Distortions to Agricultural Incentives in a Food Exporting Country: Thailand

January 2007

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Introduction and summary

Thailand is a major net agricultural exporter and its agricultural trade policy is dominated by this fact. The list of agricultural exports includes many of the most important agricultural products produced and consumed within the country, including the staple food, rice, exports of which account for between 30 and 50 per cent of its total output, but also cassava, sugar, rubber and poultry products. The list of imported agricultural commodities is much thinner. Maize has been a net export in most years but was a net import for some years in the 1990s. Soybeans was a net export for several decades, but since the early 1990s it has become a net import. Palm oil has fluctuated between a net import and a net export but since the late 1990s it has been a net export.

Historically, Thailand's large agricultural surplus has led to a degree of policy complacency regarding the agricultural sector. Agricultural importing countries are typically concerned about food security and raising agricultural productivity to reduce import dependence. In Thailand, these matters have not been a significant concern, although stabilizing food prices for consumers has been a recurrent theme of agricultural pricing policy. Until the 1980s, agricultural exports were viewed as a source of revenue for the central government. Unlike manufacturing, traditional agriculture was not seen as a dynamic sector of the economy which could contribute to rapid growth. Because the price elasticity of supply of most agricultural products was very low, at least in the short run, their production could be taxed heavily without producing a significant contraction of output. Moreover, most agricultural producers were impoverished, poorly educated and politically unorganized. Each of these statements applied in particular to rice, so taxing agriculture, and especially rice, was politically attractive and rice exports were indeed taxed until 1986.

With greatly increased incomes per person, rapid urbanization and the move to more democratic political institutions, policy has shifted away from taxing agriculture and towards a more neutral set of trade policies. This change has almost certainly owed more to politics – the political necessity of finding ways to attract the support of the huge rural electorate and the desire of the urban electorate for better economic conditions for the farm population – than to a desire to liberalize agricultural trade for the efficiency-based reasons that economists emphasize. But the move away from taxing agriculture has not progressed far in the direction of subsidizing it, for one key reason. The fact that so many of the important agricultural commodities are net exports has made subsidizing agriculture problematic, inhibiting what would otherwise have been strong political pressure to protect Thai farmers had the commodities they produced been net imports.

Thailand is an active member of the Cairns Group of agricultural exporting countries, but while its agricultural trade is relatively liberal, it cannot be described as a free-trading country with regard to agricultural commodities. Within Thailand, opposition to agricultural import liberalization is strong in the cases of soybeans, palm oil, rubber, rice and sugar. The measures employed include non-tariff instruments permitting a high degree of discretion on the part of government officials. The set of import controls includes import prohibitions, strict licensing arrangements, local content rules and requirements for special case-by-case approval of imports. The commodities for which these

restrictions are applied include the five mentioned above and also onions, garlic, potatoes, pepper, tea, raw silk, maize, coconut products and coffee.

The inclusion of rice in this list of commodities subject to import restictions may seem strange. Thailand is the world's largest exporter of rice and is undoubtedly one of the world's most efficient producers. Why should its rice industry require protection from imports? Imports of rice are in fact *prohibited* unless specifically approved by the Ministry of Commerce. The Ministry of Agriculture and Cooperatives vigorously opposes any liberalization commitments with regard to rice. The reasons apparently relate to the Ministry's wish to keep its options open with respect to rice policy in the event that market conditions should change unexpectedly. Sudden changes in the price of rice can have far-reaching political consequences. The domestic rice market operates almost entirely without government intervention, but the instruments for potential intervention are ever ready.

A lesser reason for the import controls on rice is that, as with most agricultural commodities, 'rice' is in fact a highly differentiated commodity. Not all grades of rice are produced efficiently within Thailand and the government wishes to protect domestic producers from imports of grades of rice that are closer substitutes for local grades on the consumption side than they are on the production side. Lower grades of rice produced in Vietnam but not in Thailand are an important example.

Thailand's "general exclusion list", which applies to the ASEAN Free Trade Area (AFTA) agreements, includes several agricultural industries, including rice, sugar, palm oil (both crude and refined). Within Thai government circles, discussion of the problems of agricultural trade relates overwhelmingly to the treatment of Thai exports by others. Thailand's own agricultural import policy is a closed issue. Problems have been encountered with a number of trading partners with respect to environmental and sanitary and phytosanitary (SPS) issues concerning Thailand's agricultural exports. These problems have included the well-known dispute with the United States regarding shrimp (environmental issues) and with Australia regarding Thailand's exports of frozen, cooked chicken (SPS issues).

Within Thailand, poverty is heavily concentrated in rural areas and public opinion favors government support for the rural poor. Since the economic crisis of 1997-98, and especially during the government of Prime Minister Thaksin Shinawatra (2001-2006), a wide range of income support programs, cash grants to villages and subsidized credit schemes was introduced.

Support for these schemes was a significant component of the 'populist' economic policy agenda of the Thaksin government. However, few if any of these schemes operated through the prices faced by agricultural producers. Since they were not linked directly to the production of agricultural commodities, it seems that they were not 'distorting' in terms of resource allocation. The results of the present study will make it possible to check this point. It will be possible to assess whether the price incentives facing agricultural producers were indeed 'distorted' relative to international prices during this period of populist government.

The following section of the paper briefly describes the changing structure of the Thai economy, especially concerning the agricultural sector. The core of the paper is the use of price comparisons to relate domestic and international prices of major agricultural commodities and fertilizer and this is contained in the next section, which also relates this price comparison to tariff and non-tariff barriers for these same products. This analysis focuses on the question of whether relative prices for traded commodities at the wholesale level have differed from their relative border prices, adjusted for transport and handling costs. The next section extends this analysis to the farm level. The raw commodities produced by farmers generally do not enter international trade directly. These raw commodities are inputs into production of the processed commodities which are actually traded across national borders. For example, rice produced at the farm level (paddy) must be milled before it can be traded internationally. Rice milling, transport, packaging and storage are all costly activities and several steps in the marketing chain intervene between the farmer and the international market. This raises the controversial question of how protection of the processed commodities (such as milled rice), observed at the wholesale level, as captured by the price comparisons conducted in this paper, affects the prices actually received by farmers (such as paddy). We analyze this issue econometrically using Thai price data and derive from this the imputed rates of protection for farm-produced commodities. The final section concludes with a discussion of the future prospects for agricultural trade policy in Thailand.

Growth and structural change

Over almost four decades, from 1968 to 2005, Thailand's economic output grew in real terms at an average annual rate of 6.5 per cent. The broad characteristics of this growth are summarized

in Table 1 and Figure 1. For ease of comparison with other Asian economies, the table distinguishes between the 'pre-boom' period of two decades ending in 1986 and the following 'boom' decade, which immediately preceded the Asian crisis of 1997-99. As the table shows, Thailand's growth rate during this boom decade was 9.5 per cent, the fastest in the world over this period and almost half as rapid again as during the preceding two decades, 'pre-boom'. Output contracted during the 'crisis' years of 1997 to 1999 and during the subsequent 'recovery' period growth has averaged a moderate 5.1 per cent.

As is typical of rapidly growing economies, agricultural output grew more slowly than GDP, implying a declining share of agriculture in aggregate output (Figure 2). The agricultural sector accounted for 32 per cent of GDP in 1965. By 2004 this share had declined to 10 per cent. Over the same period the GDP share of industry rose from 23 to 43 and the share of services remained almost constant, rising from 45 to 47 per cent. Declining terms of trade for Thailand's agricultural exports (Figure 3) explains part of this long term contraction. For more detailed study of the changing composition of the agricultural sector it is convenient to use the input-output tables, which are available at five yearly intervals from 1975 to 2000. Over this period, value added in paddy production (unmilled rice as produced at the farm level) declined from 38 per cent to 26 per cent of total agricultural value added. Changes in the distribution of expenditures as incomes increased explain most of this change. As incomes rise, expenditure on starchy staples typically declines as a share of total expenditures. The share of maize and cassava similarly declined, but the shares of fruits, poultry, cattle and rubber increased.

The input-output tables indicate that for almost all major agricultural commodities, over the two and a half decades since 1975, the share of intermediate input use in the value of total output increased significantly. In paddy production, for example, this share increased from 14 to 30 per cent. For the entire agricultural sector, this cost share rose from 21 per cent to 37 per cent over the same period. Most intermediate goods used in Thai agriculture are domestically produced, but from 1975 to 2000 the share of imports in total intermediate input use increased from 10 to 17 per cent. In 1975, sales of agricultural products to intermediate users (millers and processors) accounted for 57 per cent of total sales, but by 2000 these sales had increased to 70 per cent. Most, but not all paddy is milled into edible rice commercially, rather than on-farm.

Thailand's major agricultural commodities are nearly all net exports, or at least their prcessed products are net exports. Paddy is neither exported nor imported, but milled rice has

historically been an important export item, as has refined sugar. Cassava is similarly exported in the form of processed animal feeds. Rubber exports have become increasingly significant since the 1990s. Soybeans has become an important net import and is used for processed foods and for animal feed. A full description of the trading position of the major agricultural commodities is provided in Warr and Kohpaiboon (2007).

The changing structure of protection at the wholesale level

In their definitive study of agricultural price policy in Thailand up to the mid-1980s, Siamwalla and Setboonsarng (1989 and 1991) make the point that policies for the various agricultural commodities were determined individually, in response to political circumstances which varied among the commodities concerned, rather than as a part of a single, integrated agricultural policy strategy. For this reason, they argue that it is best to consider the main commodities one at a time, which they do for the commodities rice, sugar, maize and rubber. The discussion which follows will also adopt this strategy, except that the range of agricultural commodities considered includes cassava, soybeans and palm oil, in addition to the four reviewed by Siamwalla and Setboonsarng, and our analysis also considers a major input, urea fertilizer. Following this commodity-specific review, we turn to the issue of what common themes, if any, can be found for Thai agricultural policy as a whole.

The structure of the discussion for each commodity is first to relate domestic and border prices on a comparable basis. This analysis is conducted at the wholesale level, meaning that the 'domestic price' means the domestic wholesale price. All of the price data used in this analysis are presented in the Appendix tables to Warr and Kohpaiboon (2007). We then use these data to calculate nominal rates of protection (NRPs) for each commodity. Table 2 summarizes the price data used in these NRP calculations and the formula used. In the calculation of the nominal rates of protection, the border prices are amended by the transport and handling costs involved in getting imports from the *cif* level to the domestic wholesale level and in getting exports from the domestic wholesale level to the *fob* level. These transport and handling costs are summarized in Appendix to Warr and Kohpaiboon (2007). This adjustment is required to obtain prices comparable with domestic wholesale prices. The border prices adjusted by transport and

handling costs are then interpreted as indications of what the domestic wholesale prices would be in the absence of protection. The resulting estimates of nominal rates of protection at the wholesale level for six major commodities and fertilizer are presented in Table 3. The following discussion summarizes these results.

Rice

From the end of World War II to 1986, Thailand taxed its exports of rice. There were four individual instruments of export taxation, each with different legal foundations, each under the control of different parts of the bureaucracy, and each generating revenues that went to different destinations within the government. Siamwalla and Setboonsarng describe these differences but point out that their combined effect was a rate of export taxation of around 40 per cent from the late 1950s to the early 1970s. The rate increased to around 60 per cent during the commodity price boom of 1972-74, but subsequently diminished quickly to about 20 per cent. There was a further peak of about 40 per cent, at the time of the second OPEC oil price shock in 1979-80, and then a steady decline until all four forms of tax were suspended in 1986. Rice exports have remained untaxed for the two decades since then.[1]

The implications of these events for actual prices are summarized in Figure 3. As with each similar figure to be presented below for other agricultural commodities, the figure compares domestic wholesale prices with border prices for commodities of comparable quality. Since rice is a net export, 'border price' in the diagram means the export price, adjusted for transport and handling costs between the wholesale and export level. The NRP calculations that emerge are similar to those that would be inferred from the rates of taxation described above, except that the NRPs after 1986 are not zero, but have declined from around -11 per cent in the late 1980s to around -3 percent two decades later, in 2005. It is possible that the transport and handling costs between the wholesale and *fob* locations are not fully accounted for in the data used for these calculations. If so, it is difficult to explain why this statistical discrepancy could have declined so much over the 20 years concerned. But it is also possible that 'unofficial' taxes have been levied on Thai rice exports, at steadily declining rates, over the past two decades. Notwithstanding this

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[1] A general equilibrium analysis of the economic effects of Thailand's export tax, including its distributional effects, is provided in Warr (2001). A subsequent discussion, though not within a general equilibrium framework, is contained in Choeun, Godo and Hayami (2006).

puzzle, the data shown in Figure 3 and Table 3 support the view that Thailand's rice exports are currently neither protected nor subsidized to any significant extent.

Maize

Maize was a net export for Thailand until the 1990s. In 1992 and again from 1995 to 2000, imports dominated, but maize has subsequently reverted to a net export. Between 1965 and 1981 the government intervened in the maize export market in an effort to preserve Thailand's exports to Japan and Taiwan, China, primarily for use as animal feed. For both of these markets, season-long stability of supply was required. The Thai government guaranteed stability of supplies to these two markets and to ensure fulfillment of these assurances, the government imposed quota restrictions on exports to markets other than these two countries. The effect of this policy was an increase in the price volatility passed on to the domestic producer and somewhat reduced average earnings. As countries closer to Thailand, including Malaysia and Singapore, developed their own livestock industries, the need to preserve the Japanese and Taiwan markets was seen as being less crucial and by 1981 the export controls were removed. The data shown in Table 3 indicate roughly zero protection for the maize industry, and it is interesting that this outcome does not seem to have depended in any systematic way on whether maize was a net import or a net export.

Cassava

Thailand's cassava exports developed for the supply of animal feed to European and some Asian markets, including Taiwan. The quota restrictions of the EU led to rents attached to export quotas from Thailand, which in turn led to corruption in the allocation of these quotas. The rents associated with the quotas are analogous to a privately collected export tax, resulting in the export price exceeding the domestic price by amounts averaging around 10 percent (Table 3).

Soybeans

Soybeans were a net export for Thailand from 1960 until 1988. They became a net import from 1992 onwards. During the export period, the exports were taxed, but from 1995 onwards, the trade regime shifted nominally to one of tariff quotas. Within the quota volume of imports, soybeans could be imported at low or zero tariffs. Beyond the quota the applied tariff was set at

the maximum amount permitted by Thailand's WTO obligations, which varied between 80 and 90 per cent. The transition of soybeans from a net export to net import (1992) coincided with a shift from negative nominal rates of protection (around - 20%) to positive rates of 30 to 40 per cent.

Sugar

In many, perhaps most, countries of the world, the sugar industry receives unusually favorable treatment. Thailand is no exception. Sugar was an import item until the late 1950s, but has since has been a net export for over four decades. Nevertheless, it receives protection in the form of a 'home price scheme'. This type of scheme involves taxing consumers and using the proceeds to subsidize exports. A scheme of this kind was practiced in the Australian sugar and dairy industries in the 1950s and 1960s. Reportedly, a Thai economics student at an Australian university learned about the scheme in the 1960s and imported the ideas on return home. The scheme has subsequently been applied to the Thai sugar industry, long after it was abandoned in Australia.

A home price scheme drives up the domestic consumer and producer prices. It subsidizes the producer at the expense of the consumer. To make the scheme work, leakage from the export market to the more profitable home consumption market has to be prevented. In most industries, this is difficult. Re-importing for domestic consumption must also be restricted, and as Corden (1971, p.17) points out, this can be achieved by a sufficiently restrictive tariff. From the point of view of the finance ministry, an attraction is that the scheme is self-financing. But as a protectionist device, a limitation of the scheme is that the capacity of the consumption tax to subsidize exports is reduced if the volume of exports becomes a large share of total output (exports plus domestic consumption). This has been an issue in the case of the Thai sugar industry.

Siamwalla and Setboonsarng attribute the political power of the Thai sugar industry to technological changes within the sugar milling industry which required large mills and precise scheduling of sugar deliveries to these mills. Sugar milling is a highly capital intensive business and during the sugar processing season it is essential that the processing plants be fully utilized. Growers and millers have bickered over prices, but they have been able to combine their efforts to lobby the government for intervention on their behalf, something other agricultural export industries in Thailand have been unable to achieve. In Thailand, sugar growers and millers are highly organized. In the case of the Thai sugar industry, the technological changes mentioned

above also helped restrict leakage from the export market to home consumption, because the mills were large and few in number.

Figure 4 shows that consumer prices of sugar have been stabilized by the scheme, relative to the export price. The peak export prices of the early 1970s were not transmitted to consumers or producers and at this time the NRP for sugar was negative. But for most of the duration of the scheme, consumer and producer prices have been well above export prices. Since the mid 1980s the NRPs have averaged over 60 per cent. Even though it is exported, sugar is by far the most heavily protected of Thailand's agricultural industries, with the possible exception of its small and inefficient dairy industry.

Palm oil

Thailand's palm oil industry has fluctuated between a net import and a net export. Although the industry has been net export since 1998, a system of import quotas remains in place. Price data for palm oil, which can support the price comparisons conducted in this paper, are available only from 1995 onwards and palm oil is therefore not included in Table 3. The nominal rate of protection for palm oil, measured at the wholesale level, has exceeded 50 per cent since the late 1990s. In this respect, the case of palm resembles sugar. It is a net export which is nevertheless protected, reflecting the political lobbying power of its capital intensive processing sector.

Rubber

Rubber is a net export for Thailand and the Thai rubber industry has been subject to an export tax. The manner of calculating the tax meant that the rate drifted upwards with inflation. Due to the inflation of the 1970s, by the early 1980s the rate of export tax had reached 26 per cent. Pressure from members of Parliament from the rubber growing areas of the south of Thailand led to the revision of the system of calculation and a return to the lower rates of taxation of the 1960s. Table 3 confirms that since 1990 the nominal rate of protection on rubber has been roughly zero.

Fertilizer

Thailand imports urea for use as fertilizer and urea imports have been subjected to declining rates of tariff protection. Of course, taxation of imports of this agricultural input implies disprotection for the agricultural industries which use it. The decline in tariff rates began in the early 1990s. By

the early 2000s the tariff rates were negligible. These policy changes are confirmed by the outcome the price comparisons reported in Table 3. Nominal rates of protection have declined steadily and are currently close to zero. This treatment of fertilizer in Thailand – steadily declining rates of taxation – contrasts with several neighboring countries, where fertilizer use has tended to be subsidized as part of a general program of agricultural subsidization.

Imputed protection at the farm level

So far, our discussion of protection has related to the effects that policy interventions have at the wholesale market level. In this section, we extend the analysis to consider the way protection (or its opposite) at the wholesale level produces price effects at the farm level.

Theory

One of the intentions of protection policy is to influence prices at the farm level and in any case the farm level effects of agricultural protection policy are always a matter of policy concern. But the goods produced directly by farmers seldom enter international trade themselves. The raw commodities produced by farmers are generally non-traded. The commodities which enter international trade are the processed or partially processed versions of these non-traded raw products. Between the non-traded raw product produced by the farmer and the traded processed commodity which enters international trade, there may be several steps of transport, storage, milling, processing and re-packaging.

The significance of this point is that protection policy operates directly on the goods which actually enter international trade, either exported or imported, not the raw commodities produced by farmers. Protection at the farm level is therefore a derived effect. It depends on the extent to which policies applied to trade in processed agricultural goods induce changes in their prices which are then transmitted to the prices actually faced by farmers. The question thus arises as to what extent price changes at the wholesale level, induced by protection policy, affect the prices actually received by farmers for the raw products they sell.

We construct a simple econometric model to investigate this issue. We shall use the notational convention that upper case Roman letters (like X) will denote the values of variables in their levels and lower case Roman letters (like x) will denote their natural logarithms. Thus

$x = \ln X$. Protection at the wholesale level is defined as

$$P_{it}^{W} = P_{it}^{*}(1+T_{it}^{W}),$$ (1)

where P_{it}^{W} denotes the level of the wholesale price of commodity i at time t, P_{it}^{*} is the corresponding border price, expressed in the domestic currency and adjusted for handling costs in getting the commodity from the *cif* level to the domestic wholesale level, in the case of an import, and for the cost of getting it from the wholesale level to the *fob* level in the case of an export. The nominal rate of protection at the wholesale level is given by T_{it}^{W}. In this discussion, both the border price and the nominal rate of protection are treated as exogenous variables. The border price is determined by world markets and the country concerned is presumed to be a price taker. The nominal rate of protection is determined by the government's protection policy.

The farm gate price of the raw material is denoted by P_{it}^{F} and its logarithm, p_{it}^{F}, is related to the logarithm of the wholesale price by

$$p_{it}^{F} = a_{i} + b_{i}p_{it}^{W} + u_{it},$$ (2)

where a_{i} and b_{i} are coefficients and u_{it} is a random error term. The coefficient b_{i} is the 'pass-through' or 'transmission' elasticity. The estimated values of the coefficients a_{i} and b_{i} are denoted $\hat{a}_{i}$ and $\hat{b}_{i}$, respectively. The econometric estimation of these parameters is discussed below.

The estimated coefficients are used as follows. We estimate the logarithm of the farm price that would obtain *in the absence of any protection* as

$$\hat{p}_{it}^{F*} = \hat{a}_{i} + \hat{b}_{i}p_{it}^{W*},$$ (3)

where p_{it}^{W*} is the estimated value of the wholesale price that would obtain in the absence of protection, $p_{it}^{W*} = \ln P_{it}^{W*}$. This is then compared with the estimated value of the wholesale price

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in the presence of protection

$$\hat{p}_{it}^{F} = \hat{a}_{i} + \hat{b}_{i}\, p_{it}^{W}\ . \tag{4}$$

Denoting the anti-logs of $\hat{p}_{it}^{F}$ and $\hat{p}_{it}^{F*}$ by $\hat{P}_{it}^{F}$ and $\hat{P}_{it}^{F*}$, respectively. The nominal rate of protection at the farm level is then estimated as

$$\hat{T}_{it}^{F} = (\hat{P}_{it}^{F} - \hat{P}_{it}^{F*})/\hat{P}_{it}^{F}\ . \tag{5}$$

It is important to observe that the value of the protection-inclusive farm level price used in these calculations is the level estimated from the econometric model (equation (4)) rather than the actual price given by the raw data. The reason is that our intention is to use the model to estimate the *change* in the farm gate price caused by protection at the wholesale level. Thus both the protection-inclusive and the protection-exclusive prices used in (5) are their predicted values, obtained from the model.

The implied nominal rate of protection at the farm level can be related to the nominal rate of protection at the wholesale level, as follows. Substituting $\hat{P}_{it}^{F} = \hat{A}_{i}(P_{it}^{W})^{\hat{b}_{i}}$ and $\hat{P}_{it}^{F*} = \hat{A}_{i}(P_{it}^{W*})^{\hat{b}_{i}}$ into equation (5), where $\hat{A}_{i}$ is the anti-log of $\hat{a}_{i}$, rearranging, and using equation (1), we obtain the simple expression

$$\hat{T}_{it}^{F} = (1 + T_{it}^{W})^{\hat{b}_{i}} - 1. \tag{6}$$

Obviously, if $T_{it}^{W} = 0$, then $\hat{T}_{it}^{F} = 0$, regardless of the value of $\hat{b}_{i}$. Similarly, if $\hat{b}_{i} = 0$, then $\hat{T}_{it}^{F} = 0$, regardless of the value of T_{it}^{W}. Also, if $\hat{b}_{i} = 1$, then $\hat{T}_{it}^{F} = T_{it}^{W}$. It can readily be seen that when $T_{it}^{W} > 0$, $\hat{T}^{F} \geq T_{it}^{W}$ as $\hat{b}_{i} \geq 1$ and $\hat{T}^{F} \leq T_{it}^{W}$ as $\hat{b}_{i} \leq 1$. When $T_{it}^{W} < 0$, $\hat{T}^{F} \leq T_{it}^{W}$ as $\hat{b}_{i} \geq 1$ and $\hat{T}^{F} \geq T_{it}^{W}$ as $\hat{b}_{i} \leq 1$.

Econometric application

The purpose of the econometric analysis is to estimate the parameter $\hat{b}_i$ for each commodity. Here, the results will be summarized briefly. For each commodity we conduct the analysis using time series price data with each variable expressed in logarithms and each deflated by the GDP deflator for Thailand: the farm gate price (LFP), the wholesale price (LWP), and the log of the international price, adjusted by the nominal exchange rate and transport and handling costs (LIP).

We first test each of the series for the existence of a unit root. The null hypothesis of a unit root was rejected for all price series (recalling that they are real, not nominal, price series, using the GDP deflator) for all commodities except soybeans. However, in the case of soybeans the two price series where the null hypothesis of a unit root could not be rejected, the series were not cointegrated. For all commodities except soybeans, the price series were thus considered stationary.

Ordinary least squares (OLS) estimates of equation (2) were first produced. In most cases, autorrelation was a problem and an AR(1) correction term was included to eliminate it, which it did effectively. The OLS estimates assume that LFP is endogenous and LWP is exogenous. These assumptions were tested using Hausman's endogeneity test. In the case of each commodity, the null hypothesis that LWP was (weakly) exogenous to LFP failed to be rejected, confirming the validity of the OLS estimates. Reverse Hausman's tests were also conducted and the null hypothesis that LFP was exogenous to LWP was rejected in every case. These results support the validity of using the OLS framework to estimate the transmission elasticity from LWP to LFP, treating LWP as exogenous. For completeness, instrumental variable estimates were produced for each commodity, using LIP as the instrument for LWP. The resulting estimates of $\hat{b}_i$ differed from the OLS estimates (some larger, some smaller) but not by much.

Table 4 summarizes the estimates for each of the commodities included in Table 3. All of the OLS estimates of the transmission elasticity were significantly different from zero with the expected positive signs. This is an important point. It is often asserted that middlemen prevent commodity price changes at the wholesale level, whether resulting from protection or from international price movements, from being transmitted to farmers. This hypothesis is strongly rejected by the Thai data. The transmission elasticities are *not* zero. Economists often assume

that the transmission elasticities are unity. But this hypothesis is also rejected for most commodities. The estimated values are generally significantly less than unity, most lying between 0.7 and 0.9. In one case (sugar) the estimate is somewhat lower (0.53) and in another (cassava) the estimated value slightly exceeds unity, but is not significantly different from unity.[2] It is likely that the true transmission elasticities change over time, but the limited data available for this exercise made it necessary to assume that the true values remain constant.

Estimation of protection at farm level

Given the estimated value of the transmission elastity, equation (6) was used together with the estimated nominal rates of protection at the wholesale level, discussed above, to produce estimates of imputed NRPs at the farm level for each commodity. These are shown in Table 5. Because the estimated values of the transmission elasticity are (except for cassava) between zero and unity, the imputed nominal rates of protection at the farm level are somewhat lower in absolute value than the nominal rates at the wholesale level, but (because of the assumption of constant transmission elasticities) they track the pattern of the wholesale level results closely.

The imputed nominal rates of assistance at the farm level are negative in all years for rice, in most years for maize, cassava and rubber. For these commodities, the absolute magnitudes of these negative rates have declined over time. For soybeans, the nominal rate was negative until soybeans became a net import in the early 1990s, since when soybeans has been significantly protected. Sugar has been a highly protected commodity since 1980.

Aggregate measures of agricultural protection

In this section we calculate aggregate measures of rates of protection using the information assembled from the preceding analysis and following, as much as possible, the methodology outlined in Anderson et al. (2006). The annual calculations reported in this section fluctuate somewhat from year to year. International and domestic price changes from year to year alter the protective effects of all instruments of protection except *ad valorem* tariffs. In addition, the time

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[2] There is no theoretical reason to suppose that the true value of the transmission elasticity is necessarily below unity. For example, if all margins between the farm level and wholesale level remained constant in nominal terms as the wholesale price changed, the percentage change in the derived farm level price would necessarily exceed the percentage change in the wholesale price. The transmission elasticity would therefore exceed unity.

taken for domestic prices to adjust to international price changes means that annual data on price differences produces some spurious variation from one year to the next. Our interest is on broad trends, rather than these annual fluctuations.

Table 6 uses the above information to calculate *direct rates of assistance* at the farm level, taking account of assistance to fertilizer inputs. The direct rate of assistance to a particular commodity is calculated as its nominal rate of protection (synonymous with nominal rate of assistance) at the farm level *minus* the product of the cost share of fertilizer in production of the commodity concerned and the nominal rate of assistance to fertilizer. The nominal rate of assistance to fertilizer is negative in every year but one, meaning that fertilizer use is taxed in every year but one, although the rates of taxation have declined since the mid-1980s. The direct rates of assistance are therefore below the nominal rates at the farm level for every commodity using fertilizer as an input.

Finally, estimates of sector-wide and economy-wide rates of assistance are summarized in Table 7. The *total rate of assistance to agriculture* (TRA) (in column (5)) is calculated as the difference between the direct rate of assistance to total agriculture (column (1)) and the direct rate of assistance to manufacturing (column (4)). The latter is derived from effective rates of protection for manufacturing estimated from Nicita and Olarreaga (2006). The estimated TRA for agriculture is negative in every year, but has declined in absolute value from over 40 percent in the 1970s to less than 10 percent since 2000.

Because the Nicita and Olarreaga data are highly incomplete we have assumed direct rates of assistance for manufacturing before 1989 to be the same as the Nicita and Olarreaga 1989 levels. This undoubtedly *understates* rates of manufacturing protection prior to 1989. Although our estimates show negative values of the TRA for agriculture for the period before 1989, better estimates of manufacturing protection during this period would show *larger* negative numbers. Our estimates of the DRA for manufacturing for 2003, 2004 and 2005 are the same as the 2002 Nicita and Olarreaga estimate. Manufacturing protection has probably continued to decline in these years and so our estimates may *understate* the positive values of the TRA for agriculture in these most recent years. Our crude extrapolations of the Nicita and Olarreaga estimates for manufacturing therefore introduce errors whose correction would reinforce, rather than undermine our broad conclusions.

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As noted above, the objective of this discussion is to identify broad trends over time in the structure of protection, and not year-to-year changes. Our estimates show that agriculture has remained a net taxed sector, relative to manufacturing, throughout the three and a half decades covered by our data. But the rate of net taxation has declined dramatically. The transition from high to low rates of net taxation occurred in the mid-1990s.

Conclusions and prospects for future reform

As Thailand has industrialized, successive Thai governments have become increasingly interested in intervening on behalf of agricultural producers and processors. But the fact that Thailand is a major agricultural exporter has limited the scope for protection policy as a means of influencing domestic commodity prices. This paper has used comparisons between the prices of agricultural commodities in domestic markets and international markets as a means of studying the magnitudes of these interventions.

Over time, the direct taxation of agricultural exports has been gradually eliminated. This has been important in the case of rice, where the high rates of export taxation prior to the mid-1980s have been abolished. Rubber exports, taxed prior to 1990, have been untaxed since then. Cassava exports have continued to be taxed to a minor extent by the system of export quotas. Fertilizer is a major input into agricultural production and taxes on fertilizer imports have been steadily eliminated since the early 1990s. Maize exports have been consistently untaxed, as have chicken exports, a commodity not covered by the analysis of this paper due to lack of suitable price data. Most of this is a story of eliminating the price distortions which formerly acted against agricultural export industries.

Four commodities depart from this general story of liberalized agricultural markets. Soybeans was an export prior to 1992 and has been a net import since then, with imports subject to quota restrictions. The change from net export to net import coincided with a switch from negative to positive nominal rates of protection. Since the early 1990s the domestic soybean industry has received a nominal rate of protection of around between 30 and 40 per cent. Sugar is an export commodity for Thailand but the domestic sugar industry is protected by a 'home price' system which taxes domestic consumers and transfers the revenue to producers. Nominal rates of

protection have averaged over 60 per cent. The political power of the highly capital intensive sugar milling industry is the explanation for this pattern of protection. The case of palm oil is qualitatively similar to sugar, but the rates of protection are somewhat lower. Finally, Thailand's small dairy industry is protected from competition from imported milk powder. It is not been possible to obtain the data required to quantify this protection for the purposes of this paper, but informed sources report that the rate of protection is comparable with sugar. The prospects for further trade liberalization in Thailand are not encouraging, unless this occurs through bilateral preferential trading arrangements such as the scheme proposed with the United States.[3]

Almost all of Thailand's poor people reside in rural areas and most of these people are directly involved in agricultural production (Warr 2004). The Thai public is well-disposed to finding ways to alleviate rural poverty and Thai governments have responded to this sentiment. Interventions on behalf of rural people have been important, but Thailand is remarkable in that, except for the cases discussed above, these interventions have seldom taken the form of intervening in agricultural commodity markets. The unusual export-orientation of Thai agriculture must be an important part of the explanation for this outcome. Instead, cash transfers to village organizations, subsidized loan schemes not linked to agricultural production and a generally good system of public infrastructure have been the main instruments of intervention. Unfortunately, these transfers have not been directed in any systematic way at raising the productivity of rural people or at assisting them to find better economic opportunities outside agriculture. Their long-term contribution to alleviating rural poverty will probably be small.

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[3] A bilateral trading arrangement with the United States was under negotiation prior to February 2006 but as of November 2006 the negotiations remain suspended pending the holding of new elections in Thailand. Elections are currently scheduled for late 2007. The protection of Thailand's soybeans industry would be an important issue in these negotiations.

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Table 1: Thailand, Real growth of GDP and its components (% per annum)

	Pre-boom 1968-1986	Boom 1987-1996	Crisis 1997-1999	Recovery 2000-2005	Whole period 1968-2005
Total GDP	6.7	9.5	-2.5	5.1	6.5
Agriculture	4.5	2.6	0.1	3.6	3.5
Industry	8.5	12.8	-1.7	6.3	8.5
Services	6.8	9.0	-3.6	4.2	6.2

Source: Author's calculations from World Bank, *World Development Indicators*, various issues.

Table 2: Thailand, Industry value added / Agriculture value added (%)

Industry	1975	1980	1985	1990	1995	2000
Paddy	38.0	30.3	34.7	24.9	26.9	26.1
Maize	6.4	4.3	4.2	3.7	3.7	3.4
Other cereals	0.5	0.6	0.5	0.2	0.1	0.2
Cassava	4.2	7.6	5.5	6.6	5.2	2.5
Beans & nuts	2.4	2.5	3.7	3.0	2.1	1.7
Vegetables	11.7	10.4	9.1	12.7	9.9	10.6
Fruits	11.4	15.0	10.5	10.9	11.1	15.8
Sugar cane	5.9	5.4	3.2	6.7	5.2	5.3
Coconut	1.4	1.7	1.8	1.2	0.9	0.7
Palm nut and oil palm	0.0	0.1	0.6	1.2	1.2	1.4
Rubber	2.2	4.6	8.4	10.2	17.5	12.4
Other crops	5.7	5.2	5.3	4.3	4.3	4.3
Cattle and buffalo	2.5	3.3	5.3	6.3	3.9	4.8
Swine	3.2	3.0	1.6	1.9	1.7	1.5
Poultry	1.1	2.0	4.0	3.6	3.9	6.6
Other livestock	3.6	4.0	1.9	2.7	2.1	2.9
Total, above industries	100	100	100	100	100	100

Table 3: Thailand, Industry value added / Industry output (%)

Industry	1975	1980	1985	1990	1995	2000
Paddy	85.8	85.2	78.3	77.5	76.8	69.6
Maize	77.8	75.6	62.2	60.9	61.6	60.5
Other cereals	83.0	80.7	58.9	64.0	71.6	72.7
Cassava	87.1	84.1	69.7	74.7	73.4	64.6
Beans & nuts	86.1	85.8	67.5	70.1	73.1	57.6
Vegetables	83.7	82.4	71.7	76.3	73.5	64.3
Fruits	87.1	182.5	76.5	78.1	78.4	65.9
Sugar cane	80.7	80.0	63.1	70.6	68.2	64.4
Coconut	91.2	92.9	87.8	89.0	84.1	89.8
Palm nut and oil palm	91.9	90.8	76.9	71.2	70.9	61.6
Rubber	92.5	92.6	85.6	83.0	83.4	84.8
Other crops	83.1	84.3	71.7	70.8	72.3	65.5
Cattle and buffalo	86.0	87.9	81.5	81.5	75.6	80.1
Swine	41.1	41.2	20.1	20.3	19.6	28.1
Poultry	34.5	40.9	31.6	29.6	31.6	38.1
Other livestock	45.2	45.7	40.0	40.3	34.7	38.7
Total agriculture	78.4	83.9	67.5	67.2	67.2	62.9

Table 4: Thailand, Industry imported intermediate inputs / Industry total intermediate inputs (%)

Industry	1975	1980	1990	1995	2000
Paddy	17.7	19.6	28.3	27.4	36.2
Maize	2.2	2.5	9.6	13.4	35.7
Other cereals	0.6	0.4	0.3	1.0	2.5
Cassava	5.1	3.4	15.6	13.0	0.2
Beans & nuts	6.7	6.9	14.2	12.3	0.6
Vegetables	19.9	27.2	25.8	25.8	16.6
Fruits	24.2	23.9	31.6	25.0	24.4
Sugar cane	16.0	17.3	20.6	21.2	16.6
Coconut	17.9	19.2	18.3	41.0	0.0
Palm nut and oil palm	16.2	17.3	5.6	21.9	0.5
Rubber	23.7	26.6	47.2	46.3	45.5
Other crops	23.3	23.0	25.8	27.7	14.3
Cattle and buffalo	1.4	0.9	4.9	5.3	2.7
Swine	0.3	0.6	2.7	6.1	0.1
Poultry	1.6	1.4	3.4	6.1	0.7
Other livestock	0.6	0.6	2.5	5.8	1.0
Total agriculture	9.8	10.6	15.4	17.6	16.8

Source:
National Economic and Social Development Board, *Input-Output Tables of Thailand*, Bangkok, various years.

Note:
The Thai input-output table for 1985 does not distinguish between imported and domestically produced intermediate inputs and so does not support the calculations reported in the table.

Table 5: Thailand, Industry sales to intermediate users / Industry total sales (%)

Industry	1975	1980	1985	1990	1995	2000
Paddy	94.0	94.3	99.0	98.2	97.6	100
Maize	16.5	14.2	97.6	44.0	61.7	93.6
Other cereals	36.4	59.1	53.4	100	99.9	95.2
Cassava	97.9	99.6	97.7	96.2	95.9	98.1
Beans & nuts	29.9	23.0	49.5	65.5	70.1	81.6
Vegetables	11.2	7.2	18.4	22.6	25.9	24.6
Fruits	5.7	4.6	16.0	20.9	20.5	35.8
Sugar cane	96.9	82.9	99.9	100	100	100
Coconut	14.9	13.0	37.2	54.3	57.8	68.5
Palm nut and oil palm	95.9	97.7	98.7	93.4	92.7	88.8
Rubber	100.0	100.0	87.3	71.9	67.3	86.4
Other crops	69.9	68.6	77.8	79.7	74.9	81.5
Cattle and buffalo	94.3	95.2	98.5	92.3	100	100
Swine	100	99.9	100	95.3	99.4	99.3
Poultry	64.2	72.1	82.5	75.5	87.1	91.1
Other livestock	12.2	10.0	31.8	33.1	33.0	39.5
Total agriculture	57.3	55.2	71.0	67.0	68.8	70.0

Notes:
[a] The input-output tables classify unmilled rice (paddy) as an output of the agricultural sector and milled rice as an output of the manufacturing sector.
[b] Milled rice excluded.
[c] Data for 1980 refer to milled cereal.

Source:
National Economic and Social Development Board, *Input-Output Tables of Thailand*, Bangkok, various years.

Table 6: Thailand, Industry sales to export users / Industry total sales (%)

Industry	1975	1980	1985	1990	1995	2000
Paddy	0.0	0.1	0.0	0.0	0.0	0.0
Maize	77.6	79.2	0.0	34.7	2.8	1.7
Other cereals	53.7	32.9	43.5	7.8	3.0	5.2
Cassava	0.0	0.0	0.0	2.2	0.0	0.0
Beans & nuts	31.5	34.4	38.6	24.5	11.1	7.9
Vegetables	0.5	0.9	2.0	1.7	3.0	2.6
Fruits	1.2	1.5	5.2	4.5	8.0	8.0
Sugar cane	0.0	0.0	0.0	0.0	0.0	0.0
Coconut	0.2	0.1	2.5	1.8	2.2	7.2
Palm nut and oil palm	4.1	2.3	1.1	4.9	4.4	8.9
Rubber	0.0	0.0	0.0	6.3	32.4	19.3
Other crops	10.4	12.5	14.0	12.3	17.3	11.2
Cattle and buffalo	4.9	0.0	0.0	0.0	0.0	0.0
Swine	0.0	0.0	0.0	0.0	0.0	0.0
Poultry	0.3	0.0	0.0	0.0	0.0	0.0
Other livestock	1.2	0.2	0.5	1.2	1.9	1.9
Total agriculture	7.6	6.1	4.1	4.5	7.4	4.9
Rice milling	15.1	36.7	32.6	35.5	39.8	51.7
Refined sugar	56.5	22.4	36.3	47.0	48.3	39.1

Source:
National Economic and Social Development Board, *Input-Output Tables of Thailand*, Bangkok, various years.

Notes:
[a] The input-output tables classify unmilled rice (paddy) as an output of the agricultural sector and milled rice as an output of the manufacturing sector.

Table 7: Thailand, Imports / total usage (%)

Industry	1975	1980	1985	1990	1995	2000
Paddy	0.0	0.0	0.0	0.0	0.0	0.0
Maize	0.0	0.0	0.0	0.1	6.9	7.8
Other cereals	34.6	33.7	39.6	71.0	79.9	81.2
Cassava	0.0	0.0	0.0	0.0	0.0	0.0
Beans & nuts	0.2	2.8	1.1	4.0	16.9	52.3
Vegetables	0.9	0.6	0.7	0.5	1.0	0.6
Fruits	0.5	0.2	1.7	3.4	6.9	3.7
Sugar cane	0.0	0.0	0.0	0.0	0.0	0.0
Coconut	0.0	6.5	0.2	0.2	0.2	0.5
Palm nut and oil palm	0.0	0.2	0.1	0.4	0.1	1.5
Rubber	0.0	0.0	0.0	0.0	0.0	0.1
Other crops	23.1	24.8	33.0	47.0	45.4	44.5
Cattle and buffalo	0.3	0.0	0.1	2.4	0.9	2.9
Swine	0.0	0.1	0.5	0.2	0.1	0.0
Poultry	0.6	1.3	0.6	1.1	1.0	0.2
Other livestock	0.2	0.2	2.0	10.3	8.7	7.6
Total agriculture	2.2	2.3	3.5	5.7	6.3	7.2
Rice milling	0.0	0.0	0.2	0.1	0.2	0.0
Refined sugar	0.1	10.1	0.5	0.5	0.5	0.7

Notes:
[a] The input-output tables classify unmilled rice (paddy) as an output of the agricultural sector and milled rice as an output of the manufacturing sector.

Source:
National Economic and Social Development Board, *Input-Output Tables of Thailand*, Bangkok, various years.

Table 8: Thailand, Calculation of Nominal Rates of Protection

Commodity	Domestic price	Border price
Rice	Domestic price	Export price
Maize	Domestic price	Export price
Cassava	Domestic price	Export price
Sugar	Grower price	Export price
Rubber	Domestic price	Export price
Soybean	Domestic price	Export price (up to 1991)
		Import price (after 1991)
Palm oil	Domestic price:	Import price (1995 to 1996);
	(average of crude and refined)	Export price (1997 to 2004)
Fertilizer (urea)	Wholesale price	Import price

Note: NRP is calculated as NRP = $100(P^D - P^B)/ P^B$, where P^D denotes the domestic price and P^B denotes the border price.

Table 9: Thailand, Estimates of Transmission Elasticities from Wholesale to Farm Prices

Commodity	Estimated elasticity	(t-statistic)
Rice	0.7587	(7.30)
Maize	0.8089	(14.38)
Cassava	1.0695	(8.20)
Soybeans	0.8003	(11.23)
Sugar	0.5309	(3.93)
Palm oil	[0.8981] a	(19.97)
Rubber	0.8981	(19.97)
Fertilizer	0.8889	(17.70)

Source:
Author's calculations, using data and methodology discussed in the text. Estimates shown relate to the parameter b_i in equation (2).

Note:
t-statistics are shown in parthentheses.
 a Estimation for palm oil was not possible, due to insufficient data points, and the estimated value for rubber was used instead.

Table 10. Thailand: Nominal Rate of Assistance at Wholesale Level, by Commodity, 1970 to 2005

Year	Rice	Maize	Cassava	Soybean	Sugar	Rubber	Fertilizer
1970	-40.1	-0.2	-8.6	-19.9	63.6	-4.0	8.5
1971	-41.0	-1.1	-16.9	-19.9	45.8	5.1	8.5
1972	-41.2	9.0	-23.2	-19.9	8.3	12.1	8.5
1973	-37.6	-7.4	-17.3	-19.9	-0.7	-6.1	8.5
1974	-62.5	0.0	-14.0	-19.9	-35.6	-22.9	8.5
1975	-45.9	-4.1	-12.8	-19.9	-36.8	-9.0	8.5
1976	-19.8	-0.8	-10.2	-19.9	-5.6	-14.7	8.5
1977	-32.9	2.9	-15.6	-19.9	3.0	-14.9	8.5
1978	-38.4	0.2	-11.6	-19.9	12.9	-16.2	8.5
1979	-26.3	-2.1	5.9	-19.9	19.0	-19.2	8.5
1980	-30.1	-3.0	-4.7	-19.9	35.9	-24.6	8.5
1981	-35.6	-6.4	-22.0	-19.9	35.7	-30.2	8.5
1982	-15.5	2.6	-10.1	-19.9	14.6	-14.9	8.5
1983	-11.3	2.6	0.9	-19.9	47.9	-7.9	8.5
1984	-14.7	2.6	-25.1	-19.9	66.6	-18.9	8.5
1985	-20.8	-1.3	-20.3	-27.1	98.3	-11.2	27.0
1986	-20.1	-10.8	-1.4	-20.9	86.3	-8.2	14.4
1987	-11.7	-2.5	-17.0	-13.2	83.7	-11.4	27.4
1988	-11.3	0.8	-14.4	-5.2	90.7	-9.2	18.0
1989	-10.2	-1.0	-15.8	-10.0	50.2	-8.5	21.7
1990	-9.7	1.3	-9.8	-47.4	59.4	-2.1	24.9
1991	-10.4	0.1	-13.6	-15.6	92.0	-4.3	16.2
1992	-10.2	-13.3	-9.5	47.0	85.0	-0.9	8.6
1993	-19.0	4.6	-13.9	31.7	79.5	-6.3	18.0
1994	-26.3	0.9	-2.2	37.2	61.9	-1.4	9.8
1995	-6.6	10.1	1.3	31.1	47.8	-0.2	8.2
1996	-7.7	-10.7	-8.6	33.3	73.9	6.6	4.2
1997	-15.2	-42.8	-18.2	9.3	66.8	-8.8	4.1
1998	-8.3	-4.8	-4.1	25.3	33.2	3.1	19.3
1999	-8.2	-8.5	-4.4	52.3	55.6	-4.9	20.4
2000	-9.5	2.8	-10.9	48.9	50.7	-1.7	9.1
2001	-5.7	-0.9	-6.2	39.5	37.2	2.8	5.8
2002	-4.1	0.0	4.4	44.8	59.8	6.5	12.7
2003	-4.0	-0.1	-2.1	36.4	46.0	5.5	-2.5
2004	-2.8	0.9	-2.9	29.1	44.6	-1.3	2.6
2005	-2.9	-3.6	-2.9	24.9	39.1	1.5	1.3

Source: Authors' calculations.

Table 11. Thailand: Nominal Rate of Assistance at Farm Level, by Commodity, 1970 to 2005

Year	Rice	Maize	Cassava	Soybean	Sugar	Rubber
1970	-23.9	-0.1	-9.1	-16.3	34.8	-4.2
1971	-27.5	-0.9	-24.3	-16.3	32.0	5.7
1972	-20.7	7.2	-31.5	-16.3	13.9	11.6
1973	-19.9	-6.0	-38.4	-16.3	6.4	-4.6
1974	-50.7	0.0	-6.9	-16.3	-15.2	-7.6
1975	-38.2	-3.3	0.8	-16.3	-9.2	2.4
1976	-19.3	-0.6	1.5	-16.3	-0.8	-2.1
1977	-25.2	2.4	-8.7	-16.3	-0.5	-9.9
1978	-29.7	0.2	-11.5	-16.3	4.0	-13.0
1979	-22.9	-1.7	20.5	-16.3	-0.5	-17.2
1980	-23.7	-2.4	-0.7	-16.3	7.4	-20.1
1981	-27.9	-5.2	-20.1	-16.3	22.7	-26.8
1982	-14.6	2.1	-5.9	-16.3	2.9	-13.4
1983	-7.8	2.1	8.4	-16.3	9.1	-7.6
1984	-10.4	2.1	-19.5	-16.3	30.0	-17.8
1985	-16.5	-1.0	-25.1	-22.4	45.8	-11.0
1986	-16.5	-8.8	2.5	-17.1	43.7	-9.3
1987	-6.7	-2.0	-16.9	-10.7	43.1	-12.5
1988	-6.9	0.7	-16.9	-4.1	46.2	-12.0
1989	-13.5	-0.8	-9.5	-8.1	25.6	-10.6
1990	-10.1	1.1	-6.6	-40.2	28.8	-1.0
1991	-11.5	0.1	-13.0	-12.7	37.9	-5.2
1992	-8.9	-10.9	-10.5	36.1	46.7	-1.1
1993	-17.0	3.7	-13.5	24.6	40.5	-6.1
1994	-22.3	0.8	2.4	28.8	30.9	-1.3
1995	-8.3	8.1	4.1	24.2	22.6	-1.3
1996	-1.1	-8.7	-17.9	25.9	38.1	2.2
1997	-15.9	-36.4	-19.7	7.4	37.8	-3.1
1998	-12.5	-3.9	-7.4	19.8	17.7	7.1
1999	-8.0	-6.9	-18.6	40.0	5.3	-2.2
2000	-11.6	2.2	-12.4	37.5	17.8	1.1
2001	-7.9	-0.7	-6.7	30.5	8.7	2.9
2002	-3.7	0.0	-3.2	34.5	14.4	7.1
2003	-4.0	0.0	-13.8	28.2	8.1	2.2
2004	-5.8	0.7	-9.5	22.7	18.3	-5.3
2005	-1.7	-2.9	-9.5	19.5	33.1	-4.9

Note: See text for explanation of estimation of NRP at the farm level. The nominal rate of assistance and nominal rate of protection are synonymous.
Source: Authors' calculations.

Table 12. Thailand: Direct Rate of Assistance at Farm Level, by Commodity, 1970 to 2005

Year	Rice	Maize	Cassava	Soybean	Sugar	Rubber
1970	-24.9	-2.5	-10.1	-17.3	33.0	-5.0
1971	-28.4	-3.2	-25.3	-17.3	30.1	4.9
1972	-21.6	4.9	-32.6	-17.4	12.1	10.9
1973	-20.7	-8.2	-39.5	-17.5	4.6	-5.3
1974	-51.7	-2.2	-8.0	-17.5	-17.0	-8.3
1975	-39.0	-5.4	-0.4	-17.6	-11.0	1.7
1976	-19.9	-2.7	0.2	-17.6	-2.6	-2.8
1977	-25.8	0.4	-10.1	-17.7	-2.4	-10.6
1978	-30.3	-1.8	-12.9	-17.7	2.1	-13.7
1979	-23.3	-3.6	19.1	-17.8	-2.3	-18.0
1980	-24.1	-4.3	-2.2	-17.8	5.6	-20.8
1981	-28.4	-7.1	-21.6	-17.8	20.9	-27.6
1982	-15.0	0.2	-7.4	-17.8	1.2	-14.1
1983	-8.2	0.1	7.0	-17.8	7.5	-8.4
1984	-10.8	0.1	-20.8	-17.8	28.5	-18.7
1985	-19.5	-7.5	-29.3	-27.3	40.9	-13.8
1986	-17.8	-12.2	0.2	-19.6	41.0	-10.8
1987	-9.7	-8.5	-21.3	-15.5	38.0	-15.3
1988	-8.6	-3.6	-19.7	-7.2	42.8	-13.8
1989	-15.8	-6.0	-13.0	-11.7	21.4	-12.8
1990	-12.9	-4.8	-10.6	-44.3	23.9	-3.5
1991	-13.0	-3.6	-15.6	-15.5	34.8	-6.8
1992	-9.4	-12.8	-12.0	34.6	45.1	-1.9
1993	-19.0	-0.1	-16.6	21.1	37.1	-7.6
1994	-23.2	-1.3	0.6	26.8	29.2	-2.1
1995	-8.7	6.5	2.6	22.4	21.1	-1.9
1996	-0.9	-9.5	-18.7	25.0	37.3	1.8
1997	-15.9	-37.1	-20.4	6.6	37.1	-3.6
1998	-14.9	-7.1	-10.6	16.5	14.5	4.1
1999	-10.7	-10.2	-22.0	36.8	1.9	-5.9
2000	-12.4	0.9	-13.9	36.2	16.3	-0.8
2001	-8.1	-1.5	-7.6	29.8	7.8	1.5
2002	-5.2	-1.7	-5.1	33.0	12.4	3.7
2003	-2.7	0.3	-13.4	28.4	8.5	2.9
2004	-5.5	0.4	-9.9	22.5	17.9	-6.1
2005	-1.2	-3.0	-9.7	19.4	32.9	-5.4

Note: DRA means the nominal rate of assistance at the farm level for that industry (Table 11) minus the product of the cost share of fertilizer for that industry and the nominal rate of assistance to fertilizer (Table 10).
*Source*: Authors' calculations.

Table 13. Thailand: Aggregate Direct and Total Rates of Agricultural Assistance and Anti-trade Bias, 1970 to 2005

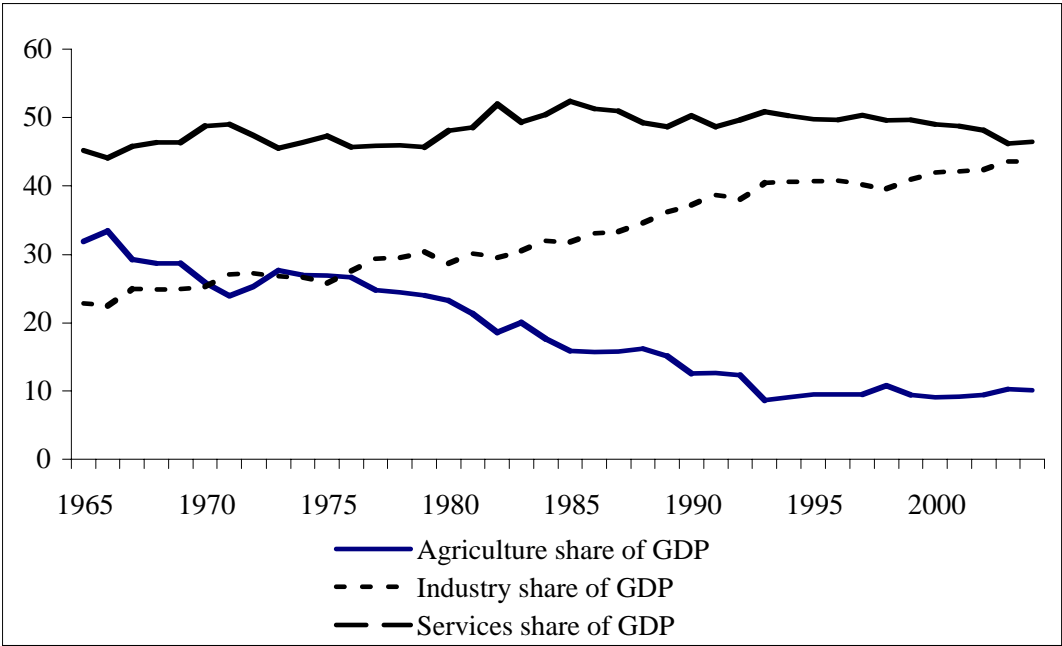| Year	Direct Rates of Assistance				Total rate of assistance to agriculture
	Total agriculture (1)	Import agriculture (2)	Export agriculture (3)	Manu-facturing (4)	(5)
1970	-4.9	n.a.	-4.9	32.9	-37.8
1971	-6.9	n.a.	-6.9	32.9	-39.8
1972	-7.5	n.a.	-7.5	32.9	-40.5
1973	-14.7	n.a.	-14.7	32.9	-47.6
1974	-17.5	n.a.	-17.5	32.9	-50.5
1975	-11.9	n.a.	-11.9	32.9	-44.8
1976	-7.6	n.a.	-7.6	32.9	-40.6
1977	-11.3	n.a.	-11.3	32.9	-44.3
1978	-12.7	n.a.	-12.7	32.9	-45.7
1979	-8.0	n.a.	-8.0	32.9	-40.9
1980	-11.1	n.a.	-11.1	32.9	-44.0
1981	-14.4	n.a.	-14.4	32.9	-47.4
1982	-9.3	n.a.	-9.3	32.9	-42.2
1983	-3.7	n.a.	-3.7	32.9	-36.6
1984	-7.6	n.a.	-7.6	32.9	-40.6
1985	-10.5	n.a.	-10.5	32.9	-43.4
1986	-4.1	n.a.	-4.1	32.9	-37.0
1987	-6.2	n.a.	-6.2	32.9	-39.1
1988	-2.5	n.a.	-2.5	32.9	-35.5
1989	-6.8	-11.7	-5.9	32.9	-39.7
1990	-8.7	-44.3	-1.9	33.9	-42.6
1991	-3.7	n.a.	-3.7	32.9	-36.6
1992	7.0	12.7	4.5	34.1	-27.1
1993	1.7	21.1	-2.1	36.0	-34.3
1994	4.5	26.8	0.0	35.9	-31.4
1995	6.5	15.1	2.7	14.9	-8.4
1996	5.7	8.9	4.3	14.7	-9.0
1997	-5.3	-14.3	-1.4	14.3	-19.6
1998	0.3	4.9	-1.7	13.6	-13.3
1999	-2.4	13.3	-9.0	15.0	-17.4
2000	3.4	18.1	-2.7	9.7	-6.3
2001	2.8	29.8	-1.5	10.3	-7.5
2002	5.3	33.0	1.0	10.6	-5.3
2003	3.2	28.4	-0.5	10.6	-7.4
2004	1.9	22.5	-1.0	10.6	-8.7
2005	4.3	6.5	3.5	10.6	-6.3

Source: Authors' calculations.

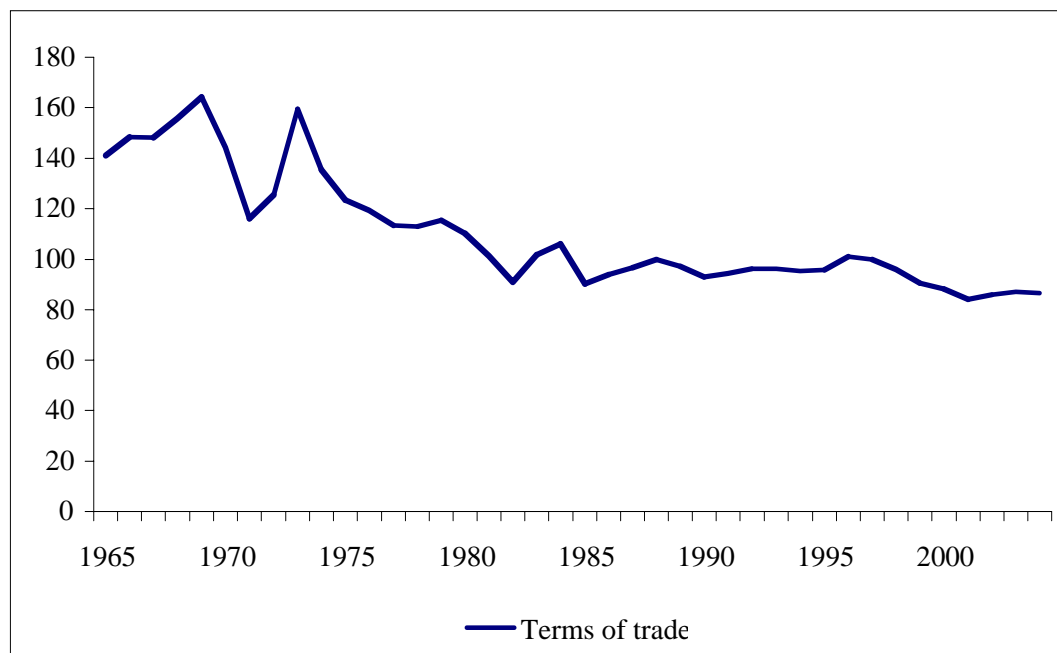**Figure 1: Thailand: Annual Growth Rate of Real GDP, 1965 to 2005   (per cent per year)**
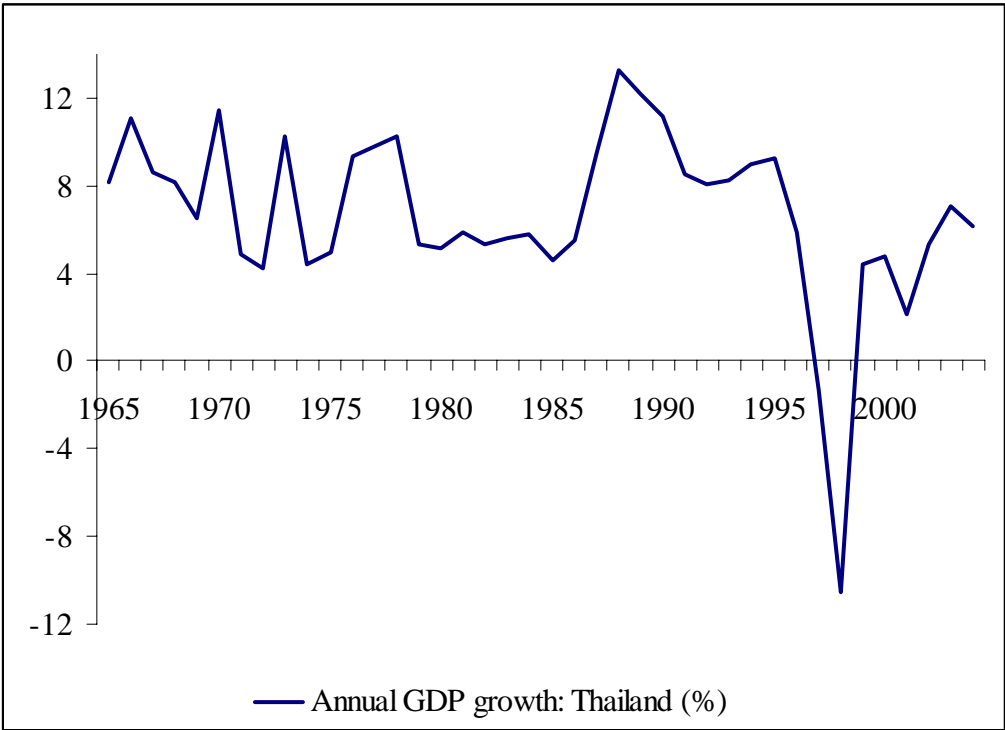
Source:
World Bank, *World Development Indicators*, various issues.

**Figure 2: Thailand: Sectoral Shares of GDP, 1965 to 2005   (per cent)**

Figure 3: Thailand: External Terms of Trade, 1965 to 2004 (2000 = 100)

Source: World Bank, *World Development Indicators*, various issues.

Note: The external terms of trade are calculated here as the ratio of average unit value of exports (value relative to volume) to the average unit value of imports.

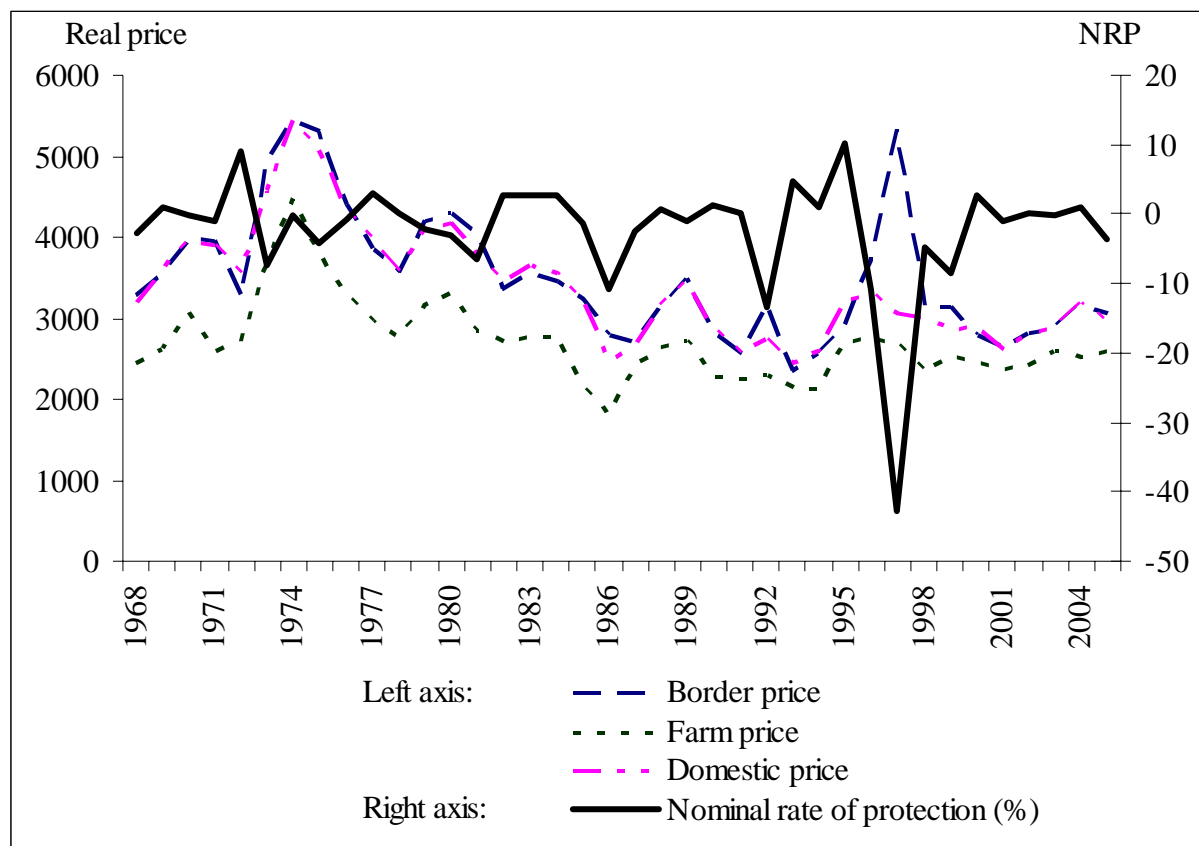**Figure 4: Thailand: Price comparison and NRP at wholesale level - Rice**
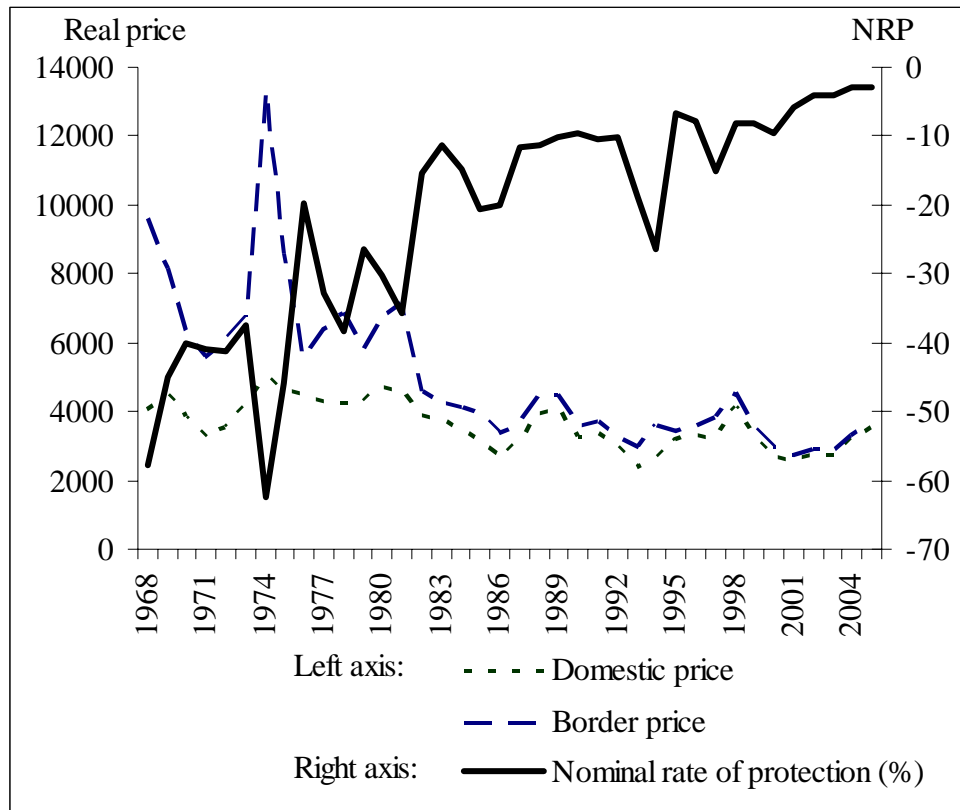
Source: Authors' calculations based on data in Tables A1 and A10.

Note: Nominal rate of protection is calculated as 100*(Domestic price- Border price)/Border price.

Figure 5: Thailand: Price comparison and NRP at wholesale level - Maize

Source: Authors' calculations based on data in Tables A2 and A10.

Note: Nominal rate of protection is calculated as 100*(Domestic price- Border price)/Border price.

Figure 6: Thailand: Price comparison and NRP at wholesale level - Cassava

Source: Authors' calculations based on data in Tables A3 and A10.

Note: Nominal rate of protection is calculated as 100*(Domestic price- Border price)/Border price.

Figure 7: Thailand: Price comparison and NRP at wholesale level - Soybeans

Source: Authors' calculations based on data in Tables A4 and A10.

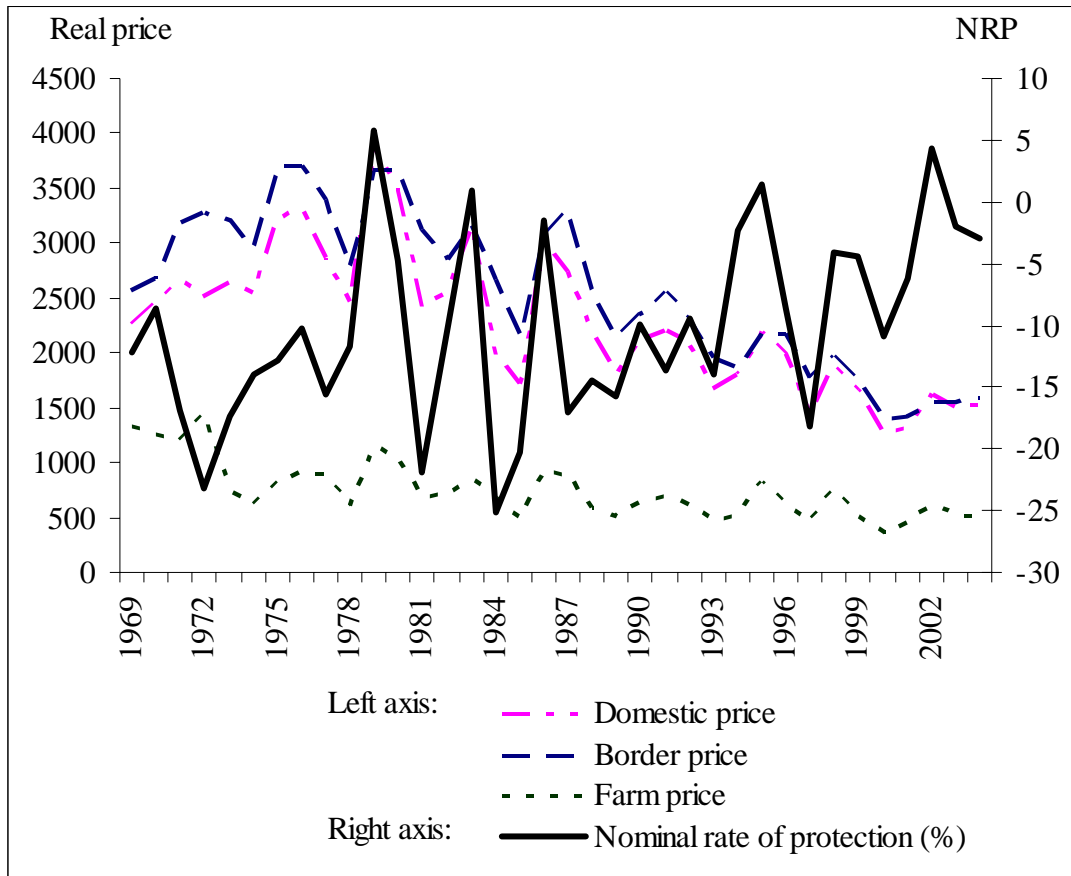*Note*: Nominal rate of protection is calculated as 100*(Domestic price- Border price)/Border price.

Figure 8: Thailand: Price comparison and NRP at wholesale level - Sugar

Source: Authors' calculations based on data in Tables A5 and A10.

Note: Nominal rate of protection is calculated as 100*(Domestic price- Border price)/Border price.

Figure 9: Thailand: Ratios of consumer price to border price and miller price to grower price - Sugar

Source: Authors' calculations based on data in Table A5.

Note: Nominal rate of protection is calculated as 100*(Domestic price- Border price)/Border price.
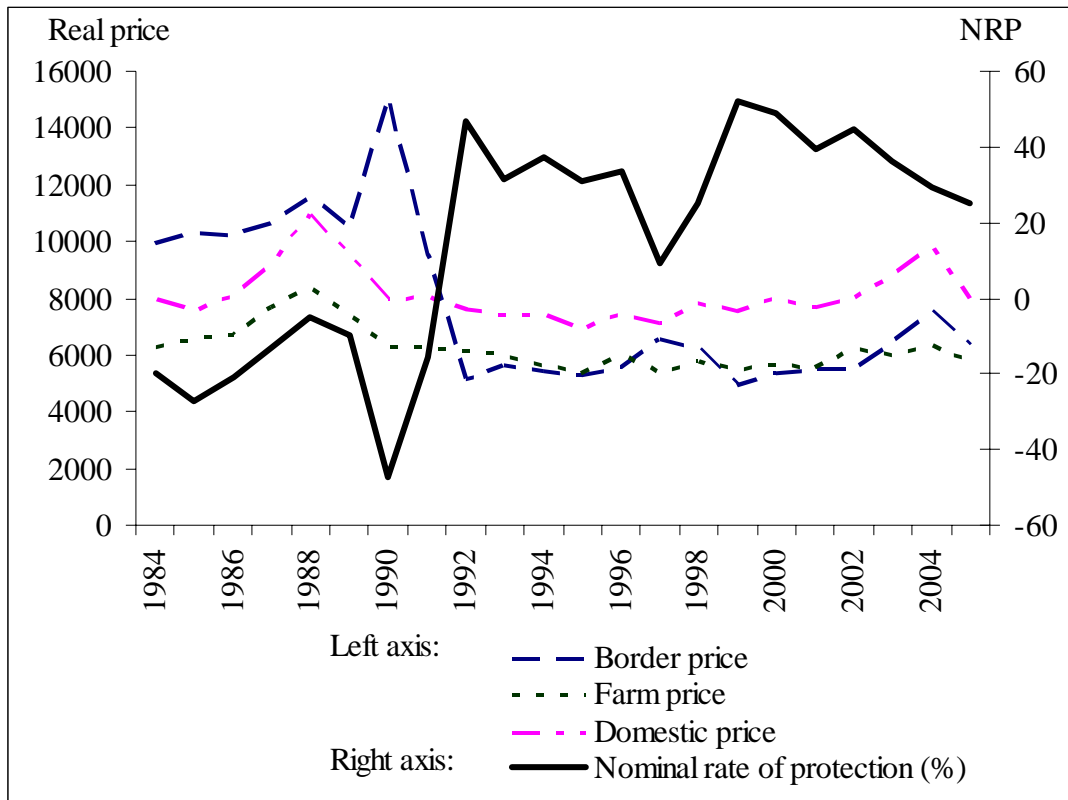
Figure 10: Thailand: Price comparison and NRP at wholesale level - Palm oil
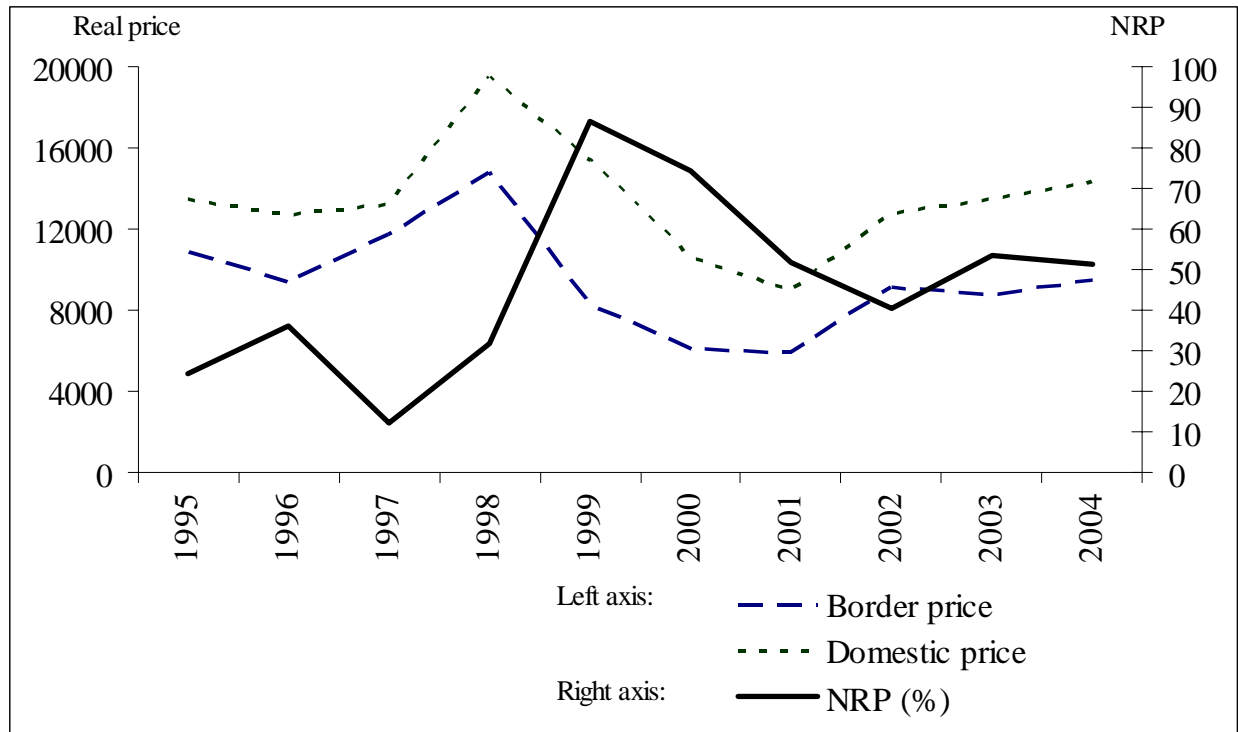
Source: Authors' calculations based on data in Tables A6 and A10.

Note: Nominal rate of protection is calculated as 100*(Domestic price- Border price)/Border price.

Figure 11: Thailand: Price comparison and NRP at wholesale level - Rubber
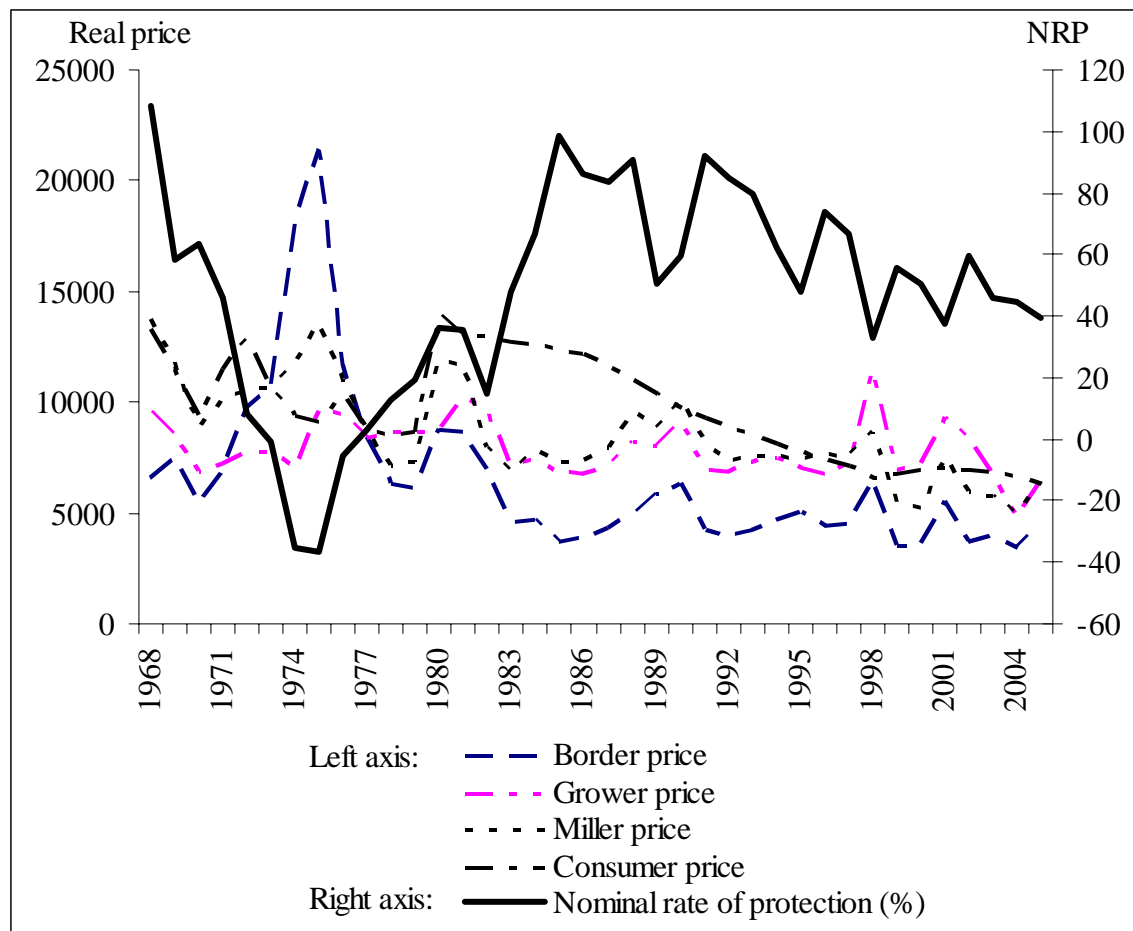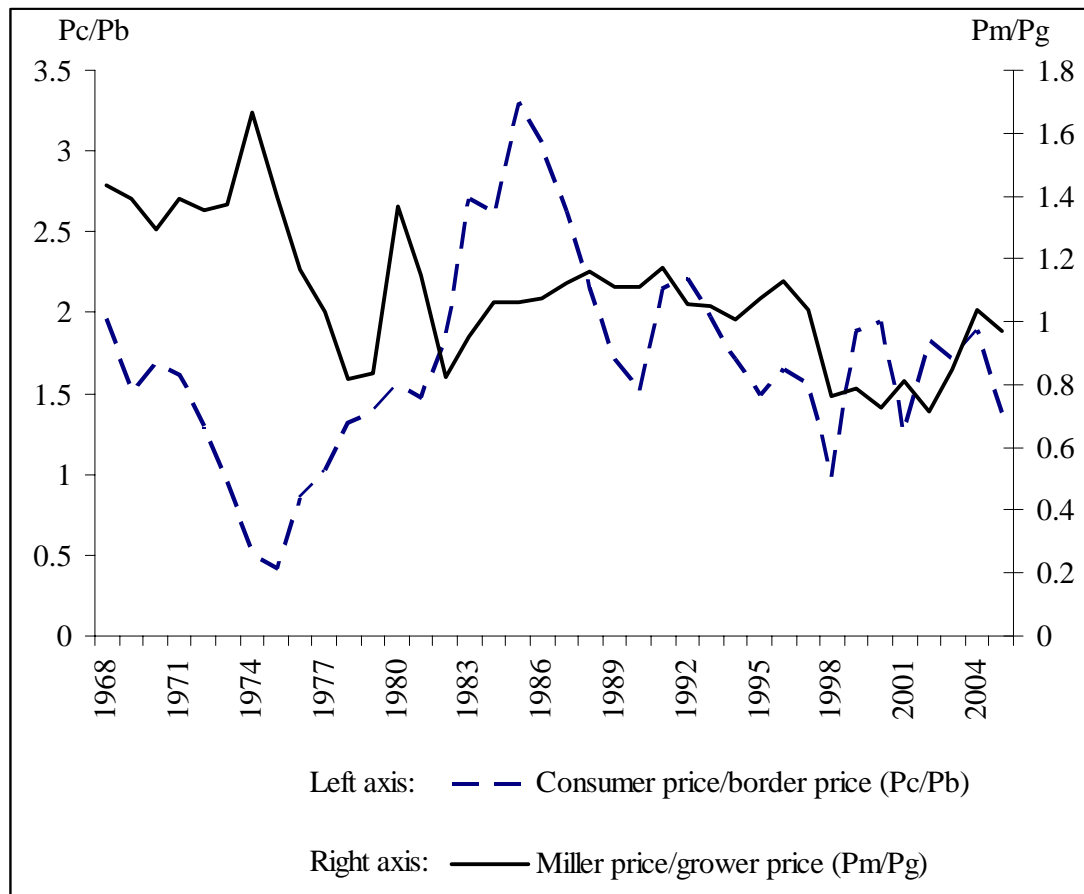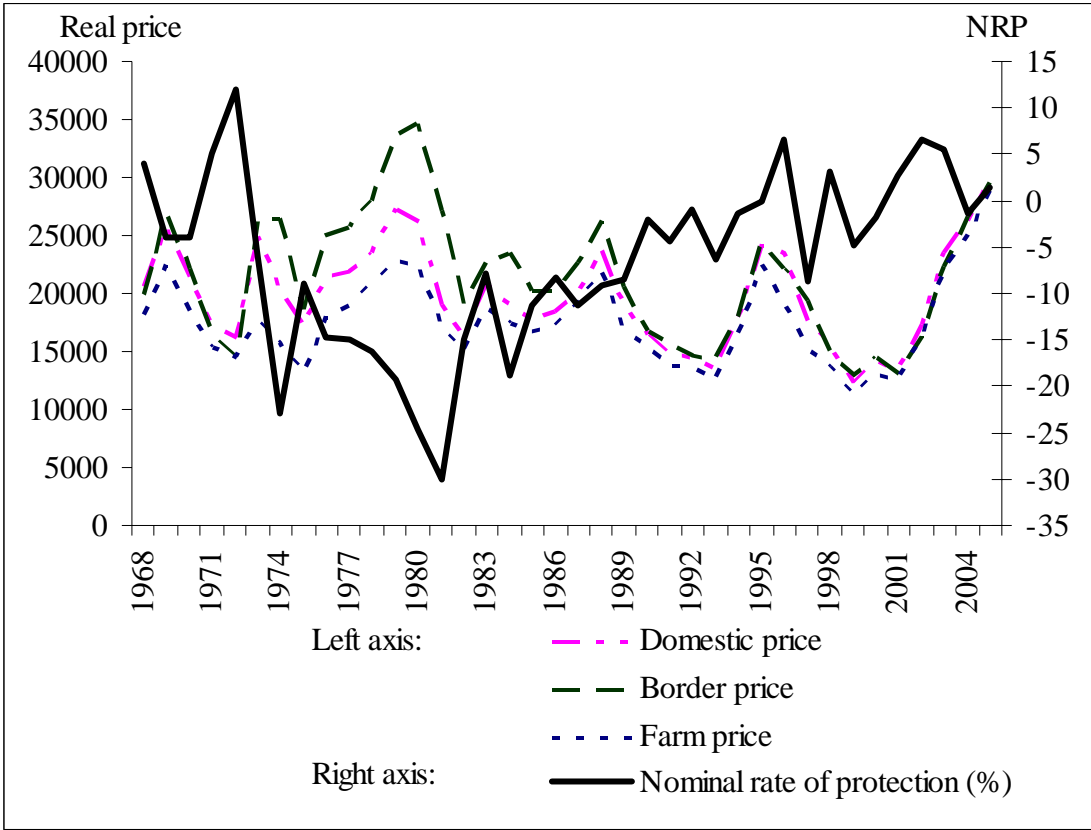
Figure 12: Thailand: Price comparison and NRP at wholesale level - Fertilizer
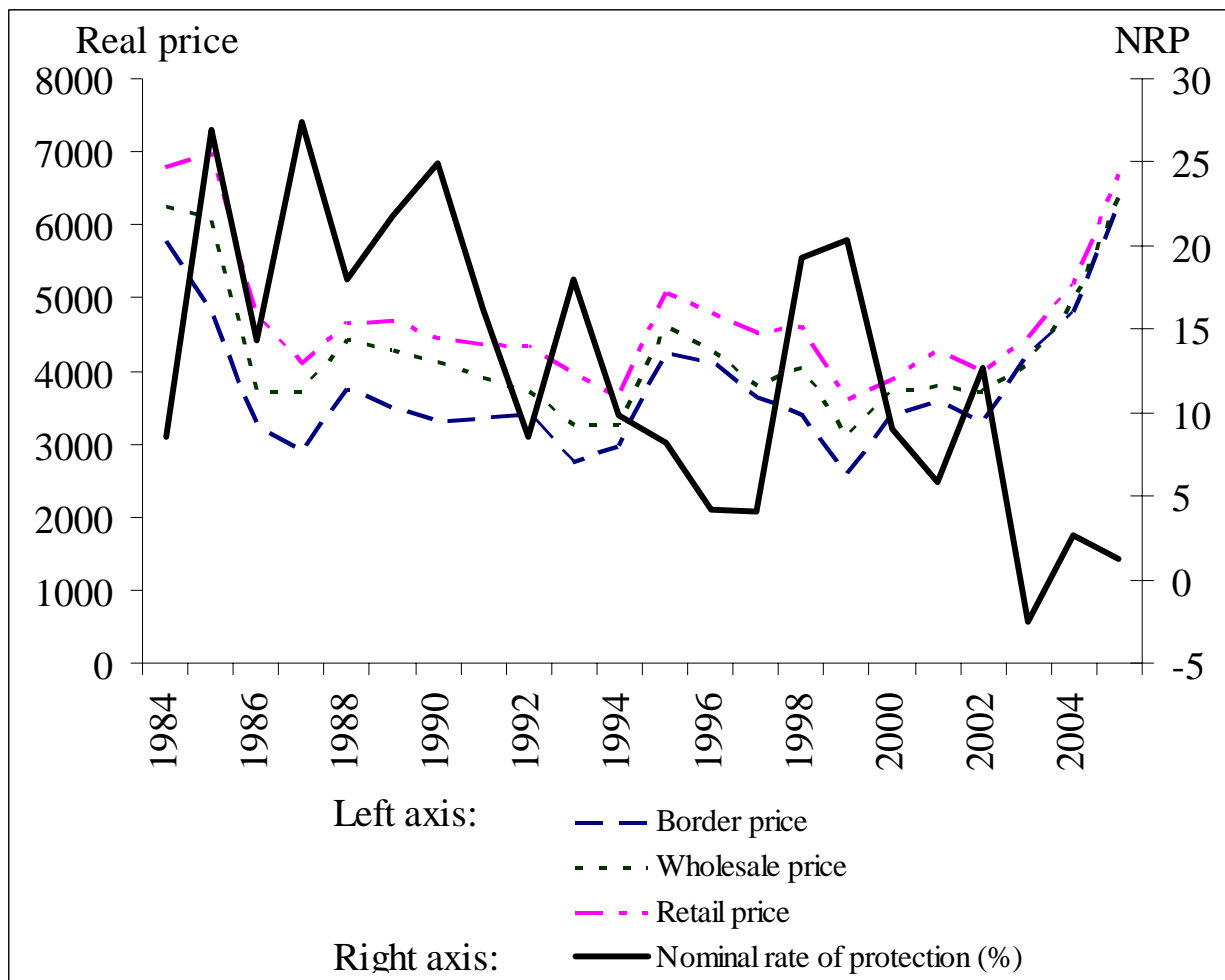
Source: Authors' calculations based on data in Tables A8 and A10.

Note: Nominal rate of protection is calculated as 100*(Domestic price- Border price)/Border price.

Figure 13: Thailand, Estimation of imputed NRP at farm level - Rice
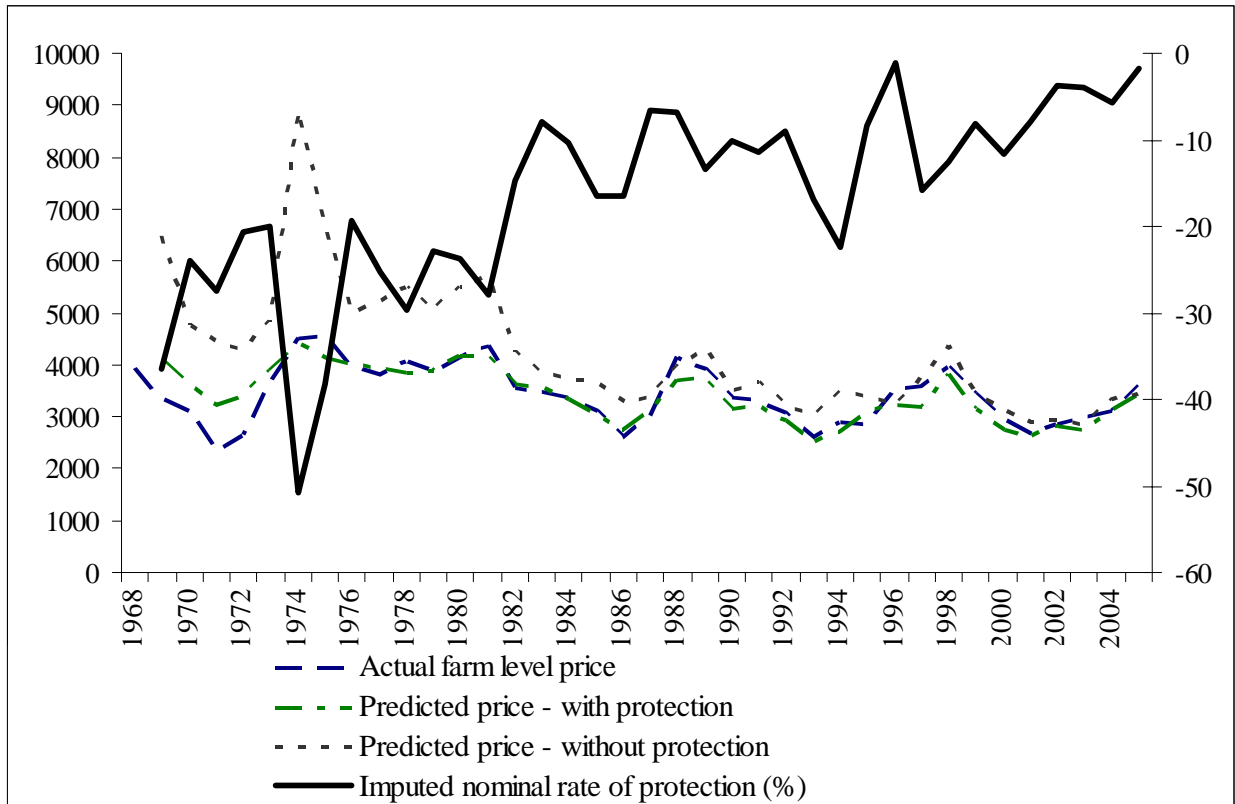
Source: Authors' calculations, based on methodology and data discussed in the text.

Note: Imputed nominal rate of protection is calculated as 100*(Predicted price with protection - Predicted price without protection)/ Predicted price without protection.

Figure 14: Thailand, Estimation of NRP at farm level – Maize

Source: Authors' calculations, based on methodology and data discussed in the text.

Note: Imputed nominal rate of protection is calculated as 100*(Predicted price with protection - Predicted price without protection)/ Predicted price without protection.

Figure 15: Thailand, Estimation of NRP at farm level – Cassava

Source: Authors' calculations, based on methodology and data discussed in the text.

Note: Imputed nominal rate of protection is calculated as 100*(Predicted price with protection - Predicted price without protection)/ Predicted price without protection.

Figure 16: Thailand, Estimation of NRP at farm level – Soybeans
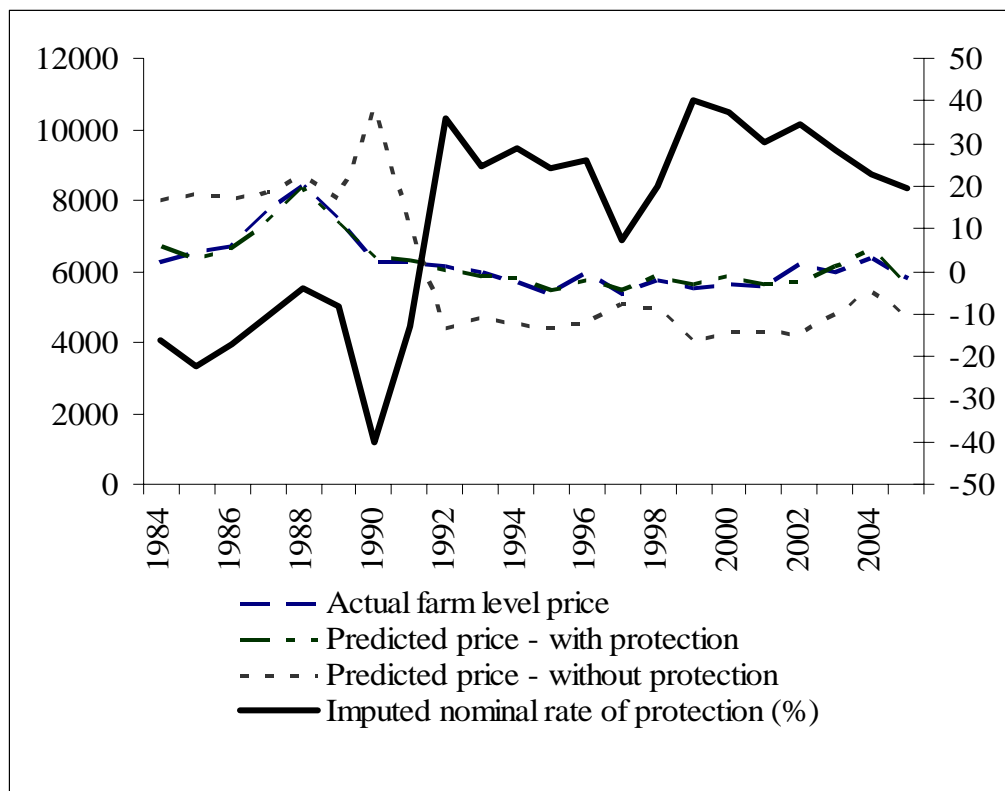
Source: Authors' calculations, based on methodology and data discussed in the text.

Note: Imputed nominal rate of protection is calculated as 100*(Predicted price with protection - Predicted price without protection)/ Predicted price without protection.

Figure 17: Thailand, Estimation of NRP at farm level – Sugar
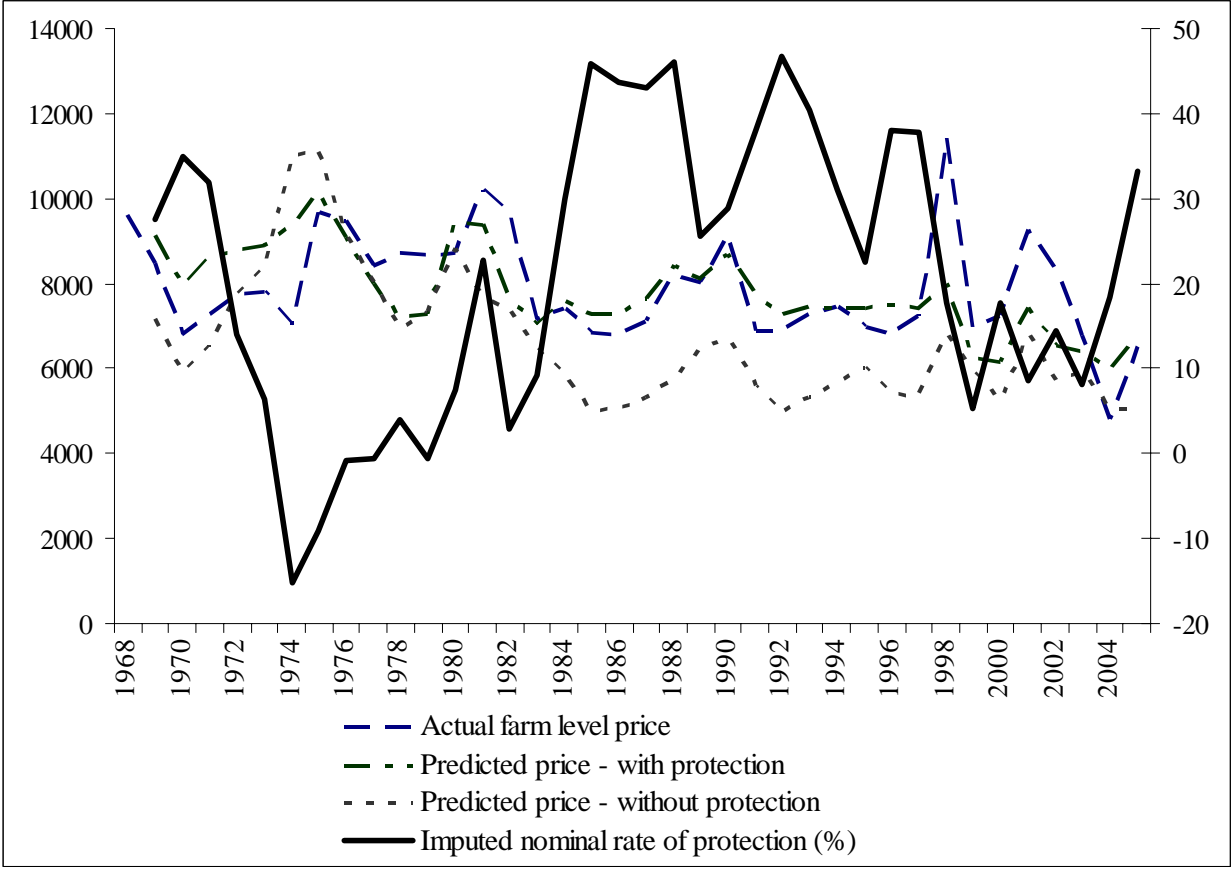
Source: Authors' calculations, based on methodology and data discussed in the text.

Note: Imputed nominal rate of protection is calculated as 100*(Predicted price with protection - Predicted price without protection)/ Predicted price without protection.

Figure 18: Thailand, Estimation of NRP at farm level – Palm oil
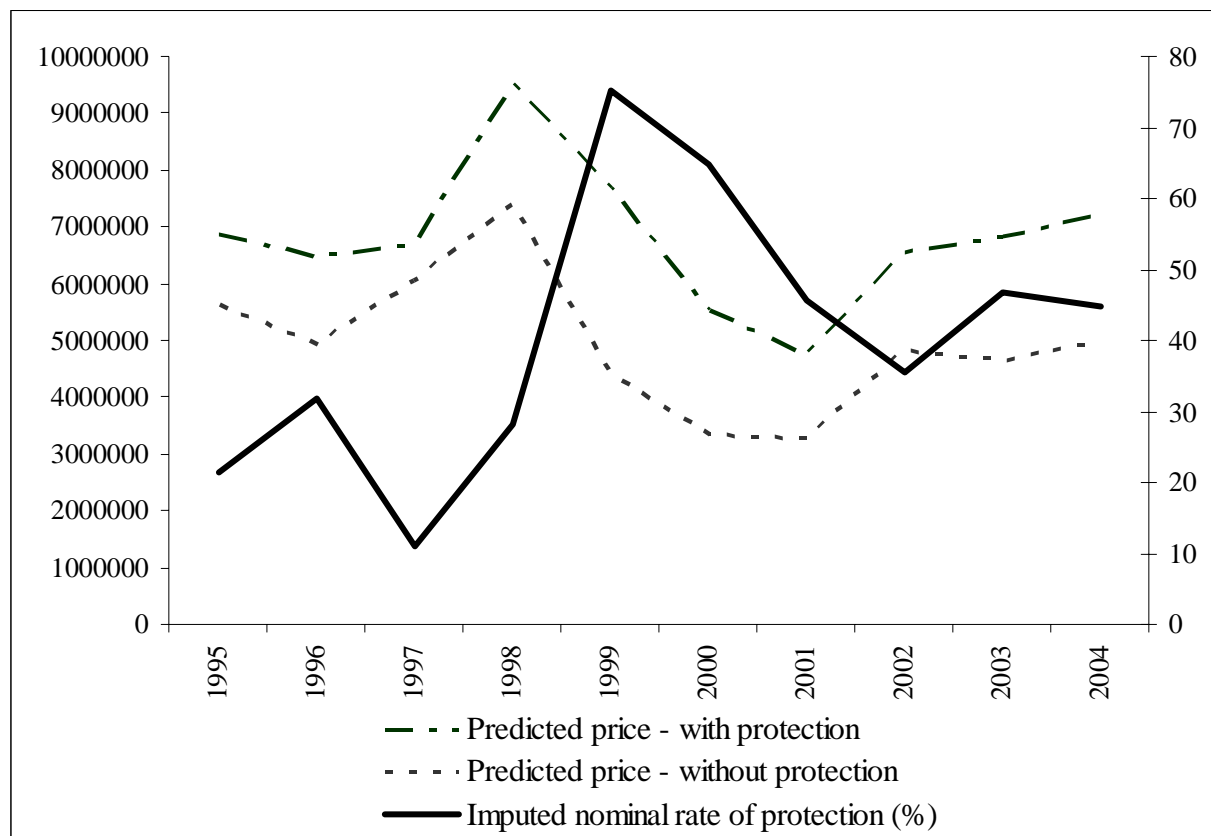
Source: Authors' calculations, based on methodology and data discussed in the text.

Note: Imputed nominal rate of protection is calculated as 100*(Predicted price with protection - Predicted price without protection)/ Predicted price without protection.

Figure 19: Thailand, Estimation of NRP at farm level – Rubber
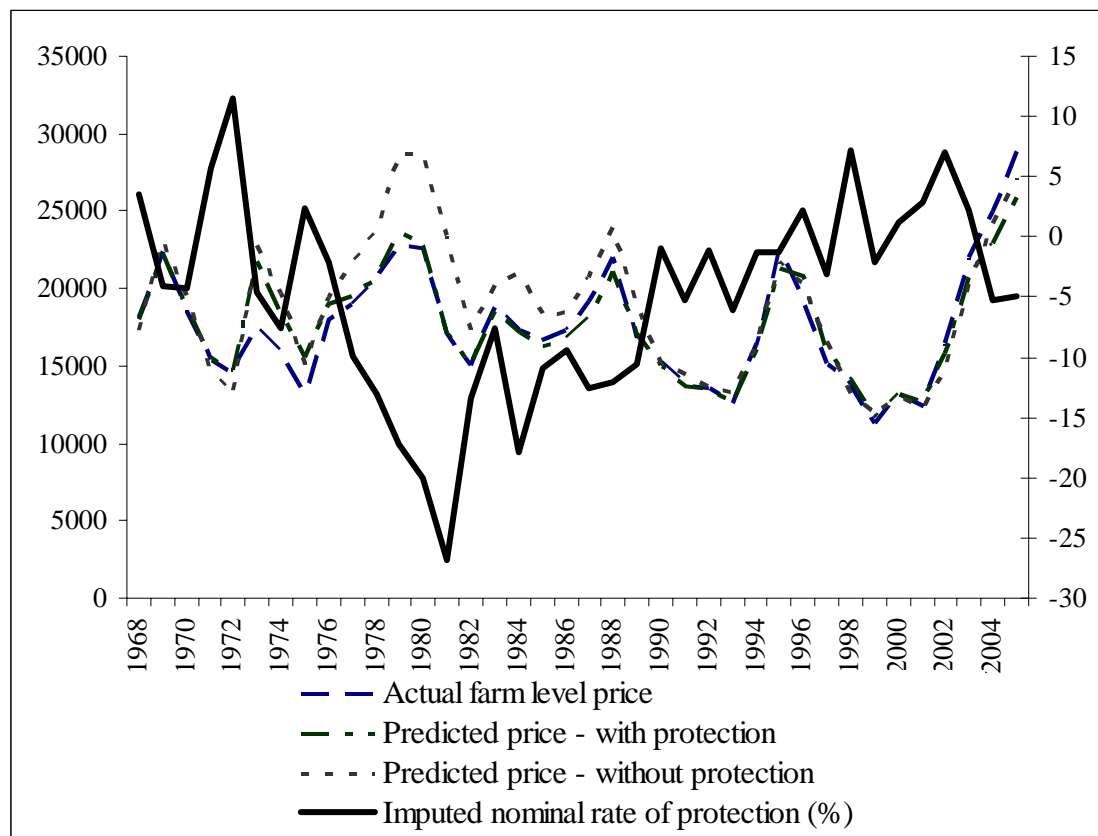
Source: Authors' calculations, based on methodology and data discussed in the text.

Note: Imputed nominal rate of protection is calculated as 100*(Predicted price with protection - Predicted price without protection)/ Predicted price without protection.
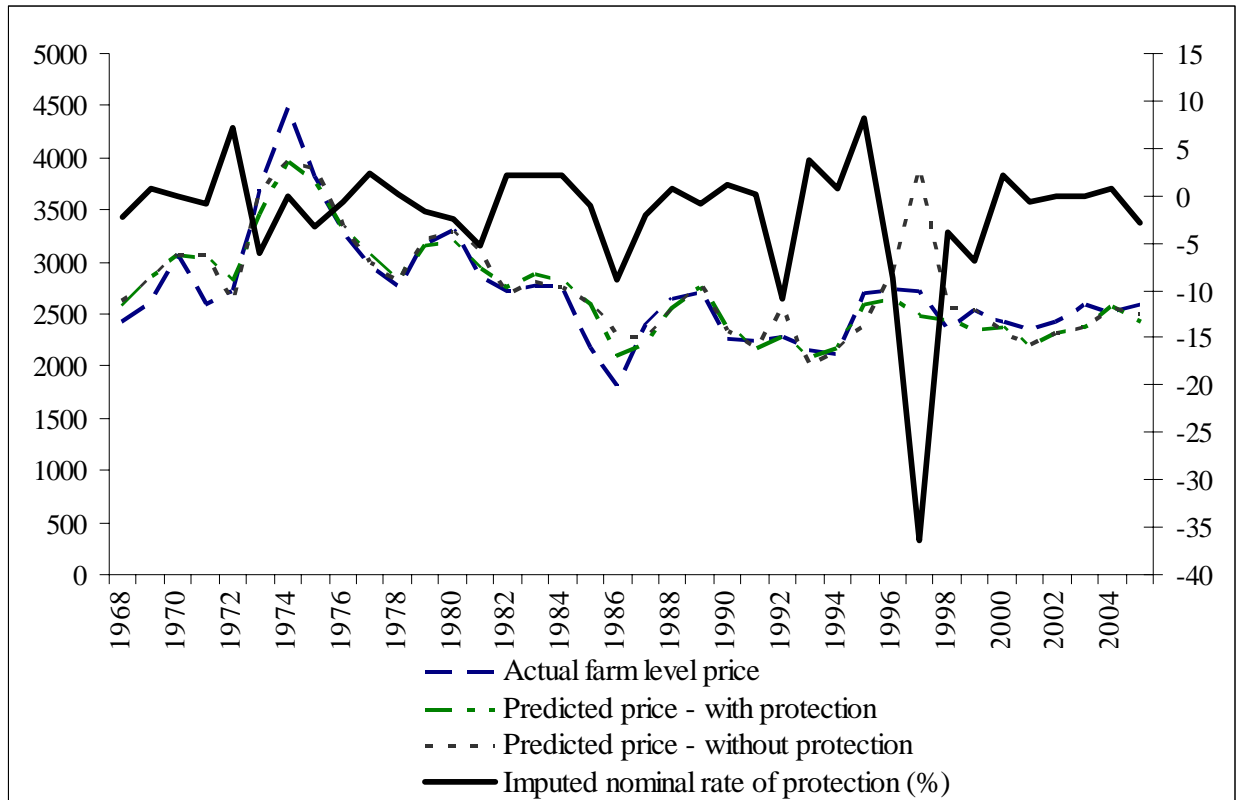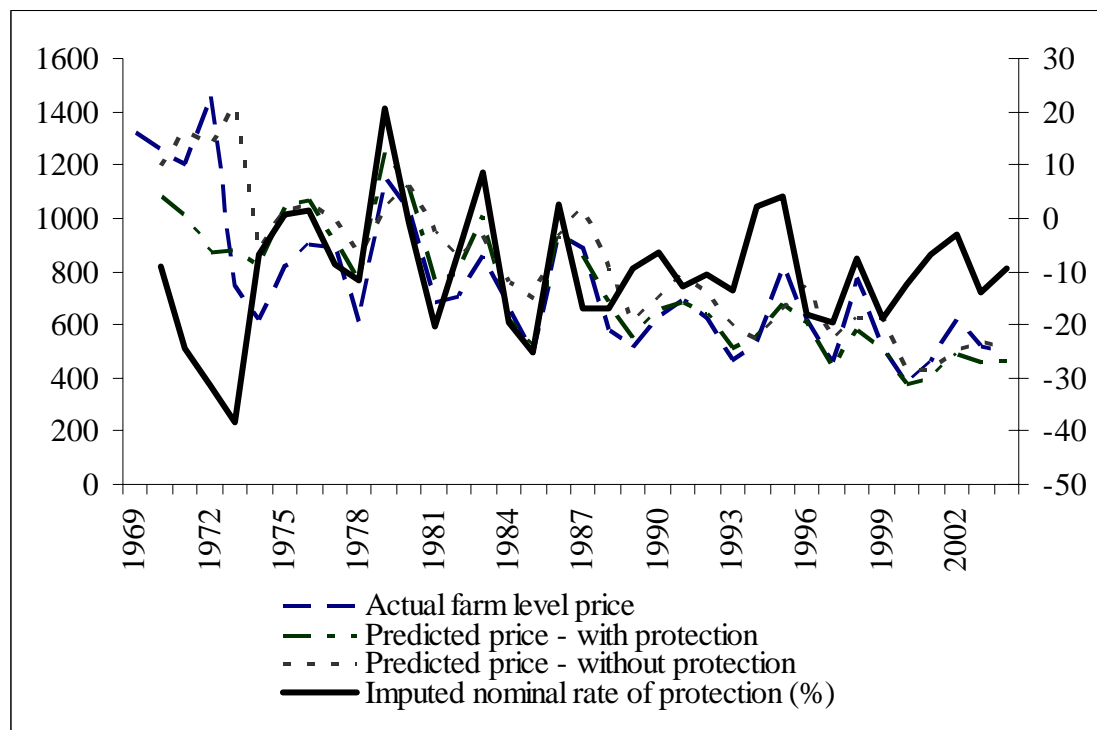
Figure 20: Thailand, Estimation of NRP at farm level – Fertilizer
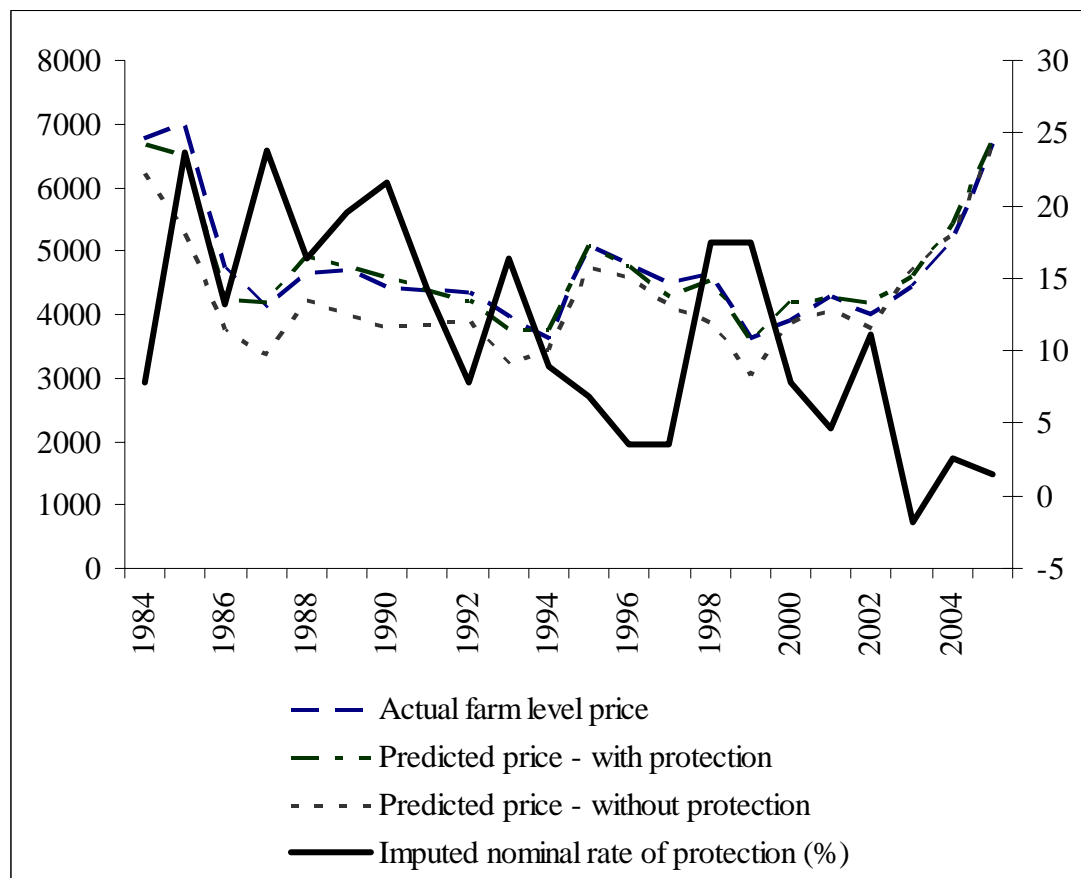
Source: Authors' calculations, based on methodology and data discussed in the text.

Note: Imputed nominal rate of protection is calculated as 100*(Predicted price with protection - Predicted price without protection)/ Predicted price without protection.

**Appendix Table A1 Price comparisons and trade status – Rice**

| Year | Rice : Nominal Price (Paddy basis) | | Trade |
	Domestic price (baht/ton) (1)	Border price (baht /ton) (2)	
1968	1,231	3,034	X
1969	1,381	2,618	X
1970	1,182	2,053	X
1971	1,011	1,784	X
1972	1,168	2,068	X
1973	1,650	2,750	X
1974	2,348	6,517	X
1975	2,269	4,364	X
1976	2,282	2,963	X
1977	2,309	3,582	X
1978	2,498	4,222	X
1979	2,751	3,887	X
1980	3,405	5,071	X
1981	3,628	5,865	X
1982	3,212	3,954	X
1983	3,228	3,789	X
1984	3,041	3,713	X
1985	2,757	3,622	X
1986	2,428	3,165	X
1987	3,027	3,570	X
1988	3,971	4,658	X
1989	4,286	4,969	X
1990	3,632	4,186	X
1991	3,978	4,620	X
1992	3,647	4,225	X
1993	3,082	3,959	X
1994	3,562	5,034	X
1995	4,561	5,081	X
1996	4,897	5,524	X
1997	5,029	6,174	X
1998	6,971	7,910	X
1999	5,252	5,953	X
2000	4,404	5,065	X
2001	4,309	4,758	X
2002	4,710	5,111	X
2003	4,648	5,037	X
2004	5,659	6,058	X
2005	6,597	7,071	X

Notes:

[a] To make the old and new series consistent, we have to redefine the product composition as follows. According to S&S (1989), a ton of paddy is composed of 450 kg. of white rice 5 percent, 150 kg. of broken rice A1 extra, 30 kg. of broken rice C1 extra, and 30 kg. of broken rice C3. Nonetheless, broken rice C1 and C3 are no longer reported by Department of Internal Trade, Ministry of Commerce. We use the new definition is one ton of paddy is defined as 450 kgs of white rice 5%, plus 210 kgs of broken rice A1 special. This new definition is applied for the series 1968-2005. The correlation coefficients are greater than 95 per cent.

[b] X=Net export; M = Net Import; and N= Non-trade/Balanced Trade.

Source:

(1) Thailand, Ministry of Commerce, Department of Internal Trade.

(2) Board of Trade of Thailand.

Appendix Table A2 Price comparisons and trade status – Maize

| Year | Maize : Nominal Price (Maize grain basis) | | | | | | Trade |
| | Border price (baht/ton) (1) | | Farm Price (baht/ton) (2) | Domestic price (baht/ton) (3) | Quantity of export (ton) (4) | Quantity of import (ton) (5) | |
	Import price	Export price					
1960	n.a.	1,067	n.a.	n.a.	463,500	n.a.	X
1961	n.a.	1,127	n.a.	n.a.	538,874	n.a.	X
1962	0	1,101	n.a.	n.a.	448,785	0	X
1963	n.a.	1,092	n.a.	n.a.	706,844	n.a.	X
1964	n.a.	1,142	n.a.	n.a.	1,059,289	n.a.	X
1965	n.a.	1,257	n.a.	n.a.	764,161	n.a.	X
1966	n.a.	1,193	n.a.	n.a.	1,157,610	n.a.	X
1967	n.a.	1,225	820	1,162	1,036,224	n.a.	X
1968	n.a.	1,023	740	970	1,406,799	n.a.	X
1969	n.a.	1,135	810	1,117	1,402,301	n.a.	X
1970	n.a.	1,263	950	1,229	1,302,900	n.a.	X
1971	n.a.	1,247	800	1,202	1,715,733	n.a.	X
1972	n.a.	1,095	890	1,164	1,669,700	n.a.	X
1973	n.a.	1,976	1,440	1,784	1,240,873	n.a.	X
1974	n.a.	2,623	2,100	2,555	2,080,794	n.a.	X
1975	n.a.	2,656	1,860	2,483	1,968,665	n.a.	X
1976	n.a.	2,292	1,660	2,217	2,268,774	n.a.	X
1977	n.a.	2,124	1,600	2,131	1,441,984	n.a.	X
1978	n.a.	2,163	1,630	2,114	1,856,849	n.a.	X
1979	n.a.	2,765	2,040	2,638	1,888,743	n.a.	X
1980	n.a.	3,196	2,400	3,022	2,066,564	n.a.	X
1981	n.a.	3,243	2,230	2,960	2,420,049	n.a.	X
1982	n.a.	2,850	2,250	2,850	2,661,180	n.a.	X
1983	n.a.	3,129	2,370	3,129	2,498,543	n.a.	X
1984	n.a.	3,085	2,410	3,085	2,960,905	n.a.	X
1985	n.a.	2,950	1,930	2,839	2,614,796	n.a.	X
1986	n.a.	2,570	1,630	2,235	3,734,000	n.a.	X
1987	n.a.	2,630	2,260	2,500	1,465,557	n.a.	X
1988	n.a.	3,210	2,650	3,155	1,087,885	n.a.	X
1989	n.a.	3,800	2,890	3,666	1,062,739	n.a.	X
1990	n.a.	3,260	2,550	3,220	1,226,000	n.a.	X
1991	n.a.	3,130	2,670	3,054	1,215,000	n.a.	X
1992	3,835	3,500	2,840	3,408	135,000	440,000	M
1993	4,900	3,080	2,760	3,140	179,000	9,000	X
1994	8,300	3,540	2,860	3,483	125,000	9,805	X
1995	4,048	4,760	3,850	4,570	96,190	276,000	M
1996	5,348	5,069	4,060	4,896	50,443	307,000	M
1997	8,020	5,003	4,180	4,703	51,460	235,000	M
1998	5,174	5,207	3,950	5,052	112,700	228,000	M
1999	4,930	4,665	4,100	4,626	64,900	109,350	M
2000	4,470	4,760	3,980	4,710	19,944	338,720	M
2001	19,380	4,509	3,940	4,356	490,851	6,647	X
2002	21,820	4,856	4,090	4,734	146,050	4,916	X
2003	10,710	5,060	4,420	4,930	189,418	7,868	X
2004	4,800	5,730	4,450	5,636	871,792	75,754	X
2005	n.a.	5,824	4,800	5,475	58,662	58,626	N

Notes:

[a] Despite unspecified type of maize used in Siamwalla and Setboonsarng (1989), we use grained maize at the grade of 14% moisture. Its time pattern is similar to S&S (1989). Import and export price are adjusted for the same basis.

[b] Domestic price is the wholesale prices in Bangkok Metropolis.

[c] Farm price is the official reported price.

[d] Export price is F.O.B price of maize.

[e] Import price is C.I.F. price of maize.

[f] During 1992-1999 import price and quantity are roughly estimated, using FOA data.

[g] * represents the number is negligible.

[h] n.a. is not available.

[i] Trade definition: X=Net export; M = Net Import; and N= Non-trade/Balanced Trade.

Source:

(1) Bank of Thailand Quarterly Bulletin, Bank of Thailand.

(2) and (3) Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

Appendix Table A3 Price comparisons and trade status – Cassava

| Year | Cassava : Nominal Price (Cassava pellet basis) | | | Trade |
	Domestic price (baht/ton) (1)	Border price (baht/ton) (2)	Farm price (baht/ton) (3)	
1960	n.a.	n.a.	n.a.	X
1961	n.a.	n.a.	n.a.	X
1962	n.a.	n.a.	n.a.	X
1963	n.a.	n.a.	n.a.	X
1964	n.a.	n.a.	n.a.	X
1965	n.a.	n.a.	n.a.	X
1966	n.a.	n.a.	n.a.	X
1967	n.a.	n.a.	450	X
1968	n.a.	n.a.	480	X
1969	699	819	410	X
1970	762	859	390	X
1971	817	1,013	370	X
1972	828	1,110	480	X
1973	1,033	1,288	290	X
1974	1,195	1,433	290	X
1975	1,571	1,857	400	X
1976	1,688	1,937	460	X
1977	1,543	1,884	480	X
1978	1,450	1,692	360	X
1979	2,493	2,427	740	X
1980	2,524	2,731	750	X
1981	1,907	2,519	540	X
1982	2,110	2,419	580	X
1983	2,720	2,778	730	X
1984	1,730	2,380	580	X
1985	1,520	1,965	430	X
1986	2,722	2,847	840	X
1987	2,582	3,207	840	X
1988	2,186	2,632	580	X
1989	1,913	2,341	540	X
1990	2,373	2,713	710	X
1991	2,625	3,131	820	X
1992	2,570	2,927	770	X
1993	2,154	2,580	600	X
1994	2,438	2,571	710	X
1995	3,115	3,168	1,160	X
1996	2,937	3,314	910	X
1997	2,224	2,803	710	X
1998	3,173	3,410	1,300	X
1999	2,689	2,900	830	X
2000	2,045	2,367	610	X
2001	2,231	2,451	770	X
2002	2,721	2,688	1,040	X
2003	2,603	2,740	890	X
2004	2,720	2,888	880	X

Notes:
[a] We use cassava pellet for the basis for the price comparison because it has the highest proportion in cassava export during 2001-2004.
[b] Domestic price is the average wholesale prices of cassava pellets.
[c] Border price is the F.O.B. price of cassava pellets, i.e. the ratio between export value and its quantity.
[d] Farm price is the official reported price that the farmer of raw cassava received.
[e] n.a. is not available.
[f] Trade definition: X=Net export; M = Net Import; and N= Non-trade/Balanced Trade.

Source:
(1) Bank of Thailand Quarterly Bulletin, Bank of Thailand.
(2) And (3) Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

Appendix Table A4 Price comparisons and trade status – Soybeans

| Year | Soybean : Nominal Price (Mixed grade soybean grain basis) | | | | | | Trade |
| | Border price (baht/ton) (1) | | Farm price (baht/ton) (2) | Domestic price (baht/ton) (3) | Quantity of export (ton) (4) | Quantity of import (ton) (5) | |
	Import price	Export price					
1960	0	n.a.	n.a.	n.a.	n.a.	0	X
1961	0	2,493	n.a.	n.a.	2,090	0	X
1962	0	2,611	n.a.	n.a.	1,910	0	X
1963	0	2,296	n.a.	n.a.	4,400	0	X
1964	0	2,153	n.a.	n.a.	4,320	0	X
1965	0	2,804	n.a.	n.a.	1,610	0	X
1966	0	2,608	n.a.	n.a.	5,608	0	X
1967	0	2,565	n.a.	n.a.	5,897	0	X
1968	0	2,716	n.a.	n.a.	3,486	0	X
1969	0	2,645	n.a.	n.a.	4,973	0	X
1970	0	2,576	n.a.	n.a.	6,290	0	X
1971	0	2,800	n.a.	n.a.	6,099	0	X
1972	0	3,187	n.a.	n.a.	7,240	0	X
1973	0	5,535	n.a.	n.a.	13,715	0	X
1974	0	5,458	n.a.	n.a.	8,612	0	X
1975	0	5,561	n.a.	n.a.	24,055	0	X
1976	0	5,858	n.a.	n.a.	8,132	0	X
1977	6,376	7,175	n.a.	n.a.	11,506	4,003	X
1978	5,495	6,333	n.a.	n.a.	8,099	10,808	X
1979	7,000	7,026	n.a.	n.a.	9,715	5	X
1980	6,577	8,231	n.a.	n.a.	3,394	15,297	X
1981	7,000	8,917	n.a.	n.a.	2,531	15	X
1982	5,541	8,801	n.a.	n.a.	1,295	3,218	X
1983	23,000	8,958	n.a.	n.a.	1,035	1	X
1984	4,981	8,752	5,430	6,916	995	107	X
1985	20,000	9,264	5,820	6,659	2,342	1	X
1986	0	9,326	6,030	7,279	1,983	0	X
1987	25,070	10,211	7,250	8,742	142	1	X
1988	7,992	11,688	8,410	10,933	16	33,277	X
1989	220,667	11,273	7,890	10,010	11	9	N
1990	185,750	17,149	7,020	8,902	74	16	N
1991	237,853	11,410	7,440	9,496	529	34	X
1992	6,311	11,672	7,600	9,407	781	158,047	M
1993	7,121	14,834	7,630	9,505	471	44,689	M
1994	7,179	12,567	7,640	9,985	312	97,998	M
1995	7,417	14,882	7,650	9,855	279	203,157	M
1996	8,169	12,838	8,860	11,040	222	418,811	M
1997	9,908	18,094	8,250	10,975	329	869,397	M
1998	10,392	10,881	9,710	13,205	797	687,255	M
1999	7,892	13,095	8,870	12,185	781	1,007,984	M
2000	8,690	17,099	9,190	13,115	617	1,320,402	M
2001	9,092	21,887	9,320	12,855	335	1,363,224	M
2002	9,124	17,417	10,390	13,395	835	1,528,557	M
2003	10,864	21,241	10,210	15,020	572	1,689,649	M
2004	13,200	23,844	11,260	17,275	975	1,435,803	M
2005	11,591	31,071	10,720	14,680	1,223	1,607,784	M

Appendix Table A4a Import quotas – Soybeans

Year	Soybean					
	Quota				Non quota	
	WTO Obligation		Applied Rate		WTO Obligation (%) [a]	Applied Rate (%)
	tariff rate (%)	import quota (ton) [a]	tariff rate (%)	import quota (ton) [b]		
1995	20	10,402	5	278,947	88.1	88.1
1996	20	10,402	5	426,460	88.1	87.2
1997	20	10,402	0	unlimited	88.1	86.3
1998	20	10,402	0	unlimited	88.1	88.1
1999	20	10,402	0	unlimited	88.1	88.1
2000	20	10,402	0	unlimited	88.1	88.1
2001	20	10,402	0	unlimited	88.1	88.1
2002	20	10,806	0	unlimited	81.8	81.8
2003	20	10,864	0	unlimited	80.9	80.9
2004	20	10,922	0	unlimited	80.0	80.0
2005	20	10,922	0	unlimited	80.0	80.0

Notes:
[a] the official figures in 1998-2001 are not available. To the best for our knowledge so far, there has not considerable change in these figures since 1997 so that we use the 1997 figure as the estimates.
[b] Unlimited import quota (from 2002 onward) is allocated among 6 Associations and 6 food processors.

1. Soybean and Rice Bran Oil Processor Association
2. Thai Feed Mill Association
3. Broiler Raiser for Exporting Association
4. The Feedstuff Users Promotion Association
5. Thai Livestock Association
6. Thai Broiler Processing Exporters Association
7. Thai Theparos Food Products Public Company Limited
8. Lactasoy Company Limited
9. Green Spot (Thailand) Limited
10. Dairy Plus Co. Ltd.
11. Serm Suk YHS Beverage Co., Ltd.
12. Korat Jeesae Partnership Limited

Source:
Department of Internal Trade, Ministry of Com

Appendix Table A5 Price comparisons and trade status – Sugar

| Year | Sugar : Nominal Price (Raw sugar basis) | | | | Trade |
	Border price (baht/ton) (1)	Grower price (baht/ton) (2)	Miller price (baht/ton) (3)	Consumer price (baht/ton) (4)	
1960	1,398	n.a.	4,628	n.a.	X
1961	1,952	n.a.	4,231	n.a.	X
1962	1,161	3,413	3,450	3,810	X
1963	2,648	3,251	4,752	4,900	X
1964	3,222	3,236	5,394	5,140	X
1965	1,184	2,690	2,453	2,540	X
1966	1,651	2,410	2,784	3,050	X
1967	2,176	2,384	3,650	3,480	X
1968	2,054	2,919	4,178	4,030	X
1969	2,369	2,630	3,662	3,560	X
1970	1,708	2,115	2,730	2,880	X
1971	2,182	2,229	3,108	3,520	X
1972	3,263	2,545	3,452	4,210	X
1973	4,306	3,043	4,176	4,110	X
1974	8,762	3,309	5,515	4,420	X
1975	10,676	4,721	6,597	4,470	X
1976	6,069	4,808	5,595	5,220	X
1977	4,647	4,528	4,677	4,760	X
1978	3,818	5,150	4,212	5,020	X
1979	4,025	5,603	4,679	5,590	X
1980	6,499	6,315	8,631	10,110	X
1981	6,932	8,023	9,191	10,190	X
1982	5,841	7,949	6,540	10,720	X
1983	4,037	6,119	5,833	10,910	X
1984	4,194	6,421	6,829	10,960	X
1985	3,330	6,069	6,452	10,970	X
1986	3,610	6,133	6,571	10,980	X
1987	4,190	6,714	7,521	10,970	X
1988	5,120	8,216	9,539	10,980	X
1989	6,420	8,500	9,421	10,988	X
1990	7,293	10,221	11,360	10,988	X
1991	5,127	8,200	9,619	10,988	X
1992	4,991	8,532	9,024	10,990	X
1993	5,570	9,314	9,769	10,990	X
1994	6,430	10,076	10,174	10,989	X
1995	7,395	9,956	10,675	10,995	X
1996	6,690	10,084	11,367	10,997	X
1997	7,090	11,162	11,556	10,997	X
1998	11,234	19,242	14,622	11,100	X
1999	5,842	11,263	8,880	10,993	X
2000	5,863	11,849	8,632	11,415	X
2001	9,368	15,470	12,558	11,763	X
2002	6,414	13,994	10,014	11,754	X
2003	6,890	11,598	9,830	11,762	X
2004	6,248	8,498	8,827	11,761	X
2005	8,560	11,994	11,637	11,750	X

Notes:
[a] Since 1982, Thai Cane and Sugar Industry has adopted the 70:30 revenue sharing formula, i.e. 70% of net revenue from selling cane products go to cane farmer and the rest go to sugar millers.
[b] We use the end of plantation year as a proxy for the calendar year. For example, 1985/86 of plantation year is the 1986 calendar year.
[c] n.a. is not available.
[d] Trade definition: X=Net export; M = Net Import; and N= Non-trade/Balanced Trade.

Source:
The data during 1985-2005 are obtained from:
(1) FOB price of raw sugar obtained from Office of the Cane and Sugar Board, Ministry of Industry.
(2) It is represented by the ratio of sugar cane's price divided by the conversion/extraction ratio from sugar cane to raw sugar. Both data are obtained from Office of the Cane and Sugar Board, Ministry of Industry.
(3) We use 1984 price from Siamwalla and Setboonsarng (1989) as the starting point and then adjust by annual growth calculated from annual change in remuneration for miller's production and selling.
(4) The wholesale price of white sugar at Bangkok market is obtained from Office of Agricultural Economics, Ministry of Agriculture and Cooperatives. Note that the white sugar price is chosen because of updating the original series from Siamwalla and Setboonsarng (1989).

Appendix Table A6 Price comparisons and trade status – Palm oil

| Year | Palm Oil : Nominal Price (Crude & refined palm oil basis) | | | | | | | Trade |
| | Border price (baht/ton) (1) | | Farm price (baht/ton) (2) | Domestic price (baht/ton) (3) | | Quantity of export (ton) (4) | Quantity of import (ton) (5) | |
	Import price	Export price		Crude	Refined			
1960	n.a	0	n.a.	n.a.	n.a.	0	n.a.	N
1961	6,997	0	n.a.	n.a.	n.a.	0	15	N
1962	6,947	0	n.a.	n.a.	n.a.	0	33	N
1963	6,450	0	n.a.	n.a.	n.a.	0	42	N
1964	10,161	0	n.a.	n.a.	n.a.	0	41	N
1965	8,101	0	n.a.	n.a.	n.a.	0	36	N
1966	8,120	0	n.a.	n.a.	n.a.	0	46	N
1967	6,644	0	n.a.	n.a.	n.a.	0	72	N
1968	4,899	0	n.a.	n.a.	n.a.	0	183	M
1969	5,980	0	n.a.	n.a.	n.a.	0	91	N
1970	6,589	0	n.a.	n.a.	n.a.	0	54	N
1971	6,342	0	n.a.	n.a.	n.a.	0	99	N
1972	4,587	0	n.a.	n.a.	n.a.	0	146	M
1973	9,406	0	n.a.	n.a.	n.a.	0	78	N
1974	11,322	1,168	n.a.	n.a.	n.a.	178	18	X
1975	12,698	624	n.a.	n.a.	n.a.	2,158	98	X
1976	9,377	697	n.a.	n.a.	n.a.	2,073	7,046	M
1977	10,317	386	n.a.	n.a.	n.a.	124	4,855	M
1978	12,229	909	n.a.	n.a.	n.a.	2,668	6,406	M
1979	14,131	98	n.a.	n.a.	n.a.	219	13,909	M
1980	13,791	0	1,290	n.a.	n.a.	0	58,703	M
1981	12,200	0	1,240	n.a.	n.a.	0	26,936	M
1982	10,268	507	1,190	n.a.	n.a.	231	9,203	M
1983	9,922	839	1,430	n.a.	n.a.	360	12,792	M
1984	17,409	1,312	1,720	n.a.	n.a.	4,741	7,572	M
1985	20,968	1,239	1,510	n.a.	n.a.	13,549	3,333	X
1986	0	531	1,120	n.a.	n.a.	4,587	0	X
1987	0	655	2,290	n.a.	n.a.	558	0	X
1988	9,792	700	2,860	16,150	22,370	1	5,407	M
1989	0	2,057	1,850	11,940	22,370	53	0	N
1990	0	1,976	1,890	12,490	18,450	79	0	N
1991	0	2,037	1,830	12,260	18,620	99	0	N
1992	10,467	1,107	1,800	14,840	18,620	1,440	9,725	M
1993	0	0	1,790	13,170	22,510	0	0	N
1994	0	1,286	1,710	13,690	19,630	9,386	0	X
1995	15,296	1,694	2,050	15,870	22,610	6,157	14,976	M
1996	13,693	2,173	2,030	15,400	22,310	643	24,772	M
1997	18,290	1,835	2,170	16,600	24,030	52,690	17,379	X
1998	26,430	2,513	3,370	26,470	38,930	44,695	8,471	X
1999	n.a.	1,348	2,210	18,990	30,670	24,329	n.a.	X
2000	0	1,011	1,660	12,920	21,870	20,234	0	X
2001	0	1,002	1,190	10,860	19,190	160,811	0	X
2002	20,290	1,559	2,300	17,290	25,880	49,744	90	X
2003	21,550	1,527	2,340	18,260	27,980	76,667	2	X
2004	0	1,700	3,110	20,130	30,600	3,036	0	X

[a] We collected two series of domestic prices, the average wholesale prices of crude and refined palm oil.
[b] Export price is F.O.B price of palm oil (crude plus refined palm oil).
[c] Import price is C.I.F. price of palm oil (crude plus refined palm oil).
[d] Farm price is the official reported price that the farmer of oil palm fruits attaching to the bunch received.
[e] Zero figures on import price is a result of zero import value. As official claimed, this was a result of import restriction.
[f] Trade definition: X=Net export; M = Net Import; and N= Non-trade/Balanced Trade.

Source:
(1), (4) and (5) Office of Agricultural Economics, Ministry of Agriculture and Cooperatives and FOA, United Nations (UN).
(2) and (3) Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

Table A6a Import quotas – Palm oil

Year	Palm oil		Non Quota (%)
	Quota		
	tariff rate (%)	import quota (ton)	
2000	20	4,757	147.8
2001	20	4,809	146.2
2002	20	4,834	144.6
2003	20	4,860	143.0
2004	20	4,860	143.0
2005	20	4,860	143.0

Note:
Non quota % means the *ad valorem* tariff rate for imports exceeding the quota. For example, suppose Thailand imports 6000 tons in 2005. The first 4860 tons are subject to the 20 per cent tariff rate and the rest (6,000-4,860= 1,140 tons) are subject to the 143 per cent tariff rate.

Source:
Department of Internal Trade, Ministry of Commerce.

Appendix Table A7 Price comparisons and trade status – Rubber

Year	Rubber : Nominal Price (Raw rubber sheet basis)			Trade
	Domestic price (baht/ton) (1)	Border price (baht/ton) (2)	Farm price (baht/ton) (3)	
1960	12,601	14,352	n.a.	X
1961	9,336	10,649	n.a.	X
1962	8,463	9,968	n.a.	X
1963	7,891	9,286	n.a.	X
1964	7,584	8,596	n.a.	X
1965	7,930	8,588	n.a.	X
1966	7,446	8,292	n.a.	X
1967	5,851	6,555	5,100	X
1968	6,237	6,304	5,490	X
1969	7,995	8,745	6,940	X
1970	6,580	7,197	5,720	X
1971	5,295	5,292	4,740	X
1972	5,300	4,968	4,770	X
1973	9,680	10,834	6,860	X
1974	9,553	13,024	7,380	X
1975	8,310	9,589	6,420	X
1976	10,841	13,358	9,150	X
1977	11,756	14,512	10,190	X
1978	13,850	17,368	12,210	X
1979	17,520	22,780	14,680	X
1980	18,940	26,377	16,350	X
1981	14,840	22,320	13,400	X
1982	13,430	16,574	12,420	X
1983	17,750	20,252	16,080	X
1984	16,447	21,315	15,070	X
1985	15,820	18,716	14,820	X
1986	16,630	19,030	15,610	X
1987	18,930	22,440	18,000	X
1988	23,810	27,550	21,980	X
1989	19,940	22,885	17,840	X
1990	18,326	19,661	17,150	X
1991	17,550	19,265	16,350	X
1992	18,060	19,139	16,870	X
1993	17,118	19,198	16,050	X
1994	23,910	25,478	22,110	X
1995	34,470	36,273	31,890	X
1996	34,718	34,226	28,660	X
1997	27,040	31,148	23,290	X
1998	25,730	26,227	23,060	X
1999	19,800	21,869	18,050	X
2000	23,200	24,799	21,520	X
2001	22,530	23,020	20,760	X
2002	29,130	28,733	27,570	X
2003	40,140	39,959	37,660	X
2004	46,240	49,215	44,130	X
2005	55,180	57,130	53,570	X

Notes:
[a] Domestic and Farm prices are based on the grade 3 raw (unsmoked) rubber sheets.
[b] Border price is the F.O.B. of grade 3 raw (unsmoked) rubbers sheets.The export price of processed grade 3 (smoked) rubber sheets is converted to equivalent price of raw rubber sheets by subtracting average value added of smoked rubbers sheet price.
[c] Trade definition: X=Net export; M = Net Import; and N= Non-trade/Balanced Trade.

Source:
(1) Bank of Thailand Quarterly Bulletin, Bank of Thailand.
(2) and (3) Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

Appendix Table A8 Price comparisons and trade status – Urea fertilizer

| Year | Urea Fertilizer: Nominal Price (N-P-K formula is 46-0-0) | | | Trade |
| | Border price (baht/ton) | Domestic price (baht/ton) | | |
		Wholesale	Local / Retail	
1984	4,745	5,417	5,887	M
1985	4,050	5,409	6,197	M
1986	2,791	3,358	4,265	M
1987	2,612	3,500	3,862	M
1988	3,551	4,408	4,657	M
1989	3,539	4,533	4,971	M
1990	3,525	4,633	4,985	M
1991	3,783	4,625	5,180	M
1992	4,041	4,617	5,375	M
1993	3,356	4,167	5,098	M
1994	3,790	4,379	4,900	M
1995	5,756	6,554	7,200	M
1996	5,795	6,354	7,090	M
1997	5,327	5,833	6,954	M
1998	5,409	6,788	7,770	M
1999	3,962	5,017	5,832	M
2000	5,289	6,069	6,369	M
2001	5,691	6,336	7,139	M
2002	5,260	6,238	6,719	M
2003	6,832	7,008	7,593	M
2004	8,060	8,700	9,148	M
2005	11,007	11,729	12,349	M
2006	10,325	11,513	12,625	M

Notes:
[a] Border price means the C.I.F. price of urea fertilizer.
[b] Thailand is an importer of urea fertilizer throughout the period shown.
[c] The data in 2006 are based on the first four months of that year.

Source:
Office of Agricultural Economics, Ministry of Agriculture and Cooperatives.

Appendix Table A9 Applied tariff rates of agricultural products in Thailand, February 2006

HS	Description	Applied Tariff (%)			
		Unweighted	Weighted (import value)	Max	Min
01	Live animals	0.0	0.0	30.0	0.0
02	Meat and edible meat offal	30.0	38.6	50.0	30.0
03	Fish, crustaceans, molluscs, aquatic invertebrates ne	5.0	5.1	30.0	5.0
04	Dairy products, eggs, honey, edible animal product ne	5.0	10.2	30.0	5.0
05	Products of animal origin, nes	0.0	2.9	30.0	0.0
06	Live trees, plants, bulbs, roots, cut flowers etc	30.0	33.1	54.0	30.0
07	Edible vegetables and certain roots and tubers	23.0	39.9	40.0	23.0
08	Edible fruit, nuts, peel of citrus fruit, melons	10.0	19.1	30.0	10.0
09	Coffee, tea, mate and spices	27.0	27.0	30.0	27.0
10	Cereals	0.0	4.5	24.7	0.0
11	Milling products, malt, starches, inulin, wheat gluten	5.0	13.7	30.0	5.0
12	Oil seed, oleagic fruits, grain, seed, fruit, etc, ne	1.0	18.7	30.0	1.0
13	Lac, gums, resins, vegetable saps and extracts nes	0.6	9.8	27.0	0.6
14	Vegetable plaiting materials, vegetable products nes	0.0	10.3	30.0	0.0
15	Animal,vegetable fats and oils, cleavage products, et	0.1	21.3	30.0	0.1
16	Meat, fish and seafood food preparations nes	20.0	27.9	30.0	20.0
17	Sugars and sugar confectionery	0.1	13.7	65.0	0.1
18	Cocoa and cocoa preparations	5.0	20.2	27.0	5.0
19	Cereal, flour, starch, milk preparations and products	5.0	8.5	30.0	5.0
20	Vegetable, fruit, nut, etc food preparations	30.0	30.0	30.0	30.0
21	Miscellaneous edible preparations	5.0	5.7	30.0	5.0
22	Beverages, spirits and vinegar	0.0	58.9	60.0	0.0
23	Residues, wastes of food industry, animal fodder	1.0	7.9	9.0	1.0
24	Tobacco and manufactured tobacco substitutes	60.0	60.0	60.0	60.0

Source:
Complied from Official Data provided by Custom Department, Ministry of Finance

Appendix Table A10 Transport and handling costs between border and wholesale level of agricultural products in Thailand (% gross value)

Commodity	Transport and handling cost (%)
Rice	5.0
Maize	2.5
Cassava	1.4
Soybeans	1.4
Sugar	2.3
Rubber	4.8
Fertilizer	5.2
Palm oil	1.3

Source: Thailand, Ministry of Commerce, Bangkok.