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Thai Agriculture in the World Economy

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EXECUTIVE SUMMARY

World agricultural trade over the next decade will continue to be depressed by problems of oversupply, and it is unlikely that the present GATT round of trade negotiations will be successful in making a sizable dent in the oversupply. Although prices are not expected to be as low as they were in 1987, it is expected to be only slightly above that on average.

These developments will not affect the trade orientation of Thai agriculture. The crop subsector is expected to continue to produce a net exportable surplus in the aggregate over and above domestic demand. A study of comparative advantage in the fisheries subsector indicates that Thailand enjoys favorable production conditions for much of that sector (except fishmeal) so that it will probably continue to generate surpluses in this area as well. Our own studies show also that, within the livestock sector, the Thai poultry industry enjoys substantial comparative advantage. The swine industry also does, although the margin of advantage is not as decisive. Thailand however has no comparative advantage in the dairy industry, which can only be sustained by protection.

Despite some exceptions, Thai agriculture is therefore expected to be producing an exportable surplus, despite the expected fall in prices (relative to levels ruling in 1989). Therein lies some of the problems, for it implies that without an increase in productivity, their incomes cannot be expected to rise. Policies designed to shore up their incomes would imply a net outlay from the government, which, given past behavior patterns, is unlikely.

Increases in productivity can be generated only by putting more effort into research on new technology. Unfortunately, such research tends only to help farmers in areas that are already productive, and therefore would enhance inequalities among different regions in the country.

THAI AGRICULTURE IN THE WORLD ECONOMY

1. INTRODUCTION

No other sector in the Thai economy is as oriented to international markets as agriculture. Although it has been contributing less than a fifth of the Gross National Product throughout the 1980s, its share in Thailand's export trade remains close to a half. Most of the goods produced by the sector (accounting for about three-quarters of the value-added in the agricultural sector) are considered as traded goods, that is they are traded in international markets. Movements in these markets thus have considerable impact on their prices, and consequently on producers' incomes.

Until quite recently, the dominance of the agricultural sector in Thailand's export trade was overwhelming--it contributed close to 60 percent of the gross value of exports in 1980, but there is a clear downward trend in the contribution of agriculture--its share in 1987 was only 45 percent. This relative decline (the absolute value and volume of agricultural exports has continued to increase) has prompted speculations that Thailand is becoming an industrialized country. More precisely, it is alleged that Thailand is acquiring comparative advantage in industrial goods and services. Now, by definition, comparative advantage gained in one area implies comparative advantage lost in some other areas, meaning in agriculture. In the next link in the chain of the argument, agriculture is a natural candidate for a "sunset" industry. People should therefore be hurried along to leave this sector, it is said. They should move to where the future comparative advantage beckons.

The present paper examines the nature of comparative advantage in agriculture. Analysis of comparative advantage normally juxtaposes domestic production conditions against international opportunities. We therefore start the paper by examining the international environment, stressing in particular the rules of the game in the international market place. Normally, these rules of the game are considered beyond Thailand's ability to manipulate. We feel however that they have a bearing on our approach to agriculture. We then look at Thailand's comparative advantage in three subsectors of - agriculture, given world prices for the various commodities and their projected future movements. From the results of this examination, we draw inferences on the proper pricing and technology policies.

2. THE RULES OF THE GAME

GATT and World Trade in Agriculture

The central rule of the game that has guided international trade in the postwar period is the General Agreement on Tariffs and Trade (GATT). It is fashionable, and easy, to make fun of this document ("the General Agreement to Talk and Talk") as an ineffective device full of loopholes and exceptions. A clearer perspective of the achievements and failures of the GATT can be had by comparing the way it treats agriculture as against trade in industrial goods.

The GATT is supposed to be a document designed to promote free trade in goods. A major preoccupation of the economic powers of the postwar period, primarily the US, has been to ensure that the international trading system does not break down into protectionist blocs, as it did in the 1930s. As much as possible, trade in goods is to be subject to clearly established tariffs. Nontariff barriers, such as quantitative restrictions, domestic and export subsidies, and the like are to be discouraged as much as possible. Rules and regulations were written into the GATT to curb such activities. As with all law, attempts were made by the contracting parties to circumvent such rules and regulations. We begin to observe phenomena such as voluntary export restraints, the Multifiber Agreement, or managed trade in major items such as steel. Nevertheless, it is true that, thanks to the GATT, and the successive rounds of tariff-reductions under its auspices, trade in industrial products and among the industrialized countries have become considerably freer over the decades since the Second World War. Even where attempts were made to restrict or manage trade, importers can only with difficulty impose the barriers unilaterally, hence the need to get exporters' cooperation through such devices as voluntary export restraints.

From the beginning agriculture was regarded as an exception to the free-trade prescriptions. Ironically, the US the country now at the forefront demanding a revision to the GATT, was most responsible for putting many of these exceptions in to meet its special needs in the immediate postwar period. Not content with the exceptions that it asked to be written into the GATT itself, it asked for an additional waiver to some of rules.

Two key exceptions that were written into the GATT are:

- To Article XI (grandly titled: *General Elimination of Quantitative Restrictions*). Article XI:2(c) allowed import restrictions on any agricultural and fisheries product, necessary to the enforcement of various domestic measures listed;
- To Article XVI (titled: *Subsidies*). Article XVI required all the contracting parties to eliminate export subsidies on all products, except on primary products.

It would not be an exaggeration to maintain that these two exceptions were the fount of all the troubles in world agricultural trade. It is on the strength of these that:

- The European Economic Community (EEC) was able to provide variable export restitution, a major factor depressing cereal prices in the 1980s;

- Japan was able to impose a virtual ban on rice imports, even though the sight of high-wage Japanese farmers bending over to transplant rice is faintly ridiculous;

- The United States could subsidize rice exports to the European Community, while proclaiming that the purpose of the 1985 Food Security Act was to bankrupt the Europeans and force them to the negotiating table.

- All developed countries could protect their domestic sugar industry, even though cane sugar from the tropics costs considerably less. As if protecting the beet sugar industry is not enough, the developed world is fast developing the high-fructose corn syrup industry to add to its burdens.

To be sure, the exceptions were subject to various hedges. Thus, export subsidies cannot lead the implementing country to capture a "more than equitable share of the world export trade" (Article XVI:3). This phrase has been debated in at least four GATT panels with characteristically inconclusive results (Sathirathai and Siamwalla 1987). Similarly, the permission granted under Article XI:2(c) to impose quantitative restrictions on imports of agricultural products asks the contracting parties to ensure that the restriction should not lead to a diminished share of imports in domestic consumption relative to what would be the case in the absence of the restriction. This requirement again seems to have been totally ignored.

The developing countries did not play a major role in the formulation of the GATT rules, because they were relatively powerless in the world economic fora at the time these rules were being written. But even after they have become more of a voice, in the 1960s and the 1970s, they have concentrated their energies in other directions, primarily in getting themselves out of GATT obligations (the non-reciprocity doctrine), rather than on getting the developed countries to live up to their liberal professions. Agriculture, in any case, was not fashionable. Most developing countries were then influenced by ideas that agricultural exports are the cause of their underdevelopment and that they should form cartels of exporters (following the path of the then enormously successful OPEC). Such cartels would attempt to restrict trade, rather than promote it. Besides, the majority of the developing countries were net importers of cereals. Export subsidization by the developed countries was therefore beneficial to them.

Developing countries' efforts were also diverted by the placing of "tropical products" onto a separate track during the various rounds of negotiations. In these negotiations, developed countries have made sure that the term "tropical products" exclude items such as rice, sugar and tropical vegetable oils. In any case, the assumption in these tropical-product negotiations is that the industrialized countries are importers, and the subject to be discussed is the cut in import tariffs, either of the raw products themselves, or of products processed from them (the tariff-escalation issue). This assumption ignores the fact, for example, that the European community is now a major exporter (subsidized, of course) of sugar, that the US is the second largest (at times the largest) exporter of rice, that the US exports vegetable oil in competition with tropical palm oil. While duties on items included in the tropical product negotiations are higher than for industrial products, the level of protection on agricultural products excluded from consideration as "tropical products" is generally much higher.

With the GATT thus becoming totally ineffective in imposing some discipline on interventions affecting agricultural trade, protection has steadily escalated. Already in the Tokyo round (1973-1979), agriculture was placed on the agenda, at the insistence of the US But the intransigence of the Europeans, together with the high agricultural prices prevailing in the 1970s caused the Americans to give way in the interest of securing some agreement from the Europeans on other issues (Winham 1986). In any case, the American attitude towards restricting agricultural trade has always been ambivalent, as we shall see.

When the Uruguay round was proposed, the Cairns group of countries was formed, specifically to push for agricultural trade liberalization. One reason for the formation of the Cairns group has been the reluctance to entrust leadership of liberalization efforts entirely to the US which has begun to adopt policies that, were they to continue, would make it indistinguishable from those of the Europeans.

What will result from the Uruguay round remains unclear. The major actors on this issue will remain the US and the EEC. Both take a very intransigent stand, to the point where some observers have doubted whether either wants the matter to be concluded. That the EEC would much prefer the status quo is not in doubt, but it appears that large portions of the American farm lobby (who in the end do have the veto power over farm policies) appears to prefer the status quo also.

Gains and Losses for Thailand Under the Present Regime

Two sections below will provide an account of the gains and losses to Thailand of the present regime. Before we proceed to discuss these, it is important to ask what Thai measures toward agriculture that the government would have to dismantle, should GATT rules be universally applied.

Many things can be said about Thailand's agricultural policies, but one thing that cannot be said is that it has been heavily protectionist. (Protection is here defined as any measure that tends to raise domestic producer prices above world prices). Indeed in the past, its policy has been actually quite the opposite, with rather hefty export taxes levied on major commodities such as rice and rubber. This is not to say that protectionist policies are entirely absent. Historically, and even now, sugar has been the favored sector--it is alone among the export sectors to be significantly subsidized, albeit implicitly. Among the import-competing sectors, two sets of commodities stand out as being among the more heavily protected, namely dairy products and soybeans.

Cassava stands in a class by itself. While it is true that the voluntary export restraint agreement with the EEC affects the local farmers adversely, government policies, particularly the bonus quota system, have succeeded in limiting the adverse impact on the farmers somewhat. However, its workings may be construed as dumping, but since anti-dumping measures can only be taken by importing countries who apparently are quite happy with the consequences, Thailand is relatively safe from any GATT action.

We now turn to the impact of other countries' policies on Thailand, examining first the impact of EEC's Common Agricultural Policy.

The EEC's Common Agricultural Policy and Thailand

The impact of the EEC's Common Agricultural Policy (CAP) is many-layered. At the most basic level, the CAP has a favorable impact on Thailand, which is able to export large quantities of cassava because the CAP has raised cereal prices and thus encouraged the use of many kinds of cereal substitutes, among which cassava is one. It so happened that, back in 1967, during the Kennedy round of the GATT the Europeans thought they could provide some largesse to the developing world (without hurting themselves, of course) and agreed to a bound tariff for cassava at 6 percent ad valorem. The boom in the cassava trade that followed surprised the Europeans and by 1980 had affected their sensitivities sufficiently for them to request Thailand's "cooperation" in limiting her exports. For reasons best known to themselves, Thai government officials responded with alacrity to the request and the result is the voluntary export restraint agreement (VERA) whereby Thailand limited its exports to approximately 5 million tons per year since 1982.

Even thus constrained, the trade in cassava remains beneficial to the Thai economy, a fact which the Europeans never tire of reminding the Thais. However, a balanced view of the CAP would require us to look at a wider range of commodities which Thailand exports and which is no less affected by CAP, namely sugar, rice and cereals. The CAP on these commodities have adversely affected the world prices of these commodities and thus indirectly lowered Thai export earnings.

In an as yet unpublished paper co-authored by one of us (Setboonsarng and Tyers, unpublished), this broader view was taken. Using a multi-market multi-commodity model developed by Rodney Tyers and Kym Anderson of Australia, an attempt was made to get the full measure of the CAP. While it is true that the price for cassava for Thai producers would fall by 15 percent and its level of exports by 25 percent, the effect of the removal of CAP on other commodities would be quite favorable. Table 1 shows the impact on international prices and on the export earnings of three of Thailand's major export items other than cassava.

Unfortunately, the particular model employed does not have enough "room" for both sugar and cassava, so that the large adverse impact of CAP on sugar is not represented in Table 1. There is another almost identical model which includes sugar but excludes cassava. This model was employed to estimate the impact of the EEC sugar policies on Thailand. While the figures obtained from this second model are not strictly comparable to those in Table 1, the results do indicate tentatively that the impact of EEC policies on Thai sugar trade and producers' income to be roughly of the same order of magnitude as that on rice.

The gains in export earnings estimated in Table 1 are not the gains in Thai exports to the EEC. It is highly unlikely that Thailand will increase its exports of rice, sugar and maize to the EEC. The point is that CAP has had also a pernicious impact on Thai exports in third markets, and these can be substantial as shown in Table 1. The recent tendency of trade discussions to be conducted in bilateral and reciprocitarian terms have misled many into believing that the CAP has been entirely beneficial to Thailand, and that the EEC is thereby doing Thailand a favor.

The Rice Title of the US Farm Act and Its Impact on Thailand

In contrast to the CAP, there is no ambiguity about the effect of the US policies. In major items of Thai trade, namely rice, maize and sugar, US policies have clearly affected Thai farmers adversely. True, there are a few items which Thailand imports which have been helped by US subsidies, namely cotton, tobacco and soybeans, but total imports of these items do not add up to even a third of our rice exports. The US has also been insisting that Thailand accepts more US subsidies by buying their cigarettes, but as of this writing (September 1989), Thailand is still passing up this golden opportunity.

Table 1: Effect of the removal of CAP on the prices, export volumes and export earning of Thailand in rice, coarse grains sugar and cassava

	International Price (% Change)	Export Volumes (Change in mn.tons)	Export Earnings (Change in mn.$)	Producers' Gain (Change in mn.$)
Rice	8.40	426.00	204.50	369.10
Coarse Grains	5.60	143.00	62.10	76.80
Others	-	-	0.20	95.10
Cassava	(15.10)	(2,380.00)	(147.20)	(151.30)
Total	-	-	119.60	389.70

Source : Setboonsarng and Tyers (unpublished work)

It is fair to say that the major point of controversy between Thailand and the US in the area of agriculture has been the Rice Title of the US Farm Act. What has been its impact on Thai rice prices and exports? The US rice industry likes to point out that this legislation has not hurt Thailand at all, as it has not dented our market share in the least--on the contrary, Thailand has managed to increase its exports substantially. The US feigns innocence as to why Thailand should have been protesting vocally in 1985 and 1986. This "Who, me?" attitude is rather disingenuous. A specially included section (Section 1165) of the Food Security Act implies that Thailand has unfairly encroached on US market shares during 1981-85 (Subsections (a)(7) and (a)(8)). A reference was then made to a countervailing duty (CVD) petition then pending with the Commerce Department. The purpose of all these insinuations was twofold: the first reflects the attempt by the rice lobby to bamboozle the rest of Congress into believing that the Thais were using the subsidies to encroach on the US share in the world rice market. The Commerce Department's finding on the CVD petition gave the lie to this argument: it found that the Thais were giving 0.75 percent subsidies to its rice exports. But by the time the findings came out, it was too late: Congress had already legislated a more than 100 percent subsidy on the US's own rice exports. The second purpose behind this superficially crude exercise is somewhat more subtle. It is trying to square the proposed subsidy with the GATT's requirement that it would not lead to the US capturing a "more than equitable share of the world export trade" in rice.

The main impact of the 1985 Act has been to permit the Commodity Credit Corporation to unload onto the world market some 2 million metric tons of rice that it has been accumulating between 1981 and 1985 during the lifetime of the previous Farm Act.

That the disgorgement of the rice stocks with the CCC in 1986 did reduce the world market rice price now admits of little doubt. A recent US study of the US rice program shows quite clearly that in that year, the US itself transfers a substantial benefit (about 90 million dollars worth) to foreign buyers of US rice, by dumping the rice abroad (Cramer, Wailes, Gardner and Lin 1989:16). The impact of that dumping on Thai prices is a bit more complex.

The expected release of the CCC stocks has an immediate impact in reducing Thai price of 100 percent B rice by $30 to $40 per metric ton in early 1986, from the $210-$220 per ton range to about $180-190 range (Figures concerning export prices of rice during this period are somewhat murky, as the Thai authorities were then doctoring them more than usual). How much of this $30-$40 fall can be attributed to the US legislation remains debatable, as there were other shifts in the world market, shifts that could have cushioned the drop as much as would have exacerbated it. An example of a cushioning shift is the rise in Brazilian demand that took place in that year. An example of an exacerbating shift is the lifting of the rice export tax in Thailand in January 1986.

That $30 fall in rice prices which we shall attribute to the rice title translates into about 400 baht a ton fall in paddy prices which is about 15 percent of the then current farm-gate prices. A 15 percent fall in the price of rice is, given the diversified structure of the Thai economy, not a large drop (Rice now constitutes only 4-5 percent of the GDP). What people do tend to forget however is that even today one-third of the Thai households make a living from rice. In all the trade disputes between Thailand and the US (with the US being in all cases the demanders), no Thai action under dispute (even assuming that Thailand is the "guilty" party) has affected such a large swathe of the US population to such a degree.

After 1987, the rice prices have climbed again thanks to that year's drought in Thailand, and the depletion of CCC stocks. Thai complaints about US rice policies have also disappeared. The US administration has also contributed by maintaining its acreage restriction program at a stringent level. This program was a quid pro quo to the American farmers for the very generous support that they have obtained from the Congress. This acreage restriction has undoubtedly contributed to keeping the world rice price at a decent level. Indeed, at times in 1988 and again this year the world price of rice, worked back to rough rice (paddy) equivalents, came close to the US target prices, so that the US could claim that the US subsidies are now close to zero and that the problem has disappeared.

The Food Security Act expires at the end of 1990. In designing new legislation it would be nice if the Congress could bear in mind the fact that the American rice lobby did say in 1985, with a straight face, that the purpose of the Food Security Act was to "orient" the American rice industry towards the market, and that the measures deployed between 1986 and 1990 were to bridge over the difficulties. Furthermore, the US rice industry commissioned a study that showed that the burden of the rice program would taper off by 1990. Indeed the general mood in the Congress appears to be that the marketing loan has been a great success, and that its application should be extended from rice and cotton to other crops.

Does "success" mean therefore that the American rice industry has attained full manhood of "market orientation" and can sustain itself without any government subsidies? Can the American rice industry go out and fight foreign competition on a level playing field? If the rice industry were to be held to the statements that they have made in defense of the great boondoggle that they have received, it should be ready to face the international market without any help from the long-suffering (and long-bamboozled) American taxpayer.

Realistically, it is likely that the American rice lobby will still press for and obtain a continuation of the existing program. Given the rather severe budget constraint, it is hard to imagine it acquiring an even greater subsidy. At the present level of subsidization (with its attendant price in the form of acreage restriction), it is unlikely that American exports would expand much beyond the 2.5-3 million ton range.

Notes on Changes in the Centrally-Planned Economies

The changes now taking place in the centrally-planned economies appear to have taken everyone by surprise. It is difficult, and premature to come up with precise estimates (and even guesses) of the impact of these changes. The best that can be done is to draw some lessons from countries that have embarked on the process of economic liberalization before everyone else, e.g. China (even though that process may have gone in reverse there), bearing in mind the different nature of the countries involved.

Much ink has been spilt on the effectiveness of central planning in economic management. One thing that the experience of all centrally-planned economies seems to indicate beyond any doubt is that central planning is singularly ill-adapted for agricultural production. There is therefore an enormous potential gain in agriculture from economic liberalization in these countries. How quickly this potential can be realized is a little more problematic. In Asia, where the efficiency of small-scale farming is so clearly superior to large-scale state or collective farms, there is an immediate jump in output when central planning is dismantled. This was the experience of China between 1979 and 1985 (see Table 2). The more recent experience of Vietnam seems to bear this out. The spurts in output from these two liberalizing countries had an immediate consequence in trade. Seemingly overnight, China became a major exporter of coarse grains, and Vietnam of rice.

However, the initial spurt cannot always be sustained. One of the many difficulties encountered by the reformers in China after 1984 was the slackening of the growth pace, after the one-time efficiency gains have been achieved. In particular, grain output--a key indicator for the Chinese--appears to have reached a plateau. One consequence has been that China is once more importing rice. Whether the present economic reforms in Vietnam will repeat the pattern in China remains to be seen.

It is certain that the Eastern European economic reforms, now in full swing, will not repeat the pattern followed in Asia, as the two agricultural systems are vastly different. Many knowledgeable observers question whether the Soviets, in particular, will enjoy the spurt in output that China did in the early 1980s as a result of the current round of reforms (see e.g. Johnson 1989). A period of sustained reform is needed before the impact can be felt.

As a consequence of these changes, the international agricultural markets will be subject to additional strains. The GATT, which China and the Union of Soviet Socialist Republics have both expressed interest in, is wrestling with the question of how to handle an economy where the state plays a major direct role as a trader. This implies a reexamination of Article XVII (State Trading Enterprises)--an issue which incidentally has wider relevance, for many countries use state enterprise for their foreign trade in agricultural products.

Table 2: Agricultural Output Growth in China
(Based on 1980 constant price)

(Percent Per Year)

	1971-78	1980-82	1982-86
Gross Value of agricultural output	4.3	7.5	13
Crops	2.7	5.6	4.2
Grain	2.9	3.9	2.5
Nongrain	2.1	13.2	9.4
Animal husbandry	2.6	10.1	10.1
Subsidiary output	17.9	13.7	40
Village industry	23.5	14.8	43.1

Source: Perkins (1988:612)

The Thai Government and the International Rules of the Game

The tasks facing the Thai government in the international arena can be subdivided into two parts: those dealing with multilateral issues which mean primarily the Uruguay round negotiations and those dealing with bilateral issues.

On multilateral trade negotiations, the Thai government's stand thus far has been logical. It has seen its interest clearly to lie in the direction of promoting world liberalization of agricultural trade. It has, as a result, been an active member of the Cairns group, and it has put a large proportion of its very limited staff on the tedious work of participating actively in the negotiations with a major focus on agriculture.

That is not to say that the Thai government is starry-eyed about the round. It is well aware of the difficulties that face the GATT, and of the improbable nature of the enterprise. This makes it imperative that the government should tackle the bilateral agricultural issues with even more seriousness than it has tackled the multilateral negotiations.

Two major issues now face the Thai government. The first is the necessity to renegotiate the cassava agreement with the EC which, if we do not declare our intention to renegotiate before December 1989, would be renewed until 1994.

On the US front, the present Farm Act will come up for renewal in 1990 and will be the subject of intense discussions in Washington next year. The government needs to formulate a clear strategy of how it wishes to present its case to the Congress. It needs to make a sophisticated case. In particular, it should not plead poverty, and the damage the US farm program has inflicted on the Thai economy. Rather, considerable work needs to be done to understand the workings of the Farm Act from the point of view of the *American* economy and how the Rice Title in particular have hurt *American* taxpayers.

3. THE WORLD MARKET AND THAILAND'S RESPONSE: SOME PRELIMINARIES

Thailand's Comparative Advantage in Agriculture

That Thailand at the moment possesses considerable comparative advantage in agriculture is obvious. It is able to maintain a high level of net exports of agricultural commodities without subsidies (except for sugar) in competition with other suppliers, some of whom subsidize heavily.

Among its exports, the share of agriculture has been steadily declining, particularly since 1980, suggesting that its comparative advantage in manufactures has also been increasing. Now, a country cannot have comparative advantage in everything (a truism, but a seldom-recognized one). As Thailand demonstrates more comparative advantage in certain manufacturing items, its clear advantage in agriculture can no longer be taken for granted. The following pages explore what the future holds in store, in respect of Thai agriculture in the world economy.

Before we proceed to measure Thai comparative advantage, we must recognize that "agriculture" is many things. For some, agriculture appears synonymous with crop production: not altogether an unreasonable view, considering that it comprises about 75 percent of total value added in Thai agriculture. Usually ignored are three other sectors that should be included as part of agriculture, namely livestock, fisheries and forestry. In the following, forestry will continue to be ignored. Even though silviculture is growing in importance, the sector is generally small and declining. Forestry should be much more viewed as natural resources whose past overexploitation is creating serious problems rather than explored for its comparative advantage potential.

The Measurement of Comparative Advantage

The very term "comparative advantage" requires us to look at the Thai situation relative to the rest of the world. One summary measure of the "comparative advantage" of agriculture in the rest of the world would be the prices in the world market of agricultural commodities relative to manufactured goods. The world-price measure would be immediately derided by many for reasons dealt with in the first section of this paper. However, if one accepts, as we do, that Thailand cannot wish away the distortions in world agricultural trade, and that willy-nilly we have to conform to the international rules of the game (or lack thereof), then the future evolution of relative agricultural prices would be a good signpost for Thai agriculture to adapt to. Another way of putting the same idea is that the term "comparative advantage" for the rest of the world includes here the ability of foreign farmers to extract resources from taxpayers in their countries, which Thai farmers appear not to possess. For this reason, we have therefore measured below Thai comparative advantage in agriculture in the face of expected future movements of world agricultural prices, distortions and all.

Among crop production, livestock and fisheries, the measurement of comparative advantage below follows different procedures, largely because the activities involved are quite different in nature. Crop production in general is constrained by the availability of basic resources, notably land in relation to the agricultural labor force. Traditionally, until about the late 1970s, land under cultivation has been expanding faster than labor. This is the fundamental source of comparative advantage of Thai agriculture. As land has become scarcer from 1980 onwards, its comparative advantage in crop production may be expected to decline, if world prices do not change. World price changes would, of course, have to be taken into account, but only in the context of shifting resource availability in Thailand.

Livestock production is in many respects similar to industrial processes, particularly for poultry and swine, the two larger activities within this category. Unlike crop production, there are no domestic natural resource constraints (such as land) to its expansion. One has to examine whether the technology at present utilized allows socially profitable utilization of domestic resources to produce livestock in competition with products available in the world market. Competition in the world market implies some comparison of the cost of domestic resources vis-a-vis world prices. Such a comparison assumes that the livestock sector can easily acquire, at a price, additional domestic resources (meaning mostly labor and other nontradable goods and services, e.g. transport) that it uses, simply by pulling them in from other activities in the economy. Contrast this easy augmentability with the difficulty of expanding land in the case of the crop subsector. The technique used to measure the comparative advantage in cases where resources can be easily augmented at some price is called domestic resource cost (DRC) analysis. The details of the technique will be given below.

The fishery subsector is something of a hybrid. A part of it--that part depending on capture rather than culture--depends on the bounty of nature and is thus similar to crop production. The part depending on culture, the more rapidly growing one in recent years, is similar to livestock. Different approaches should be adopted for these two components of the fishery subsector. Lack of adequate data of the available natural resources prevents us from doing full justice to the capture part of the subsector. We have perforce adopted the DRC technique to examine the comparative advantage of both parts of the Thai fishery industry.

4. THE WORLD MARKET AND THAILAND'S RESPONSE IN CROP PRODUCTION

Shifting Comparative Advantage in Thai Crop Sector

In the past agriculture has grown slowly relative to the industrial and service sectors. There are many and complex reasons for the different expansion rates, among them:

- o The world terms of trade of agriculture relative to industrial and service sectors have been moving steadily against agriculture, even though within Thailand, this tendency has been moderated by the gradual removal of the barriers against exports;

- o Agricultural expansion is more natural-resource constrained, while the industrial and service sectors rely heavily on capital and labor which are more easily augmented;

- o The technologies in use in both the agricultural and non-agricultural sectors are backward relative to the best practice in the rest of the world. While the nonagricultural sector can easily acquire and adapt foreign technology and therefore grow rapidly on this basis, the acquisition and adaptation of foreign technology into Thai agriculture is by no means simple or in some cases even possible. Considerable effort has to be put into both adaptive and new technology before they can be put into practice. Crop output growth cannot therefore be as rapid.

Ultimately, shifts in the comparative advantage occur as a result of the shifts in the domestic resource costs (which, in the case of crops, depend primarily on changes in domestic resource endowments) interacting with changes in the relative world prices (which measure the opportunities faced by Thai agriculture). TDRI's agricultural supply model allows us to explore the impact of the above shifts. The speed of the transformation in the agricultural sector depends primarily on changes in land and labor, although we have included factors that enhance the productivities of these two inputs, namely public and private capital, schooling, and agricultural research. To take into account the changes in the economic environment facing Thai agriculture, price movements are also included in the analysis. The data which form the bases of this essentially long-term analysis came from Thailand's experience in the period 1960-1985. The analysis is reported extensively in Siamwalla, Patmasiriwat, Mundlak and Setboonsarng (1989).

The assumptions needed to employ the above model to forecast future changes are:

- Crop price forecasts;

- Changes in the amount of land and labor as well as the productivity-enhancing factors mentioned above.

Agricultural Price Forecasts to the Years 1995 and 2000

The Thai agricultural sector is highly export-oriented. The movements of world prices carry a great deal of consequences for the sector. The task of forecasting movements of world agricultural commodity prices over long periods is a gigantic one. Only one organization in the world performs this task, namely the World Bank (Commodity Division), not that its pronouncements are generally accepted. Nevertheless, as they are the only body to have devoted substantial resources to this effort, we should not try and second-guess them without putting a comparable amount of resources.

Table 3 reproduces their crop price forecasts. It can be immediately seen that prices in 1987 were particularly low, even when one accepts the fact that over time one can expect agricultural prices, particularly food prices to fall. With the very low prices for that year, any comparison relative to it will appear favorable, which is why many of the forecasted prices show a rise in the future, sometimes by a substantial percentage.

The forecasts for other crop prices not covered by the World Bank are based on our judgement or their historical trends.

In aggregate, these forecasts show that the price index for the 20 crops of importance to Thailand (deflated by the nonagricultural price) will increase at a moderate pace of 0.14 percent per annum on the average between 1987 and 1995. But this aggregative change hides a number of differing movements.

Rice: Rice price is forecast to fall slightly in real terms from the base level in 1987 at the rate of 0.3 percent per year to the year 1995.

Maize and Soybean: Both maize and soybean are expected to rise at around 2 percent per year from 1987-1995. The soybean price forecast should be treated with caution for at least two reasons: a study by a group of American agricultural economists anticipates that soybean price will tend to decline as a result of the continued rapid expansion in Brazil and Argentina and the World Bank itself expects soybean prices to decline in the period beyond 1995, the rate of decline being 0.9 percent per year, from 1987 to 2000.

Table 3: Price Forecasts for Agricultural Commodities

(1985 US$/metric ton)

Commodity	Actual			Forecast		Increase or Decrease	
	1970	1980	1987	1995	2000	1987-1995	1987-2000
						(Percent per year)	
Rice	396	416	177	173	166	-0.3	-0.5
Maize	161	120	58	68	73	2.0	1.8
Sugar	223	606	115	224	254	8.7	6.3
Sorghum	143	124	56	62	68	1.3	1.5
Soybean	322	284	166	198	148	2.2	-0.9
Soybean Oil	845	572	257	470	371	7.8	2.9
Rubber	1,270	1,560	860	1,150	1,060	3.7	1.6
Palm Oil	716	559	264	327	296	2.7	0.9
Copra	619	434	238	305	266	3.1	0.9
Cotton	1,740	1,980	1,270	1,230	1,160	-0.4	-0.7
Jute	754	295	248	243	236	-0.3	-0.4
Tobacco	2,717	2,205	1,471	1,492	1,439	0.2	-0.2

Source: World Bank 1989, Price Prospects for Major Primary Commodities, (1988-2000)

Rubber: Rubber price is anticipated to increase in real terms at 3.7 percent per year during 1987-1995. An important development that may be of interest to Thai policy-makers is the shift taking place in Malaysia away from rubber towards oil-palm. Malaysian economists argue that rubber is more labor intensive, and as Malaysian wages have grown, Malaysia's comparative advantage has declined. Thai wages are still very much below Malaysian wages, and therefore it can be expected that our share of world natural rubber production will increase at the expense of Malaysia.

Sugarcane: Strikingly sugarcane price is assumed to increase very strongly at the rate of 8.7 percent per year between 1987 and 1995. This growth is however from the very low base of the 1987 price level--this was the year after the US released its stocks following the Farm Act. Furthermore, the World Bank includes as part of its projection the assumption that the US will lower its target price (the receipt that the US government guaranteed sugar growers) down from 18 cents to 12 cents per lb. This expectation is based on the GATT panel ruling against the US import quota system used to regulate the US sugar market. The World Bank is supposing that the Congress will respect the panel decision.

Expected Future Changes in Resources Devoted to Agriculture

The following are the assumptions (based largely on an extrapolation of past trends) that we have made to project future trends of resource use in agriculture.

- o The amount of land per agricultural worker will be declining at the rate of 1 percent per annum over the next ten years. This is essentially a continuation of a trend which began in the second half of the 1970s;
- o Capital stock per worker will be increasing at the rate of 1 percent per annum;
- o Irrigation will expand at different rates in the different regions, but nationally, the average rate of expansion will be 8 percent per annum;
- o Schooling (an important factor explaining agricultural growth) will grow at 3 percent per annum;
- o Agricultural research expenditures will be expanding at the rate of 5 percent per annum.

Results of the Projection

The projection exercise indicates that agricultural output in the next ten years will continue to grow at 2.3 percent per year, a moderate rate of growth, no longer as strong as it was in the 1960s and the 1970s, when it was in excess of 3.5 percent. The breakdown by commodity groups is as follows:

Rice	1.4	percent;
Upland crops	6.1	percent;
Tree crops	5.5	percent.

The rice sector will be lagging somewhat, because the world price is expected to fall, and even though irrigation is projected to expand substantially and thus favor rice production, it is not sufficient to pull up rice production. But even if the rate of its production growth is barely equal to the rate of population growth, rice exports will probably continue to grow, because rice consumption per caput is presently trending downwards strongly.

We may insert an observation here concerning the future of maize trade, even though at the moment the model is not detailed enough to allow us to forecast its output and exports. Recent developments both on the demand and supply side would tend to indicate that the surplus that Thailand has been enjoying on this commodity is fast dwindling and turning into a deficit. This has strong implications for the livestock industry, unless the present import policies towards maize are substantially changed.

Thailand will continue to be a strong force in the world market in many of the other upland crops and tree crops, particularly rubber.

The upshot of this exercise is that Thailand will continue to export agricultural products under the scenario assumed above. This continuing net export surplus, as we shall see below, is going to pose a problem for policy.

5. THAILAND'S COMPARATIVE ADVANTAGE IN THE LIVESTOCK SUBSECTOR

The dynamics of expansion in the livestock subsector is driven much more by the strength of domestic demand than by international developments. As incomes have grown, the people's diet has diversified from vegetable products, primarily cereals towards livestock products, the income elasticities of consumption for these products being much higher for directly consumed crop products. Thus, the urban income elasticities for poultry and for pork, to take two examples, are 0.99 and 1.10 (Setboonsarng and Amaranand, Unpublished), as against a probably negative income elasticity for rice. The growth rates of the various components of the livestock subsector are shown in Table 4. The figures in Table 4 mask the profound changes that have taken place in livestock production in Thailand. Take the case of poultry. Production in this sector in 1970 was still mostly in the backyards with the birds scavenging food from whatever was available. This type of poultry raising still exists, but it is a very small component of the total now. The growth rate reported in Table 4 is a composite of the slow growth (or even possibly absolute decline) in this sector together with the far more rapid growth in commercial poultry operations, with each farm raising more than 10,000, sometimes more than 100,000 birds. This kind of operations requires much more intensive use of feed, which has implications for the amount of feed used in Thailand.

Although the livestock industry is driven primarily by domestic demand, international markets do exert considerable influence over the livestock subsector. Some of its products are traded in the world markets. Poultry exports from Thailand are now of some importance, and swine producers are hopeful of one day matching the performance of the poultry-raisers. On the import side, dairy products make up the largest category among Thailand's agricultural goods imports. Above all, livestock production requires for its raw materials many items in which Thailand is an active trader, either on the importing or exporting side, for example, maize, soybean meal and fishmeal.

We estimate Thailand's comparative advantage in livestock production using the domestic resource cost approach. We shall now proceed to give a bald outline of the procedure to measure comparative advantage in this fashion. Each activity, whether to produce chicken meat, pork, beef, or whatever employs the following:

- o Purely domestic resources, e.g. labor, services, or rice bran
- o Imported goods, e.g. soybean meal, animal vaccines.
- o Goods produced domestically, but which could be traded (imported or exported) internationally, e.g. maize, fishmeal, etc.

Table 4: Growth Rates of Value Added in Various Livestock Products at Constant Prices (1970-1988)

(Percentage)

	Growth Rates
Cattle and Buffaloes	3.1
Swine	5.5
Poultry and egg	7.5
Others	5.9
Total value added	6.1

Soruce: National Accounts (New Series), National Accounts Division, National Economic and Social Development Board.

We lump together the first set of items (let us call them "baht goods"), and the second and third sets ("dollar goods"). Why do we lump these items in this way? The second and third items affect foreign transactions. Whether we use imported items or exportable items, there will be a loss of foreign exchange. The use of maize to feed chicken, even if it is domestically produced, implies a loss of foreign exchange that would have otherwise been earned by exporting it.

The output from the activity for which these costs are incurred must belong to the category of dollar goods, as we are dealing with Thailand's comparative advantage--a concept applicable only to items which are internationally traded. The item produced should either be normally imported, in which case its domestic production will save Thailand's foreign exchange; or be exported, in which case foreign exchange will be earned.

The domestic resource cost analysis asks the question: how many baht worth of baht goods is required, on a net basis, to produce a dollar's worth of dollar goods. We have to *net* out the dollar value of the output by the dollar value of the dollar goods used as inputs. To take a grossly simplified example, suppose raising one kilogram of chicken requires only labor, worth 15 baht, and maize worth 75 cents f.o.b. if exported. The kilogram of chicken can be sold in the world market for $1.50 f.o.b. It can then be said that in this activity, 15 baht worth of baht goods is used to produce a net foreign exchange return of $0.75 ($1.50 - $0.75). The domestic resource cost is then 20 (15/0.75) baht per dollar earned.

It can be seen that the dimension of the domestic resource cost is the same as that of the exchange rate: so many baht per dollars. In fact, economists usually compare this number with the exchange rate (a procedure which is strictly valid if the domestic currency is not overvalued or undervalued), because the exchange rate measures the rate of exchange between domestic goods in general with foreign goods in general. If the domestic resource cost used in a particular activity is less than the exchange rate, as in the above example of the chicken, this means that it requires less domestic resources to earn one dollar of foreign exchange in this particular activity than in other activities. Thailand is then said to have a comparative advantage in raising chicken, because it would be profitable to shift domestic resources to do so.

The top part of Table 5 presents the results of the domestic resource cost calculations that TDRI did for the Asian Development Bank (Setboonsarng, Titapiwatanakun and Tubpun, 1989) for the year 1986. The numbers are given as a range, because the calculations were done for different regions of the country. The figures indicate clearly that Thailand has a comparative advantage in the poultry sector (both chicken meat and eggs), and equally clearly that it has a comparative disadvantage in the dairy sector, which at the moment can

Table 5 : Comparative Advantage in Agricultural Production,1986

Product	Domestic Resource Cost
Livestock/1	
Chicken	16.15-17.01
Eggs	13.26-15.57
Pork	24.22
Beef	19.03-45.85
Dairy	32.87-36.91
Fishery/2	
Shrimp	7.86-9.95
Shrimp farming/a	6.55-10.48
Squid	11.79-24.10
Fish	11.26-16.24

Notes : DRC: Domestic Resource Cost (DRC) = Cd/(Pb$-Cb$)*SER
where Cd is the primary and nontraded input cost for producing one unit of an output in baht
Pb$ is the border price of output, in dollars,
Cb$ is the traded input cost per unit of output, in dollars,
a/ Shrimp farming consists of extensive farming,semi-intensive, and intensive farming

Sources: 1) Setboonsarng S., "Competitiveness of Livestock and Feedgrain Subsectors in Thailand", Paper Presented at the Pacific Economic Cooperation Conference, Seoul 1989
2) Tokrisna, R., Comparative Advantage of Thai Agriculture; Fisheries, mimeo, Thailand Development Research Institute,1989

only be sustained by heavy protection. Thailand's comparative advantage in the swine sector is less glaring, but we would maintain that it is there nonetheless. These calculations are made for the year when Thailand still enjoyed a considerable maize surplus. It is not expected that the expected shift towards a deficit situation with respect to this key feed grain will affect the comparative advantage in poultry and swine substantially. The advantage in poultry that Thailand has is so large that the extra cost of imports (excluding tariffs) will not affect it, while the swine population in Thailand still depends largely on rice-bran rather than maize.

The beef sector is complicated, partly because of the enormous quality range, at least the quality as measured by the varying prices that people are willing to pay for a kilogram of beef. In Table 5, the results that are reported are merely for the high-quality beef that would compete with imports, which is a very small section of the beef market. The reason why we confine ourselves to this small section is because there is no international trade in the kind of beef that is mostly consumed in Thailand--and therefore no question of comparative advantage could arise.

For the high-quality beef, the availability of the right kind of feed explains the wide range of results reported in Table 5. We obtain our data from three areas in the country: in Sakon Nakhon, in Tak, and in Ratchaburi. The last area is the only one which shows a domestic resource cost significantly below the exchange rate whereas the other two show the cost to be much higher. The main reason for the profitability of the Ratchaburi operation is the availability of the pineapple waste from nearby canneries as roughage for the cattle, which also reduces the need for concentrated feed. The nearness to the large Bangkok market also helps.

The beef study shows the limitations of the domestic resource cost approach. Although it clearly shows that the Ratchaburi farms to have a clear comparative advantage, it does not follow that Thailand as a whole would have a comparative advantage in beef production. To draw that conclusion, the conditions in Ratchaburi must allow replication, which clearly is not the case here. On the other hand, our earlier results that chicken production generally has a low domestic resource cost is more robust, because poultry technology can be easily replicated over wide areas in Thailand.

6. THAILAND'S COMPARATIVE ADVANTAGE IN THE FISHERIES SUBSECTOR

The fisheries subsector is in the midst of a crisis stemming from an over-intensive mode of fishing. As the marine fishery resources have been mined to the point of exhaustion, Thai fishing fleet had to face rapidly rising costs, compounded in the 1970s by high fuel costs. As far as the inland fisheries are concerned, rural people are finding it more and more difficult to obtain fish from natural sources. These difficulties have a profound but unmeasured impact on the standard of living of most people, since traditionally, fish is second only to rice as an essential food item.

Surprisingly, despite all this, Thai fisheries exports (in the analysis below we exclude canned tuna fish) continue to grow. Of the major export items, only fishmeal exports have declined, so that in real terms its export value in 1986 is less than in 1977. Part of the growth in general fisheries exports came from the increase in aquacultural output. However, contrary to popular impressions, the overwhelming proportion (99 percent by weight and 90 percent by value) of Thailand's marine fisheries product still comes from capture rather culture. Even for shrimps, only a fifth of the tonnage produced in 1986 comes from farms.

One way to get at the riddle of why Thai exports of fisheries products have been doing so well is to examine the comparative advantage of the Thai fisheries industry. In a specially commissioned paper prepared for TDRI, Ruangrai Tokrisna (1989) calculated the domestic resource cost of the various kinds of fishery products, taking into account different technologies of capture and culture. The results, displayed in the lower panel of Table 5, show unequivocally that Thailand has a clear comparative advantage in most sectors of fisheries production. The main exception is shrimp caught by otterboard trawl and fishmeal, which appear by 1986 to be a socially unprofitable way of obtaining foreign exchange.

7. GOVERNMENT POLICIES TOWARDS THE AGRICULTURAL SECTOR

We discuss government policies in two parts. The first section below analyses government policies *given* the natural evolution of Thailand's comparative advantage in agriculture vis-a-vis other sectors. We confine ourselves to pricing policies (including trade interventions), because these, more than anything else, permit us to examine the interaction between comparative advantage and the incomes of the farmers. The second section examines policies that modify that comparative advantage.

Pricing Policies and Trade Interventions

Efficiency requires that a country should follow the comparative advantage that it possesses in its resource allocation. The simplest way that a country can follow its comparative advantage is to pursue a free trade policy. Most governments wish, however, to pursue policies that aim for objectives other than efficiency. In particular, agricultural output prices are supposed to have powerful effects on income distribution, and the most effective way to manipulate these prices is through border interventions. Consequently, free trade is seldom practiced by most governments. In this respect, Thailand is no exception.

Traditionally, the Thai government has adopted two conflicting instruments to manipulate domestic prices for agricultural products. On the one hand, it has restricted trade, either by quota restrictions (or in some cases outright export or import ban), or by export or import duties. Such trade restrictions would lower the prices of exportable items and raise the price of import-competing items. On the other hand, the government claims to be conscious of the fact that Thai farmers are poor, and therefore product prices have to be "supported" or "guaranteed" as a means of enhancing their incomes. Measures were then adopted to "support" and "guarantee" these prices. For exportable products, these two sets of measures stand in direct conflict with each other, but such contradiction has not prevented many governments from adopting both. Unfortunately, the price "support" and "guarantee" measures have been generally ineffective in reaching its objective and have succeeded only in frittering away considerable amounts of taxpayers' money. The export taxation on the other hand has been all too effective in depressing domestic prices. Past pricing policies have therefore not only been inefficient, in that it has distorted incentives away from that dictated by comparative advantage, but also inequitable, in that it has imposed a burden on the farmers who generally tend to be poorer than the nonfarming population.

From the beginning of the 1980s onwards the government policies of export taxation on agricultural goods have been gradually dismantled. Only natural rubber is now subject to heavy export taxation--why it should be singled out is never quite clear.

What has not been dismantled is the panoply of protection awarded to the industrial sector. It is generally thought that such protection is a help granted to the industrial sector at no cost to anybody except the consumers. This is a misunderstanding of the way the economic system works. Protection awarded to one sector imposes a penalty on the unprotected sectors, particularly those producing for exports, for protection leads inexorably to a real appreciation of the baht. Another way of putting the same matter is to say: take away the protection and the baht will have to be devalued. Now a devaluation of the baht would mean a better price for export commodities; thus protection which prevents such devaluation would mean that producers of exportables lose. An earlier exercise that TDRI conducted for the World Bank indicated that the system of tariffs that protect Thai industry imposes a cost to the Thai export sector (including, of course, most of the agricultural sector) equivalent to a 10 percent across-the-board export taxation (Siamwalla and Setboonsarng 1989). Now that part of manufacturing industry is an export sector, this part also bears a portion of the burden.

The analysis above shows that Thailand's agricultural sector will remain competitive, in the sense that Thailand will retain at least the present level of exports in most of the items, with a few exceptions, even though the proportion of labor force engaged in agriculture will continue to decline. Superficially, this is a matter for self-congratulation, because it shows that our farmers remain competitive with those from the rest of the world--and that without the benefit of subsidies that the developed countries' taxpayers lavish on their allegedly more efficient farmers.

In this respect, Thai farmers have been singularly unfortunate for being so efficient. As long as Thai farmers continue to churn out surpluses for export, then for the government to enhance their incomes through price measures, it has to expend fiscal resources to subsidize exports. This the Thai government has been most reluctant to do. The only successful example where domestic interests have pushed the government to subsidize exports has been the sugar industry. The peculiar industrial structure for sugar allows the government to implement a scheme to have the domestic sugar consumers cross-subsidize directly the exports, without any direct fiscal outlay (Siamwalla and Setboonsarng 1989). Otherwise, only producers of import-competing products, such as soybean meal and palm-oil, enjoy domestic prices higher than world prices.

An interesting price and trade policy issue is now arising as Thailand is switching from being a maize-surplus to a maize-deficit situation. Should Thailand enhance the income of its maize farmers by limiting imports? One byproduct of such protection is that the demand for cassava as domestic feed might go up and therefore the income of cassava growers would also rise, the more so if soybean meal imports are less restricted than they are now. But equally clearly such protection, if substantial, will affect the viability of the livestock sector, particularly poultry which is now being exported in some quantities. As pointed out above, the viability of the poultry sector from the country's point of view does not depend on whether we import or export maize, but its private viability (i.e. from the individual producer's point of view) depends very much on the kind of tariffs and trade restrictions that the government imposes on maize imports.

Most developed countries and the Asian newly industrialized countries (NICs) do protect their agriculture heavily by providing hefty export subsidies, among other measures. As Thailand progressed towards that aspired NIC status, it could be argued, it could use its new-found industrial wealth to help out agriculture. To make such claims is to misread the recent history of many of these Asian NICs. Both Korea and Taiwan turned towards protecting their agricultural sector (particularly that benchmark commodity: rice) only after they became net importers. Both Korea and Taiwan were traditional rice exporters (before the war, as part of the Japanese Empire, they were assigned the task of supplying Japan with cheap rice), and Taiwan continued to export rice until the late 1960s. It was only after their farmers were unable to produce the rice needed domestically, that they supported their farmers by giving them prices well above the world prices and by a concomitant policy of import restrictions. Japan, indeed, began a serious program of support for its rice-farmers only after 1961, four decades after it began to import rice on a regular basis. (True, all these countries later turned out surpluses for exports which are subsidized--such exports however count as surplus disposals). Closer at home, Malaysia, well ahead of Thailand in per capita GNP, is supporting its rice farmers, but only because it is also an importer of rice. Most of its export commodities are subject to border taxation, and therefore of negative protection. The association between importer status and protection on the one hand, and exporter status and disprotection on the other, is too strong to be ignored, at least for countries near Thailand's level of income. It is therefore unlikely that the existing political economy will allow an increase in effective support for farmers, unless they grow import-competing crops.

Changing the Comparative Advantage Through Investment

Thailand needs not take its comparative advantage as immutably given. It can attempt to modify it for many reasons, in particular, if a sector which appears to be losing its comparative advantage employs a large proportion of the labor force. If Thailand can continue to retain its comparative advantage in that sector, it will lead to a happy solution in that the painful costs of adjustment can be avoided without imposing any distortions on the economy.

Paradoxically, the Thai government, while penalizing the agricultural sector heavily with the price policy measures in the past, did invest rather large sums of money to enhance agricultural comparative advantage. Two avenues were followed. The first is the building of roads which lowers the marketing cost of agricultural produce. The second was the building of the irrigation systems, which had of course a direct impact on productivity, particularly of rice.

We shall not discuss the role of roads and road-building, because much of the gains from this public investment are behind us, now that much of the primary network has been built up. True, there is now congestion on many of these roads, but investments to relieve this congestion will affect agriculture relatively little.

For irrigation, on the other hand, the issue is at an altogether different level of complexity. Thailand has invested considerable sums in irrigation, probably the largest single form of investment in agriculture. Almost the entire system was designed for rice. As rice prices declined, and as the more favorable sites became irrigated, the return on investment in new sites, never very high, also declined. The issues facing the government now are firstly, whether to expand the irrigation and what to do with those areas already irrigated. On the first question, it appears unlikely that any major new irrigation scheme will be worthwhile. If one factors in the cost of irrigation, Thailand probably has no comparative advantage in growing irrigated rice. That lack of comparative advantage was becoming obvious in 1985-1986, when large amounts of land were taken out of rice in the Central Plains, and put to other use, mostly horticulture and aquaculture, while at the same time more rice was being grown in the unirrigated Lower North and the Northeast, where more and more of wet season rice is coming from. Expensive irrigated land is best put to uses other than for rice, particularly if rice prices continue to drop, as the World Bank is projecting.

Indeed the question that has been subdued during the past two years of extraordinarily high domestic prices of rice is how to use the irrigated lands. Before this boom in rice prices, farmers in these areas have expressed their preferences by shifting to other higher-valued crops.

Normally, over much of Thai agriculture, it is futile to ask what the government's land use policy should be. Farmers normally make these decisions themselves and the government has little effective control over what the farmers can and cannot do with their lands--indeed it has little effective control even what people can do in the officially "public" lands. In the irrigated areas, things are a little more complicated. An individual farmer's choice of crops have a great deal of spillover effects, in both the literal and the technical senses of the term. Furthermore, farmers' decisions are significantly constrained by the timing of the water flow, which is a government decision. Unavoidably therefore, the government plays a decisive role in how an individual farmer in an irrigated area uses his land.

Two levels of policy decisions have to be made. Given the present irrigation hardware, how should the water be allocated? And how much more investment should be made to modify that hardware? The present hardware has been designed specifically for rice, as is the water allocation system. Yet, over large areas of the central plains, during the years when rice prices were low, farmers have gone ahead and reshaped their lands for activities other than rice. This has implications for the water allocation system. If the government is to reform the water allocation system away from the present rice-only stance, it would necessarily become involved in decisions concerning cropping patterns, which in turn entail forecasting what individual crop prices would be during the forthcoming season. Is the government ready to do so? How much responsibility is it willing to take for its forecasts and decisions? When it makes a wrong forecast--as inevitably it will, no matter how sophisticated the methods employed are--will it share in the farmers' losses? These are issues that will be on the political agenda, as the irrigated areas move to a more complex cropping pattern.

The present rice-only design for the irrigation hardware is obviously less efficient than an alternative which would be less specific. To modify the existing system to become more flexible will require new investments. A study conducted by the World Bank (1985) concluded that such a modification would not be socially profitable. Unfortunately, the study assumed a shift away from rice toward the relatively low-valued upland crops, thus biasing the result downwards. It is not clear what kind of returns would be for the higher-valued products that would come from a shift towards aquaculture or horticulture.

Changing the Comparative Advantage Through Technology

The present comparative advantage between agriculture and industry can and will be modified by technological change. Technological change can in turn be accelerated or retarded, or its direction changed by government policies. Because we are discussing comparative advantage, strictly speaking, we should be addressing technology policies in both the agricultural and nonagricultural sectors. However, neither time nor competence allows us to tackle technology policies at that broad level. We shall confine ourselves to government policies to induce technological change in agriculture.

Each individual crop grown in Thailand has undergone relatively little technological change. By and large there is little application of what is conventionally regarded in the rest of Asia as modern technology. There is little use of modern high-yielding varieties of rice, for example, and the rate of fertilizer application is well below that in most of the rest of Asia. Only in the use of machineries are Thai farmers somewhat ahead of their brethern in the rest of Asia. The outcome of this low application of modern technology is that agricultural yields in Thailand in general lag behind other countries.

To look at technological developments at the level of each individual crop however is to underestimate the technological dynamism displayed by the Thai farmer during the last three decades. While he has used age-old techniques to grow any particular crop, he has also been adopting new crops with speed, aided by the availability of abundant land resources. And it is due to this same abundance of land resources that he has been slower to intensify his practices and adopt the new high-yielding varieties and the associated use of fertilizers, generally known as the Green Revolution. As long as a farmer can extend their land, or his children can clear new areas, there is no reason for them to adopt a more intensive technique. But it must be remembered that acceptance of a new crop is no less an innovation than acceptance of a new technique or a new variety.

Government has expended resources to promote technological change, at least for the crop subsector. The amount of resources put in has however not been as large as it could be. In this respect, Thai agriculture has again suffered the misfortune of success. Because Thailand export most agricultural commodities, there is not a sufficiently strong impulse for the government to invest heavily in research. In rice, for example, Thailand offers a sharp contrast to neighboring countries, such as Indonesia or India, where the drive for self-sufficiency has impelled their governments to put a great deal of resources into research. The same drive for self-sufficiency has also been at work with respect to import-competing crops in Thailand. For a long time, for example, research on cotton and soybeans have received a larger share of the research budget than would be justified by their importance in terms of the income that they generate for Thai farmers (Table 6). In these instances it can be said that the research policy has tended to lead to changes in comparative advantage.

For export crops on the other hand, while the government has not been instrumental in introducing new crops to the farmers, once a crop becomes successful, the research budget has tended to expand pari passu with its importance in the economy. The reason for this strategy is to increase the income of the farmers growing these crops by making their farms more productive, the reason has not been to protect the competitiveness of the particular crop. In these instances research policy follows the comparative advantage.

The key role played by private firms has been in introducing new crops to the farmers, but until recently they have played a minor role into researching new technology. Even in the poultry sector, where the private firms have played the dominant role, they have imported the technology from foreign multinationals. Domestic firms have confined themselves to adapting foreign technology to conditions here. Only recently has private firms in the hybrid maize industry begun to conduct research of their own (Setboonsarng, Wattanutchariya and Puthigom 1988), and much of that work has capitalized on the success of the Suwan varieties--a success of public sector research.

Not to be omitted are the unending experiments conducted by farmers themselves ever since man started practicing agriculture 10000 years ago. Thai farmers' trial-and-error methods have played an essential role in the progress of the horticultural sector, and are playing some role in the swine and cattle industry. Such activities will no doubt continue. The potential of the farmers' own technologies is beginning to be realized in widening circles, not least by the Department of Agricultural Extension, which is now keen to diffuse such technologies.

Regardless of the source of new technologies, one undesirable consequence has been that they have with few exceptions tended to increase income inequalities among rural areas, for one simple reason. It is much easier to come up with new technologies or better varieties

Table 6: Research Expenditure per 100 Baht of Crop Value

Crops	1987	1988
Exportable Crops		
Rice	0.49	0.37
Rubber	0.46	0.54
Maize	0.52	0.20
Tapioca	0.20	0.18
Sugarcane	0.43	0.23
Mungbean	0.88	0.74
Sorghum	1.01	0.77
Importable Crops		
Soybean	0.79	0.66
Oil Palm	0.72	0.46
Cotton	4.35	2.30
Groundnut	1.20	2.30

Source: Setboonsarng and Khaoboriauth (forthcoming), Research Budget Allocation of the Department of Agriculture, Discussion Paper for the Research Priorities in Thai Agriculture Project, Department of Agriculture, Thailand Development Research Institute (TDRI), Australian Centre of International Agricutural Research (ACIAR) and International Service for National Agricultural Research (ISNAR).

for areas that are agriculturally favorable, for example, most of the new rice varieties are adapted to irrigated areas, the hybrid maize is best grown in areas with the more regular rainfall. Researchers inside and outside Thailand recognize the inherent bias in their work. Many organizations, for example the International Rice Research Institute (IRRI) have shifted the focus of their work towards such problems as drought tolerance and thus be more helpful to farmers in the less favorable growing environment, but so far with no results remotely matching their performance with the Green Revolution of the 1970s.

Such has been the experience in the past with government and private research activities to introduce new technologies to the Thai agricultural sector. What should be the strategy in a now-changed world agricultural environment?

First of all, it must be recognized that private firms will play an increasing role in research and diffusion of new technologies. Thai private firms still play a small role in generating new technology for agriculture. Nevertheless the success of the poultry and feed firms, and mushrooming of the hybrid maize seed companies (Setboonsarng, Wattanutchariya and Puthigom 1988) suggests that their role will expand. From a social point of view, however, private firms have certain biases in the choices that they make, which must also be recognized. By and large, they prefer to confine their research activities to crops that are propagated by cross-pollination (for which they can offer a hybrid alternative more easily) and on animals. Crops that are self-pollinating or that are vegetatively propagated do not appeal to them, because farmers can easily reproduce the outcome and the investing firms cannot recapture the benefits from research to finance it.

This modest and biased entry of private firms into agricultural research suggests that public agricultural research will still continue to play a major, indeed the predominant role. The rate of return to public sector research for all countries for which it has been measured--and there is no reason to suppose that Thailand is the exception--has always been very high, usually much higher than the return on irrigation.

But aside from conducting its own research, the government has also to police private sector technology. In particular, with the growth of private seed industry, the present laissez-faire stance of the government towards it will no longer suffice. Seed certification procedures and regulations will have to be devised to protect farmers against substandard seeds. True, the present method relies heavily on the incentive of private firms to protect their brand names by maintaining the quality of their seeds, but such methods tend to lead to an oligopolistic structure of the industry--not necessarily a desirable outcome either for the farmers or for the country as a whole.

A question that has been raised is whether Thailand should, for its own benefit (and not because of U.S. pressure), offer intellectual property right protection to people who invent new technology for agriculture. The present patent law specifically excludes agricultural machinery from products that can be so protected. Nor does Thailand have plant or animal variety protection. Little research has been conducted to measure the costs and benefits of such protection to the country as a whole. In our opinion, for the present level of agricultural technology, the benefits or costs of such protection are relatively small. Domestic production of technology that is patentable (patents require an invention which is a discrete step over and above what is known) is relatively small, and plant variety protection laws can be easily circumvented (even in developed countries). Import of foreign technology is also not much hampered. Under present technology, foreign firms build in their own protection to the genetic material which cannot be replicated (as genetic material), as can be seen in the case of poultry, oil-palm, cattle and maize. They do not require any intellectual property protection.

With the more radical form of biotechnology such as genetic engineering, however, the issue of intellectual property protection may become important in the future. At the moment it is not clear in what form the product of such research will be sold to farmers. If it is again embodied in genetic material which cannot be replicated, then the present argument for doing nothing remains. But genetic engineering may promise advances in self-pollinating crops such as rice, in which case the lack of protection would hamper introduction of the new technology. The government may then have to look more seriously into the costs and benefits of providing the protection. For this reason, among many others, domestic research into this form of technology, particularly by the public sector, should be actively pursued, at least so that there is awareness of the nature of the technology itself.

8. CONCLUSION

World agricultural trade over the next decade will continue to be depressed by problems of oversupply, and it is unlikely that the present GATT round of trade negotiations will be successful in making a sizable dent in the oversupply. Although prices are not expected to be as low as they were in 1987, it is expected to be only slightly above that on average.

These developments will not affect the trade orientation of Thai agriculture. The crop subsector is expected to continue to produce a net exportable surplus in the aggregate over and above domestic demand. A study of comparative advantage in the fisheries subsector indicates that Thailand enjoys favorable production conditions for much of that sector (except fishmeal) so that it will probably continue to generate surpluses in this area as well. Our own studies show also that, within the livestock sector, the Thai poultry industry enjoys substantial comparative advantage. The swine industry also does, although the margin of advantage is not as decisive. Thailand however has no comparative advantage in the dairy industry, which can only be sustained by protection.

Despite some exceptions, Thai agriculture is therefore expected to be producing an exportable surplus, despite the expected fall in prices (relative to levels ruling in 1989). Therein lies some of the problems, for it implies that without an increase in productivity, their incomes cannot be expected to rise. Policies designed to shore up their incomes would imply a net outlay from the government, which, given past behavior patterns, is unlikely.

Increases in productivity can be generated only by putting more effort into research on new technology. Unfortunately, such research tends only to help farmers in areas that are already productive, and therefore would enhance inequalities among different regions in the country.

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