# *PROTECTION, REGIONAL AGRICULTURE AND INCOME DISTRIBUTION*

**By**

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# Protection, Regional Agriculture and Income Distribution

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## 1. Introduction

This paper uses the PARA general equilibrium model to analyse the effects that changes in Thailand's protection policy have on the structure of the Thai economy and on the distribution of incomes within Thailand. A feature of the analysis is that it examines the effects that reduced protection has on Thai agriculture at a regional level. This is an important matter because regional issues have played a large part in the debate on protection policy within Thailand, as with most other aspects of economic policy. The effects on the most impoverished parts of the country, especially the North-east region and to a lesser extent the North region are particularly sensitive areas of policy concern.

In the last two decades Thailand has made significant changes in its structure of industry protection. Over the same period, but especially since the mid-1970s, Thailand has experienced an impressive export boom, concentrated in labour-intensive manufactured goods. The outcome of these and other events has been an acceleration of aggregate economic growth but also increased inequality of income distribution. The growth of manufactured exports has coincided with increasing economic pressure on Thailand's traditional export sectors, especially the rice industry, with strong pressures emerging for government subsidies for this industry. Further changes in manufacturing protection are under constant policy discussion. The conclusion of the Uruguay round of the GATT has intensified these discussions because of the obligation it implies for Thailand, along with other developing country members of the GATT to reduce its own rates of protection across the board. The effects that these changes may have on the agricultural sector, and on rice in particular, are therefore of great policy interest.

Other effects of changes in protection are also controversial. Both the rhetoric of Thailand's government planners and much academic discussion have suggested that the changes in protection which have occurred over the past twenty years contributed significantly to the success in increasing exports. But was this true? Did the changed structure of protection really favour export promotion? If so, were the changes in protection policy important enough to be a significant contributor to the export boom? And to what extent, if any, can the worsening Thai income distribution be attributed to changes in protection policy? To answer these and related questions we must attempt to take account of the full general equilibrium impacts of the structure of protection. The present paper attempts to contribute to such an analysis.

The results confirm the power of general equilibrium analyses for analysing complex economic phenomena of this kind - where the interaction between factor markets, product markets and the expenditure characteristics of different household groups are critical. While the conventional wisdom has been that reform of protection policy may exacerbate income inequalities, these conclusions have been based, almost entirely, on partial equilibrium analyses. Our results show that these conclusions can be reversed once the indirect effects of changes in protection - those operating through the prices of the goods consumed by the poor - are incorporated into the analysis.

## 2. Policy Background

Like most middle-income developing countries, Thailand exhibits a structure of tariffs and quantitative restrictions on imports which favour selected import-competing industries. Since the mid-1970s this system of protection has come under increasing scrutiny, and the tariff code has been amended several times. At the same time, Thailand's manufactured exports have boomed, replacing agricultural exports as the country's major foreign exchange earners. It has been easy to assume that these events were causally connected - that the changes in protection contributed significantly to, perhaps even caused, the export boom. Several observers of the Thai economy have concluded exactly that.

Such a view was encouraged by the change in the language of Thailand's economic planners, as reflected in the five-year development plan documents produced by the government's economic planning agency, the National Economic and Social Development Board (NESDB). From the mid-1970s onwards, the plan documents argued the case for export-promotion, in contrast with the earlier emphasis on import substitution. But the reality of economic policy is potentially another matter. To some extent, plan documents are mere talk, influenced by changes in intellectual fashion, and sometimes intended to conceal rather than reveal the actual policy changes taking place. The actual changes in Thailand's protection policies have not been nearly as clear cut as the change in the rhetoric. Some industries have received export incentives and the rates of protection accorded to some import-competing industries have fallen - examples include the cigarette and plastic wares industries. Other rates have risen significantly. the most important example is the motor vehicle assembly industry - the country's most heavily protected large industry - whose nominal rate of protection increased considerably between 1975 and 1985.

Until recently, studies of protection in Thailand have concentrated on measuring effective rates of protection These earlier studies are summarised in Tables 1 and 2. It is hazardous to attempt to compare studies across time because the methodologies used by the various authors to measure both nominal and effective rates have differed so much. For example, some studies use the official tariffs rates, while others use tariff rates estimated from customs duty collections or from price comparisons. Nevertheless, from these studies the structure of protection in Thailand seems to exhibit the familiar features of bias against export industries and in favour of import-competing industries and at least until the mid 1970s showed escalating rates, increasing from intermediate goods and capital goods to final consumer goods. The protective system has been biased against the agro-based industries and towards the manufacturing sector, both import competing and non-import competing goods (Industrial Management Corporation, 1984; Somsak 1993). This is the typical pattern of protection found in developing countries.

Narongchai (1973, 1977) estimated ERPs of 58 industries for 1969, and of 80 industries for 1971 and 1974 using input-output coefficients obtained from industrial surveys.

Narongchai classified industries according to their overall trade orientation into export-oriented, import competing, etc. Under the assumption that tariffs were used as the main instrument of trade policy, his results showed that over the period studied the import competing and non-import competing industries received highest protection. When the industries were classified by end use and level of fabrication, the effective protection system was favoured towards beverages and tobacco and processed food, followed by transport equipment and consumer goods.

Pairote (1975) estimated the ERPs of 58 industries for 1964, and of 82 industries for 1971 and 1974 using the input-output coefficients obtained from industrial surveys. The results showed that the protection system over the period of study was inward-looking, favouring firms selling on domestic markets. Import competing and non-import competing industries received greatest protection. The structure of protection was biased against export industries. When industries were classified by end uses and levels of fabrication, the incentive effects were strongly in favour of consumer goods, especially beverages and tobacco, and transport equipment, followed by consumer goods (Juanjai et al. 1986).

Paitoon et al. (1989) estimated ERPs in Thailand's manufacturing sector for 1981, 1984 and 1987 using input coefficients from the 180-sector input-output tables of 1982 and 1985. The protective instruments covered in the study were mainly tariffs, import surcharges, export taxes, tax rebates and refunds, and royalties. When industries were classified by trade orientation, the results showed that the effective protection was biased against export industries. The non-import competing industries received the highest protection, followed by the import competing industries.

In 1969 and 1974, most of the export industries were agro-based, such as rice milling, frozen seafood and canned fruit, which use agricultural products as raw materials. From 1980 onwards, there have been more diversified export industries. The new export industries, in addition to the traditional agro-based ones, have been canned fished and crustaceans, garments, rubber sheets and rubber products, wood products, jewellery and footwear. A dominant characteristic of the new export industries is that they are labour-intensive, such as garments and footwear. But these have not been the industries favoured by the system of protection.

## 3. Analytical Background

The inter-industry effects of changes in protection policy are highly complex - their distributional effects even more so. Some industries are advantaged, drawing additional factors of production into them in proportions which reflect factor prices and the technology of the expanding industry, while other industries contract, releasing factors of production. All these changes have subsequent effects on factor returns, thus affecting production incentives in industries not directly affected by the changes in protection. These events also affect the distribution of household incomes in ways which depend on the changes in factor returns, the distribution of factor ownership across households, the changes in the prices of goods and services and the expenditure patterns of the different household groups. Change in tariffs also reduce government revenue. The incipient revenue shortfall which results must be met by some combination of increases in other taxes, reductions in government expenditure, and increased government borrowing.

In short, the inter-industry and income distributional effects of changes in protection policy are not straightforward, nor easily assessed. Their analysis requires use of the most advanced research tools available for the purpose. A general equilibrium approach is required because of the overall size of the protected import-competing sector, the importance of its links to the rest of the economy, and the complexity of the underlying economic relationships. It is apparent that for protection to be analysed in more than a cursory manner requires a substantial commitment of data and human resources and must be conducted within a framework which recognises the general equilibrium nature of the problem.

The PARA model greatly extends earlier general equilibrium models' flexibility in dealing with changes in protection in Thailand. It incorporates a highly disaggregated and detailed representation of the Thai economy and thereby overcomes some of the most important limitations inherent in the structural and technical specifications of earlier models. It also captures the wide regional variation which characterises the agriculture sector of Thailand, as of so many large developing economies. PARA also incorporates the results of a large econometric research program directed towards estimating the economic behavioural parameters

underlying the model. The outcome of this program of empirical work is that every element of the data base and *every behavioural parameter* entering used in PARA is based on original empirical work using Thai data. Few applied general equilibrium models, constructed for any country, can match this claim.

The PARA model, including its structure, its data base and its behavioural parameters, are documented in full in the set of technical papers presented at this workshop. For the assistance of readers unfamiliar with this material, we shall briefly describe its general features, its treatment of factors of production, and the special characteristics of its agricultural sector.

*General Features*

PARA is a conventional, real, micro-theoretic general equilibrium model of the Thai economy, designed primarily to address micro-economic policy issues for that country. It belongs to the class of general equilibrium models which are linear in proportional changes, sometimes referred to as Johansen models. PARA shares many structural features with the highly influential ORANI general equilibrium model of the Australian economy (Dixon, et.al., 1982), but these features have been adapted in light of the realities of the Thai economy. These structural differences are especially important in the treatment of agriculture. The behavioural parameters of the model and its Social Accounting Matrix data base are all estimated from Thai data.

The model contains 60 producer goods and services produced by 120 industries, allowing for regional differentiation. The difference between the number of industries and commodities arises because the 20 agricultural commodities are each produced in each of four agricultural regions of Thailand - the North, North-east, South and Central regions. This gives a total of 80 regionally differentiated agricultural industries. Production conditions differ significantly across these four regions, as do the economic characteristics of their rural populations. Poverty in Thailand is a predominantly rural phenomenon, heavily concentrated in the Northeast and Northern regions. Each of the remaining 40 non-agricultural industries of the model produces an individual non-agricultural producer good or service. These non-

agricultural industries are not regionally differentiated. making a total of 60 commodities represented.

The various industries of the model are classified as either export-oriented or import-competing. The criterion used to classify these industries is the ratio of an industry's imports to its exports. If this ratio exceeds 1.5, then the industry is regarded as producing an importable. The observed exports of such an industry are treated as exogenous in the model. If the import/export ratio is less than 0.5, then the industry is deemed to be export-oriented. For ratios between 0.5 and 1.5, additional relevant information is used in classifying the industry. The importance of this distinction is in the treatment of the exports from import-competing industries. These exports are fixed exogenously.

The analytical structure of the model includes the following major components:

- A complete consumer demand system based on 20 consumer goods, estimated from the 1988 Socio-economic Survey compiled by the National Statistical Office.

- A factor demand system which relates the demand for each primary factor to industry outputs and prices of each of the primary factors. This reflects the assumption that factors of production may be substituted for one another in ways that depend on factor prices and on the elasticities of substitution between the factors. The latter are estimated with data from the Office of Agricultural Economics agricultural surveys and from the Ministry of Industry's Manufacturing Censuses.

- An intermediate good demand system which assumes that intermediate goods are used in each industry in proportion to the output produced (the Leontief assumption).

- Zero profit conditions for each industry determining specific factor returns from commodity prices, intermediate good prices and mobile factor returns.

- Demands for imported and domestically produced versions of each good, incorporating Armington elasticities of substitution between the two, the latter estimated from trade data obtained from the Thai Customs Department.

- Market clearing conditions for each commodity and factor of production ensuring that aggregate demand does not exceed aggregate supply for that commodity or factor.

- A set of equations determining the incomes of households from their ownership of factors of production, their rates of return and transfers from elsewhere in the system..

- A set of macroeconomic identities which ensures that standard macroeconomic accounting conventions are observed.

Production functions are assumed to exhibit constant returns to scale. This assumption enters the model via factor demand functions, which are homogeneous of degree one in output and through the zero profit conditions, which relate unit commodity prices to unit costs of production. All behavioural functions are homogeneous of degree zero in prices. Thus, for example, a ten per cent increase in the exchange rate will result in a ten per cent increase in all nominal domestic prices but no change in any quantity determined within the model. The nominal exchange rate is also fixed exogenously. Its role within the model is to determine the domestic nominal price level. Since there is no monetary sector, the nominal exchange rate plays no role in the achievement of trade balance; that is accomplished by endogenous adjustments in the 'real exchange rate' - the ratio of traded to non-traded goods prices.

*Factors of production*

There are four mobile or semi-mobile primary factors of production: skilled labour, unskilled labour, agricultural mobile capital and non-agricultural mobile capital. In addition, each industry also uses an industry-specific fixed factor. Only unskilled labour is freely mobile across all industries of the model. Three primary factors are freely mobile among the 40 non-agricultural industries of the model: skilled labour, unskilled labour and non-agricultural mobile capital. Two factors are freely mobile across all 20 agricultural industries in each of the four agricultural regions: unskilled labour and mobile agricultural capital.

Unskilled labour is freely mobile between the non-agricultural and agricultural parts of the economy, but skilled labour is not used in agriculture. Skilled labour is to be thought of as those in the work force who are capable of performing tasks requiring more than a specified level of work experience, training, or both. The criteria used in construction of the data set were that all workers receiving a monthly salary and / or who had completed at least lower secondary education were classified as skilled. All receiving a daily salary were classified as

unskilled provided they had not completed at least lower secondary education. Educational criteria are at best a rough proxy for true skill but the data available do not permit a finer level of definition. While skilled labour can presumably perform unskilled tasks, the model treats these two kinds of labour as distinct.

Mobile non-agricultural capital includes non-agricultural land and structures which are not necessarily devoted to any particular production activity, such as buildings and related fixed structures. When relative prices change, it is possible for owners of such assets to rent them out to producers facing more profitable circumstances.

Agricultural land is specific to each of the regional agricultural industries of the model. Agriculture also uses a form of capital which is mobile across all agricultural industries within each region, but not mobile between agriculture and non-agriculture or between the four agricultural regions. Region and sector-specific capital consists of physical capital assets devoted to a particular line of production activity. Changes in relative prices do not cause any reallocation of such capital inputs in the short run, as a movement to other sectors is assumed to require sufficient re-tooling costs as to render such reallocations economically infeasible.

In a long run setting, the amounts available of each of these region and sector-specific capital resources would adjust as a result of the investments made in each time period of the model. PARA does not allocate its level of fixed capital formation in a given time period into specific industries, because it is essentially a short-run model. The length of run implicit in the model's comparative static adjustment processes should be thought of as being between two and four years.

## 4. Simulation Experiments

We now describe our simulation experiments using the PARA model. Our experiments take the estimated rates of protection for Thailand and apply a 25 per cent reduction in each of them to PARA. The aim is to determine the economic impact that an across-the-board reduction in these observed rates of protection would have within the Thai economy, *holding all other exogenous factors constant.* This is the principal value of general equilibrium models like

PARA. They can handle controlled experiments, changing one exogenous variable at a time, or any combination of them, holding all other exogenous variables constant. The model is solved using the GEMPACK simulation package, designed for use with linearized models (Codsi, Pearson and Wilcoxen,1991).

The results should be interpreted as indicating the percentage change in each endogenous variable, in response to the exogenous shock, relative to the value that variable would have taken if the specified shock had not occurred and no other exogenous variables had changed either.

To perform an experiment with a general equilibrium model like PARA, a particular macroeconomic closure must be specified, and because the simulation results can be affected by the choice of closure, it is necessary that the main features of the closure be stated. All domestic prices, output quantities and consumption quantities were endogenous. Household savings were held fixed in real terms. All components of real aggregate absorption were fixed exogenously - real investment by commodity, real consumption by household and real government spending. Reductions in tariff rates will ordinarily reduce government revenues. We assume that the government restores its budgetary balance by increasing other taxes to keep the budget deficit constant in real terms. In these simulations, the government increases the rate of the personal income tax uniformly across all income tax payers to achieve this outcome. The current account balance is fixed exogenously. These features imply that the full economic effects of a change in protection, in particular the effects of economic efficiency, will be will be reflected in resulting changes in the levels of real consumption.

The international prices of all imported commodities were fixed exogenously, reflecting the assumption that Thailand is a price taker in these international markets. The international prices for Thai exports are assumed to be responsive to the volume of Thai exports of the commodity concerned. In all cases except rice and cassava this feature is unimportant, because export demand elasticities are set at very high levels. But for rice and cassava these elasticities reflect empirical export demand studies and the estimated elasticities were -2.5 for rice and -5.0 for cassava.

## 5. Results

A summary of the simulation results is provided in the Appendix. Our discussion here will concentrate on one particular aspect of the results - the estimated effects that trade policy reform has on regional agriculture and on household income distribution - but some discussion of the estimated macroeconomic effects is also necessary. Reduced protection induces declines in both the GDP deflator and the CPI because it lowers the domestic prices of imported commodities. The effect on the GDP deflator is larger, because it is more sensitive to the prices of imported commodities. Services play a larger role in the CPI than in the GDP deflator. The estimated effects that reduced protection has on aggregate welfare indicators like real household consumption is small. The distributional effect of reduced protection prove to be more significant than its overall effect on aggregate economic welfare. The estimated effect on real GDP is also small, but positive. An overall increase in export revenue occurs, making an increase in imports also possible under our balanced current account closure.

Real wages of both skilled and unskilled labour rise. The reason is primarily the expansion in the labour intensive manufacturing industries such as textiles and leather which have been responsible for much of Thailand's export expansion over the last decade. The expansion of these industries, in response to reduced protection, bids up the wages of skilled and unskilled labour. The major losers from reduced protection are, not surprisingly, the owners of fixed factors of production used in the most highly protected manufacturing industries, but the results are more complex than merely this. Within agriculture, the effects are mixed. Overall, agriculture is not a net gainer from reduced protection. Output of the vegetables and fruits industry (not shown in the summary) declines in all regions, as do tobacco and 'other crops'. These are the most highly protected components of the agricultural sector. The producer price of vegetables and fruits declines by 0.54 percent and those of tobacco and 'other crops' decline by 0.94 and 1.4 per cent, respectively.

The regional effects of reduced protection vary across regions. The North and North-east regions gain while the South, and to a lesser extent the Central region, is a net loser. While the rubber industry expands, the effect on the return to mobile capital used in Southern agriculture produces negative effects on other agricultural industries in the South, such as

paddy. It is notable that the effects that reduced protection has on paddy production vary significantly across regions. These differences reflect differences in production conditions in the various regions as well as differences in the effect of reduced protection on the returns to 'mobile agricultural capital' which is mobile within regions but not between them.

The last item in the summary shows the simulated effects on real household consumption, classified by household. In calculating these household specific changes in real consumption, household-specific consume price indices have been used - indices whose composition reflects the expenditure pattern of that particular household. The results show clearly that reduced protection favours the poorest households. The principal reason is that real wages rise, particularly those of unskilled labour. All households gain in absolute terms except the richest two urban quintiles. Their loss derives from the reduced returns to fixed factors used in the most highly protected manufacturing industries.

It is notable that our estimates of the favourable income distributional effects of reduced protection in Thailand do not derive from larger reductions in the prices of goods consumed by the poor than by the rich. In fact, the changes in the household-specific consumer price indices of the various households indicate the reverse.[1] The reductions in the household-specific consumer price indices are the largest for the richest households and smallest for the poorest. For example the changes in these indices for the poorest and richest rural households are -0.18 and -0.29, respectively, and for the corresponding urban households they are -0.13 and -0.30, respectively. The overall distributional effects occur in spite of, rather than because of, these effects. They derive from two phenomena: the increased returns to labour and the fact that the reduction in tariff revenue is being recouped by means of income tax increases. These income tax increases fall mainly on the richest households.

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[1] These indices are not reported explicitly in the summary table but may be calculated from the difference between nominal gross income changes and real gross income changes, shown in the table.

## 6. Conclusions

This paper reports the results of an analysis of the regional and income distributional effects of changes in protection in Thailand. The analysis utilises a recently constructed 60-commodity, regionally differentiated, applied general equilibrium (AGE) model of the Thai economy, the PARA model.

The regional and income distributional effects of reduced protection in Thailand prove to depend critically on three matters: differential changes in the returns to primary factors of production; the distribution of returns between those factors of production that are mobile across industries and those which are not; and the relationship between changes in the prices of final consumer goods and the expenditure patterns of different income classes. Analyses which fail to address any one of these issues could easily produce false conclusions.

Capturing the income distributional effects of trade policy reform requires dealing with the interaction of a great number of economic variables. This is what general equilibrium models like PARA are capable of doing well. For general equilibrium models to be worthy of being taken seriously, however, they must possess a sensible and transparent structure, they must be fully documented, and they must be empirically based. PARA meets each of these requirements. It is especially notable that the behavioural parameters underlying the PARA model are based *solely* on original econometric estimates of the relevant parameters. These estimates were the result of a large research program conducted by the authors and their colleagues, using Philippine data.

The PARA general equilibrium model represents around 20 person-years of professional research input. The results summarised in this paper indicate that an effort of this magnitude is required to do justice to the analysis of an economic phenomenon as complex as technical change in the agricultural sector of a large developing country. Clearly, the cost of such a research effort is high, but the resulting analytical tool is capable of shedding much-needed light on policy issues of great social importance. Moreover, it is significant that once it is built, the research tool so constructed can subsequently be used to analyse a wide range of policy issues, concerning any part of the economy represented in the model.

It would be quite wrong to suggest that a large AGE model like the one discussed in this paper is required for satisfactory analysis of *any* policy issue. For many commodity-specific policy questions, simple partial equilibrium analysis may be sufficient. But for more complex policy issues, involving the interactions among many markets, a general equilibrium framework of some kind is essential. AGE models like PARA offer the capability of using efficiently all available information on the structural features and related behavioural parameters characterising the economic system. They are capable of being updated as this information base is improved and, due to advances in computing technology, they are becoming increasingly user-friendly.

Like all such analytical tools, AGE models like PARA may in practice be well or poorly constructed and they are capable of being misused. But the analytic power they offer is so great that development policy analysts should not dismiss their potential contribution to our understanding of the development process or their practical utility for policy analysis.

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TABLE 1 *Effective Protection of Industry Groups by Levels of Fabrication and End Uses, 1964 to 1984*

(per cent)

| Industry group | 1964 | 1969 | 1974 | 1984 |
|---|---|---|---|---|
| Processed food | 47 | -33 | -19 | 8 |
| Beverages & tobacco | 215 | 241 | 2,281 | 27 |
| Construction materials | n.a. | 47 | 47 | 17 |
| Intermediate goods I | 82 | 3 | 16 | 18 |
| Intermediate goods II | 60 | 79 | 49 | 242 |
| Consumer non-durable goods | 71 | 33 | 91 | 24 |
| Consumer durable goods | 64 | 69 | 201 | 19 |
| Machinery | 37 | 31 | 30 | 32 |
| Transport equipment | 118 | 35 | 354 | 46 |

Note: n.a.: not available.

Sources: ERPs for 1964 and 1969 were obtained from Juanjai (1986). The ERPs for 1974 and 1984 were obtained from Narongchai (1977) and Paitoon et al (1989), respectively. The weights used to aggregate products for 1974 and 1984 were value added at market prices of 1975 and 1985, respectively, obtained from the Thai input-output tables.

TABLE 2 *Effective Rates of Protection of the Manufacturing Sector Classified by Trade Oriented Group, 1969 TO 1987*

(per cent)

| Sector / Year | 1969 [1] | 1974 [2] | 1984 [3] | 1987 [3] |
|---|---|---|---|---|
| Export group | -43 | -35 | 2 | 4 |
| Import competing group | 54[a] (648)[b] | 63 | 21 | 39 |
| Non-import competing group | 187 | 77[c] (812) [d] | 53 | 55 |

Notes:
[a] Tyres and tubes are excluded.
[b] Tyres and tubes are included.
[c] Cigarettes and soft drinks are excluded.
[d] Cigarettes and soft drinks are included.

Products are classified, based on Narongchai's studies (1973, 1977), into three groups: export oriented, import competing and non-import competing, according to their trade orientation. A product is classified as export if its export level is greater than 10 per cent of its domestic production and its net export is positive. It is import competing if its import is greater than 10 per cent of its total consumption and if its net import is positive. The rest are classified as non-import competing.

The 1975 value added at market price of each industry are used as weights to estimate the aggregate ERP of each product group of all years.

Sources:
[1] Calculated from Narongchai (1973).
[2] Calculated from Narongchai (1977).
[3] Calculated from Paitoon et al. (1989).

APPENDIX[3]

Simulated effects of a 25 per cent across the board cut in protection

Version: PARA Regional Version

**A. Macro Results:**

A.1 Overall Economy

| | |
|---|---|
| Gross Domestic Product | |
| Nominal (local currency) | -0.442 |
| Real | 0.031 |
| Consumer Price Index | -0.245 |
| GDP Deflator | -0.473 |
| Wage (nominal) | |
| Skilled | 0.391 |
| Unskilled | 0.382 |
| Mobile capital (nominal) | |
| Non-agriculture | 0.355 |
| Agriculture | 0.048 |
| Employment | |
| Skilled | * |
| Unskilled | * |

A.2 External Sector

| | |
|---|---|
| Export Revenue (foreign currency) | 0.718 |
| Import Bill (foreign currency) | 0.578 |

A.3 Government Budget

| | |
|---|---|
| Nominal Revenue (local currency) | -1.244 |
| Expenditure | |
| Nominal (local currency) | -1.244 |

[3] An asterisk (*) indicates that the variable is exogenously held fixed.

| | |
|---|---|
| Real | -1.310 |
| Budget Deficit (in levels, foreign currency) | * |

A.4 Household Sector

Consumption

| | |
|---|---|
| Nominal (local currency) | -0.242 |
| Real | 0.003 |

## B. Sectoral Results

B.1 Specific Industries Output

Agriculture by Region

Central

| | |
|---|---|
| Paddy | 0.008 |
| Maize | -0.028 |
| Cassava | 0.064 |
| Sugar Cane | -0.109 |
| Cotton | 0.236 |
| Rubber | 0.693 |

Northern

| | |
|---|---|
| Paddy | 0.047 |
| Maize | -0.005 |
| Cassava | 0.078 |
| Sugar Cane | -0.098 |
| Cotton | 0.489 |
| Tobacco | -0.400 |

Northeastern

| | |
|---|---|
| Paddy | -0.047 |
| Cassava | 0.065 |
| Sugar Cane | -0.111 |
| Cotton | 0.273 |

Southern

| | | |
|---|---|---|
| | Paddy | -0.381 |
| | Rubber | 0.625 |
| Manufactures | | |
| | Food Processing | 0.147 |
| | Rice Milling | -0.035 |
| | Sugar Refinery | -0.109 |
| | Animal Feeds | 0.075 |
| | Beverages | -0.245 |
| | Cigarettes | -0.426 |
| | Textiles | 1.212 |
| | Leather | 0.801 |
| | Printing | -0.052 |
| | Fertilizer | 0.591 |
| | Petroleum | 0.122 |
| | Cement | -0.204 |
| | Basic Metals | -0.543 |
| | Agricultural Machinery | -0.032 |
| Services | | |
| | Transport | 0.508 |
| | Trade | -0.352 |
| | Banking | 0.107 |
| | Other Services | -0.020 |

B.2 Industry Groups I

| | | | |
|---|---|---|---|
| Primary Industries | | | |
| | National | | -0.011 |
| | Regional | | |
| | | Central | -0.013 |
| | | Northern | 0.077 |
| | | Northeastern | 0.014 |
| | | Southern | -0.167 |
| Natural Resources | | | -0.011 |
| Agricultural Processing | | | 0.020 |
| Other Manufacturing | | | 0.169 |

| | |
|---|---|
| Services | 0.022 |

B.3 Industry Groups II

| | |
|---|---|
| Export-oriented | 0.231 |
| Import-competing | -0.037 |
| Strong | -0.160 |
| Weak | -0.027 |

**C. Tax collection**

| | |
|---|---|
| Corporate | 0.332 |
| Tariff | -23.974 |
| Excise | -0.932 |
| VAT | 0.437 |
| Personal | 28.145 |
| Business | -0.643 |
| Other | -1.253 |

**D. Income Distribution**

Nominal Gross Income Changes

Rural

| | |
|---|---|
| HHR1 (poor) | 0.159 |
| HHR2 | 0.185 |
| HHR3 | 0.181 |
| HHR4 | 0.222 |
| HHR5 (rich) | 0.296 |

Urban

| | |
|---|---|
| HHUR1 (poor | 0.298 |
| HHUR2 | 0.331 |
| HHUR3 | 0.345 |
| HHUR4 | 0.361 |
| HHUR5 (rich) | 0.370 |

Real Gross Income Changes (deflated by household specific CPI)

Rural

| | |
|---|---|
| HHR1 (poor) | 0.338 |
| HHR2 | 0.536 |

| | |
|---|---|
| HHR3 | 0.462 |
| HHR4 | 0.524 |
| HHR5 (rich) | 0.583 |

Urban

| | |
|---|---|
| HHUR1 (poor | 0.432 |
| HHUR2 | 0.498 |
| HHUR3 | 0.531 |
| HHUR4 | 0.576 |
| HHUR5 (rich) | 0.665 |

Real Consumption Expenditures

Rural

| | |
|---|---|
| HHR1 (poor) | 0.363 |
| HHR2 | 0.408 |
| HHR3 | 0.440 |
| HHR4 | 0.246 |
| HHR5 (rich) | 0.059 |

Urban

| | |
|---|---|
| HHUR1 (poor | 0.433 |
| HHUR2 | 0.333 |
| HHUR3 | 0.160 |
| HHUR4 | -0.164 |
| HHUR5 (rich) | -0.909 |