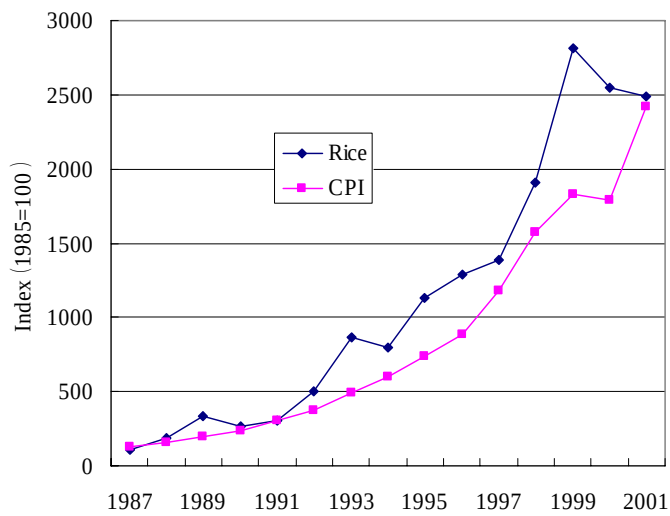
Sources: MAS (1994), CSO, Statistical Yearbook (2002).

Table 5: Major Agricultural Commodities: Changes in Exports, by Value, 1980 – 2002 (Units: million kyat, percentages)

Export Value (Million Kyat)	1980/81	1985/86	1990/91	1995/96	1996/97	1997/98	1998/99	1999/2000	2000/01	2001/02
Agricultural Products	1761	1126	942	2321	1981	1952	1890	1602	2312	3021
Rice	1355	763	172	440	126	38	167	65	208	754
Pulses	152	238	515	1358	1272	1403	1135	1179	1658	1898
Maize	11	15	13	46	107	45	116	54	92	59
Oil Cake	46	32	11	12	4		1	2		
Rubber	82	56	3	180	171	134	100	75	67	76
Cotton	4	18		1	3	26	21	10	11	1
Jute	99			6	5	8			5	37
Other	12	4	228	278	293	298	350	217	271	196
Livestock Products	13	11	5	7	9	8	34	28	37	42
Fishery Products	82	94	165	615	887	945	941	807	934	861
Fish	58	13	36	159	219	289	307	229	291	310
Prawns	24	76	114	407	560	559	569	529	598	519
Other		5	15	49	108	97	65	49	45	32
Timber	793	1046	999	1048	985	853	789	925	803	1880
Teak	721	982	740	903	855	698	640	727	651	1423
Hard Wood	72	64	259	145	130	155	149	198	152	457
Sub-Total	2649	2277	2111	3991	3862	3758	3654	3362	4086	5804
Precious Stones	295	188	158	207	192	237	223	508	687	415
Natural Gas							5	31	1110	4247
Garment		6	8	300	402	436	471	2722	3785	2970
Other	281	183	685	546	1032	2016	2403	2324	3068	3695
Grand Total	3225	2654	2962	5044	5488	6447	6756	8947	12736	17131
Share (%)										
Agricultural Produce	54.6	42.4	31.8	46.0	36.1	30.3	28.0	17.9	18.2	17.6
Rice	42.0	28.7	5.8	8.7	2.3	0.6	2.5	0.7	1.6	4.4
Pulses	4.7	9.0	17.4	26.9	23.2	21.8	16.8	13.2	13.0	11.1
Maize	0.3	0.6	0.4	0.9	1.9	0.7	1.7	0.6	0.7	0.3
Oil Cake	1.4	1.2	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0
Rubber	2.5	2.1	0.1	3.6	3.1	2.1	1.5	0.8	0.5	0.4
Cotton	0.1	0.7	0.0	0.0	0.1	0.4	0.3	0.1	0.1	0.0
Jute	3.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.2
Other	0.4	0.2	7.7	5.5	5.3	4.6	5.2	2.4	2.1	1.1
Livestock Products	0.4	0.4	0.2	0.1	0.2	0.1	0.5	0.3	0.3	0.2
Fishery Products	2.5	3.5	5.6	12.2	16.2	14.7	13.9	9.0	7.3	5.0
Fish	1.8	0.5	1.2	3.2	4.0	4.5	4.5	2.6	2.3	1.8
Prawns	0.7	2.9	3.8	8.1	10.2	8.7	8.4	5.9	4.7	3.0
Other	0.0	0.2	0.5	1.0	2.0	1.5	1.0	0.5	0.4	0.2
Timber	24.6	39.4	33.7	20.8	17.9	13.2	11.7	10.3	6.3	11.0
Teak	22.4	37.0	25.0	17.9	15.6	10.8	9.5	8.1	5.1	8.3
Hardwoods	2.2	2.4	8.7	2.9	2.4	2.4	2.2	2.2	1.2	2.7
Sub-Total	82.1	85.8	71.3	79.1	70.4	58.3	54.1	37.6	32.1	33.9
Precious Stones	9.1	7.1	5.3	4.1	3.5	3.7	3.3	5.7	5.4	2.4
Natural Gas	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	8.7	24.8
Garments	0.0	0.2	0.3	5.9	7.3	6.8	7.0	30.4	29.7	17.3
Other	8.7	6.9	23.1	10.8	18.8	31.3	35.6	26.0	24.1	21.6
Grand Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

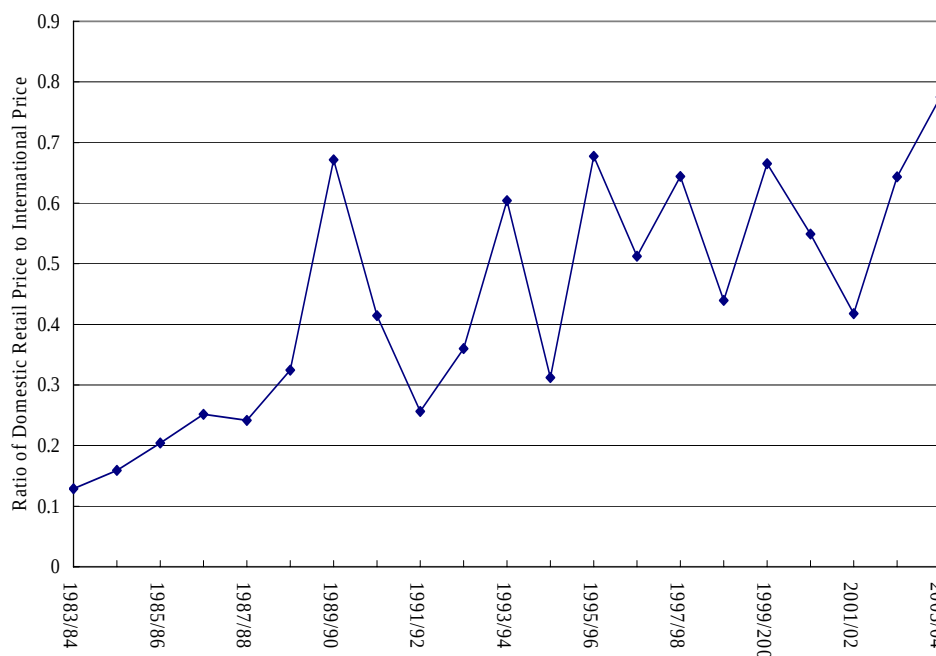
Source: CSO, Statistical Yearbook (2002) .

Figure 1. Changes in Rice Price



Source:CSO, *Statistical Yearbook*

Figure 2: Myanmar Rice Price: Ratio of Domestic Retail Price to International Price, 1983 – 2004



Source: Rice International price(Thai rice) : IMF, *International Financial Statistics* , Rice :Domestic retail price, CSO, *Statistical Yearbook* (1991,1997,2000), CSO, *Monthly Economic Indicators* (March 2003).Market exchange rate:1988/89-1996/97 [ADB](2001):1997/98-2002/03 Tokyo Mitsubishi Yangon Representative Office.

Table 6: Irrigated Acreage, by Type of Irrigation, 1974 – 2000 (Unit: thousand acres)

		1974/75	1984/85	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000
Canal	Government	855	893	614	613	593	638	651	701	685	668	726	761	806
	Farmer	700	691	664	665	651	645	601	618	608	636	634	600	611
Tank	Government	130	98	394	388	378	416	418	389	350	435	455	408	462
	Farmer	111	75	82	92	82	95	70	89	94	95	74	44	34
Tubewell		31	44	53	53	65	69	75	92	99	123	135	164	199
Pump		267	470	322	310	323	469	1,051	1,551	2,057	1,511	1,545	1,865	2,076
Other		318	411	354	358	375	411	437	403	448	378	363	340	362
Total		2,412	2,682	2,483	2,479	2,467	2,743	3,303	3,843	4,341	3,846	3,932	4,182	4,550

Source: GUM, *Agricultural Statistics* (2001).

Table 7: Paddy Land in Myanmar: Changes in the Sown Acreage, by Region, and Type of Rice (by season) Sown, 1993 - 2001 (Unit: thousand acres)

Monsoon Paddy	States and Division	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000	2000/01	2001/02
Delta	Ayeyarwaddy	3,232	3,226	3,279	3,237	3,229	3,224	3,323	3,369	3,372
	Yangon	1,165	1,161	1,174	1,165	1,131	1,135	1,162	1,176	1,176
	Bago	2,160	2,161	2,167	2,204	2,094	2,114	2,347	2,359	2,378
	Mon	646	649	649	651	641	641	659	667	670
	Total	7,203	7,197	7,268	7,258	7,095	7,114	7,491	7,570	7,595
Dry Zone	Sagaing	1,102	1,133	1,144	1,260	1,260	1,257	1,404	1,404	1,331
	Magwe	379	401	439	502	468	383	437	463	505
	Mandalay	551	586	608	674	648	524	552	612	616
	Total	2,033	2,120	2,190	2,437	2,376	2,164	2,392	2,479	2,451
Coastal Area	Rakine	859	868	856	860	854	864	913	935	940
	Tanintharyi	208	210	213	214	208	208	215	225	233
	Total	1,067	1,078	1,069	1,074	1,062	1,072	1,128	1,159	1,173
Mountainous Area	Shan	859	867	866	873	793	787	874	898	954
	Kachin	251	252	269	282	292	329	365	383	388
	Kaya	61	66	68	70	67	44	51	68	68
	Kayin	325	327	327	328	326	326	326	328	330
	Chin	88	88	90	91	93	93	105	106	107
	Total	1,584	1,599	1,620	1,645	1,571	1,579	1,721	1,784	1,847
Grand Total Area		11,886	11,994	12,148	12,414	12,104	11,928	12,732	12,992	13,066
Summer Paddy	States and Division	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/2000	2000/01	2001/02
Delta	Ayeyarwaddy	1,120	1,435	1,613	1,223	1,277	1,412	1,597	1,619	1,625
	Yangon	155	126	334	170	172	197	253	213	222
	Bago	291	423	317	130	174	141	210	227	195
	Mon	72	93	105	71	73	85	127	108	113
	Total	1,638	2,077	2,369	1,594	1,696	1,836	2,187	2,167	2,155
Dry Zone	Sagaing	150	179	203	124	124	95	134	82	243
	Magwe	30	32	56	43	42	45	67	64	79
	Mandalay	150	154	145	140	137	123	174	170	165
	Total	330	365	404	307	303	263	375	316	487
Coastal Area	Rakine	7	10	14	9	9	9	10	12	13
	Tanintharyi	8	11	23	6	10	15	14	16	17
	Total	15	21	37	15	19	25	25	28	30
Mountainous Area	Shan	33	37	36	36	35	49	59	60	56
	Kachin	8	15	24	14	13	14	16	16	16
	Kaya	4	6	8	9	10	3	8	8	8
	Kayin	122	140	140	128	114	112	126	126	128
	Chin	0	0	0	1	0	0	0	0	0
	Total	167	198	208	188	172	178	209	211	209
Grand Total Area		2,150	2,661	3,018	2,104	2,190	2,302	2,796	2,721	2,880

Sources: MAS Documents (1999/200-2000/01), GUM *Agricultural Statistics* (2001,1997).

Table 8: Rice Production in Myanmar: Cost and Revenue Structure, by Major Regions

Area	Delta				Dry Zone					Mountainous Area	
Township in which Study Villages Locate	Htantabin(1998/99)		Myaungmya (2000/01)		Kyaukse(1993/94)		Kyaukse (2000/01)		Taundwingyi (2000/01)	Taungyi (1993/94)	Nyaung Shwe (2000/01)
Season	Monsoon	Summer	Monsoon	Summer	Monsoon	Summer	Monsoon	Summer	Monsoon	Monsoon	Monsoon
Type of Irrigation	Rainfed	Pump	Rainfed	Pump	Canal	Canal	Canal	Canal	Rainfed/Tank	Rainfed	Rainfed
Number of Farmers in Sample	9	9	67	66	68	52	33	25	13	14	9
Sown Acres	17.4	8.1	8.6	6.5	4.4	3.3	4.1	2.7	5.2	4.2	2.4
Yield per Acre (Basket/Acre)	46.8	86.8	45.4	67.7	45.1	66.8	56.2	69.0	25.4	35.1	44.5
①Gross Revenue	29427	53,324	17,615	27,526	10,042	15,128	29,171	42,093	11,865	13,904	31,238
②Current Input Cost	6,064	20,210	4,736	13,765	1,390	1,715	10,273	12,686	3,003	1,682	12,001
Seed	1,883	4,701	1,558	2,375	502	515	2,827	2,806	1,407	391	2,009
Manure	0	0	144	39	0	0	528	327	891	1,291	1,186
Chemical Fertilizer	3,704	9,438	2,702	8,599	888	1,200	6,405	8,813	640	0	5,923
Other Chemicals	53	600	39	174	0	0	240	594	65	0	2,519
Diesel Oil	424	5,471	293	2,578	0	0	271	145	0	0	365
③Labor Cost	8,629	7,410	7,884	6,400	2,750	3,339	5,937	8,178	3,107	5,336	15,395
Hired Labor	5,238	4,543	5,023	2,881	2,323	3,089	5,072	6,887	2,063	3,661	10,194
Family Labor (a)	3,390	2,867	2,861	3,519	427	250	865	1,292	1,044	1,675	5,201
④Capital Cost	5,277	8,336	3,963	7,271	822	846	5,927	8,493	3,591	2,532	5,682
Agricultural Machinery	1,696	4,980	983	5,017	186	178	2,488	3,471	162	104	1,906
Bullocks	3,284	3,264	2,564	1,791	636	668	3,430	4,256	3,166	2,428	3,335
Interest Payment	297	92	416	464	0	0	10	766	264	0	441
⑤Total of Production Cost (②+③+④)	19,970	35,956	16,582	27,436	4,962	5,900	22,137	29,357	9,701	9,550	33,079
⑥Operator's Surplus (①-⑤)	9,457	17,368	1,033	90	5,080	9,228	7,034	12,737	2,164	4,354	-1,840
⑦Income (⑥+a)	12,847	20,235	3,894	3,609	5,507	9,478	7,899	14,028	3,208	6,029	3,360
Share of Each Cost and Operators' Surplus in Gross Revenue (%)											
Current Input Cost	20.6	37.9	26.9	50.0	13.8	11.3	35.2	30.1	25.3	12.1	38.4
Labor Cost	29.3	13.9	44.8	23.3	27.4	22.1	20.4	19.4	26.2	38.4	49.3
Capital Cost	17.9	15.6	22.5	26.4	8.2	5.6	20.3	20.2	30.3	18.2	18.2
Operator's Surplus	32.1	32.6	5.9	0.3	50.6	61.0	24.1	30.3	18.2	31.3	-5.9

Note1: Year in brackets is the survey year.

Note2 :The Survey for Htantabin was done Fujita and Okamoto, and the Kyaukse(1993/94) , and Taungyi surveys were by Takahashi's Survey.

The remainder relate to surveys by srelate to survey by Kurosaki and others.

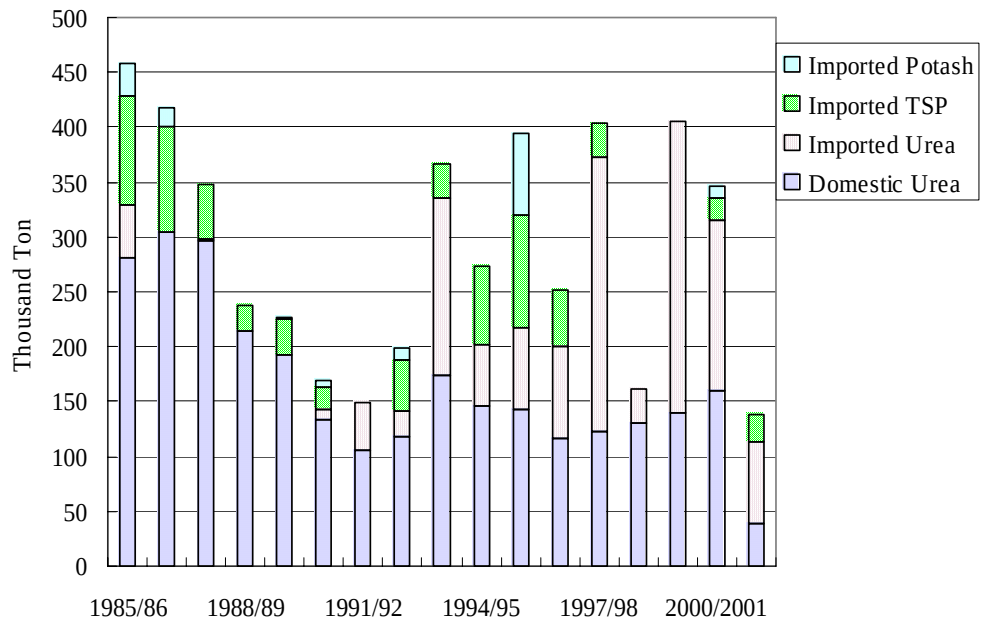
Note3: Water charge is not available for every survey, and it is generally quite nominal (10-20 kyats per acre). It is not included in the current cost.

Note4: Summer paddy produced in Kyaukse is generally called " Mo-Kyaw Zaba" (pre-monsoon paddy) and has been produced for very many years.

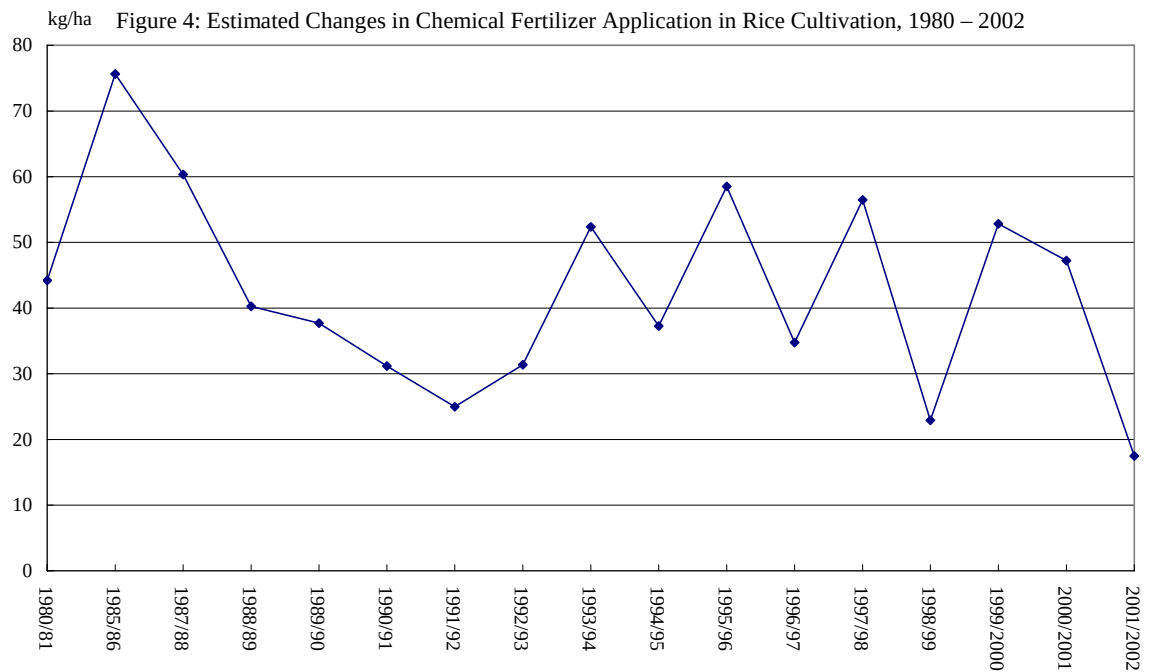
Note5: One basket equals 20.9 kg in the case of paddy.

Sources: Takahashi (2000), Fujita and Okamoto (2001) , Kurosaki et.al (2004).

Figure 3: Changes in the Supply of Chemical Fertilizer, 1985 – 2001



Sources: GUM, *Statistical Yearbook* (1995;1997;2002), MOAI [2000 b], MAS Documents.



Sources: GUM, *Statistical Yearbook* (1995;1997;2002), MOAI (2000 b), MAS Documents.

Table 9: Ratio of Rice Prices to Fertilizer (Urea) Prices, 1986 - 2005

Year	Official Paddy Procurement Price/Official Fertilizer Distribution Price	Market Paddy Price/Market Fertilizer Price
1986	1.3	—
1994	0.6	—
2000	—	0.7
2001	0.3	0.3
2003	0.1	0.3
2005	—	0.2

Sources: 1986,1994 are based on Takahashi (2000, p.40)

The paddy price for 2000-2003 has been obtained from the authors' survey.

Prices are from the MIS Bulletin.

For 2005, both rice and fertilizer prices have been obtained from Okamoto's survey.

Table 10: Pulse Exports, by Major Destinations, 1991 – 2000

(Unit: percentage)					
Country	1991/92	1993/94	1995/96	1997/98	1999/2000
India	55.7	66.4	71.5	73.6	67.5
Pakistan	16.3	8.3	6.5	4.8	2.1
Bangladesh	0.0	3.4	0.1	0.2	0.7
Singapore	14.4	7.6	8.6	4.7	5.7
Indonesia	0.4	7.1	5.9	7.2	11.7
Malaysia	2.4	4.0	3.5	4.0	4.1
Japan	8.9	2.9	1.9	1.4	1.4
Philippine	0.3	0.1	1.1	1.2	0.8
Other	1.6	0.2	0.9	2.8	5.9
Total	100.0	100.0	100.0	100.0	100.0

Sources: GUM, *Agricultural Statistics* (1997, 2001).

Figure 5: Myanmar Black Gram (Pulse) Prices Compared: Ratio of Domestic Wholesale Price to International Price, 1989 – 2002

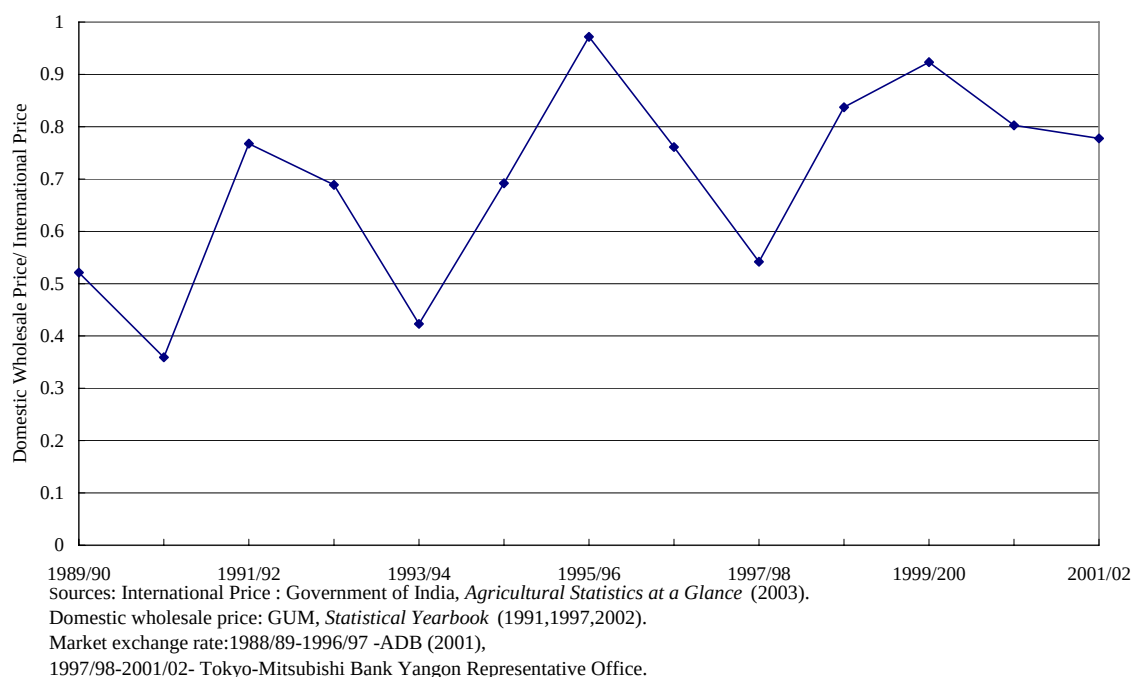


Table 11: Changes in the Sown Area of Pulses, 1974 – 2000 (Unit: thousand acres)

		1974/75	1984/85	1989/90	1991/92	1993/94	1995/96	1997/98	1999/2000
Area	Black Gram	164	227	255	725	693	1,172	1,215	1,371
	Green Gram	72	150	227	434	721	1,137	1,349	1,839
	Pigeon Pea	197	201	155	280	571	617	622	761
	Soy Bean	54	73	83	85	114	177	195	267
	Cow Pea	98	145	148	210	241	392	364	509
	Penauk	72	87	176	218	316	289	270	385
	Garden Pea	57	78	63	69	91	90	92	92
	Chick Pea	373	491	392	459	329	410	297	323
	Total of the above pulses	1,087	1,452	1,499	2,480	3,076	4,284	4,404	5,547
Total of other pulses		1,226	1,491	1,297	1,506	1,568	1,882	1,781	2,238
Share in the Total Area of Pulses (%)	Black Gram	9.9	11.0	13.2	24.6	19.5	24.4	24.5	22.1
	Green Gram	4.3	7.2	11.7	14.7	20.3	23.6	27.2	29.6
	Pigeon Pea	11.9	9.7	8.0	9.5	16.1	12.8	12.5	12.3
	Total	26.1	27.9	32.9	48.9	55.9	60.9	64.1	64.0

Note: The cow pea acreage is the sum of the acreages under Pelun and Bokait.

Sources: MAS (1994), MOAI (2001).

Figure 6: Changes in Production of Black Gram by States and Divisions, 1974 – 2000

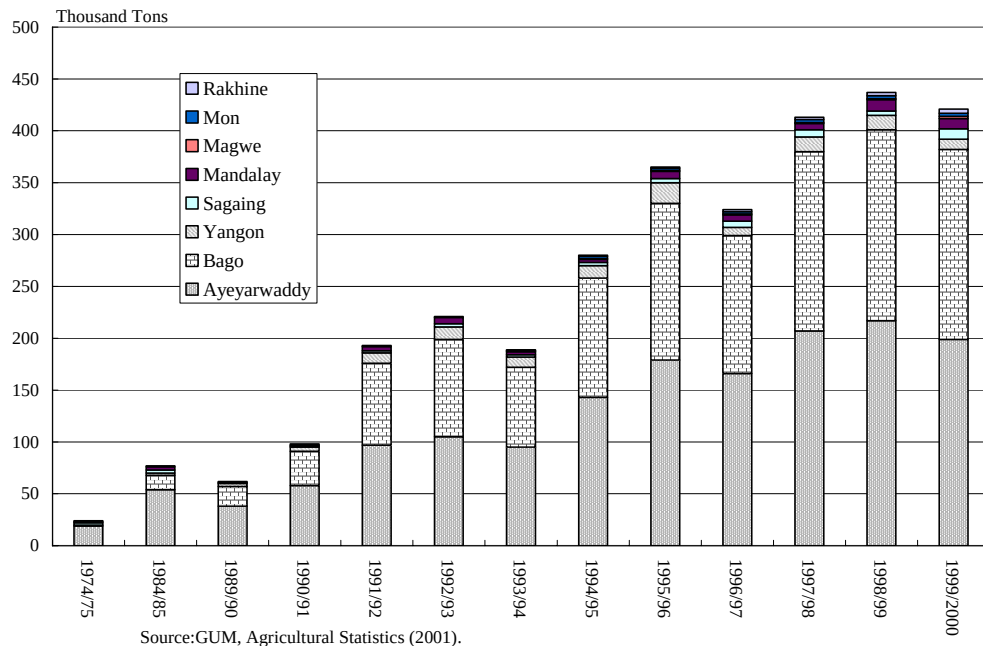
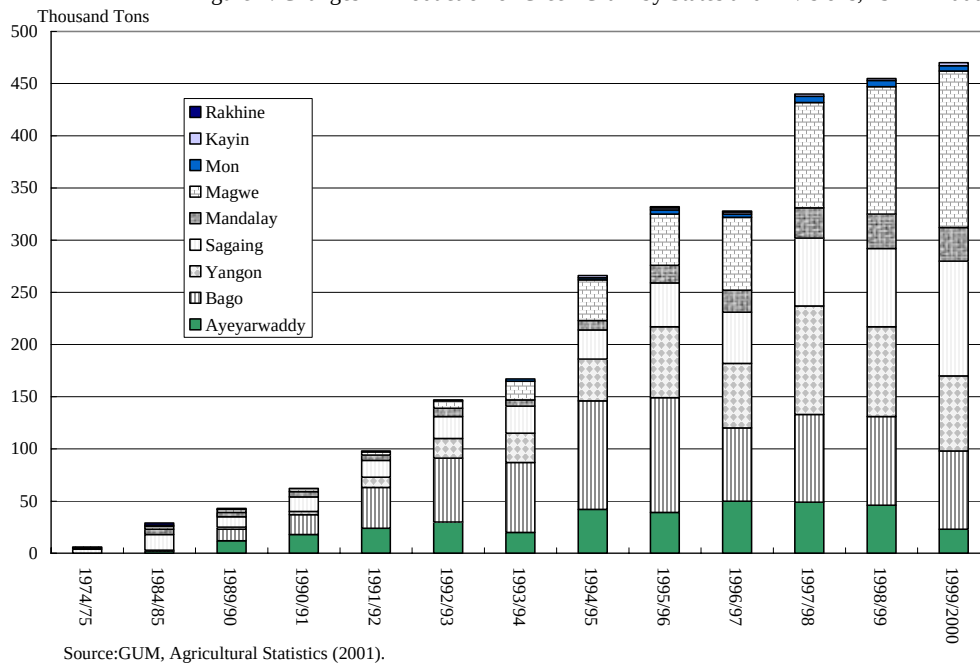


Figure 7: Changes in Production of Green Gram by States and Divisions, 1974 – 2000



(Thousand Tons) Figure 8: Changes in Production of Pigeon Pea by States and Divisions, 1974 – 2000

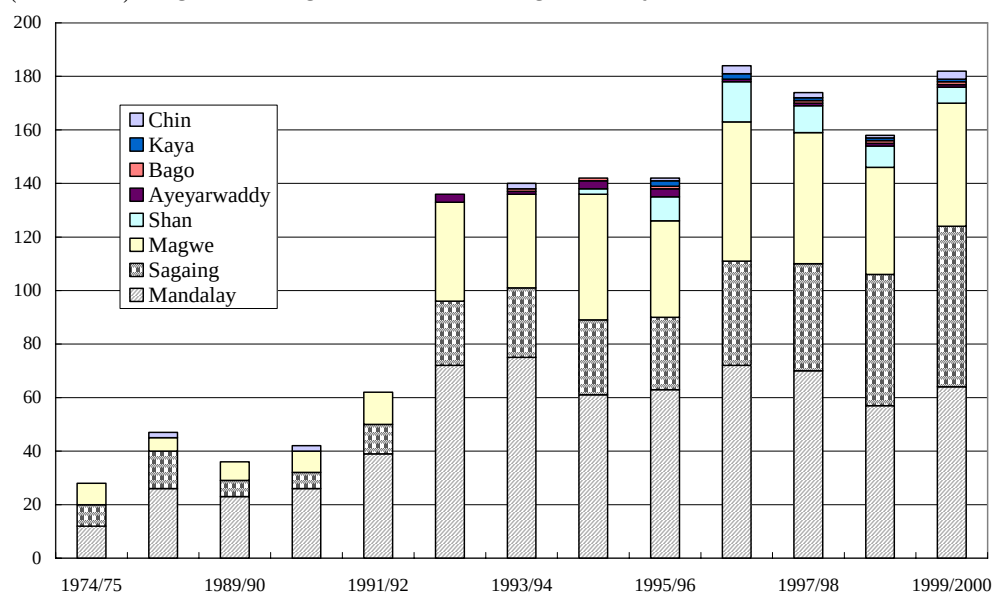


Table 12: Cost and Revenue Structure of Cropping Patterns that Include Pulses and Beans

	Lower Myanmar (Delta)					Upper Myanmar (Dry Zone)				
	Paddy + Pulses					Sesame/ Pigeon Pea + Green Gram			(Reference) Groundnut + Sorghum	
	Bago (2000/01)			Yangon (1999/2000)		Magwe (2000/01)				
	Monsoon Paddy	Black Gram	Green Gram	Monsoon Paddy	Green Gram	Sesame	Pigeon Pea (Mix cropped with Sesame)	Green Gram	Ground nut	Sorghum
Number of Samples	36	15	14	43	43	13	3	8	3	3
Sown Acres	9.4	5.6	3.7	11.8	7.9	4.2	8.2	4.1	4.3	2.4
Yield per Acre (Basket/Acre)	40.0	6.3	4.1	46.7	7.5	6.6	1.0	3.8	40.6	—
①Gross Revenue	18,071	30,648	20,630	25,405	25,538	32,563	3,035	12,052	56,890	19,067
②Current Input Cost	2,956	5,467	4,630	4,075	4,830	9,489	93	4,657	14,497	4,382
Seed	1,224	4,660	3,676	2,218	3,323	2,019	93	1,798	7,053	1,163
Manure	741	67	72	0	0	2,093	0	0	1,721	0
Chemical Fertilizer	805	159	357	1,853	786	4,185	0	1,808	5,723	3,038
Other Chemicals	125	417	525	4	720	1,193	0	1,051	0	181
Diesel Oil	61	165	0	0	1	0	0	0	0	0
③Labor Cost	7,486	6,156	4,846	8,313	3,948	4,772	1,554	4,836	7,313	2,163
Hired Labor	5,406	3,550	1,934	6,765	3,088	3,733	1,144	3,991	6,824	834
Family Labor (a)	2,080	2,606	2,912	1,548	860	1,039	410	844	489	1,329
④Capital Cost	4,433	4,488	4,085	7,250	5,145	3,132	49	1,947	2,330	2,292
Agricultural Machinery	637	344	148	67	3,390	0	0	157	0	0
Bullocks	3,607	4,144	3,891	5,648	1,657	2,299	44	1,449	2,224	2,292
Interest Payment	190	0	46	1,535	98	833	5	342	106	0
⑤Total of Production Cost (②+③+④)	14,875	16,111	13,561	19,638	13,923	17,393	1,696	11,440	24,140	8,837
⑥Operator's Surplus (①—⑤)	3,197	14,537	7,069	5,767	11,615	15,170	1,339	612	32,750	10,230
⑦Income (⑥+a)	5,277	17,143	9,981	7,315	12,475	16,209	1,749	1,456	33,239	11,559
Share of Each Cost and Operators' Surplus in Gross Revenue (%)										
Current Input Cost	16.4	17.8	22.4	16.0	18.9	29.1	3.1	38.6	25.5	23.0
Labor Cost	41.4	20.1	23.5	32.7	15.5	14.7	51.2	40.1	12.9	11.3
Capital Cost	24.5	14.6	19.8	28.5	20.1	9.6	1.6	16.2	4.1	12.0
Operator's Surplus	17.7	47.4	34.3	22.7	45.5	46.6	44.1	5.1	57.6	53.7

Note1: All data is based on field survey in a township in each Division.

Note 2: The year of the survey is given in brackets

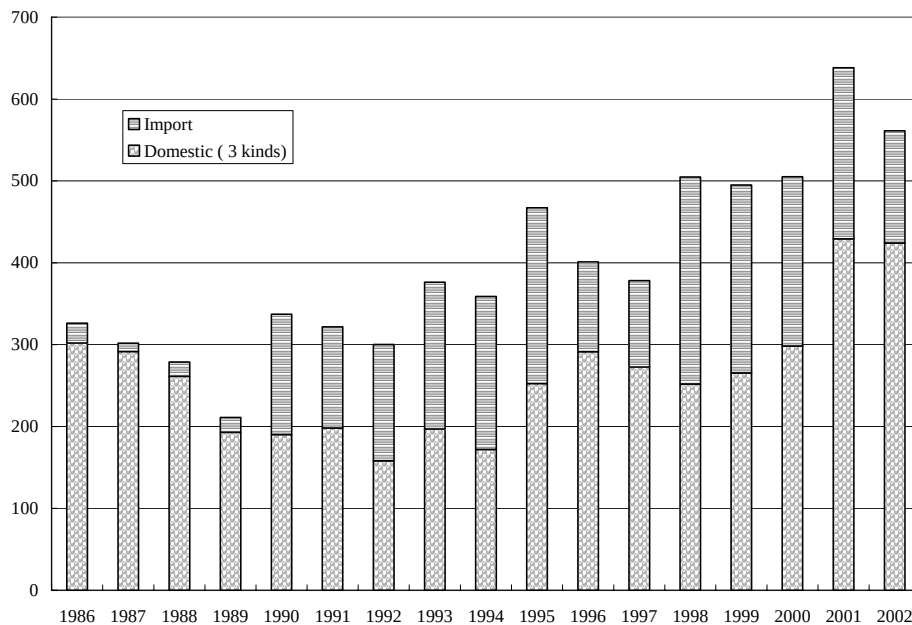
Note3: In Bago, either black gram or green gram is cultivated after monsoon paddy.

Note4: In Magwe, sesame mixed with pigeon pea + green gram is the major cropping pattern.

Formerly, the main pattern was ground nut followed by sorghum or cow pea or soy bean.

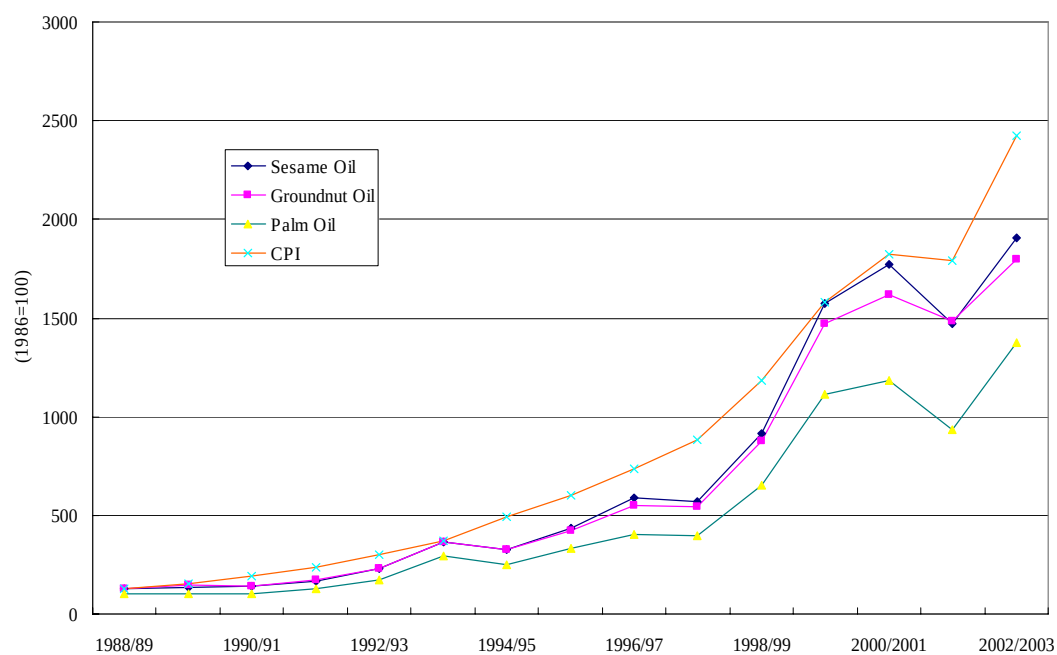
Sources: Kurosaki et.al (2004), Okamoto(2006).

Thousand Tons Figure 9: Changes in the Supply of Edible Oils, 1986 – 2002 (Unit: thousand tons)



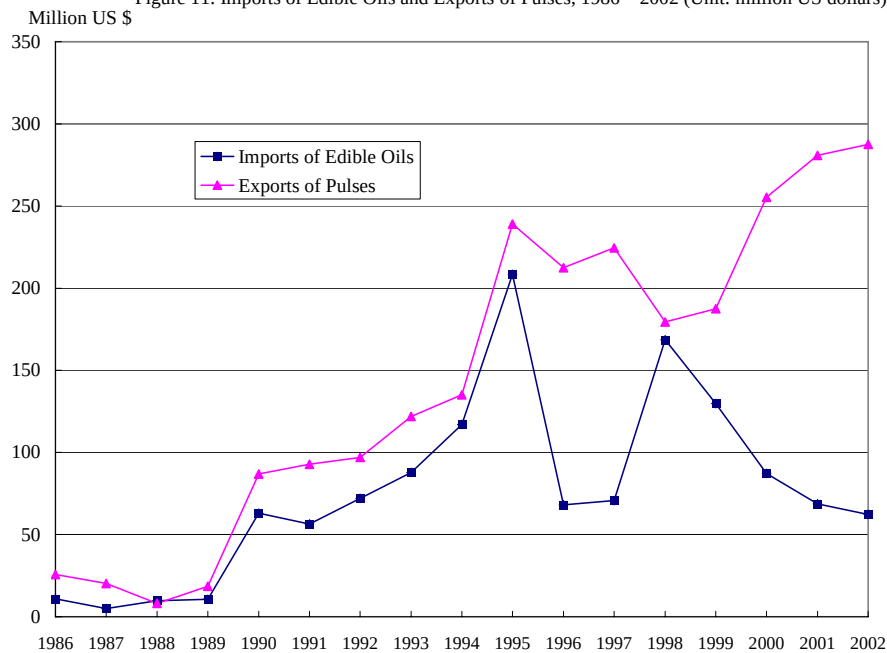
Source: FAOSTAT.

Figure 10: Changes in the Price Index of Edible Oils, 1988 – 2003



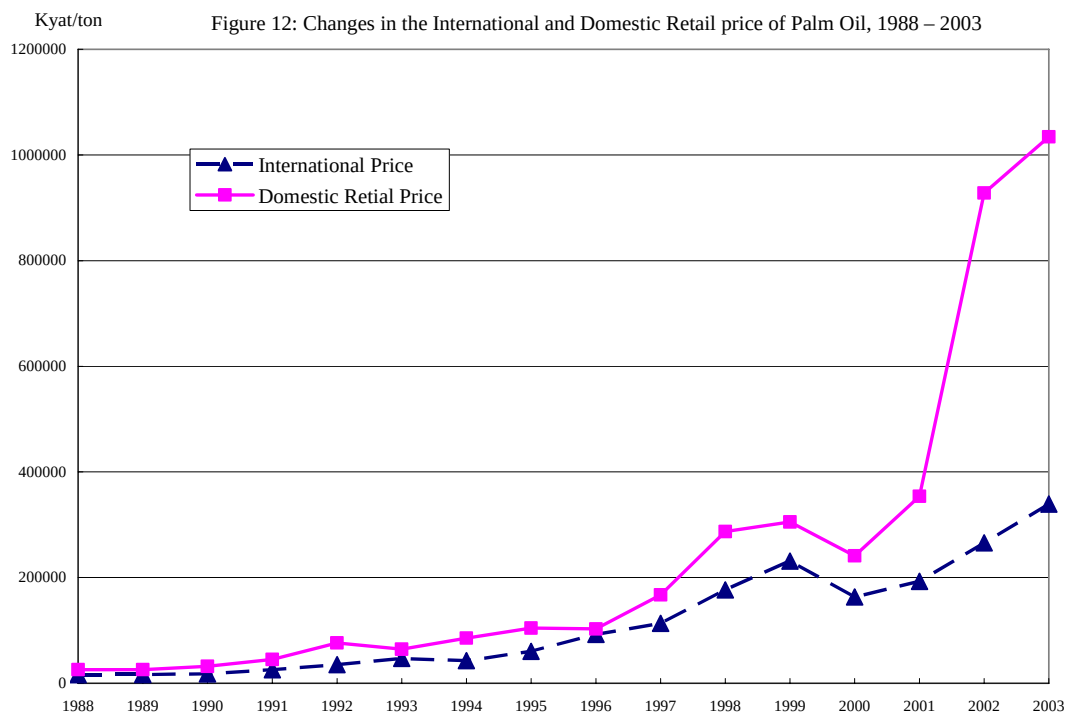
Source: CSO, Statistical Yearbook (1993, 1995, 2001, 2002).

Figure 11: Imports of Edible Oils and Exports of Pulses, 1986 – 2002 (Unit: million US dollars)

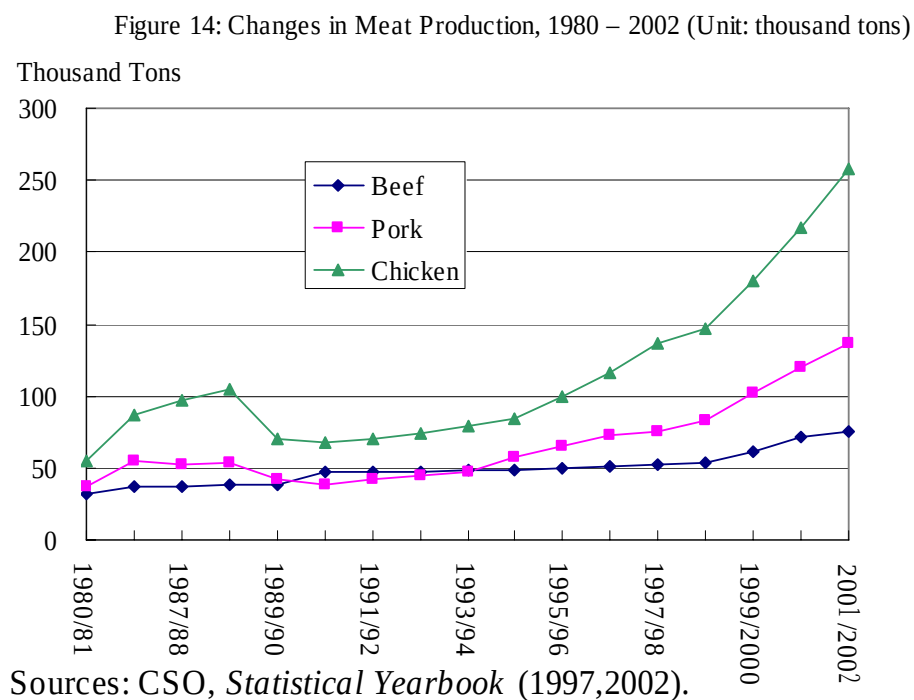
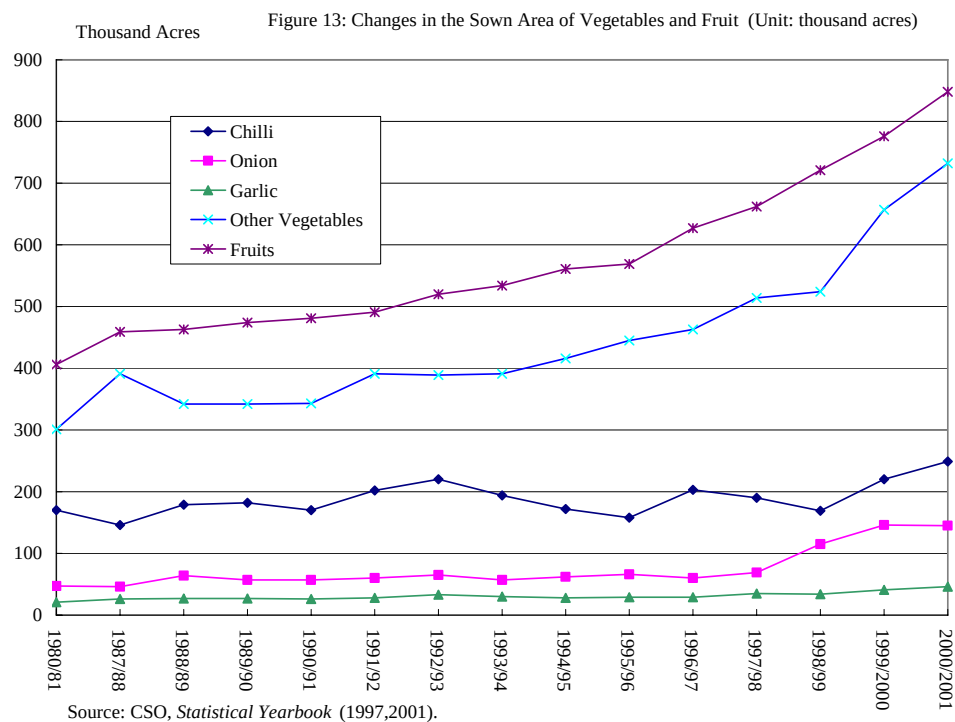


Source: FAOSTAT.

Figure 12: Changes in the International and Domestic Retail price of Palm Oil, 1988 – 2003



Sources: CSO, Statistical Yearbook (2002:1997). Monthly Economic Indicators (April 2003] International Price IFS (Malaysian Export Price)
Market exchange rates: 1988/89-1996/97 ADB(2001):1997/98-2002/03 Tokyo-Mitsubishi Bank Yangon Representative Office.



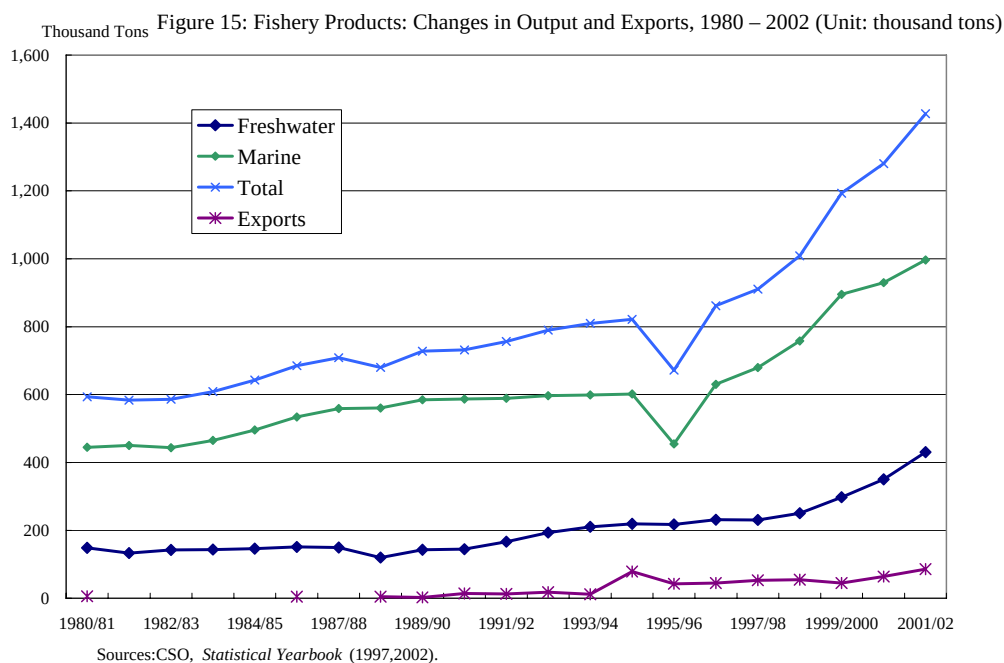


Table 13: Changes in Modes of Transportation, 1980 – 2001

		1980/81	1985/86	1990/91	1995/96	2000/01	(Rate of Change %)			
							80/81-85/86	85/86-90/91	90/91-95/96	95/96-2000/01
Road (Miles)		7,620	10,490	10,943	11,962	14,145	37.7	4.3	9.3	18.2
	Asphalt	3,138	5,485	5,608	5,979	8,029	74.8	2.2	6.6	34.3
	Other Surface	1,069	1,457	1,639	1,889	2,991	36.3	12.5	15.3	58.3
	Other	3,413	3,548	3,696	4,094	3,125	4.0	4.2	10.8	-23.7
Small Trucks (Number)		3,818	6,527	10,355	19,629	24,229	71.0	58.6	89.6	23.4
	Yangon	2,587	3,874	2,386	10,196	13,845	49.7	-38.4	327.3	35.8
	Other Areas	1,231	2,653	7,969	9,433	10,384	115.5	200.4	18.4	10.1
Large Trucks (Number)		30,863	34,064	22,188	23,199	29,663	10.4	-34.9	4.6	27.9
	Yangon	11,490	12,651	10,032	10,039	8,112	10.1	-20.7	0.1	-19.2
	Other Areas	19,373	21,413	12,156	13,160	21,551	10.5	-43.2	8.3	63.8

Source: CSO, Statistical Yearbook (2002).

Figure 16: Changes in the Sown area of Sugarcane and in Sugar Production, 1990 – 2001

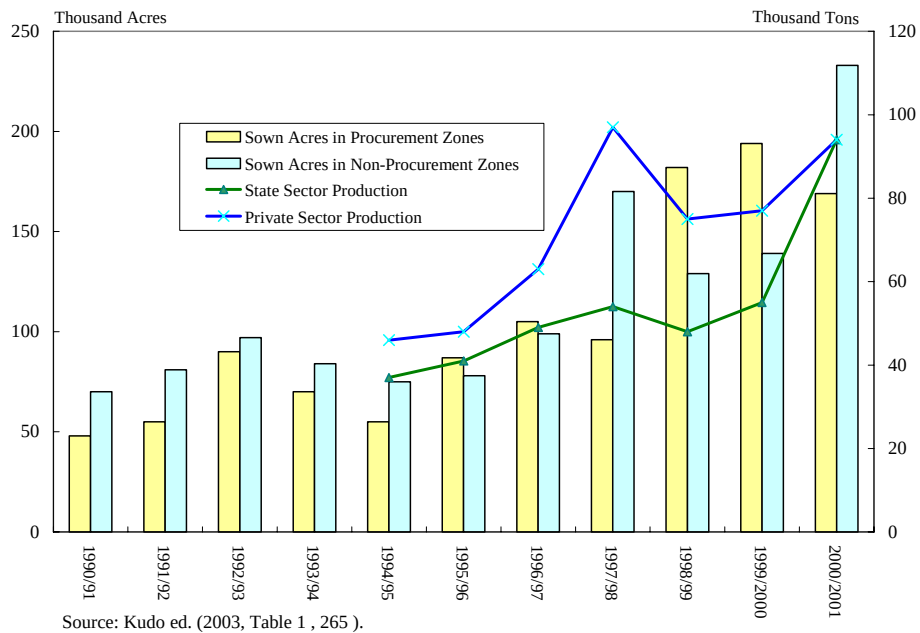
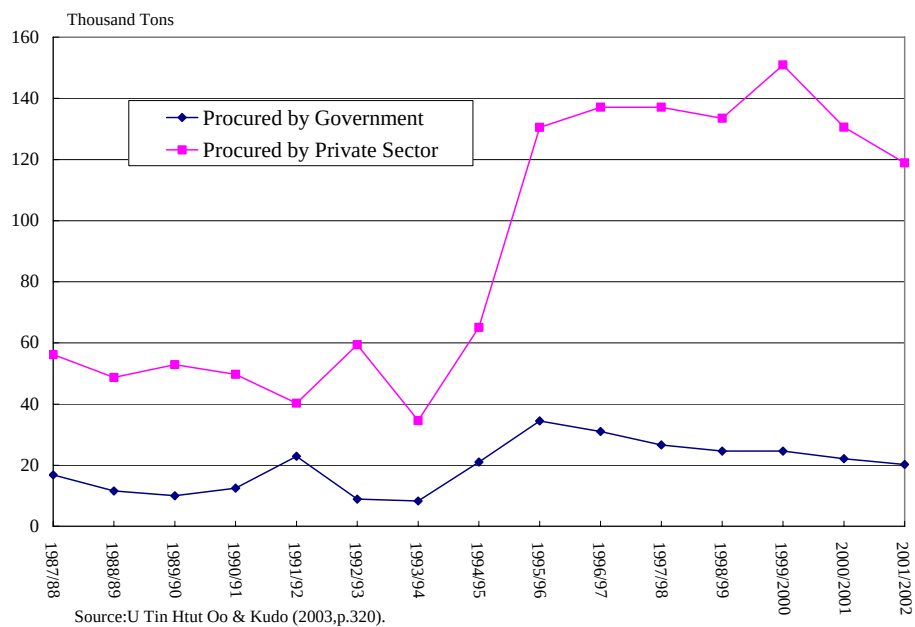


Figure 17: Cotton Production, 1987 – 2002 (Unit: thousand tons)



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