NERAM: A Nominal and Effective Rates of Assistance Model for the SALTER World Trade Model

by

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1 INTRODUCTION

The Commission has developed, under contract to the Department of Foreign Affairs and Trade, a multi-country, multi-commodity general equilibrium model of the world economy. This is known as the SALTER (Sectoral Analysis of Liberalisation of Trade in the East-Asian Region) model and is designed to simulate policy effects on world trade flows particularly in the Australian and Pacific regions. The Commission calculates two measures of industry assistance, nominal and effective rates. These measures give an indication of the distortion to an economy due to a particular assistance regime. This paper outlines a Nominal and Effective Rates of Assistance Model (NERAM) that utilizes the SALTER database.

Section 2 discusses assistance measurement, looking at the basic concepts, measures and assumptions. This section highlights issues such as the treatment of capital, traded and non-traded goods in NERAM. This is followed by a discussion of the SALTER database and some additional assumptions used in the model in section 3. Section 4 looks at the computer implementation of NERAM giving an overview of the GEMPACK software followed by a description of how the data was derived and a discussion of the difficulties involved. The results of the model are presented in section 5. This involves a international comparison of the assistance estimates calculated for agricultural and non-agricultural products. Following this, assistance estimates are discussed on a more detailed sectoral basis. The final section is a summary of the model.

2 ASSISTANCE MEASUREMENT

2.1 Concepts

NERAM is designed to perform quantitative analysis of government interventions that induce differences between domestic and world prices. The interventions NERAM considers are the tariff on competing imports, export and producer subsidies. The model assumes tradability of commodities, perfect substitution between goods of the same description and that the benchmark price of a good is the import parity for import competing and export parity for export activities. As an example of the effects of these interventions, figure 2.1 shows the results of placing a tariff on an import competing commodity. In figure 2.1, with no intervention in the market, the world price P will hold giving total demand at the level Q'''. Domestic producers, at this price, will supply the amount Q with the remaining QQ''' being taken up by imports. The imposition of a tariff raises the domestic price of that commodity from P to P'. The increased price encourages domestic producers to raise their output from Q to Q' and also discourages consumers from buying the commodity. Demand falls from the level Q''' to Q''. Imports are squeezed from both sides, falling from QQ''' to Q'Q''. Increased output at higher prices results in a subsidy to producers of the area P'AFP. The higher prices mean consumers are now taxed the amount P'BDP of which ABDE is customs tariff revenue. The higher level of inefficient output leads to a production deadweight loss of the area AEF. The higher prices also lead to a consumption deadweight loss of the area BCD. Similarly, one might imagine an exported commodity where the world price lies above the domestic equilibrium price as shown in figure 2.2. The imposition of an export subsidy raises the price producers receive for the exported commodity from P to P'. Domestic consumers must now pay the subsidy inclusive price P' for the commodity or all the production will be exported. This type of policy leads to the subsidisation of the producers of the area P'FDP and taxing of the consumers P'ABP. The government paying the subsidy AFEB. In this case, the production deadweight loss is represented by the area FDE and consumption deadweight loss by the area ABC.

Figure 2.1: **Partial Equilibrium Effects of a Tariff**

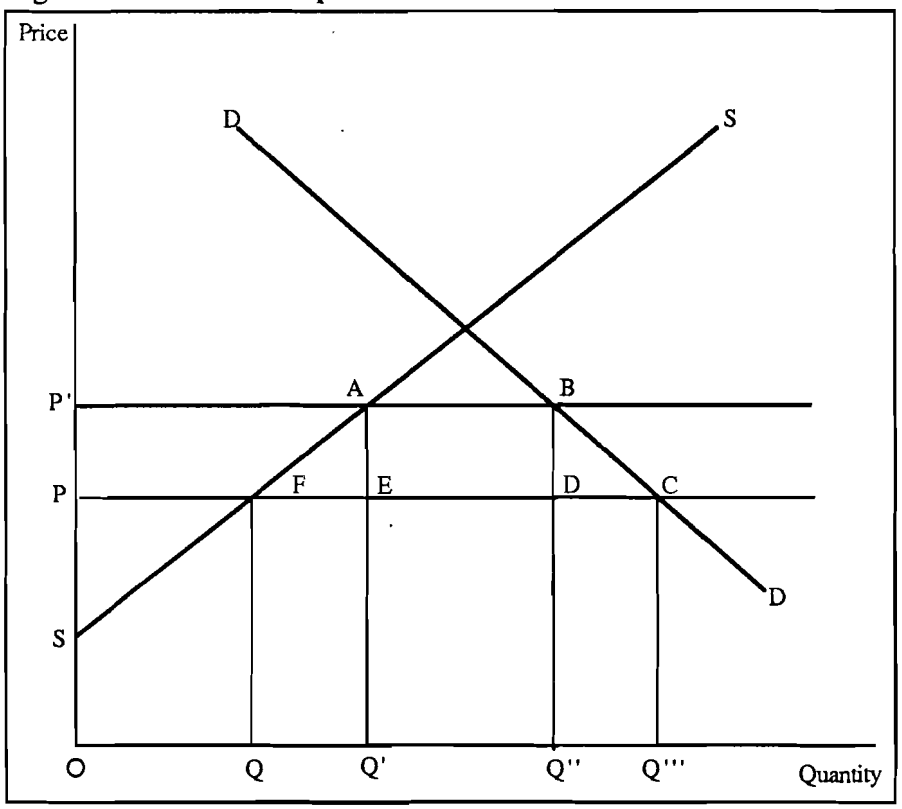
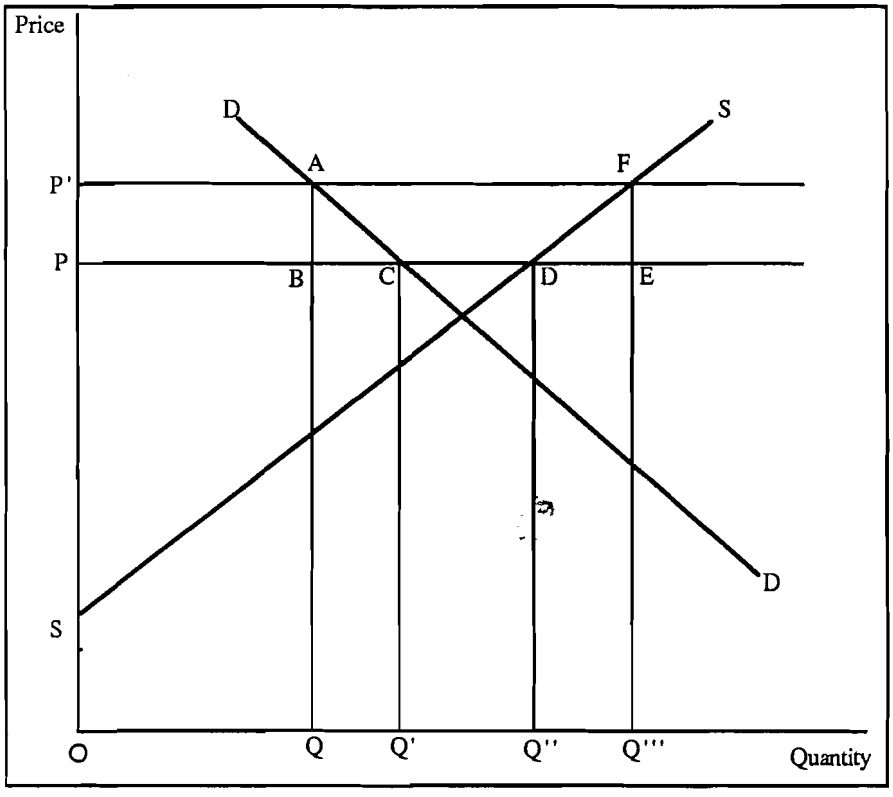


Figure 2.2: **Partial Equilibrium Effects of an Export Subsidy**



2.2 Measures

2.2.1 Nominal rates of assistance

Nominal rates measure the gross assistance afforded an industry. The nominal rate of assistance is the proportional change in the value of output due to any assistance arrangements. It is an indication of the price distortion consumers and producers face. A high nominal rate of protection indicates a large wedge between world and domestic prices. This results in higher consumption and production deadweight losses. The nominal rate of protection is calculated as follows:

$$(2.1) \qquad nrp_{(j,z)} = \frac{AVO_{(j,z)} - UVO_{(j,z)}}{UVO_{(j,z)}} \qquad j=1,...,h, \;\; z=1,...,m$$

where $nrp_{(j,z)}$ = the nominal rate of protection for industry j in country z;

$AVO_{(j,z)}$ = the value of output of industry j at world prices in country z; and

$UVO_{(j,z)}$ = the value of output of industry j at actual domestic prices in country z.

For an imported commodity, figure 2.1 shows the assisted and unassisted values of output are represented by the area's P'AQ'O and PFQO respectively. In figure 2.2, the assisted and unassisted values of output for the exported commodity are P'FQ"'O and PDQ"O.

2.2.2 Effective rates of assistance

Effective rates take into account assistance measures have on an industry's inputs and outputs. Figure 2.1 shows how the price, and hence the value of output, increases with the imposition of a tariff. However, with government intervention occuring across a range of commodities, the value of material inputs into production will be greater causing a shift upward in the supply curve (marginal cost curve). Effective rates measure the net effect on each industry of all assistance and represents the proportion by which the value added at domestic prices exceeds the value added an industry would be receiving at world prices. Effective rates of assistance can be thought of as a subsidy rate applied to an industries value added (see Tower 1984). The effective rate of assistance is calculated as follows:

(2.2) $$erp_{(j,z)} = \frac{AVA_{(j,z)} - UVA_{(j,z)}}{UVA_{(j,z)}} \qquad j=1,...,h,\ z=1,...,m$$

where $erp_{(j,z)}$ = the effective rate of protection for each industry j in each country z;

$AVA_{(j,z)}$ = the assisted value added for each industry j in each country z; and

$UVA_{(j,z)}$ = the unassisted value added for each industry j in each country z.

2.2.3 Net Subsidy and Consumer Tax Equivalent

The net subsidy equivalent is the estimated amount of money that would provide an industry with the equivalent level of assistance as does the effective rate of assistance. It measures the value added subsidy eluded to in section 2.2.2 for a particular industry. The increase in the price of an industry's output is measured by the gross subsidy equivalent:

(2.3) $$GSE_{(j,z)} = AVO_{(j,z)} - UVO_{(j,z)} \qquad j=1,...,h,\ z=1,...,m$$

where $GSE_{(j,z)}$ = the gross subsidy equivalent for industry j in country z.

The gross tax equivalent is the cost to an industry of the higher prices of inputs:

(2.4) $$GTE_{(j,z)} = AVI_{(j,z)} - UVI_{(j,z)} \qquad j=1,...,h,\ z=1,...,m$$

where $GTE_{(j,z)}$ = the gross tax equivalent for industry j in country z;

$AVI_{(j,z)}$ = the assisted value of material inputs for industry j in each country z; and

$UVI_{(j,z)}$ = the unassisted value of material inputs for industry j in each country z.

The net subsidy equivalent estimates the net effect to an industry from the assistance on inputs and outputs:

(2.5) $NSE_{(j,z)} = GSE_{(j,z)} - GTE_{(j,z)}$ j=1,...,h, z=1,...,m

where $NSE_{(j,z)}$ = the net subsidy equivalent for each industry j in country z.

By definition, the net subsidy equivalent for a particular industry is the assisted minus the unassisted value added:

(2.6) $NSE_{(j,z)} = AVA_{(j,z)} - UVA_{(j,z)}$ j=1,...,h, z=1,...,m

Equations (2.2) and (2.6) can be used to relate the net subsidy equivalent to the effective rate of protection:

(2.7a) $$erp_{(j,z)} = \frac{AVA_{(j,z)} - UVA_{(j,z)}}{UVA_{(j,z)}}$$ j=1,...,h, z=1,...,m

(2.7b) $erp_{(j,z)} \times UVA_{(j,z)} = AVA_{(j,z)} - UVA_{(j,z)}$

from (2.6)

(2.7c) $erp_{(j,z)} \times UVA_{(j,z)} = NSE_{(j,z)}$

Equation (2.7c) shows how the effective rate of assistance can be thought of as a subsidy rate to value added. Looking back to figure 2.1, the consumer tax equivalent measures the transfers of income from consumers to domestic producers and the government through the increased prices of goods due to the assistance structure. The consumer tax equivalent is a measure of P'BDP in figure 2.1:

(2.8) $CTE_{(i,z)} = GSE_{(i,z)} + DT_{(i,z)}$ i=1,...,h, z=1,...,m

where $CTE_{(i,z)}$ = the consumer tax equivalent for each commodity i in country z; and

$DT_{(i,z)}$ = the value of duty paid on commodity i in country z.

2.3 Assumptions

2.3.1 Basic Assumptions

In addition to the assumptions concerning the tradability of goods, perfect substitution and exogenous world prices, two important additional assumption are:

1) the quantity and direction of trade remain in the absence of assistance; and

2) production relationships between inputs (ie material and primary factors) and output remain unchanged by the structure of assistance.

2.3.2 Value added and the treatment of capital

Value added is the difference between sales revenue and the costs of materials used in production. Following the input–output structure, industries sell their product for a variety of purposes: intermediate usage, private and government consumption, investment and exports. Gross value added excludes the depreciation expense of an industry from the costs of materials used in production – only costs associated with intermediate usage are considered in calculating gross value added. Tariffs and export subsidies raise the cost of an industries capital inputs and, therefore, the value of depreciation. This increase in the cost of materials lowers the net subsidy equivalent and, therefore, the effective rate of protection. Following the Balassa treatment (Balassa et al 1971), NERAM uses net value added so the costs of materials include intermediate usage, commodity taxes on intermediate usage and depreciation. Producer taxes/subsidies are also included in the calculation of value added and, therefore, in the effective rate of assistance measure.

2.3.3 Traded and non-traded goods

A non-traded good is one produced domestically but not exported eg. electricity. Under the small country assumption, the supply of traded commodities is said to be perfectly elastic. Prices of non-traded goods are determined by domestic supply and demand conditions. An increase in the price of traded inputs or demand by user industries will increase the price of a non-traded good. Therefore, the supply curve for non-traded goods is not perfectly elastic. There are two main approaches that have been developed to simplify and measure the effects on

non-traded goods, namely the Corden method and the Balassa method. The Corden method (Corden 1971) lumps together all the traded goods and measures the direct effects on them due to an assistance regime. In the production of non-traded goods, the Corden method considers the effects on their traded inputs. This measures the indirect effect of protection. Owing to it's simplicity and solveability with the GEMPACK suite of programs, NERAM adopts the Balassa treatment of non-traded goods. This method assumes the non-traded goods are supplied at constant costs, ie the supply curve is elastic (the same as traded goods) over the appropriate range, giving an effective rate of protection equal to zero.

2.4 Solving the model for non-traded and traded goods

2.4.1 Deriving unassisted from assisted values

The values of sales and costs obtained from the database are post assistance. It is from these, unassisted values must be derived. This is possible because tariffs and export taxes are assumed to be ad valorem:

(2.10) $$AV = (1+t)\,UV$$

where AV = the assisted value of commodity i in country z;

UV = the unassisted value of commodity i in country z; and

t = the tariff or export subsidy rate on commodity i in country z.

With the assisted values present on the database, unassisted values are derived:

(2.11) $$UV = \frac{AV}{(1+t)}$$

Output sold in the domestic market is affected by tariffs as shown in figure 2.1. Output which is exported is affected by export subsidies as shown in figure 2.2.

2.4.2 Non-traded Goods

Taking as an example a country that produces one traded good T and one non-traded good N. Using the Balassa assumptions, a "tariff rate" for non-traded goods is derived so as to set it's effective rate of protection equal to zero. Exports and export subsidy rates are included in the calculations for non-traded goods and are (presumably) zero. From the definition of value added given in the previous section, the assisted value added for a non-traded industry is determined from the database:

$$(2.12) \qquad AVA_N = [Zd_N + EXP_N] - [VMI_{NN} + VMI_{TN}] - TSR_N$$

where AVA_N = assisted value added for the non-traded industry N;

Zd_N = domestic sales of the non-traded commodity N;

EXP_N = exports of the non-traded commodity N;

VMI_{NN} = value of non-traded material input N in the production of the non-traded good N;

VMI_{TN} = value of traded material input T in the production of the non-traded good N; and

TSR_N = producer taxes/subsidies paid from/to the non-traded industry N.

Equation (2.12) states that the assisted value added for the non-traded industry N, is total sales minus the total costs. Included in the value of material inputs are intermediate usage at purchasers prices and the depreciation expense. Also, to include producer taxes (subsidies) in the effective rate of assistance calculation, they are subtracted from the value of output. From the database, the assisted value added calculated for an industry in equation (2.12) is equivalent to that industries payments to primary factors (labour, capital and land). Using the method described in equation (2.11), the formula for unassisted value added is :

$$(2.13) \qquad UVA_N = \left[\frac{Zd_N}{(1+df_N)} + \frac{EXP_N}{(1+ef_N)}\right] - \left[\frac{VMI_{NN}}{(1+df_N)} + \frac{VMI_{TN}}{(1+df_T)}\right]$$

where UVA_N = unassisted value added for the non-traded industry N[1];

df_N = the "tariff rate" on the non-traded good;

df_T = the tariff rate on the traded goods; and

ef_N = the export subsidy rate on the non-traded good.

The tariff rate for traded goods is calculated from the database, however, without the "tariff rate" for non-traded goods the model cannot solve for unassisted value added for non-traded (and also traded) goods. Using the Balassa treatment of non-traded goods, with the effective rate of protection is set equal to zero, equation (2.2) becomes:

$$(2.14) \qquad 0 = \frac{AVA_N - UVA_N}{UVA_N}$$

Therefore;

$$(2.14a) \qquad AVA_N = UVA_N$$

Substituting equation (2.14a) into (2.13);

$$(2.15) \quad AVA_N = \left[\frac{Zd_N}{(1+df_N)} + \frac{EXP_N}{(1+ef_N)}\right] - \left[\frac{VMI_{NN}}{(1+df_N)} + \frac{VMI_{TN}}{(1+df_T)}\right]$$

In equation (2.15), df_N is the only unknown as the other values are determined from the database. The Balassa assumptions enable the model to solve a "tariff rate" for the non-traded good.

2.4.3 Traded Goods

The "tariff rate" for the non-traded good is then used to calculate unassisted value added for traded goods:

$$(2.16) \quad UVA_T = \left[\frac{Zd_T}{(1+df_T)} + \frac{EXP_T}{(1+ef_T)}\right] - \left[\frac{VMI_{NT}}{(1+df_N)} + \frac{VMI_{TT}}{(1+df_T)}\right]$$

[1] This calculation excludes the payment/receipt of producer taxes/subsidies.

where UVA_T = unassisted value added for the traded industry T;

ef_T = the export subsidy rate on the traded good;

Zd_T = domestic sales of the traded commodity T;

EXP_T = exports of the traded commodity T;

VMI_{NT} = value of non-traded material inputs N in the production of the traded good T; and

VMI_{TT} = value of traded material inputs T in the production of the traded good T.

In the SALTER database there are many traded and non-traded goods. The model solves the set of linear equations through a process of matrix inversion using the GEMPACK suite of software (Codsi and Pearson 1988).

3 ASSISTANCE MEASUREMENT WITH SALTER

3.1 Overview of SALTER

3.1.1 The Database

The SALTER database has been derived primarily from input–output tables. The purchaser's prices of goods are split into basic values and commodity taxes. Depreciation is only available for each country which makes the calculations weak as the model can not capture the full effects of varying depreciation costs for different capital commodities in different industries. The basic value for imports is landed duty paid. Imports of commodities (and the duty paid) will have nine sources (the number of SALTER countries plus the rest of the world) which then must be aggregated. NERAM calculates a single duty rate for each commodity in each country. The SALTER database may have trade in non-tradables, it is possible for the database to have present exports of electricity. Due to this, exports and their subsidy rates are calculated for non-traded goods. However, the "tariff rate" for non-traded goods are calculated using the Balassa assumptions as previously discussed.

3.2 Additional Assumptions

3.2.1 Ad valorem commodity taxes

Tariffs and export taxes in NERAM are assumed to be ad valorem. These taxes raise both the price paid by the domestic user as well as received by domestic producers by the same percentage. The SALTER model also includes commodity taxes on final demands (investment, private and government consumption). Though NERAM considers the effects of assistance on the value of commodity taxes charged on intermediate usage and exports, the effects of the other commodity taxes present in the database are not taken into account.

3.2.2 Assistance methodology and SALTER

The SALTER model assumptions differ from those used in standard assistance methodology. SALTER assumes imperfect substitution between imported and domestic commodities. NERAM, however, allows for no substitution between domestic and imported commodities.

Both models employ the Armington assumption which states that imported commodities aren't perfectly substitutable for the domestic commodity. For example, significant changes in the relative prices of Australian-made and imported cars due to the removal of tariffs on motor vehicles can take place without the elimination of the domestic industry as may be expected if the price were to fall substantially. A substantial fall in the price of a commodity leads to higher nominal rate of protection. Also, in the assistance methodology, the output price is demand-determined with supply being fixed. However, in the SALTER model, over the long run, for those industries without a fixed factor (non-agricultural industries) the output price is supply-determined.

4 COMPUTER IMPLEMENTATION

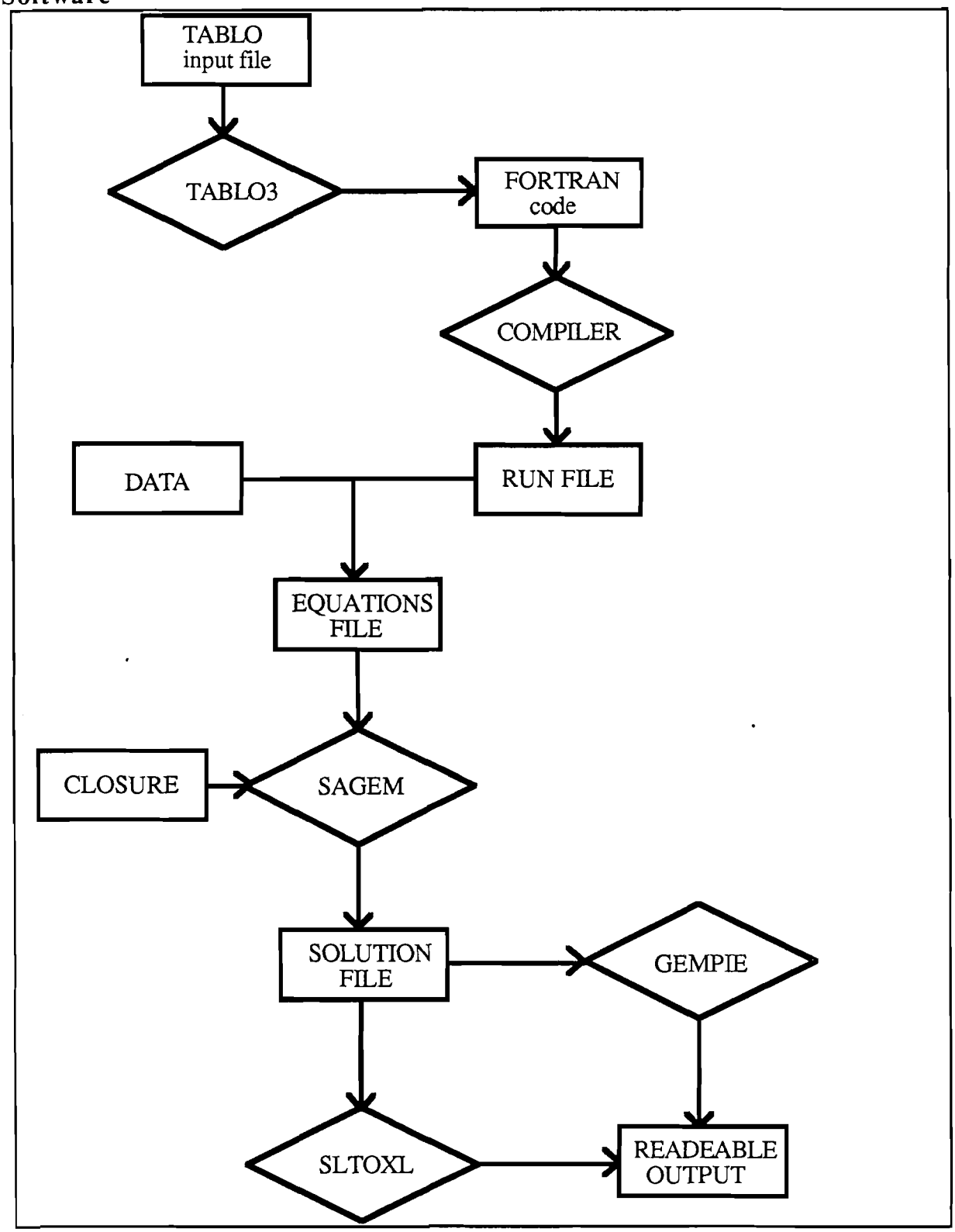
4.1 An Overview of GEMPACK

NERAM is implemented through version 4.3 of the GEMPACK suite of software programs (Codsi and Pearson 1988). GEMPACK comprises a number of software applications designed to solve computable general equilibrium (CGE) models. Following the flow diagram in figure 4.1, the model is defined in a text file known as the TABLO input file[2]. This file contains formula and equations are written in algebraic notation. This notation is transformed to FORTRAN code when this text file is used as an input to the tablo3 program. After compiling and linking the FORTRAN code, an executable file is obtained. On execution, this file reads the data stored in header array format and an equations file is generated. It is from this equations file that a solution file is obtained via the SAGEM program (which specifies exogenous and endogenous variables and the shocks to be applied to the system). The SAGEM program generates a solution file. The GEMPIE program is then used to obtain a readable print out of the solution. The readable output from the GEMPIE program, however, is limited by the amount of characters it can print. To this end, the program SLTOXL has been developed. This reads the solution file and prints the variables out in a text file that can be loaded into a spreadsheet package such as MICROSOFT EXCEL[3].

[2] The TABLO input deck is in appendix 1.

[3] The results of the model are in appendix 2.

Figure 4.1: **Computer Implementation of NERAM with the GEMPACK 4.3 Software**



4.2 DATA FROM SALTER

In the TABLO input deck, coefficients are defined as data that comes from the database directly, or manipulated by formulas. These formulas may be non-linear. Table 4.1 shows the data that comes directly from the SALTER database.

This original data[4] must then be manipulated to yield the coefficients necessary to perform the assistance calculations.

Table 4.1: **Coefficients from the SALTER Database to be used in NERAM**

Coefficient	*Description*	*Subscript range*
$A^{(s)}_{(i,j,z)}$	Intermediate usage of commodity i by industry j from source s in country z.	i = 1,...,h j = 1,...,h s = 1,2 z = 1,...,m
$Pi^{(s)k}_{(i,z)}$	Absorption of commodity i from source s for purpose k in country z. Purposes include; private and government consumption, investment and exports.	i = 1,...,h k = 1,...,4 s = 1,2 z = 1,...,m
$Fct^{v}_{(j,z)}$	Payments to primary factors by industry j to factor v in country z. Factors include; labour, capital, land and indirect taxes net of subsidies.	j = 1,...,h v = 1,...,4 z = 1,...,m
$TINT^{(s)}_{(i,j,z)}$	Commodity taxes on intermediate usage of commodity i by industry j from source s in country z.	i = 1,...,h j = 1,...,h s = 1,2 z = 1,...,m
$DT_{(i,z)}$	The value of duty paid on imports of commodity i in country z.	i = 1,...,h z = 1,...,m
$ET_{(i,z)}$	The value of export taxes paid on commodity i in country z.	i = 1,...,h z = 1,...,m
$DEPN_{(z)}$	The value of depreciation in country z.	z = 1,...,m

[4] Remembering that the imported goods, s=2, have been aggregated over the SALTER countries and the rest of the world.

4.2.1 Total Sales

Commodities in the database are sold for a variety of purposes: intermediate usage, household consumption, government consumption, investment and exports. These are measured at basic values (the price received by the industry). From table 4.1, total sales are given by the expression:

$$(4.1) \qquad Zj_{(i,z)} = \sum_{j=1}^{h} A^{(1)}_{(i,j,z)} + \sum_{k=1}^{5} Pi^{(1)k}_{(i,z)} \qquad i=1,...,h,\ z=1,...,m,\ k=1....4$$

where $Zj_{(i,z)}$ = the total sales of each domestically produced commodity i in each country z;

$A^{(1)}_{(i,j,z)}$ = intermediate usage of each domestically produced commodity i by industry j in each country z; and

$Pi^{(1)k}_{(i,z)}$ = absorption of each domestically produced commodity i by each purpose, k, in each country z.

The SALTER model does not recognise joint production so the total sales of a domestic commodity equals that of the industry:

$$(4.2) \qquad Zj_{(i,z)} = Zj_{(j,z)} \qquad i,j=1,...,h,\ z=1,...,m$$

The SALTER database is derived from input output tables and so equation (3) provides the assisted value or output for each industry.

$$(4.3) \qquad Zj_{(j,z)} = AVO_{(j,z)} \qquad j=1,...,h,\ z=1,...,m$$

4.2.2 The Value of Material Inputs

The total value of material inputs into an industries production is then defined as;

$$(4.4) \quad TVI_{(j,z)} = \sum_{i=1}^{h}\sum_{s=1}^{2} A^{(s)}_{(i,j,z)} + \sum_{i=1}^{h}\sum_{s=1}^{2} TINT^{(s)}_{(i,j,z)} + \sum_{i=1}^{h}\sum_{s=1}^{2} DEPN^{(s)}_{(i,j,z)} \qquad j=1,...,h,\ z=1,...,m$$

where $TVI_{(j,z)}$ = total value of inputs into industry j in each country z;

$A^{(s)}_{(i,j,z)}$ = intermediate usage of each commodity i by industry j from source s in country z;

$TINT^{(s)}_{(i,j,z)}$ = commodity taxes on intermediate usage of each commodity i by industry j from source s in country z; and

$DEPN^{(s)}_{(i,j,z)}$ = depreciation of each commodity i by industry j from source s in country z.

Again, equation (4.4) applied to the database provides the assisted value of inputs into each industry.

$$(4.5) \qquad AVI_{(j,z)} = TVI_{(j,z)} \qquad j=1,...,h,\ z=1,...,m$$

where $AVI_{(j,z)}$ = assisted value of inputs into industry j in each country z.

The database provides the assisted value added for each industry. As discussed earlier, the producer tax (subsidy) is included in equation (4.5). It, along with the value of material inputs, must be subtracted from total sales to give assisted value added.

$$(4.6) \qquad AVA_{(j,z)} = Zj_{(j,z)} - AVI_{(J,Z)} - FCT^{(4)}_{(J,Z)} \qquad j=1,...,h,\ z=1,...,m$$

where $FCT^{(4)}_{(J,Z)}$ = net indirect taxes (subsidies) paid by industry j in country z.

4.2.3 Calculation of Depreciation by Commodity, Industry and source

Depreciation in allocated by calculating shares of investment by commodity and source and shares of payments to capital by industry.

$$(4.7) \qquad SHPi^{(s)3}_{(i,z)} = \frac{Pi^{(s)3}_{(i,z)}}{\sum_{i=1}^{h}\sum_{s=1}^{2} Pi^{(s)3}_{(i,z)}} \qquad i=1,...,h,\ z=1,...,m,\ s=1,2$$

where $SHPi^{(s)3}_{(i,z)}$ = share of investment in each commodity i from source s in country z; and

$Pi^{(s)3}_{(i,z)}$ = investment in each commodity i from source s in country z.

$$(4.8) \qquad SHFct^{2}_{(j,z)} = \frac{Fct^{2}_{(j,z)}}{\sum_{j=1}^{h} Fct^{2}_{(j,z)}} \qquad j=1,...,h,\ z=1,...,m$$

where $SHFct^{2}_{(j,z)}$ = share of factor payments to capital by industry j in each country z; and

$Fct^{2}_{(j,z)}$ = factor payments to capital by each industry j in each country z.

The assumption made is that the capital stock is linearly related to returns to capital ie. the greater returns to capital are in a particular industry, the higher it's capital stock and, therefore, depreciation. Also, the greater the investment in a particular good from a particular source, the higher the capital stock of that good will be ie. one might expect higher purchases of construction to mean higher stocks of construction capital and, therefore, depreciation. Once these shares are calculated, the depreciation figure for each country is firstly split over commodities and source;

$$(4.9) \qquad DEPN^{(s)}_{(i,z)} = DEPN_{(z)} \times SHPi^{(s)3}_{(i,z)} \qquad i=1,...,h,\ s=1,2$$

where $DEPN^{(s)}_{(i,z)}$ = the depreciation of each commodity i from source s in country z;

$DEPN_{(z)}$ = the value of depreciation of each country z.

Then over industries;

$$(4.10) \qquad DEPN^{(s)}_{(i,j,z)} = DEPN^{(s)}_{(i,z)} \times SHFct^{2}_{(j,z)} \qquad i=1,...,h,\ z=1,...,m,\ s=1,2$$

where $DEPN^{(s)}_{(i,j,z)}$ = the depreciation of each commodity i of industry j from source s in country z.

4.2.4 Tariff Rates

In order to calculate the unassisted values from the database values (as described in equation 2.11), tariffs and export subsidy rates need to be determined. The SALTER database contains information on duty paid and imports of each commodity. However, the import values in the database, being at basic values, include duty.

$$(4.11) \qquad LDP_{(i,z)} = \sum_{j=1}^{h} A^{(2)}_{(i,j,z)} + \sum_{k=1}^{4} Pi^{(2)k}_{(i,z)} \qquad i=1,...,h,\ z=1,...,m,\ k=1,...,3$$

where $LDP_{(i,z)}$ = the landed duty paid value of imports of commodity i into country z;

$A^{(2)}_{(i,j,z)}$ = imported intermediate usage of commodity i by industry j in country z; and

$Pi^{(2)k}_{(i,z)}$ = imported commodity i for purpose, k, in country z.

To calculate the tariff rate the landed duty free value of imports of each commodity is derived as

$$(4.12) \qquad LDF_{(i,z)} = LDP_{(i,z)} - DT_{(i,z)} \qquad i=1,...,h,\ z=1,...,m$$

where $LDF_{(i,z)}$ = the landed duty free value of imports of commodity i into country z; and

$DT_{(i,z)}$ = the value of duty paid on imports of commodity i into country z.

The ad valorem tariff rate on each commodity can then be calculated by dividing duty paid by the landed duty free value of imports of each commodity.

$$(4.13) \qquad df_{(i,z)} = \frac{DT_{(i,z)}}{LDF_{(i,z)}} \qquad i=1,...,h,\ z=1,...,m$$

where $df_{(i,z)}$ = the tariff rate on commodity i into country z.

4.2.5 *Export Subsidy Rates*

The SALTER database gives the value of exports[5] and the value of commodity taxes paid on exports from each country. To calculate the export subsidy rate then:

$$ef_{(i,z)} = \frac{-ET_{(i,z)}}{Pi^{(1)5}_{(i,z)}} \qquad i=1,...,h,\ z=1,...,m \tag{4.14}$$

where $ef_{(i,z)}$ = the export subsidy rate on commodity i from country z;

$ET_{(i,z)}$ = export taxes paid in commodity i from country z; and

$Pi^{(1)5}_{(i,z)}$ = the value of exports of commodity,i, from country z.

4.3 Complications with TABLO

4.3.1 *The Structure of Equations*

The TABLO program makes the distinction between coefficients (those whose values come from the database) and variables which are determined in equations. The equations in a TABLO deck are of a set structure, it being;

$$\text{variable} = \text{coefficient} \times \text{variable}$$

Coefficients are unable to be divided by variables. The equations also must be linear ie. a variable cannot multiply or divide other variables. This creates some complications for the model. Considering the equation for the effective rate of protection shown in (4.15a), the unassisted value added is a variable and therefore cannot be used in the denominator of the equation. This requires the effective (and nominal) rates of protection equations to be altered:

$$erp_{(j,z)} = \frac{AVA_{(j,z)} - UVA_{(j,z)}}{UVA_{(j,z)}} \qquad j=1,...,h,\ z=1,...,m \tag{4.15a}$$

[5] Note these are pre-tax values.

(4.15b) $$erp_{(j,z)} \times UVA_{(j,z)} = AVA_{(j,z)} - UVA_{(j,z)}$$

(4.15c) $$(1 + erp_{(j,z)})UVA_{(j,z)} = AVA_{(j,z)}$$

(4.15d) $$UVA_{(j,z)} = AVA_{(j,z)} \frac{1}{(1 + erp_{(j,z)})}$$

From equation (4.15d), the model estimates the inverse power of the effective (and similarly the nominal) rate of protection. A similar problem arises when using the tariff or export subsidy rates to derive the unassisted from the assisted values in the database (as shown in equation (2.11)). The solution, again, is to define tariff and export subsidy rates as inverse powers. A third complication to the model involves the inverse powers of tariff and subsidy rates and the structure of equations in TABLO. The problem can best be illustrated when considering the equation for unassisted value of output as it reads in the TABLO input deck:

(4.16) $$UVO_{(j,z)} = \left[Zd_{(j,z)} \times ddfi_{(j,z)}\right] + \left[EXP_{(j,z)} \times dexp_{(j,z)}\right] \qquad j=1,...,h, \; z=1,...,m$$

Where ddfi and dexp are the inverse powers of the tariff and export subsidy rates respectively. As described earlier, the model solves for the inverse power of the tariff for non-traded commodities, that is, they are variables. However, for a traded good, all the terms on the RHS of equation (4.16) are coefficients derived from the database. This breaches the rules for equations in TABLO. To overcome this the inverse powers determined from the database, the tariff for traded goods and export subsidy for all commodities, are converted into variables:

(i) $$ddfi_{(t,z)} = dfx_{(t,z)} \times one \qquad t=1,...,p, \; z=1,...,m$$

(ii) $$dexp_{(i,z)} = dfexp_{(i,z)} \times one \qquad i=1,...,h, \; z=1,...,m$$

where $ddfi_{(t,z)}$ = the **variable** for the inverse power of the tariff traded commodity t in country z to be used in equations;

$dfx_{(t,z)}$ = the **coefficient** for the inverse power of the tariff for traded commodity, t,country, z that has been calculated from the database;

$dexp_{(i,z)}$= the **variable** for the inverse power of the export tax for commodity i in country z to be used in equations;

$dfexp_{(i,z)}$= the **coefficient** for the inverse power of the export tax for commodity, i, in country z calculated from the database; and

one = "dummy variable" for commodities i in country z which converts coefficients to variables enabling them to be used in equations.

In the SAGEM the variable "one" is defined as being exogenous and is shocked by one. This has no other effect on the calculated inverse powers except to make them variables.

4.4 Problems Concerning Data

4.4.1 Zero Production

A complication with the model that stems from the data is when the assisted value of output from the database is zero. This implies the unassisted value of output will also be zero. Similarly, the assisted and unassisted value added will have no value. In this case the effective and nominal rates of protection are undetermined ie. the model cannot be solved. It is possible, however, to set assisted value of output equal to some value when it is otherwise equal to zero. Equation (4.3) states the assisted value of output for each industry is equal to the value of output from the database:

$$\text{(iii)} \quad AVO_{(j,z)} = Zj_{(j,z)}$$

This formula can be modified to:

$$\text{(iv)} \quad AVO_{(j,z)} = Zj_{(j,z)} * (Zj_{(j,z)}/Zj_{(j,z)})+X * (1 - (Zj_{(j,z)}/Zj_{(j,z)})^{6}$$

Where X is the desired number, in our case 1 is chosen so that the nominal and effective rates become zero. The ZERODIVIDE DEFAULT in TABLO is set equal to zero so when $Zj_{(j,z)}$ takes on some value $AVO_{(j,z)}$ equals $Zj_{(j,z)}$. However, when $Zj_{(j,z)}$ is zero, the RHS cancels out to give X.

[6] The author wishes to thank Kevin Hanslow for this idea.

4.4.2 Non-traded Goods

The SALTER database commodity classification presented in table 4.2 shows a distinct set of typical non-traded goods ranging from commodity 29 (electricity, water and gas) to 34 (ownership of dwellings). There are, however, other not so obvious non-traded goods in the database. The first of these is commodity 7 (forestry) which, through some classification error, has virtually no trade in the database. Forestry is, therefore, considered a non-traded good. A second, not obvious non-traded good is commodity 6 (other livestock products). This is not through any classification error but for the fact that the majority of the output of other livestock products is sold as intermediate usage and almost exclusively to either industry 12 (meat products) or 13 (milk products) as shown in table 4.3.

This creates some complications, the assistance put into the SALTER database for other livestock products is quite low as shown in table 4.4. However, both the meat and milk product industries receive quite substantial assistance. The "backward linkage" (Corden 1971) of assistance to other livestock products from the assistance given to the meat and milk product

Table 4.2: **Industry and Commodity Groupings in the SALTER Model**

Agriculture	1	Paddy rice	4	Other grains
	2	Non-grain crops	5	Wool
	3	Wheat	6	Other livestock products
Resources	7	Forestry	10	Oil and gas
	8	Fishing	11	Other minerals
	9	Coal		
Food	12	Meat products	14	Other food products
	13	Milk products	15	Beverages and tobacco
Manufacturing non-metallic	16	Spinning, dyeing and made-up textiles	20	Pulp, paper and printing
	17	Wearing apparel	21	Chemicals, rubber and plastic
	18	Leather, fur and their products	22	Petroleum and coal products
	19	Lumber and wood products	23	Non-metallic mineral products
Manufacturing metallic	24	Primary iron and steel	27	Other machinery and equipment
	25	Other metals and products	28	Other manufacturing
	26	Transport equipment		
Services	29	Electricity, gas and water	32	Other services (private)
	30	Construction	33	Other services (government)
	31	Trade and transport	34	Other services (ownership of dwellings)

industries will not be captured using the model's standard assumptions about non-traded goods.

To overcome this, the meat and milk products industries have been aggregated[7] and the effective rate of protection for this new industry set at zero as if it were non-traded. This enables the model to calculate a "tariff rate" on other livestock products:

Table 4.3: **Sales Shares of Other Livestock Products to the Meat and Milk Products Industries**

	Shares in	
	Total sales of intermediate usage	*Total sales*
	%	%
Australia	99.96	90.39
New Zealand	59.53	54.63
Canada	82.87	72.85
USA	93.26	86.99
Japan	80.03	71.20
Korea	85.75	72.08
EC	69.00	56.81
ASEAN	29.02	20.07

Source: SALTER database

(4.17)
$$AVA_{(12,z)} = UVO_{(12,z)} - \sum_{T=1}^{t} \frac{AVI_{(T,12,z)}}{(1+df_{(T,z)})} - \sum_{N=1}^{t} \frac{AVI_{(N,12,z)}}{(1+df_{(N,z)})} - \frac{AVI_{(6,12,z)}}{(1+df_{(6,z)})} \qquad z=1,\ldots,m$$

where $AVA_{(12,z)}$ = assisted value added for Meat and milk products in country z;

$UVO_{(12,z)}$ = unassisted value of output for Meat and milk products in country z;

$AVI_{(T,12,z)}$ = the value of traded inputs into Meat and milk products in country z;

$AVI_{(N,12,z)}$ = the value of non-traded inputs into Meat and milk products in country z;

$AVI_{(6,12,z)}$ = the value of Other livestock products into Meat and milk products in country z;

$df_{(T,z)}$ = the tariff rate on traded goods in country z;

$df_{(N,z)}$ = the "tariff rate" on non-traded goods in country z; and

$df_{(6,z)}$ = the "tariff rate" on Other livestock products in country z.

The "tariff rate" on other livestock products is solved similarly to those on non-traded goods in equation (2.15). The exception being that it's own effective rate of protection is not set equal to

[7] The values in the database were simply added with the exception of duty which was share weighted by domestic sales.

zero, rather that of meat and milk products. The result being $df_{(6,z)}$ is the only unknown in equation (4.17).

Table 4.4: **Assistance to the Other Livestock, Meat and Milk Products in the SALTER Database**

Industry	*Export tax*[a]	*Import tax*	*Production tax*
Australia	%	%	%
Other livestock products	–0.52	0.00	–0.14
Meat products	0.00	0.00	–7.23
Milk products	–19.10	19.50	0.00
New Zealand			
Other livestock products	0.00	0.00	–0.11
Meat products	–0.06	10.49	–6.84
Milk products	0.00	0.00	1.50
Canada			
Other livestock products	0.00	0.00	–1.23
Meat products	–13.14	37.42	–18.35
Milk products	–46.50	57.30	0.00
United States			
Other livestock products	0.00	0.00	–0.22
Meat products	–23.40	34.53	–7.00
Milk products	–40.70	36.20	0.00
Japan			
Other livestock products	0.00	0.00	–0.27
Meat products	–41.29	121.46	–3.60
Milk products	0.00	83.00	0.00
Korea			
Other livestock products	0.00	0.00	–0.84
Meat products	49.46	27.06	–6.57
Milk products	–18.40	22.60	–2.00
European Community			
Other livestock products	0.00	0.00	–0.39
Meat products	–40.76	71.19	–8.95
Milk products	–31.20	46.10	4.10
Asean			
Other livestock products	0.00	0.00	0.00
Meat products	–0.47	27.67	0.00
Milk products	–6.10	6.50	0.00

[a] A negative tax is interpreted as a subsidy

4.4.3 Negative Unassisted Value Added

Some industries in the SALTER database are receiving very large amounts of assistance (in particular in the agricultural sector). It is possible for the unassisted value added[8] for some industries to be negative. Looking at the equation for the effective rate of protection:

$$erp_{(j,z)} = \frac{AVA_{(j,z)} - UVA_{(j,z)}}{UVA_{(j,z)}} \qquad j=1,...,h,\ z=1,...,m \tag{4.18}$$

The numerator of equation (4.18) is the net subsidy equivalent (see equation (2.6)). A negative unassisted value added will result in a negative effective rate of protection being estimated by the model. It is for this reason results are reported as the share of income owing to an assistance regime. This is calculated as such:

$$S_{(j,z)} = \frac{AVA_{(j,z)} - UVA_{(j,z)}}{AVA_{(j,z)}} \qquad j=1,...,h,\ z=1,...,m \tag{4.19}$$

where $S_{(j,z)}$ = The share of income owing to assistance of industry j in country z.

[8] Each industry in the database has a positive assisted value added, however, when producer subsidies are excluded from this calculation, industries receiving large production subsidies can (and do) have negative assisted value added.

5 RESULTS

5.1 International Comparisons of Results

Given the current climate of GATT negotiations where agricultural products are a major area of contention, the international comparison of results will focus on differences between agricultural and non-agricultural products as presented in table 5.1.

Table 5.1: **Agricultural and Non-agricultural Commodity and Industry Groupings in NERAM**

Agricultural products	1	Paddy rice	6	Other livestock products
	2	Non-grain crops	12	Meat and milk products
	3	Wheat	13	Other food products
	4	Other grains	14	Beverages and tobacco
	5	Wool		
Non-agricultural products	15	Spinning, dyeing and made-up textiles	22	Non-metallic mineral products
	16	Wearing apparel	23	Primary iron and steel
	17	Leather, fur and their products	24	Other metals and products
	18	Lumber and wood products	25	Transport equipment
	19	Pulp, paper and printing	26	Other machinery and equipment
	20	Chemicals, rubber and plastic	27	Other manufacturing
	21	Petroleum and coal products		

Table 5.2: **Subsidy and Tax Equivalents Estimated by NERAM**

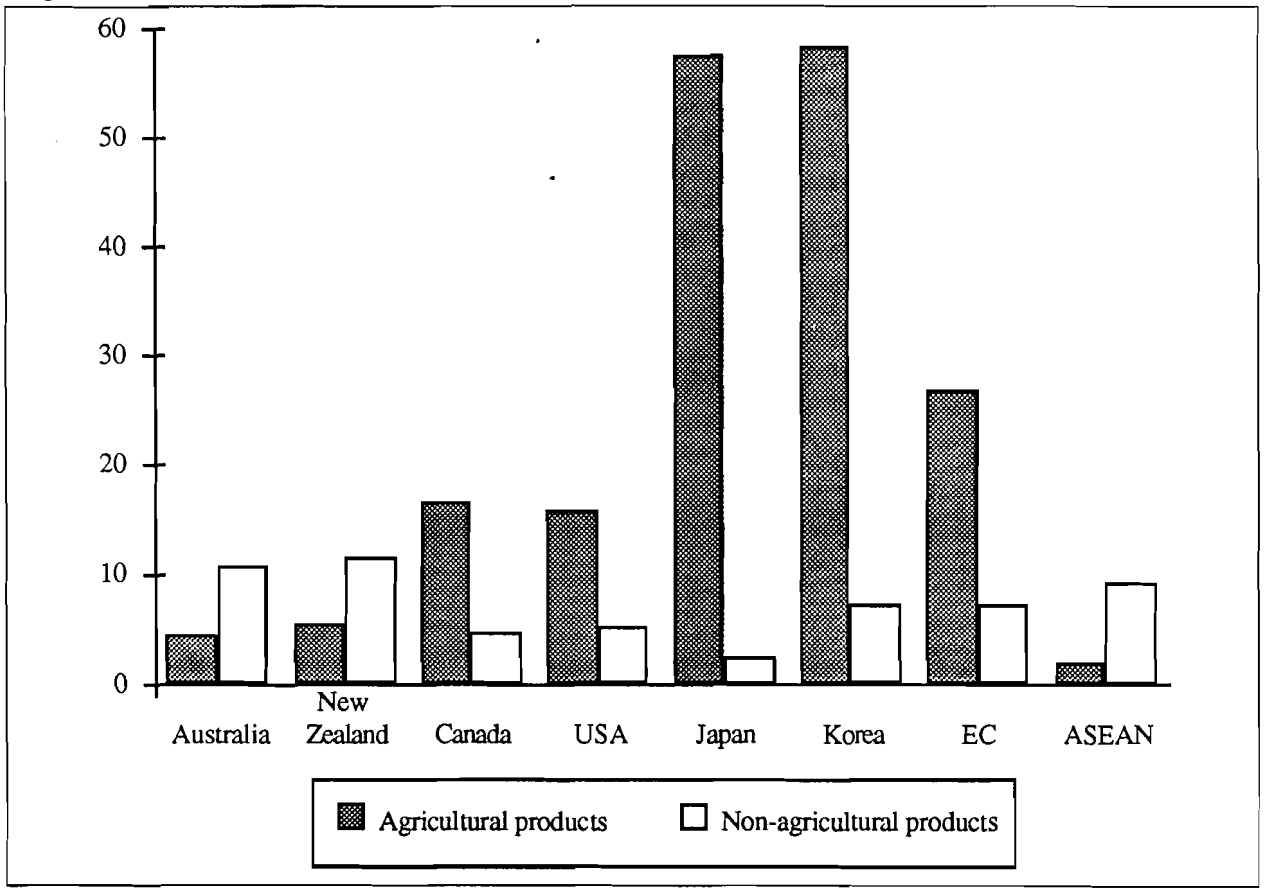
	Gross subsidy equivalent	*Tax on material inputs*	*Tax on producers*	*Gross tax equivalent*	*Net subsidy equivalent*	*Consumer tax equivalent*
	US$b	US$b	US$b	US$b	US$b	US$b
Agricultural						
Australia	2.3	2.3	-1.3	1.1	1.2	2.3
New Zealand	0.8	0.9	-0.4	0.5	0.3	0.9
Canada	10.8	7.2	-6.4	0.7	10.1	11.2
USA	70.4	43.8	-10.7	33.0	37.3	73.6
Japan	167.6	102.5	19.2	121.7	45.9	192.9
Korea	20.1	15.1	2.6	17.6	2.5	24.7
EC	187.1	105.3	-11.2	94.2	92.9	193.5
ASEAN	2.4	2.9	0.0	2.9	-0.5	2.7
Non-agricultural						
Australia	11.0	6.6	1.6	8.2	2.8	16.6
New Zealand	2.5	1.4	-0.1	1.3	1.1	3.2
Canada	11.8	9.7	1.9	11.6	0.2	18.8
USA	108.4	91.2	40.1	131.3	-22.9	126.3
Japan	40.4	56.2	88.3	144.5	-104.1	44.2
Korea	10.9	11.9	5.5	17.4	-6.5	15.6
EC	164.9	102.2	31.2	133.3	31.5	197.8
ASEAN	10.2	10.1	2.4	12.5	-2.3	25.6

[a] A negative tax is interpreted as a subsidy
Source: NERAM and the SALTER database

Nominal rates of protection (nrp) measure the direct assistance governments are targeting at a particular sector through tariffs and export subsidies. The results presented in figure 5.1 make it an easy task to separate those countries who assist the agricultural (Korea, Japan, EC, Canada and the USA) from the non-agricultural products sector (New Zealand, Australia and the ASEAN countries). The nominal rate of protection measures the price distortion between domestic and world prices induced by government intervention in the market. As an example, Japanese consumers are paying around 57% more for agricultural products than they would if buying them at the world price. This increased domestic price over the world price amounts to a subsidy for producers measured by the gross subsidy equivalent (GSE). Estimates of the dollar value of these subsidies are presented in table 5.2.

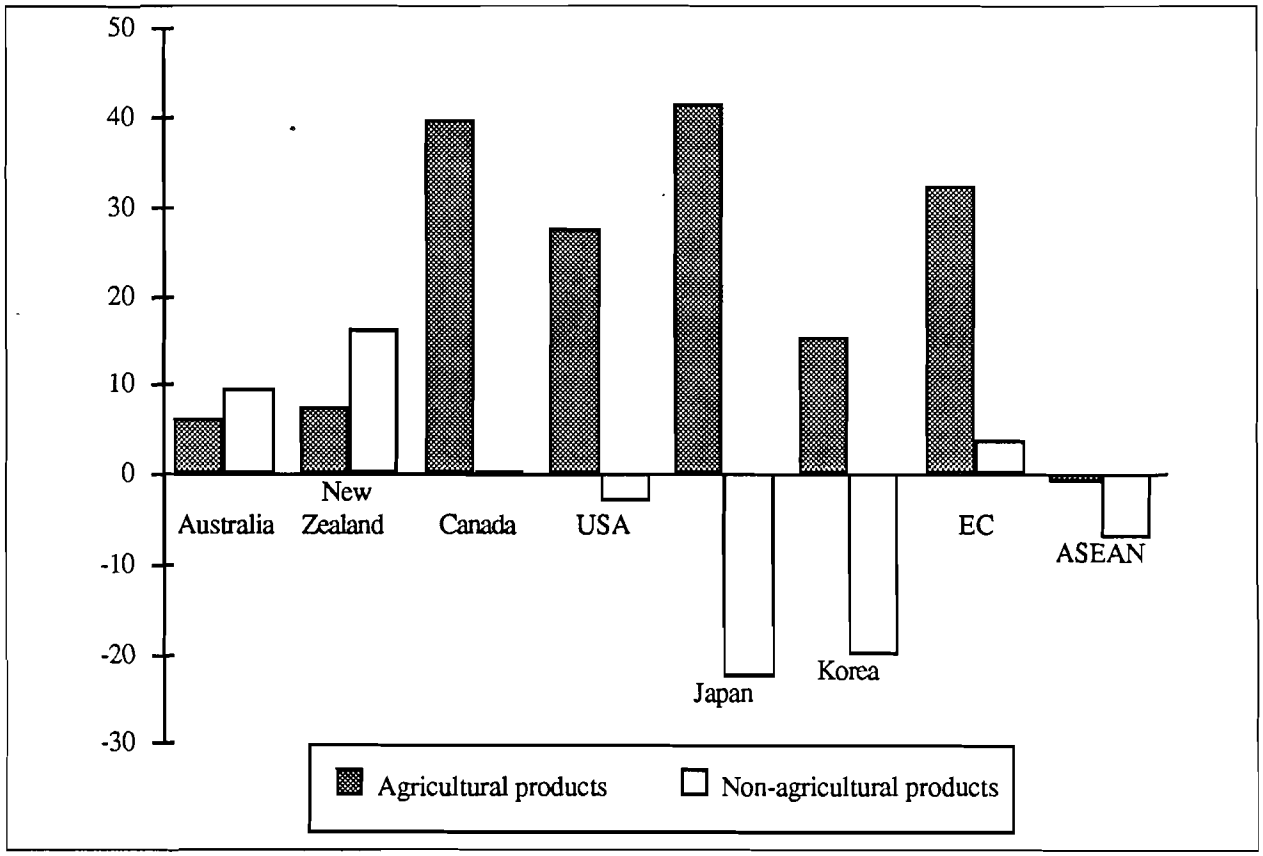
Australia is recognised as a country that protects the non-agricultural products sector. This is indicated by an estimated US$11b gross subsidy to this sector as compared to a US$2b subsidy to the agricultural products sector. From the results, agricultural producers in Japan and the EC

Figure 5.1: **Nominal Rates of Protection estimated by NERAM (per cent)**



receive large gross subsidies estimated at US$168b and US$187b respectively. Even the relatively smaller assistance measures in the EC and USA for the non-agricultural products sector are yielding large producer subsidies estimated at US$165b and US$108b respectively. The nominal rate of protection and GSE measure the gross value of assistance to an industry. However, with prices of commodities being held artificially high across the economy, this imposes a tax on the industries' inputs. This is measured by the gross tax equivalent (GTE). In table 5.2, the GTE has been split into two components, the estimated taxing effects on material inputs calculated by NERAM and the producer taxes (or subsidies) directly imposed by the government. The net effect of assistance is takes these two factors into consideration and is measured by the net subsidy equivalent (NSE). It is from this measure that effective rates of protection are calculated (see section 2.2.3). Results are reported as the percentage of value added due to assistance (see section 4.4.3) in figure 5.2.

Figure 5.2: **Assistance as a Percentage of Value Added[9] estimated by NERAM (per cent)**



[9] This is the measure as represented in equation (4.9). Assistance is the Net Subsidy Equivalent, value added is the payments to factors of production ie. the assisted value added as represented in equation (4.6).

The measures shown in figure 5.2 represent estimates of the net assistance to each sector in the SALTER countries. As shown, some countries protecting their agricultural products are doing so at the expense of their less assisted non-agricultural products sector. This is the case in Japan, Korea and the USA where the taxing effect outweighs the direct assistance the Non-agricultural products sector is receiving. This would also occur, to reverse sectors, in Australia and New Zealand if not for producer subsidies. The Agricultural sectors in Australia and New Zealand receive US$1b and US$0.4b in producer subsidies which keep the taxing effect of higher inputs below the subsidising effect of direct assistance. Canada and the EC, unlike Japan, Korea and the USA, protect their agricultural products; however this is not at the expense of the non-agricultural sector. In the ASEAN countries, net assistance to agriculture is negative, as the taxing effect on inputs outweighs direct assistance. Without the subsidies the Australian and New Zealand farmers are getting, those in the ASEAN countries are suffering negative assistance under the current policy regime.

The consumer tax equivalent (CTE) measures the transfer of income from consumers to producers. Consumers end up footing the bill for industry assistance and the CTE measures the extra amount they must pay. From the results presented in table 5.2, Japan and the EC are slugging their consumers US$193b each to assist the agricultural sector. Similarly, consumers in the countries who are assisting their non-agricultural sector are being taxed heavier than on agricultural products. Though recognised as countries who are protecting agricultural products, consumers in the EC, USA and Canada are being taxed more from the assistance to the non-agricultural products. It is interesting to note that in each sector in each country, the NSE is less than the CTE. The results suggest that by removing assistance, consumers could compensate producers and be better off.

5.2 More Detailed Sectoral Results

This section discusses the assistance results country by country, and in greater sectoral detail than the previous section. The sectoral classification has been been widened to that used in section 5.1. The agricultural products sector is split into an agricultural and food sector. The food sector comprises those industries which manufacture food products. The non-agricultural products sector is divided into six sectors: textiles, clothing and footwear (TCF), processed minerals, metal products, transport equipment, other machinery and other manufacturing. A resources sector is also included. A description of this classification is given in table 5.3. To analyse the results, as in section 5.1, there is a comparison of the nominal rates of protection

and percentage of value added from assistance in each sector. Also, the dollar values of the estimated subsidy and tax equivalents are presented, as in table 5.2.

Table 5.3: **Industry and Commodity Groupings in NERAM**

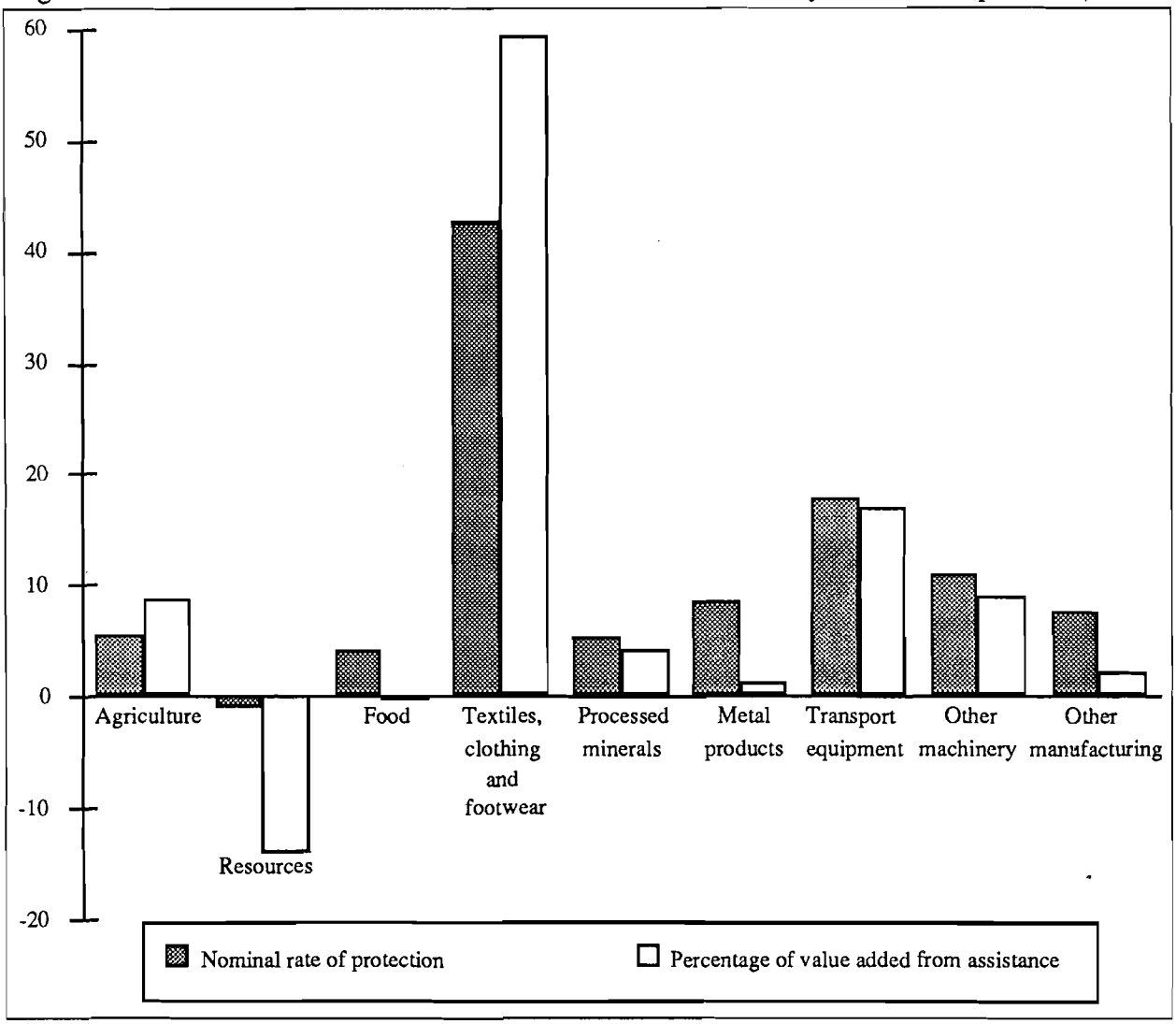
Agriculture	1	Paddy rice	4	Other grains
	2	Non-grain crops	5	Wool
	3	Wheat	6	Other livestock products
Resources	7	Forestry	10	Oil and gas
	8	Fishing	11	Other minerals
	9	Coal		
Food	12	Meat and milk products	14	Beverages and tobacco
	13	Other food products		
TCF	15	Spinning, dyeing and made-up textiles	16	Wearing apparel
Processed minerals	20	Chemicals, rubber and plastic	22	Non-metallic mineral products
	21	Petroleum and coal products		
Metal products	23	Primary iron and steel	24	Other metals and products
Transport equipment	25	Transport equipment		
Other machinery	26	Other machinery and equipment		
Other manufacturing	17	Leather, fur and their products	19	Pulp, paper and printing
	18	Lumber and wood products	27	Other manufacturing

5.2.1 Australia

Australia has been previously identified in section 5.1 as a country which assists the non-agricultural products sector. This is reinforced by the results in figure 5.3.

The nominal rates in the agriculture and food sectors are lower than that for other manufacturing. These sectors both receive producer subsidies from the government as shown in table 5.4. Producer subsidies to the agriculture sector outweigh the taxing effect assistance is having on its material inputs resulting in a negative GTE. This is not the case in the food sector where the producer subsidy cannot make up for the taxing effect in inputs. Export taxes placed on coal, oil and gas have yielded a negative nominal rate of protection for the resources sector in Australia. Assistance to the non-agricultural products sector is dominated in figure 5.3 by that given to TCF. Transport equipment and Other manufacturing are also assisted by the current regime.

Figure 5.3: **Assistance Measures estimated for Australia by NERAM** (per cent)



As a result of this assistance structure, consumers in Australia pay more for their manufactured products than they would be at world prices resulting in a taxing effect on consumers of over US$3b in each of the heavily protected sectors; TCF, transport equipment and other machinery.

Table 5.4: **Subsidy and Tax Equivalents Estimated for Australia by NERAM**

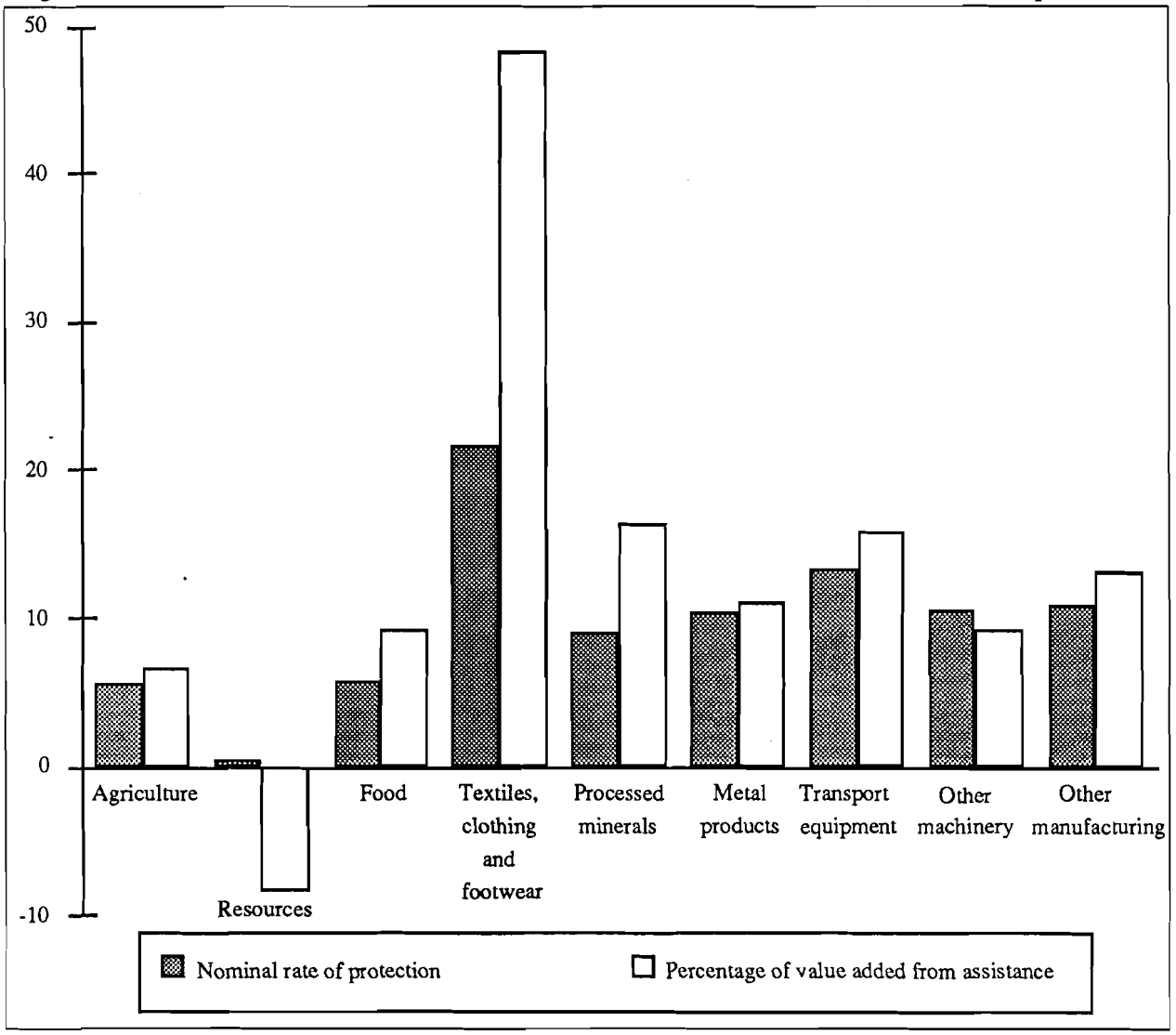
	Gross subsidy equivalent	*Tax on material inputs*	*Tax on producers*	*Gross tax equivalent*	*Net subsidy equivalent*	*Consumer tax equivalent*
	US$b	US$b	US$b	US$b	US$b	US$b
Agriculture	1.1	0.4	–0.6	–0.1	1.3	1.1
Resources	–0.2	0.9	0.3	1.2	–1.4	–0.2
Food	1.2	1.9	–0.7	1.2	0.0	1.2
TCF	2.7	1.2	0.1	1.3	1.4	3.6
Processed minerals	1.5	1.1	0.2	1.3	0.2	2.2
Metal products	2.3	1.4	0.8	2.3	0.1	2.6
Transport equipment	1.7	1.0	0.1	1.1	0.6	3.0
Other machinery	1.2	0.8	0.1	0.9	0.4	3.1
Other manufacturing	1.4	1.1	0.2	1.3	0.2	2.1

[a] A negative tax is interpreted as a subsidy
Source: NERAM and the SALTER database

5.2.2 New Zealand

New Zealand displays a similar protection structure as does Australia. New Zealand has relatively low levels of direct assistance to the agriculture and food sectors shown by relatively small nrp's in figure 5.4.

Figure 5.4: **Assistance Measures estimated for New Zealand by NERAM** (per cent)



These sectors both receive producer subsidies, as was the case in Australia, which work to dampen the effect of increased prices of inputs which manage to keep net assistance (the NSE) for these sectors positive. This is not the case in the resources sector which receives no such

subsidy and, hence, the taxing effect on inputs outweighs the meagre level of assistance it receives. High tariffs and a subsidy to production has the TCF sector in New Zealand benefiting most from assistance. Protection afforded the remaining manufacturers, the results suggest, are on par with each other.

Table 5.5: **Subsidy and Tax Equivalents Estimated for New Zealand by NERAM**

	Gross subsidy equivalent	*Tax on material inputs*	*Tax on producers*	*Gross tax equivalent*	*Net subsidy equivalent*	*Consumer tax equivalent*
	US$b	US$b	US$b	US$b	US$b	US$b
Agriculture	0.4	0.3	–0.1	0.2	0.2	0.4
Resources	0.0	0.1	0.0	0.1	–0.1	0.0
Food	0.5	0.5	–0.2	0.3	0.2	0.5
TCF	0.4	0.2	–0.1	0.1	0.3	0.4
Processed minerals	0.5	0.3	0.0	0.3	0.2	0.6
Metal products	0.4	0.3	0.0	0.3	0.1	0.5
Transport equipment	0.3	0.2	0.0	0.2	0.1	0.4
Other machinery	0.2	0.2	0.0	0.2	0.1	0.6
Other manufacturing	0.6	0.3	0.0	0.3	0.3	0.7

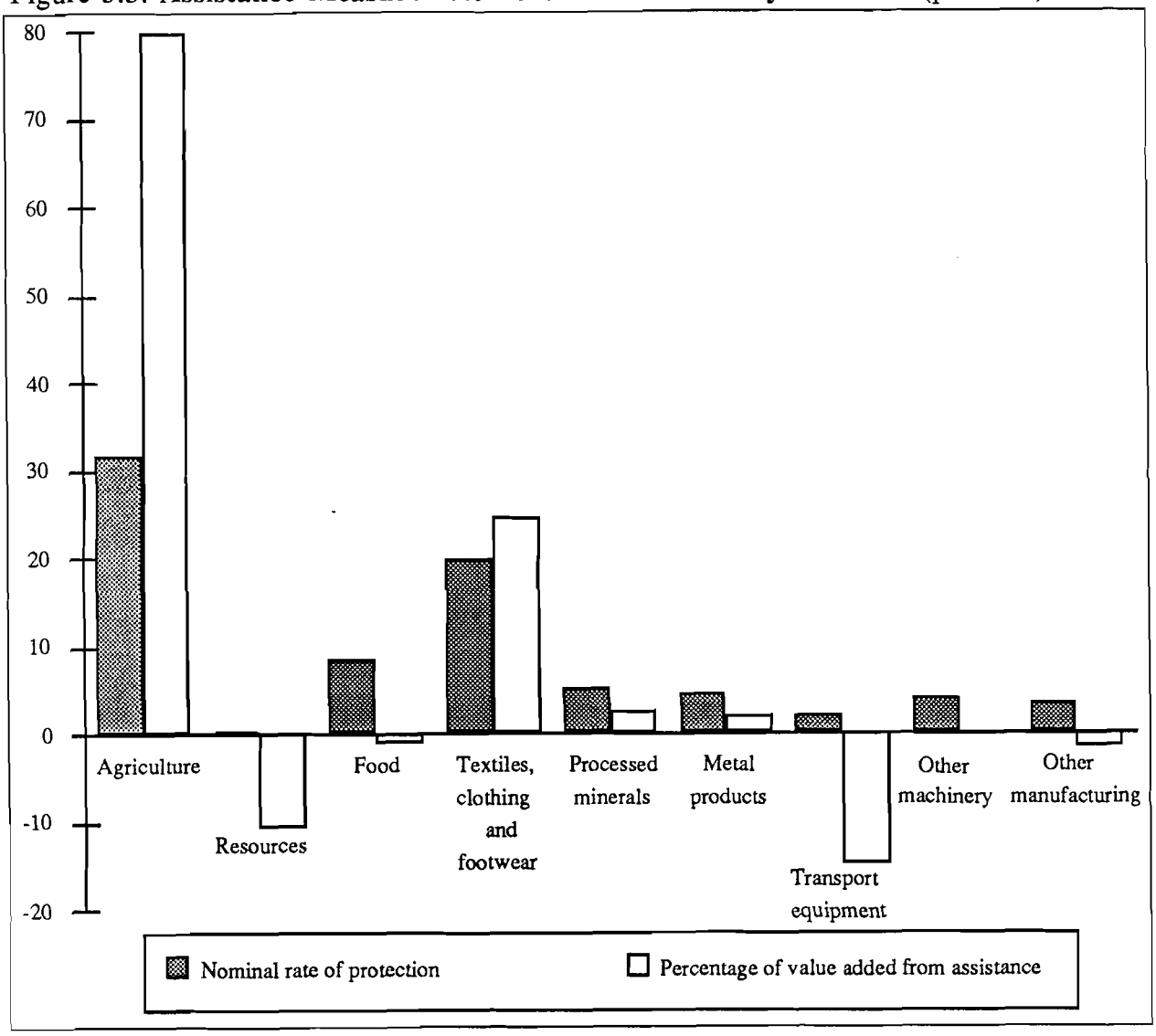
[a] A negative tax is interpreted as a subsidy
Source: NERAM and the SALTER database

Owing to the size of the New Zealand economy, results presented in table 5.5 are relatively small. These results indicate producer subsidies are given to the agriculture, food and TCF sectors. The importance of the producer subsidy to the food sector is evident, for without it, the sector would receive negative assistance.

5.2.3 Canada

From section 5.1, Canada (as opposed to Australia and New Zealand) has been recognised as a country who protects it's Agricultural products sector. This can be seen in figure 5.5.

Figure 5.5: **Assistance Measures estimated for Canada by NERAM** (per cent)



Agriculture in Canada is protected by high tariffs and export subsidies resulting in a nominal rate of protection of 31%. Accompanying this, farmers are given a US$4b subsidy which three and a half times outweighs the taxing effect on it's material inputs (see table 5.6) resulting in a net subsidy to Canadian farmers of an estimated US$10b. The food sector receives less in terms of direct protection (shown by an estimated nrp of 8%), however, the US$2b production

subsidy almost counters the taxing effect on inputs. As a result, this sector receives minor negative assistance from the existing protection regime. The resource sector suffers the same fate as does that in Australia and New Zealand. Of the non-agricultural manufacturers, TCF is receiving the largest amount of assistance. The remaining sectors receive little in terms of direct assistance (shown in figure 5.5 as relatively small nrp's), with the transport equipment and other manufacturing adversely effected by the assistance structure.

Table 5.6: **Subsidy and Tax Equivalents Estimated for Canada by NERAM**

	Gross subsidy equivalent	*Tax on material inputs*	*Tax on producers*	*Gross tax equivalent*	*Net subsidy equivalent*	*Consumer tax equivalent*
	US$b	US$b	US$b	US$b	US$b	US$b
Agriculture	7.2	1.2	–4.3	–3.1	10.2	7.3
Resources	0.2	1.1	1.2	2.3	–2.1	0.2
Food	3.6	5.9	–2.2	3.8	–0.1	3.9
TCF	2.8	1.3	0.1	1.4	1.4	3.4
Processed minerals	3.0	1.8	0.7	2.6	0.4	3.8
Metal products	1.8	1.2	0.4	1.5	0.3	2.3
Transport equipment	0.9	2.2	0.2	2.4	–1.5	3.4
Other machinery	1.2	1.1	0.1	1.1	0.0	3.3
Other manufacturing	2.2	2.1	0.5	2.5	–0.4	2.6

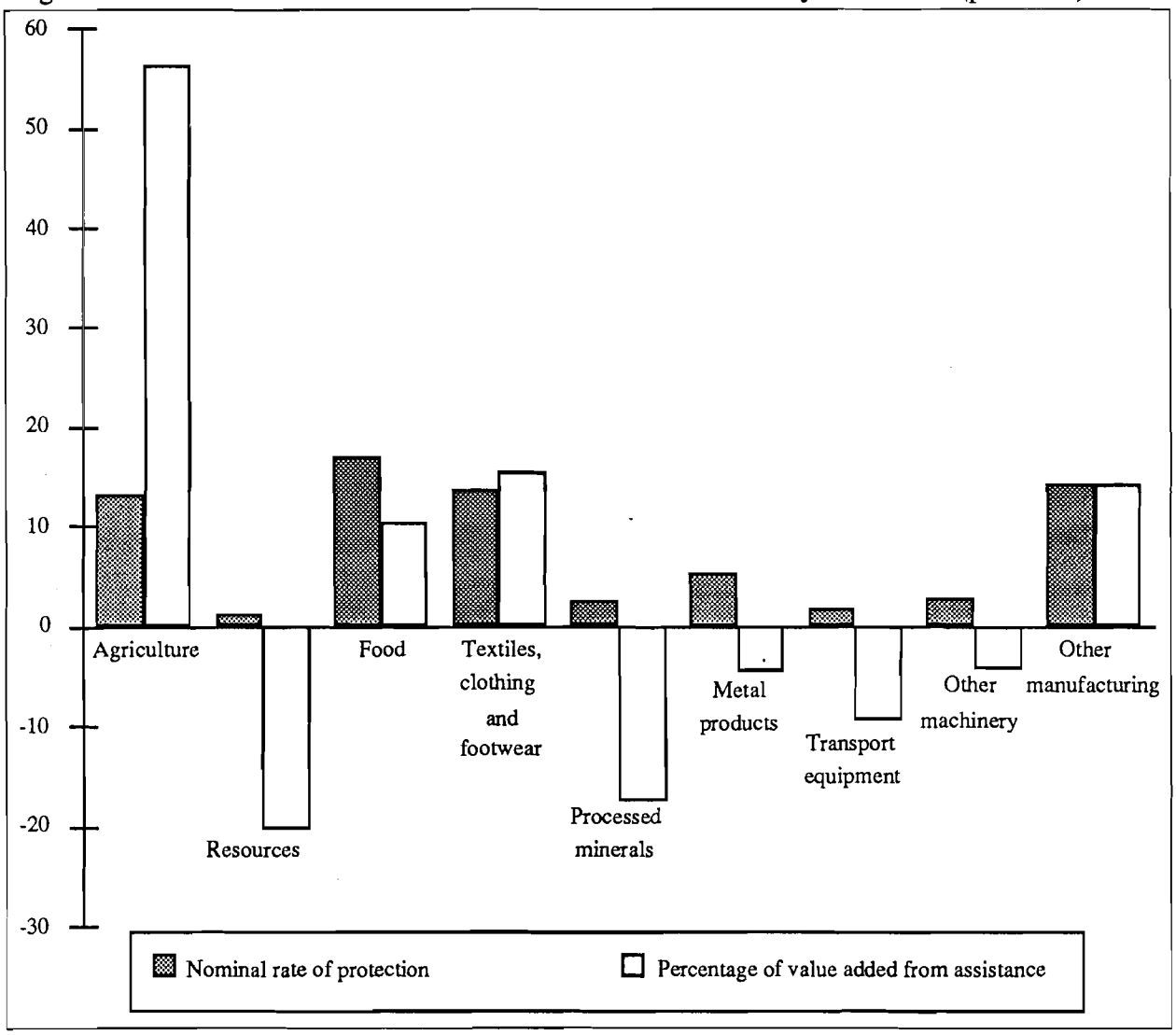
[a] A negative tax is interpreted as a subsidy
Source: NERAM and the SALTER database

The Canadian consumers are being taxed US$7b to pay for the assistance to agriculture. Due to the high subsidisation by the government of the agriculture sector, Canadian consumers would be unable to fully compensate their farmers if assistance was removed as the net subsidy is greater than the consumer tax equivalent.

5.2.4 *The United States*

The US has also been labelled an "agricultural products protector" in section 5.1. The assistance measures are presented in figure 5.6.

Figure 5.6: **Assistance Measures estimated for the USA by NERAM** (per cent)



As compared to the that given to the Canadian agriculture sector, assistance to US farmers comes not so much in the form of tariffs and export taxes (hence the nrp for the US estimated at 12% as opposed 31% in Canada) but rather from producer subsidies of US$21b As was the case in Australia and New Zealand, this more than outweighs the taxing effect on inputs into the agriculture sector. Manufacturers of food products benefit from the highest levels of direct

assistance resulting in an estimated nrp of 18%, however, with no subsidisation as in the agricultural sector, the taxing effect is substantial (an estimated US$43b) and lowers net assistance given to this sector. Of the non-agricultural manufacturers, the TCF and other manufacturing sectors are both gaining from the US assistance package, however, this is to the detriment of the resource and remaining manufacturing sectors.

Table 5.7: **Subsidy and Tax Equivalents Estimated for the USA by NERAM**

	Gross subsidy equivalent	*Tax on material inputs*	*Tax on producers*	*Gross tax equivalent*	*Net subsidy equivalent*	*Consumer tax equivalent*
	US$b	US$b	US$b	US$b	US$b	US$b
Agriculture	18.8	11.6	–21.4	–9.8	28.6	18.8
Resources	3.1	9.2	16.5	25.8	–22.7	3.8
Food	51.6	32.2	10.7	42.8	8.7	54.8
TCF	15.0	7.7	0.9	8.6	6.4	18.5
Processed minerals	14.0	18.8	19.7	38.4	–24.4	15.3
Metal products	12.9	12.3	4.8	17.2	–4.3	15.5
Transport equipment	5.3	11.3	4.4	15.8	–10.4	6.5
Other machinery	14.5	19.1	5.5	24.6	–10.2	20.0
Other manufacturing	46.7	22.0	4.7	26.7	20.0	50.5

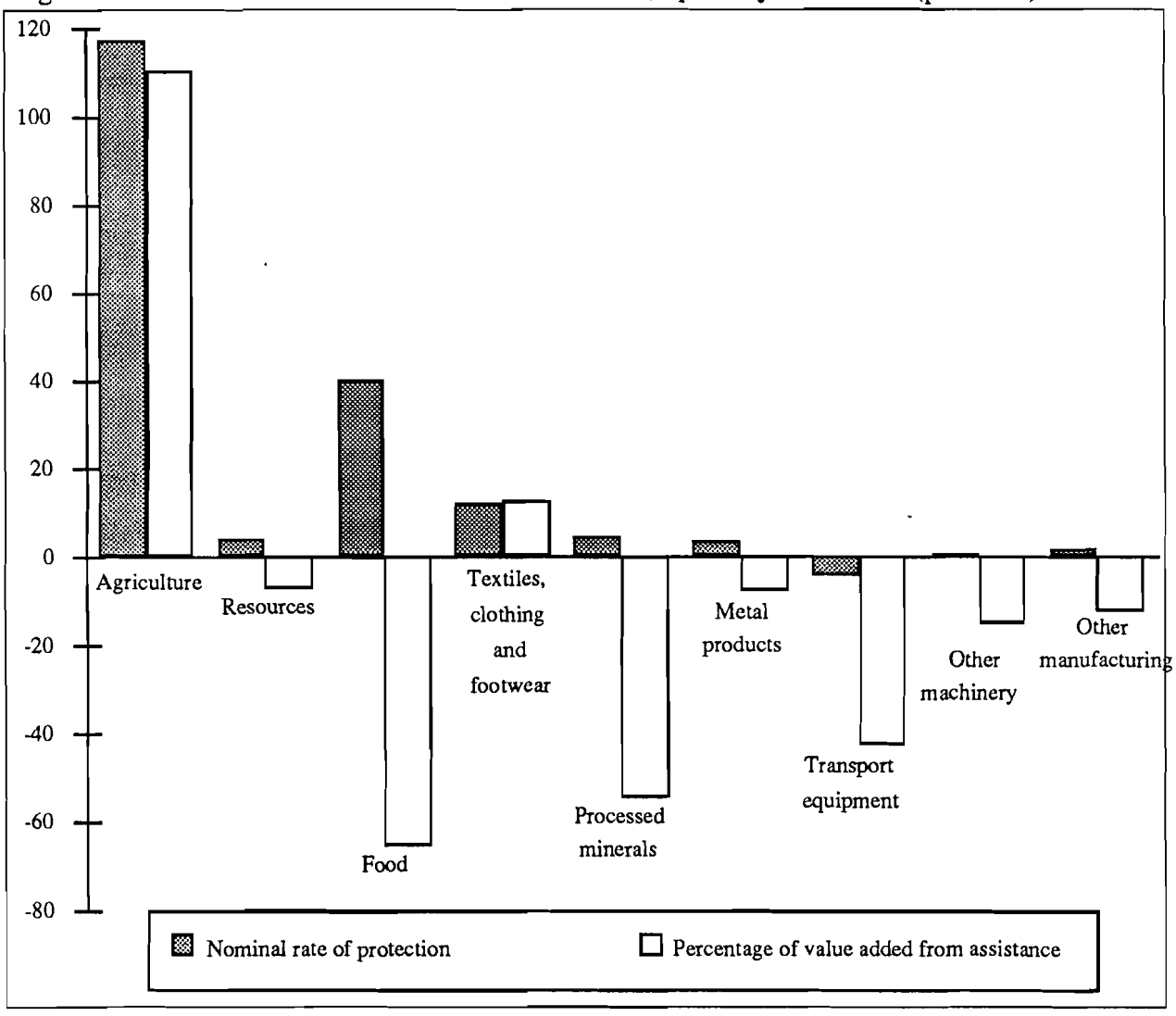
[a] A negative tax is interpreted as a subsidy
Source: NERAM and the SALTER database

Consumers are taxed an estimated US$1b and US$55b for agriculture and food products respectively. Due to the size of the US economy, even the relatively small levels of assistance yield high dollar values for the consumer tax equivalent as is the case for the processed minerals, metal products and other machinery sectors. Similar to Canada, US consumers cannot fully compensate the producers in the Agriculture sector if assistance was removed from them owing to their large government subsidies.

5.2.5 Japan

The assistance measures represented in figure 5.7 are dominated by estimates for the Japanese agriculture sector.

Figure 5.7: **Assistance Measures estimated for Japan by NERAM** (per cent)



Massive tariffs have been imposed on imports of agriculture into Japan. Accordingly, NERAM estimates the nrp for the Agriculture sector to be an astounding 117%. With a US$13b subsidy virtually cancelling out the taxing effects of inputs into the sector (see table 5.7), the estimated net subsidy to the sector amounts to US$74b. The food manufacturing sector has also been targeted for heavy assistance with an estimated nrp of around 40%. However, without the luxury of producer subsidies, the taxing effect on this sector (due to increased prices of

agricultural inputs) nets out to an estimated US$28b. The TCF sector is also receiving assistance, withe an nrp estimated to be 12% which is comparable to that of the USA. Of the remaining sectors there is little direct assistance to speak of. The transport equipment sector actually subject to a negative nrp owing to voluntary export restraints which are present as export taxes in the SALTER database (see Zeitsch, J *et al* 1991).

Table 5.8: **Subsidy and Tax Equivalents Estimated for Japan by NERAM**

	Gross subsidy equivalent	*Tax on material inputs*	*Tax on producers*	*Gross tax equivalent*	*Net subsidy equivalent*	*Consumer tax equivalent*
	US$b	US$b	US$b	US$b	US$b	US$b
Agriculture	76.3	14.7	-12.6	2.1	74.3	93.8
Resources	2.3	2.5	1.5	4.0	-1.7	3.8
Food	91.3	87.8	31.8	119.6	-28.3	99.1
TCF	11.5	5.8	2.1	7.8	3.7	12.4
Processed minerals	18.3	15.2	54.9	70.1	-51.8	19.2
Metal products	9.0	8.5	6.1	14.6	-5.6	10.0
Transport equipment	-6.3	4.2	8.2	12.4	-18.8	-6.2
Other machinery	3.3	14.1	12.3	26.4	-23.0	3.5
Other manufacturing	4.6	8.3	4.8	13.2	-8.6	5.4

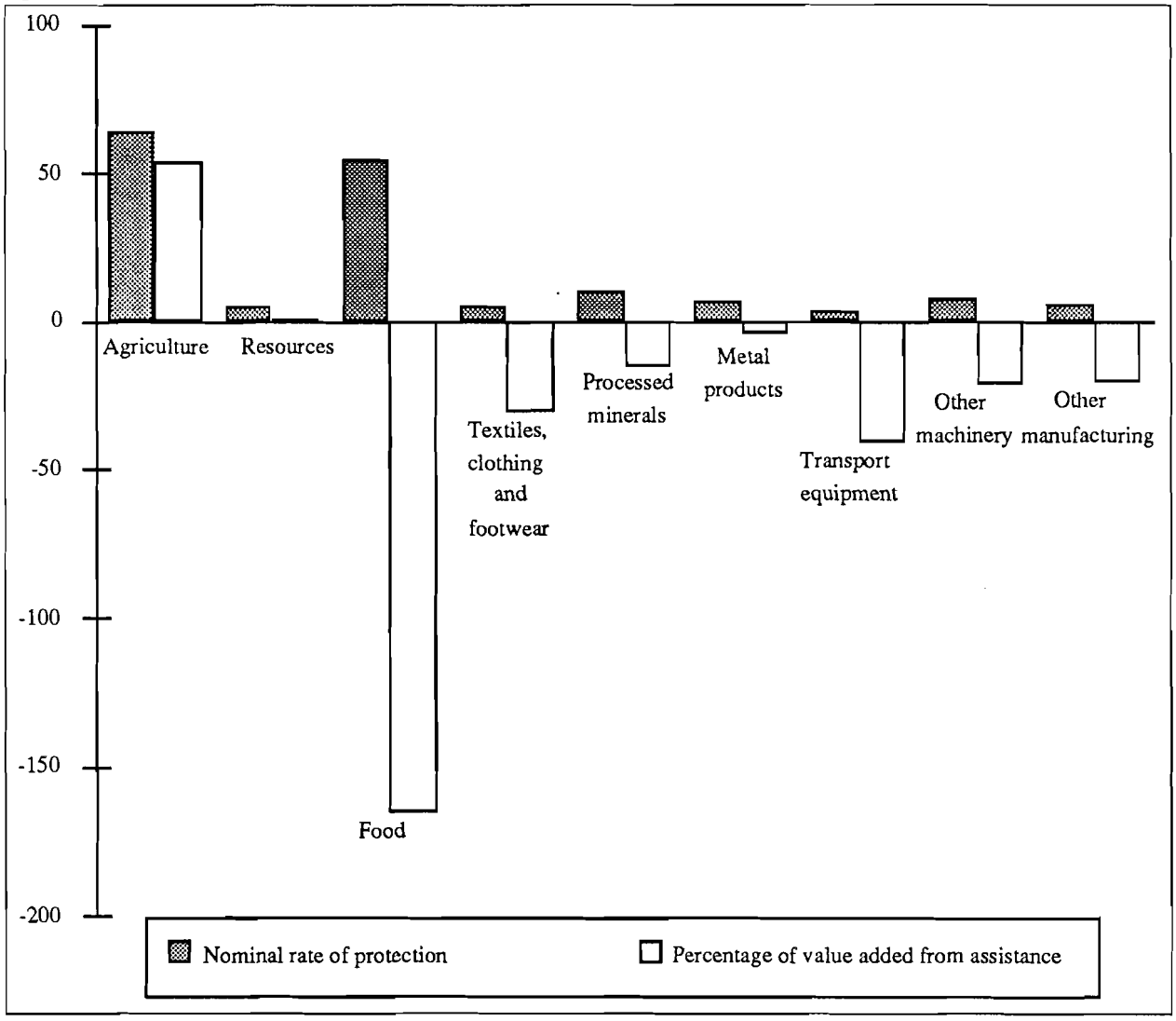
[a] A negative tax is interpreted as a subsidy
Source: NERAM and the SALTER database

Only two sectors in Japan are receiving positive net assistance; agriculture and TCF. NERAM estimates consumers in Japan are being taxed US$93b for assistance to the agriculture and US$99b for the food sector. A negative nrp for the transport equipment sector indicates that the domestic price lies below the world price. As a result, Japanese consumers receive an estimated US$6b subsidy on this commodity.

5.2.6 *The Republic of Korea*

Korea's pattern of assistance is similar to that of Japan as shown in figure 5.8.

Figure 5.8: **Assistance Measures Estimated for the Republic of Korea by NERAM** (per cent)



Korea "boasts" the second highest level of assistance to agriculture behind Japan, an estimated nrp of 63% as compared to 117%. The dollar values, however, aren't in the same spectacular proportions as shown in table 5.8. The same effects at work in Japan are present here. High levels of direct assistance to agriculture lend itself to high taxing of material inputs into the food sector who, despite receiving their share of assistance (an estimated nrp of 54%), as an end result end up taxing this sector an estimated US$5b. The remaining sectors receive very little

assistance (including TCF which Korea has the lowest of all countries with a nrp of an estimated 5%) and, therefore suffer negative assistance from the higher costs of inputs.

Table 5.9: **Subsidy and Tax Equivalents Estimated for the Republic of Korea by NERAM**

	Gross subsidy equivalent	*Tax on material inputs*	*Tax on producers*	*Gross tax equivalent*	*Net subsidy equivalent*	*Consumer tax equivalent*
	US$b	US$b	US$b	US$b	US$b	US$b
Agriculture	8.5	2.3	–1.0	1.3	7.2	12.0
Resources	0.3	0.3	0.0	0.3	0.0	0.8
Food	11.6	12.8	3.5	16.3	–4.7	12.7
TCF	1.1	2.0	0.4	2.4	–1.3	1.5
Processed minerals	4.6	3.2	3.0	6.2	–1.6	5.5
Metal products	1.6	1.6	0.1	1.8	–0.2	2.1
Transport equipment	0.3	0.8	0.6	1.4	–1.1	0.5
Other machinery	2.2	2.6	1.1	3.8	–1.5	4.5
Other manufacturing	1.1	1.5	0.4	1.9	–0.8	1.4

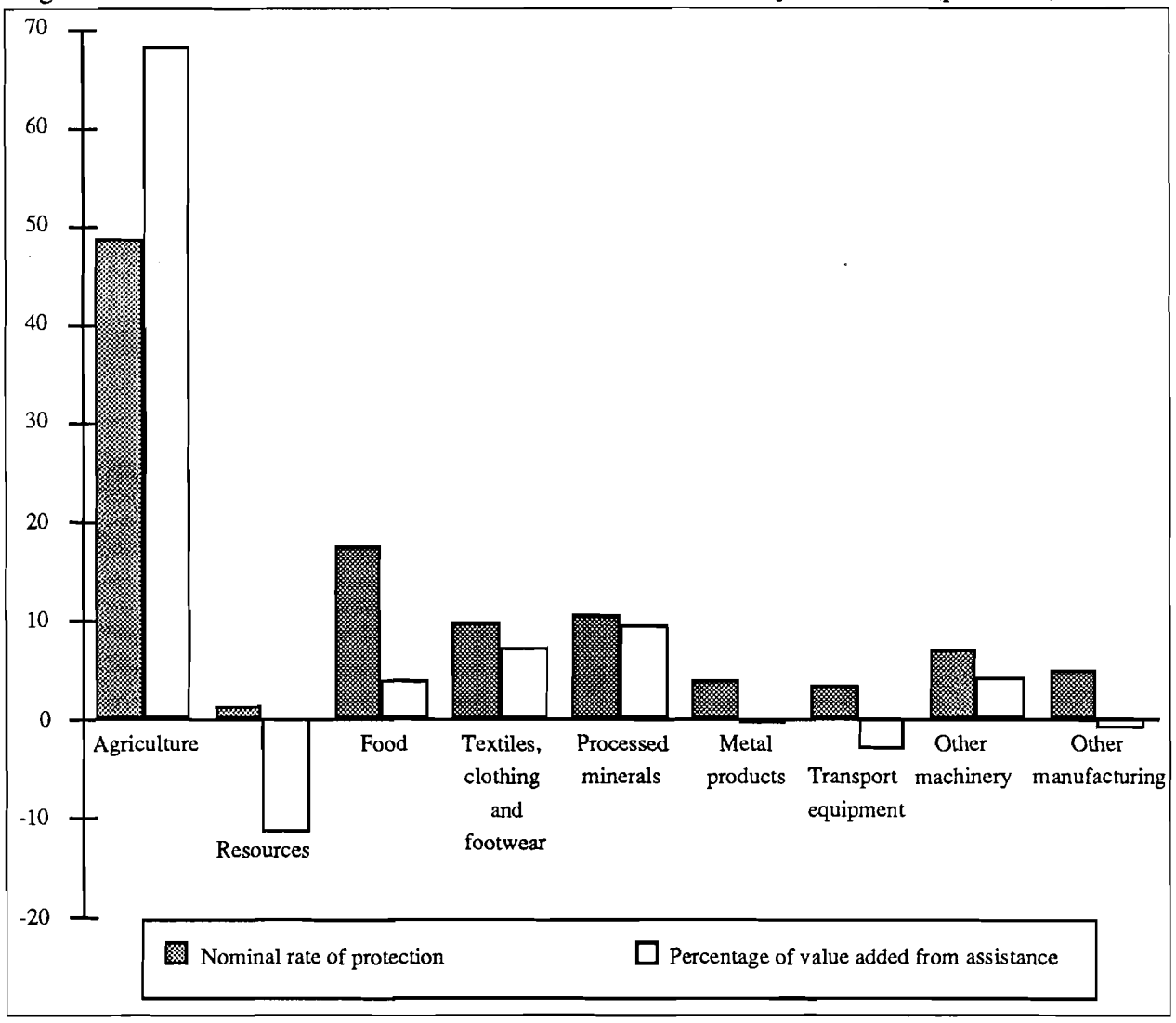
[a] A negative tax is interpreted as a subsidy
Source: NERAM and the SALTER database

Agriculture in Korea is the only that is receiving notable positive assistance. The taxing effect on the remaining sectors (with the exception of resources) in the economy are dominant as they are receiving negative assistance. The Korean consumers are being taxed and estimated US$12b for the protection being provided to the agriculture and food sectors.

5.2.7 *The European Community*

Again, the EC is another block of countries whose policies are designed to assist the agricultural products sector as shown in figure 5.9.

Figure 5.9: **Assistance Measures estimated for the EC by NERAM** (per cent)



An estimated nrp of 59% for Agriculture in the EC yield farmers a gross subsidy of US$102b (as shown in table 5.9). The high levels of assistance to the food sector are, unlike in Japan or Korea, complimented with a producer subsidy that counters the taxing effect assistance has on agricultural inputs. Both sectors benefit from the assistance regime. The current protection policies in the EC also benefit the TCF, processed minerals and other machinery sectors.

Leaving the remaining sectors, who aren't targeted for high levels of direct assistance, to suffer from the increased prices of inputs.

Table 5.10: **Subsidy and Tax Equivalents Estimated for the EC by NERAM**

	Gross subsidy equivalent	*Tax on material inputs*	*Tax on producers*	*Gross tax equivalent*	*Net subsidy equivalent*	*Consumer tax equivalent*
	US$b	US$b	US$b	US$b	US$b	US$b
Agriculture	102.0	20.3	-5.1	15.2	86.8	102.9
Resources	4.5	14.3	1.8	16.1	-11.7	4.9
Food	85.1	85.0	-6.0	79.0	6.1	90.6
TCF	18.5	11.4	1.7	13.2	5.4	21.3
Processed minerals	75.9	40.5	13.5	54.0	21.9	82.7
Metal products	8.7	5.7	3.3	9.0	-0.3	13.2
Transport equipment	9.5	10.1	2.8	12.9	-3.4	11.2
Other machinery	33.6	18.3	6.1	24.5	9.2	47.3
Other manufacturing	18.6	16.1	3.7	19.8	-1.2	22.1

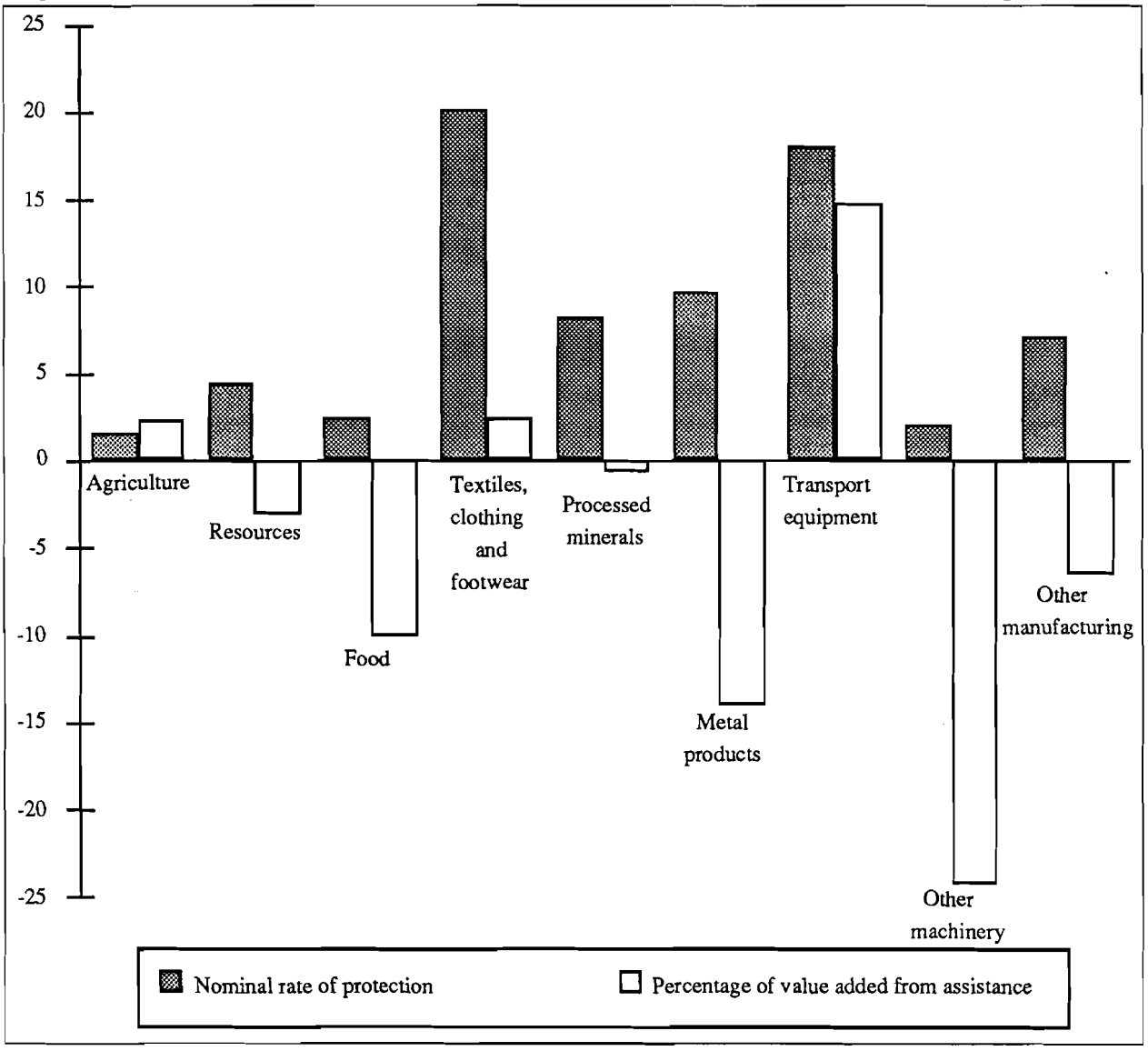
[a] A negative tax is interpreted as a subsidy
Source: NERAM and the SALTER database

Farmers in the EC are receiving and estimated US$87b extra for their product, this is greater than the US$74b those in Japan receive The taxing effect on consumers due to the higher prices of agriculture and food is estimated at US$103b and US$91b respectively. Another outstanding figure is that consumers are being taxed US$83b owing to assistance provided to the the processed minerals sector.

5.2.8 The ASEAN

Assistance in the ASEAN countries returns to the pattern seen in Australia and New Zealand as shown in figure 5.10.

Figure 5.10: **Assistance Measures estimated for the ASEAN by NERAM** (per cent)



Low nrp's in the ASEAN agriculture sector would result in a negative net assistance if not for a US$1b subsidy to counter the taxing effect on inputs (see table 5.10). The food sector receives no such subsidy and so the direct assistance provided isn't enough to cover the increased prices of inputs. The TCF and transport equipment sectors receive the lion's share of assistance, with

the latter receiving the most assistance. The remaining manufacturers and (needless to say) the resource sector are all receiving negative assistance.

Table 5.11: **Subsidy and Tax Equivalents Estimated for the ASEAN by NERAM**

	Gross subsidy equivalent	*Tax on material inputs*	*Tax on producers*	*Gross tax equivalent*	*Net subsidy equivalent*	*Consumer tax equivalent*
	US$b	US$b	US$b	US$b	US$b	US$b
Agriculture	0.8	1.0	–1.1	–0.1	0.9	0.8
Resources	1.2	0.7	1.1	1.8	–0.6	2.1
Food	1.6	1.9	1.1	3.0	–1.4	1.9
TCF	3.1	2.6	0.4	3.0	0.1	5.1
Processed minerals	1.8	1.4	0.4	1.8	0.0	4.3
Metal products	0.9	0.7	0.5	1.2	–0.3	2.9
Transport equipment	2.2	1.3	0.3	1.6	0.6	3.9
Other machinery	0.6	2.4	0.4	2.7	–2.2	6.7
Other manufacturing	1.7	1.7	0.5	2.2	–0.5	2.8

[a] A negative tax is interpreted as a subsidy
Source: NERAM and the SALTER database

6 SUMMARY

The estimates calculated measure the distortions to a particular economy due to it's assistance structure. Nominal rates of protection measure the direct assistance a government is giving a industry. It is a measure of how the tariff and export taxes inflate (or in some cases, deflate) the domestic over world prices. This measure is translated to a dollar value through the gross tax equivalent. It is from this gross measure of assistance that the tax to consumers from the inflated domestic prices is calculated (see section 2.2.3). On the other side, the inflated prices of inputs have a taxing effect on industries. When this estimate is added to the producer taxes (or subsidies) the gross tax equivalent measures the downside of assistance to a particular industry. The net subsidy equivalent takes into account the effects of a countries assistance measures on both output and inputs. It is from this net effect of assistance that the effective rate of protection is calculated. However, as discussed in section 4.4.3, results are reported as the percentage of value added from assistance (where value added is payments to primary factors: labour, capital and land). NERAM, therefore, provides useful descriptive information about particular assistance regimes.

APPENDIX 1: THE TABLO INPUT DECK

```
!-------------------------------------------------------!
!                                                       !
!       THE FOLLOWING TABLO INPUT IS A                  !
!                                                       !
!       NOMINAL AND                                     !
!       EFFECTIVE                                       !
!       RATES OF                                        !
!       ASSISTANCE                                      !
!       MODEL                                           !
!                                                       !
! FOR THE SALTER WORLD TRADE MODEL                      !
!                                                       !
!-------------------------------------------------------!
```

```
!-------------------------------------!
!                                     !
!             FILES                   !
!                                     !
!-------------------------------------!
```

```
FILE DATIO
            # FILE CONTAINING ALL I/O INFORMATION # ;

FILE (NEW) OUT1
        # FILE TO WRITE DATA TO # ;
```

```
!-------------------------------------!
!                                     !
!          SET STATEMENTS             !
!                                     !
!-------------------------------------!
```

```
SET
source #source of commodities# ( domestic, imported )  ;
fac #factors# ( wages, capital, land, taxes);
purp #purpose# ( dcons, gcons, investment, exports);
reg #region# ( CNT1 - CNT8 ) ;
sec #sectors# ( CNT1 - CNT9) ;
ind #industries# ( COM1 - COM33 ) ;
ntrded #non-traded# ( COM6-COM7, COM28 - COM33 ) ;
trded #traded# ( COM1 -COM5, COM8 - COM27 ) ;

SUBSET ntrded IS SUBSET OF ind;
```

```
SUBSET trded IS SUBSET OF ind ;
SUBSET reg IS SUBSET OF sec;


!_____________________________________________!
!                                             !
!       THE INPUT/OUTPUT DATABASE             !
!                                             !
!_____________________________________________!


! SUBSCRIPT RANGE                                        COEFFICIENT
          DETAILED DESCRIPTION                             NAME
 ------------------------------------                     ---------- !

COEFFICIENT (ALL,I,IND)(ALL,J,IND)(ALL,Z,REG)            DINT(I,J,Z)
! INTERMEDIATE USAGE (DOMESTIC) !     ;

       (ALL,I,IND)(ALL,J,IND)(ALL,Z,REG)(ALL,S,SEC)      IINTS(I,J,Z,S)
! INTERMEDIATE USAGE (BY IMPORTING SECTOR) !     ;

       (ALL,I,IND)(ALL,Z,REG)                            DINV(I,Z)
! INVESTMENT USAGE (DOMESTIC) ! ;

       (ALL,I,IND)(ALL,Z,REG)(ALL,S,SEC)                 IINVS(I,Z,S)
! INVESTMENT USAGE (BY IMPORTING SECTOR) ! ;

       (ALL,I,IND)(ALL,Z,REG)                            DCON(I,Z)
! CONSUMPTION USAGE (DOMESTIC)   ! ;

      (ALL,I,IND)(ALL,Z,REG)(ALL,S,SEC)                  ICONS(I,Z,S)
! CONSUMPTION USAGE (BY IMPORTING SECTOR)   ! ;

       (ALL,I,IND)(ALL,Z,REG)                            DGOV(I,Z)
! GOVERNMENT USAGE OF DOMESTIC COMMODITIES   ! ;

       (ALL,I,IND)(ALL,Z,REG)(ALL,S,SEC)                 IGOVS(I,Z,S)
! GOVERNMENT USAGE OF IMPORTED COMMODITIES  ! ;


        (ALL,I,IND)(ALL,S,SEC)(ALL,V,SEC)                EXPS(I,S,V)
! EXPORTS OF COMMODITY I FROM SECTOR S TO SECTOR V ! ;

       (ALL,J,IND)(ALL,Z,REG)                            TSR(J,Z)
! NON COMMODITY INDIRECT TAXES,NET  ! ;

       (ALL,J,IND)(ALL,Z,REG)                            LAB(J,Z)
! USAGE OF LABOUR  ! ;

       (ALL,J,IND)(ALL,Z,REG)                            CAP(J,Z)
```

! USAGE OF CAPITAL ! ;

(ALL,J,IND)(ALL,Z,REG) LAND(J,Z)
! USAGE OF LAND ! ;

(ALL,I,IND)(ALL,J,IND)(ALL,Z,REG) TRD(I,J,Z)
! COMMODITY TAXES ON DOMESTICALLY PRODUCED GOODS USED AS INTERMEDIATE USAGE ! ;

(ALL,I,IND)(ALL,J,IND)(ALL,Z,REG) TRI(I,J,Z)
! COMMODITY TAXES ON IMPORTS USED AS INTERMEDIATE USAGE ! ;

(ALL,I,IND)(ALL,Z,REG) TER(I,Z)
! COMMODITY TAXES EXPORTS ! ;

(ALL,I,IND)(ALL,Z,REG)(ALL,S,SEC) DR(I,Z,S)
! DUTY BY SECTOR ! ;

(ALL,Z,REG) DEPRL(Z)
! VALUE OF DEPRECIATION ! ;

```
!-------------------------------------------------!
!                                                 !
!     VALUES CALCULATED FROM READ IN COEFFICIENTS !
!                                                 !
!-------------------------------------------------!
```

(all,j,ind)(all,v,fac)(all,z,reg) Fct(j,v,z)
payments to primary factors of production # ;

(all,i,ind)(all,k,purp)(all,z,reg)(all,s,source) Pi(i,k,z,s)
absorbtion of domestic product # ;

(all,i,ind)(all,j,ind)(all,z,reg)(all,s,source) A(i,j,z,s)
intermediate inputs# ;

(all,i,ind)(all,j,ind)(all,z,reg)(all,s,source) TINT(i,j,z,s)
commodity taxes on intermediate usage # ;

(all,i,ind)(all,z,reg) DT(i,z)
import duties # ;

(all,j,ind)(all,z,reg) Zj(j,z)
level of output # ;

(all,j,ind)(all,z,reg) Zd(j,z)
domestic sales # ;

(all,j,ind)(all,z,reg) # assisted value added # ;	AVA(j,z)
(all,j,ind)(all,z,reg) # one on the assisted value added # ;	IP_AVA(j,z)
(all,z,reg) # total investment in the country # ;	TotInv(z)
(all,z,reg) # total payments to capital # ;	TotFct(z)
(all,i,ind)(all,z,reg)(all,s,source) # share of investment # ;	SHINV(i,z,s)
(all,i,ind)(all,j,ind)(all,z,reg)(all,s,source) # assisted depreciation # ;	ADPRN(i,j,z,s)
(all,i,ind)(all,z,reg)(all,s,source) # depreciation by commodity #;	depis(i,z,s)
(all,i,ind)(all,j,ind)(all,z,reg)(all,s,source) # depreciation by commodity and industry # ;	depijs(i,j,z,s)
(all,j,ind)(all,z,reg) # share of factors # ;	SHFct(j,z)
(all,j,ind)(all,z,reg) # ASSISTED VALUE OF MATERIAL INPUTS # ;	AVMI(J,Z)
(all,j,ind)(all,z,reg) # ASSISTED VALUE OF CAPITAL INPUTS # ;	AVCI(J,Z)
(all,i,ind)(all,z,reg) # assisted value of output # ;	AVO(i,z)
(all,i,ind)(all,z,reg) # tariff rate # ;	df(i,z)
(all,i,ind)(all,z,reg) # export tax rate # ;	ef(i,z)
(all,i,ind)(all,z,reg) # inverse power of the tariff # ;	ipdf(i,z)
(all,i,ind)(all,z,reg) # inverse power of the export tax # ;	ipef(i,z)
(all,i,ind)(all,z,reg) # Landed duty paid # ;	LDP(i,z)

VARIALBLES

VARIABLE

(all,i,ind)(all,z,reg)
# inverse power of the tariff #;
ddfi(i,z)

(all,i,ind)(all,z,reg)
# inverse power of the the export tax # ;
defi(i,z)

"dummy variable" # ;
one

(all,j,ind)(all,z,reg)
# effective power of assistance #;
erp(j,z)

(all,j,ind)(all,z,reg)
# unassisted value added # ;
UVA(j,z)

(all,j,ind)(all,z,reg)
# nominal rate of protection # ;
nrp(j,z)

(all,i,ind)(all,z,reg)
# unassisted value of output # ;
UVO(i,z)

(all,j,ind)(all,z,reg)
# unassisted value of material inputs # ;
UVMI(j,z)

(all,j,ind)(all,z,reg)
# unassisted value of capital inputs # ;
UVCI(j,z)

(ALL,J,IND)(ALL,Z,REG)
# gross subsidy equivalent # ;
GSUBEQ(J,Z)

(ALL,J,IND)(ALL,Z,REG)
# gross tax on material inputs # ;
GTMI(J,Z)

(ALL,J,IND)(ALL,Z,REG)
# gross tax on capital inputs # ;
GTCI(J,Z)

(ALL,J,IND)(ALL,Z,REG)
# gross tax equivalent # ;
GTE(J,Z)

(ALL,J,IND)(ALL,Z,REG)
# net subsidy equivalent # ;
NSE(J,Z)

(ALL,J,IND)(ALL,Z,REG) CTE(J,Z)
consumer tax equivalent # ;

(ALL,J,IND)(ALL,Z,REG) PIAA(J,Z)
percentage of income from assistance # ;

```
!_____________________________________!
!                                     !
!      READING THE DATABASE           !
!                                     !
!_____________________________________!
```

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READ (ALL,I,IND)(ALL,J,IND)(ALL,Z,REG)
    DINT(I,J,Z)
         FROM FILE DATIO HEADER "DI01" ;

    (ALL,I,IND)(ALL,J,IND)(ALL,Z,REG)(ALL,S,SEC)
     IINTS(I,J,Z,S)
         FROM FILE DATIO HEADER "DI02" ;

    (ALL,I,IND)(ALL,Z,REG)
     DINV(I,Z)
         FROM FILE DATIO HEADER "DI03" ;

    (ALL,I,IND)(ALL,Z,REG)(ALL,S,SEC)
     IINVS(I,Z,S)
         FROM FILE DATIO HEADER "DI04" ;

    (ALL,I,IND)(ALL,Z,REG)
     DCON(I,Z)
         FROM FILE DATIO HEADER "DI05" ;

    (ALL,I,IND)(ALL,Z,REG)(ALL,S,SEC)
     ICONS(I,Z,S)
         FROM FILE DATIO HEADER "DI06" ;

    (ALL,I,IND)(ALL,Z,REG)
     DGOV(I,Z)
         FROM FILE DATIO HEADER "DI07" ;

    (ALL,I,IND)(ALL,Z,REG)(ALL,S,SEC)
     IGOVS(I,Z,S)
         FROM FILE DATIO HEADER "DI08" ;


    (ALL,I,IND)(ALL,S,SEC)(ALL,V,SEC)
     EXPS(I,S,V)
         FROM FILE DATIO HEADER "DI11" ;

    (ALL,J,IND)(ALL,Z,REG)
```

```
 TSR(J,Z)
       FROM FILE DATIO HEADER "DI12" ;

(ALL,I,IND)(ALL,Z,REG)
 LAB(I,Z)
       FROM FILE DATIO HEADER "DI13" ;

(ALL,I,IND)(ALL,Z,REG)
 CAP(I,Z)
       FROM FILE DATIO HEADER "DI14" ;

(ALL,I,IND)(ALL,Z,REG)
 LAND(I,Z)
       FROM FILE DATIO HEADER "DI15" ;

(ALL,I,IND)(ALL,J,IND)(ALL,Z,REG)
 TRD(I,J,Z)
       FROM FILE DATIO HEADER "DI16" ;

(ALL,I,IND)(ALL,J,IND)(ALL,Z,REG)
 TRI(I,J,Z)
       FROM FILE DATIO HEADER "DI17" ;


(ALL,I,IND)(ALL,Z,REG)
 TER(I,Z)
       FROM FILE DATIO HEADER  "DI24" ;


(ALL,I,IND)(ALL,Z,REG)(ALL,S,SEC)
 DR(I,Z,S)
       FROM FILE DATIO HEADER  "DI27" ;


(ALL,Z,REG)
 DEPRL(Z)
       FROM FILE DATIO HEADER "DP07" ;
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FORMULAS

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ZERODIVIDE DEFAULT 0.0 ;

FORMULA
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!************************************************************!
!       CALCULATION OF DUTY FOR EACH COUNTRY                 !
!************************************************************!


(all,i,ind)(all,z,reg)
DT(i,z)=sum(s,sec,DR(i,z,s));

   ! summing duty by sectors !


!************************************************************!
!       DEFINING COMMODITY TAXES FOR EACH COUNTRY            !
!************************************************************!


(all,i,ind)(all,j,ind)(all,z,reg)
TINT(i,j,z,"domestic")=TRD(i,j,z);

    ! tax on domestically produced intermediates !


(all,i,ind)(all,j,ind)(all,z,reg)
TINT(i,j,z,"imported")=TRI(i,j,z);

    ! tax on imported intermediates !


!************************************************************!
!       INTERMEDIATE USAGE FOR EACH COUNTRY                  !
!************************************************************!


(all,i,ind)(all,j,ind)(all,z,reg)
A(i,j,z,"domestic")=DINT(i,j,z);

    ! domestic intermediate usage !


(all,i,ind)(all,j,ind)(all,z,reg)
A(i,j,z,"imported")=sum(s,sec,IINTS(i,j,z,s));

    ! imported intermediate usage !


!************************************************************!
!       PAYMENTS TO FACTORS OF PRODUCTION                    !
!************************************************************!


(all,j,ind)(all,z,reg)
```

```
Fct(j,"wages",z)=LAB(j,z)  ;

   ! payments to labour !

(all,j,ind)(all,z,reg)
Fct(j,"capital",z)=CAP(j,z) ;

   ! payments to capital !

(all,j,ind)(all,z,reg)
Fct(j,"land",z)=LAND(j,z)  ;

   ! payments to land !

(all,j,ind)(all,z,reg)
Fct(j,"taxes",z)=TSR(j,z)  ;

   ! net indirect taxes less subsidies !


!*************************************************************!
!     ABSORBTION OF DOMESTIC PRODUCT                          !
!*************************************************************!


(all,i,ind)(all,z,reg)
Pi(i,"exports",z,"domestic")=sum(v,sec,EXPS(i,z,v));

    ! exports !

(all,i,ind)(all,z,reg)
Pi(i,"investment",z,"imported")=sum(s,sec,IINVS(i,z,s));

     ! imported goods for investment !

(all,i,ind)(all,z,reg)
Pi(i,"investment",z,"domestic")=DINV(i,z);

    ! domestic produced goods for investment !

(all,i,ind)(all,z,reg)
Pi(i,"dcons",z,"imported")=sum(s,sec,ICONS(i,z,s));

    ! imported goods for private consumption !

(all,i,ind)(all,z,reg)
Pi(i,"dcons",z,"domestic")=DCON(i,z);

    ! domestically produced goods for private consumption !

(all,i,ind)(all,z,reg)
Pi(i,"gcons",z,"imported")=sum(s,sec,IGOVS(i,z,s));
```

```
    ! imported goods for government consumption !

(all,i,ind)(all,z,reg)
Pi(i,"gcons",z,"domestic")=DGOV(i,z);

    ! domestically produced goods for government consumption !


!************************************************************!
!   CALCULATION OF ASSISTED DEPRECIATION                     !
!************************************************************!


(all,z,reg)
Totinv(z)=sum(i,ind,sum(s,source,Pi(i,"investment",z,s)));

    ! total investment in each country !

(all,i,ind)(all,z,reg)(all,s,source)
SHINV(i,z,s)=Pi(i,"investment",z,s)/Totinv(z);

    ! share of investment by commodity !

(all,z,reg)
TOTFct(z)=sum(j,ind,Fct(j,"capital",z));

    ! total payments to capital in each country !

(all,j,ind)(all,z,reg)
SHFct(j,z)=Fct(j,"capital",z)/TOTFct(z);

     ! share of payments to fixed capital by industry !

(all,i,ind)(all,z,reg)(all,s,source)
depis(i,z,s)=DEPRL(z)*SHINV(i,z,s);

   ! splitting depreciation over commodities !

(all,i,ind)(all,j,ind)(all,z,reg)(all,s,source)
depijs(i,j,z,s)=depis(i,z,s)*SHFct(j,z);

   ! then over industries !

(all,i,ind)(all,j,ind)(all,z,reg)(all,s,source)
ADPRN(i,j,z,s)=depijs(i,j,z,s);

    ! assisted depreciation !
```

```
!************************************************************!
!    . CALCULATING THE VALUE OF OUTPUT                       !
!************************************************************!


(all,i,ind)(all,z,reg)
Zj(i,z)=sum(j,ind,A(i,j,z,"domestic"))+
        sum(k,purp,Pi(i,k,z,"domestic")) ;

  ! total value of output !

(all,i,ind)(all,z,reg)
AVO(i,z)=Zj(i,z)*(Zj(i,z)/Zj(i,z))
       +1*(1-(Zj(i,z)/Zj(i,z)));

   ! assisted value of output !


(all,i,ind)(all,z,reg)
Zd(i,z)=AVO(i,z)-Pi(i,"exports",z,"domestic");

  ! total value of domestic output !


!************************************************************!
!  CALCULATING ASSISTED VALUE ADDED                          !
!************************************************************!


(all,j,ind)(all,z,reg)
AVA(j,z)=AVO(j,z)-sum(i,ind;sum(s,source,A(i,j,z,s)))
       -sum(i,ind,sum(s,source,TINT(i,j,z,s)))
       -sum(i,ind,sum(s,source,ADPRN(i,j,z,s)))
      -TSR(J,Z);

   ! assisted value added for all industries !

(ALL,J,IND)(ALL,Z,REG)
IP_AVA(J,Z) = 1 / AVA(J,Z) ;

  ! one on assisted value added !


(ALL,J,IND)(ALL,Z,REG)
AVMI(J,Z) = sum(i,ind,sum(s,source,A(i,j,z,s)))
       +sum(i,ind,sum(s,source,TINT(i,j,z,s)));

      ! assisted value of material inputs !


(ALL,J,IND)(ALL,Z,REG)
AVCI(J,Z) = sum(i,ind,sum(s,source,ADPRN(i,j,z,s)));
```

```
        ! assisted value of capital inputs !

!************************************************************!
!  CALCULATION OF THE TARIFF AND EXPORT SUBSIDY RATES  !
!************************************************************!

ZERODIVIDE DEFAULT 1.0 ;
FORMULA

(all,i,ind)(all,z,reg)
LDP(i,z)=sum(j,ind,A(i,j,z,"imported"))+
        Pi(i,"dcons",z,"imported")+
        Pi(i,"gcons",z,"imported")+
        Pi(i,"investment",z,"imported") ;

    ! landed duty paid !

(ALL,I,IND)(ALL,Z,REG)
DF(I,Z)=LDP(I,Z)/(LDP(I,Z)-DT(I,Z)) ;

    ! the power of the tariff !

(all,i,ind)(all,z,reg)
IPDF(I;Z) = 1/DF(I,Z) ;

     ! inverse power of the tariff !



ZERODIVIDE DEFAULT 0.0 ;

FORMULA
(all,i,ind)(all,z,reg)
ef(i,z)=-TER(i,z)/Pi(i,"exports",z,"domestic") ;

     ! export subsidy rate !

(all,i,ind)(all,z,reg)
ipef(i,z)=1/(1+ef(i,z));

     ! inverse power of the export subsidy !
```

EQUATIONS

EQUATION

! EQ 1 !

POWER_TARIFF
power of tariff for domestic traded
(all,t,trded)(all,z,reg)
ddfi(t,z)=ipdf(t,z)*one;

! EQ 2 !

POWER_EXPTAX
power of tariff for domestic traded
(all,i,ind)(all,z,reg)
defi(i,z)=ipef(i,z)*one;

! EQ 3 !

UNASS_VA
unassisted value added
(all,j,ind)(all,z,reg)
UVA(j,z)= UVO(J,Z) - UVMI(J,Z) - UVCI(J,Z) ;

! EQ 4 !

ERP_all_ind
effective rates of protection
(all,j,ind)(all,z,reg)
AVA(j,z)*erp(j,z)=UVA(j,z);

! EQ 5 !

UNASS_OUTPUT
unassisted value of output
(all,j,IND)(all,z,reg)
UVO(j,z)=Zd(j,z)*ddfi(j,z)
+Pi(j,"exports",z,"domestic")*defi(j,z) ;

```
! EQ 6 !

NRP_all_ind
# nominal rates of protection #
(all,j,ind)(all,z,reg)
AVO(j,z)*nrp(j,z)=UVO(j,z) ;


! EQ 7 !

UNASSISTED_MINPUTS
# UNASSISTED VALUE OF INPUTS #
(all,j,ind)(all,z,reg)
UVMI(j,z)=sum(i,ind,sum(s,source,A(i,j,z,s))*ddfi(i,z))+
          sum(i,ind,sum(s,source,TINT(i,j,z,s))*ddfi(i,z)) ;


! EQ 8 !
UNASSISTED_CINPUTS
# UNASSISTED VALUE OF CAPITAL INPUTS #
(ALL,J,IND)(ALL,Z,REG)
UVCI(J,Z) = sum(i,ind,sum(s,source,ADPRN(i,j,z,s))*ddfi(i,z));


! EQ 9 !
GROSS_SUBSIDY
# GROSS SUBSIDY EQUIVALENT #
(ALL,J,IND)(ALL,Z,REG)
GSUBEQ(J,Z) = AVO(J,Z)*ONE - UVO(J,Z) ;

! EQ 10 !
TAX_MATERIALS
# TAX ON MATERIAL INPUTS #
(ALL,J,IND)(ALL,Z,REG)
GTMI(J,Z) = AVMI(J,Z)*ONE - UVMI(J,Z) ;

! EQ 11 !
TAX_CAPITAL
# TAX ON CAPITAL INPUTS #
(ALL,J,IND)(ALL,Z,REG)
GTCI(J,Z) = AVCI(J,Z)*ONE - UVCI(J,Z) ;

! EQ 12 !
GROSS_TAX
# GROSS TAX EQUIVALENT #
(ALL,J,IND)(ALL,Z,REG)
GTE(J,Z) = GTMI(J,Z) + GTCI(J,Z) +
        TSR(J,Z)*ONE ;
```

```
! EQ 13 !
NET_SUBSIDY
# NET SUBSIDY EQUIVALENT #
(ALL,J,IND)(ALL,Z,REG)
NSE(J,Z) = GSUBEQ(J,Z) - GTE(J,Z) ;

! EQ 14 !
CONSUMER_TAX_EQIV
# CONSUMER TAX EQUIVALENT #
(ALL,J,IND)(ALL,Z,REG)
CTE(J,Z) = GSUBEQ(J,Z) + (DT(J,Z)*ONE) ;

! EQ 15 !
PER_INCOME_ASS
#PERCENTAGE OF INCOME AS ASSISTANCE #
(ALL,J,IND)(ALL,Z,REG)
PIAA(J,Z) =  IP_AVA(J,Z)*NSE(J,Z) ;


!_____________________________________________!
!                                             !
!       WRITE STATEMENTS                      !
!                                             !
!_____________________________________________!


WRITE
AVO TO FILE OUT1 HEADER "AVO" ;
AVA TO FILE OUT1 HEADER "AVA" ;
AVMI TO FILE OUT1 HEADER "AVMI" ;
AVCI TO FILE OUT1 HEADER "AVCI" ;
DT TO FILE OUT1 HEADER "DUTY" ;
LDP TO FILE OUT1 HEADER "LDP" ;
TSR TO FILE OUT1 HEADER "TSR" ;
DF TO FILE OUT1 HEADER "DF" ;
EF TO FILE OUT1 HEADER "EF" ;
```

APPENDIX 2: RESULTS FROM THE SALTER DATABASE

Table A2.1: ASSISTANCE ESTIMATES CALCULATED BY NERAM FOR AUSTRALIA

SALTER industry	*Income(a) from protection* %	*Nominal rate of protection* %	*Gross subsidy equivalent* US$b	*Gross tax equivalent* US$b	*Net subsidy equivalent* US$b	*Consumer tax equivalent* US$b
Paddy rice	38.79	15.60	12	–14	26	13
Non-grain crops	–2.27	0.00	0	88	–88	0
Wheat	11.70	0.00	0	–191	191	0
Coarse grains	8.77	0.00	0	–38	38	0
Wool	2.86	0.00	0	–97	97	0
Other livestock products	20.79	16.57	1102	114	989	1102
Forestry(b)	0.00	5.39	46	46	0	46
Fishing	–13.17	0.12	1	55	–53	1
Coal	–20.63	–5.11	–281	251	–532	–281
Oil and gas	–14.06	–0.82	–51	273	–324	–51
Other minerals	–11.59	0.54	54	540	–486	57
Meat and milk products(b)	0.00	4.54	613	613	0	621
Other food products	–10.25	0.78	89	339	–250	88
Beverages and tobacco	20.44	12.29	475	249	227	482
Spinning, weaving, dying, textiles	45.45	27.72	1046	571	475	1603
Wearing apparel	70.17	64.05	1681	747	934	2016
Leather, fur and their products	4.92	8.03	105	82	23	135
Lumber and wood products	8.62	10.56	638	457	181	740
Pulp, paper and printing	0.91	6.90	579	550	29	716
Chemicals, rubber and plastic	9.37	10.67	1316	1001	315	1924
Petroleum and coal products	–15.63	–0.18	–19	26	–45	–19
Non-metallic mineral products	–2.56	4.38	231	276	–45	273
Primary iron and steel	0.53	7.11	601	588	13	665
Other metals and products	1.45	9.10	1747	1671	76	1968
Transport industries	16.87	17.74	1718	1139	579	3009
Other machinery and equipment	8.86	11.10	1223	868	354	3100
Other manufacturing	–7.07	3.63	126	205	–79	505
Electricity, gas and water(b)	0.00	5.01	646	646	0	646
Construction(b)	0.00	6.64	2638	2638	0	2638
Trade and transport(b)	0.00	6.07	4288	4288	0	4288
Other services - private(b)	0.00	7.50	4229	4229	0	4229
Other services - government(b)	0.00	4.17	2373	2373	0	2373
Other services - ownership of dwellings(b)	0.00	13.44	2931	2931	0	2931

Source: NERAM and the SALTER database
(a) "Income" is defined by value added, that is payments to labour, capital and land
(b) Non-traded good

Table A2.2: **ASSISTANCE ESTIMATES CALCULATED BY NERAM FOR NEW ZEALAND**

SALTER industry	*Income(a) from protection* %	*Nominal rate of protection* %	*Gross subsidy equivalent* US$b	*Gross tax equivalent* US$b	*Net subsidy equivalent* US$b	*Consumer tax equivalent* US$b
Paddy rice	0.00	0.00	0	0	0	0
Non-grain crops	–9.18	0.00	0	45	–45	0
Wheat	20.24	0.00	0	–9	9	0
Coarse grains	–2.83	0.00	0	2	–2	0
Wool	1.62	0.00	0	–13	13	0
Other livestock products	15.16	11.29	380	168	211	380
Forestry(b)	0.00	2.11	8	8	0	8
Fishing	–12.93	0.74	5	28	–23	5
Coal	–11.51	–1.00	–1	3	–4	–1
Oil and gas	–11.27	0.06	1	41	–40	1
Other minerals	–7.01	0.23	1	9	–9	1
Meat and milk products(b)	0.00	2.22	126	126	0	128
Other food products	31.96	15.28	257	126	131	310
Beverages and tobacco	16.24	12.18	77	47	30	94
Spinning, weaving, dying, textiles	38.36	8.05	81	5	75	114
Wearing apparel	53.04	37.07	323	104	219	332
Leather, fur and their products	18.34	12.84	60	27	33	81
Lumber and wood products	20.04	14.17	248	115	133	262
Pulp, paper and printing	12.35	9.97	264	147	117	296
Chemicals, rubber and plastic	3.68	6.44	227	192	35	311
Petroleum and coal products	222.59	11.68	117	16	100	132
Non-metallic mineral products	21.83	15.43	154	54	101	175
Primary iron and steel	6.01	8.06	90	70	19	110
Other metals and products	12.59	11.24	350	224	126	402
Transport industries	15.75	13.23	326	201	124	421
Other machinery and equipment	9.20	10.61	238	159	79	587
Other manufacturing	–11.31	1.14	5	27	–22	25
Electricity, gas and water(b)	0.00	2.24	58	58	0	58
Construction(b)	0.00	7.69	558	558	0	558
Trade and transport(b)	0.00	3.52	485	485	0	485
Other services - private(b)	0.00	7.20	587	587	0	587
Other services - government(b)	0.00	2.49	216	216	0	216
Other services - ownership of dwellings(b)	0.00	17.19	566	566	0	566

Source: NERAM and SALTER database
(a) "Income" is defined by value added, that is payments to labour, capital and land
(b) Non-traded good

Table A2.3: ASSISTANCE ESTIMATES CALCULATED BY NERAM FOR CANADA

SALTER industry	*Income(a) from protection* %	*Nominal rate of protection* %	*Gross subsidy equivalent* US$b	*Gross tax equivalent* US$b	*Net subsidy equivalent* US$b	*Consumer tax equivalent* US$b
Paddy rice	0.00	0.00	0	0	0	0
Non-grain crops	17.80	3.48	211	–304	516	300
Wheat	77.84	9.20	627	–2920	3547	627
Coarse grains	49.16	14.10	257	–246	503	269
Wool	0.00	0.00	0	0	0	0
Other livestock products	130.05	75.53	6062	416	5646	6062
Forestry(b)	0.00	3.40	254	254	0	254
Fishing	–5.16	–0.50	–13	59	–71	–13
Coal	–14.48	–0.49	–10	120	–130	–10
Oil and gas	–15.66	–0.12	–27	1436	–1464	–27
Other minerals	–8.02	–0.31	–35	401	–436	–35
Meat and milk products(b)	0.00	18.07	2864	2864	0	3069
Other food products	–8.33	0.08	16	508	–492	16
Beverages and tobacco	12.48	10.94	755	409	346	808
Spinning, weaving, dying, textiles	21.79	18.11	1419	785	634	1855
Wearing apparel	27.30	21.95	1389	628	760	1534
Leather, fur and their products	1.35	7.64	116	109	8	317
Lumber and wood products	0.88	4.42	858	796	62	979
Pulp, paper and printing	–1.43	3.31	1187	1389	–202	1316
Chemicals, rubber and plastic	0.83	6.31	2047	1963	85	2749
Petroleum and coal products	7.25	1.99	350	280	70	378
Non-metallic mineral products	6.97	7.30	569	344	225	698
Primary iron and steel	4.31	5.32	507	369	138	698
Other metals and products	1.27	4.31	1276	1158	118	1628
Transport industries	–14.99	2.13	895	2365	–1470	3406
Other machinery and equipment	0.02	3.99	1152	1150	2	3276
Other manufacturing	–13.59	–0.13	–7	249	–256	–7
Electricity, gas and water(b)	0.00	3.42	959	959	0	959
Construction(b)	0.00	4.76	4142	4142	0	4142
Trade and transport(b)	0.00	1.88	3025	3025	0	3025
Other services - private(b)	0.00	6.31	12136	12136	0	12136
Other services - government(b)	0.00	0.48	232	232	0	232
Other services - ownership of dwellings(b)	0.00	20.89	7911	7911	0	7911

Source: NERAM and SALTER database
(a) "Income" is defined by value added, that is payments to labour, capital and land
(b) Non-traded good

Table A2.4: ASSISTANCE ESTIMATES CALCULATED BY NERAM FOR THE USA

SALTER industry	*Income(a) from protection* %	*Nominal rate of protection* %	*Gross subsidy equivalent* US$b	*Gross tax equivalent* US$b	*Net subsidy equivalent* US$b	*Consumer tax equivalent* US$b
Paddy rice	146.41	0.00	0	-380	380	0
Non-grain crops	-3.50	0.00	0	849	-849	0
Wheat	94.68	8.76	538	-2036	2574	546
Coarse grains	95.72	0.00	0	-13348	13348	0
Wool	196.79	4.06	4	-26	30	15
Other livestock products	133.84	34.05	18254	5144	13111	18254
Forestry(b)	0.00	6.08	1123	1123	0	1123
Fishing	-6.91	2.15	63	158	-95	157
Coal	-18.02	1.41	332	2019	-1687	706
Oil and gas	-22.75	0.57	1018	20362	-19344	1096
Other minerals	-16.94	2.38	529	2101	-1572	697
Meat and milk products(b)	0.00	17.96	15915	15915	0	16719
Other food products	32.59	16.84	28141	11011	17130	29776
Beverages and tobacco	-65.13	16.11	7512	15920	-8408	8286
Spinning, weaving, dying, textiles	20.15	14.34	8615	4622	3994	9516
Wearing apparel	10.97	12.80	6384	3965	2420	8964
Leather, fur and their products	5.06	8.45	972	751	221	2030
Lumber and wood products	-7.91	2.20	1881	4425	-2544	2144
Pulp, paper and printing	26.05	21.83	42817	19327	23490	44654
Chemicals, rubber and plastic	-9.62	2.85	8540	17610	-9070	9296
Petroleum and coal products	-76.61	0.88	1826	17043	-15217	1972
Non-metallic mineral products	-0.54	6.29	3662	3794	-132	4052
Primary iron and steel	16.11	14.99	9002	5002	4000	10870
Other metals and products	-12.07	2.05	3866	12149	-8283	4642
Transport industries	-9.48	1.84	5345	15771	-10426	6516
Other machinery and equipment	-4.42	2.87	14479	24634	-10155	20040
Other manufacturing	-7.93	2.78	1016	2182	-1166	1647
Electricity, gas and water(b)	0.00	7.85	22128	22128	0	22257
Construction(b)	0.00	5.33	28748	28748	0	28748
Trade and transport(b)	0.00	13.38	155703	155703	0	156482
Other services - private(b)	0.00	7.78	96871	96871	0	99563
Other services - government(b)	0.00	3.04	34165	34165	0	34165
Other services - ownership of dwellings(b)	0.00	25.36	139419	139419	0	139419

Source: NERAM and SALTER database
(a) "Income" is defined by value added, that is payments to labour, capital and land
(b) Non-traded good

Table A2.5: ASSISTANCE ESTIMATES CALCULATED BY NERAM FOR JAPAN

SALTER industry	*Income(a) from protection* %	*Nominal rate of protection* %	*Gross subsidy equivalent* US$b	*Gross tax equivalent* US$b	*Net subsidy equivalent* US$b	*Consumer tax equivalent* US$b
Paddy rice	159.96	808.54	59720	–9627	69346	60609
Non-grain crops	–21.59	1.53	641	4727	–4086	742
Wheat	109.98	102.81	154	–74	228	1300
Coarse grains	165.77	535.14	12	–3	15	15346
Wool	0.00	0.00	0	0	0	0
Other livestock products	187.13	101.13	15819	7059	8761	15819
Forestry(b)	0.00	6.35	1040	1040	0	1041
Fishing	–7.42	4.67	948	1624	–676	1275
Coal	–4.63	1.05	0	1	0	149
Oil and gas	–4.98	4.40	195	305	–109	1088
Other minerals	–17.12	0.85	130	1011	–880	202
Meat and milk products(b)	0.00	49.24	12455	12455	0	16531
Other food products	–28.41	38.17	61741	71440	–9699	64731
Beverages and tobacco	–338.56	43.18	17066	35683	–18617	17829
Spinning, weaving, dying, textiles	2.64	8.64	4183	3804	379	4700
Wearing apparel	23.70	15.64	7330	4014	3316	7679
Leather, fur and their products	–5.15	9.55	1109	1296	–186	1355
Lumber and wood products	–8.28	3.47	1752	2970	–1218	2093
Pulp, paper and printing	–10.85	0.79	1046	5665	–4620	1073
Chemicals, rubber and plastic	–10.69	3.72	8208	14721	–6513	8881
Petroleum and coal products	–324.28	6.37	7416	51423	–44007	7604
Non-metallic mineral products	–6.32	3.92	2638	3951	–1314	2705
Primary iron and steel	–15.82	2.97	2761	6886	–4125	2926
Other metals and products	–3.35	4.41	6281	7736	–1456	7028
Transport industries	–42.72	–4.14	–6326	12425	–18750	–6209
Other machinery and equipment	–15.04	0.70	3319	26368	–23049	3509
Other manufacturing	–25.53	1.90	679	3234	–2555	848
Electricity, gas and water(b)	0.00	12.21	19049	19049	0	19049
Construction(b)	0.00	4.84	22953	22953	0	22953
Trade and transport(b)	0.00	5.34	43585	43585	0	44036
Other services - private(b)	0.00	9.52	74696	74696	0	75232
Other services - government(b)	0.00	2.30	9859	9859	0	9868
Other services - ownership of dwellings(b)	0.00	7.47	22661	22661	0	22661

Source: NERAM and SALTER database
(a) "Income" is defined by value added, that is payments to labour, capital and land
(b) Non-traded good

Table A2.6: ASSISTANCE ESTIMATES CALCULATED BY NERAM FOR THE REPUBLIC OF KOREA

SALTER industry	*Income(a) from protection* %	*Nominal rate of protection* %	*Gross subsidy equivalent* US$b	*Gross tax equivalent* US$b	*Net subsidy equivalent* US$b	*Consumer tax equivalent* US$b
Paddy rice	111.72	679.40	5611	-152	5763	5672
Non-grain crops	-1.05	3.49	284	344	-60	313
Wheat	83.57	49.85	204	-322	525	474
Coarse grains	130.26	542.70	1443	32	1411	4577
Wool	-94.36	0.00	0	13	-13	0
Other livestock products	-53.02	26.75	986	1419	-433	986
Forestry(b)	0.00	4.66	57	57	0	57
Fishing	4.33	8.30	235	166	69	268
Coal	-2.06	1.13	27	55	-28	44
Oil and gas	5.25	5.54	0	0	0	349
Other minerals	-6.02	1.42	9	30	-21	46
Meat and milk products(b)	0.00	15.58	729	729	0	984
Other food products	-91.71	95.02	9837	11337	-1500	10699
Beverages and tobacco	-432.36	16.75	1034	4239	-3205	1038
Spinning, weaving, dying, textiles	-26.69	4.70	563	1201	-638	1033
Wearing apparel	-34.95	4.90	497	1197	-700	501
Leather, fur and their products	-46.60	3.34	212	717	-505	286
Lumber and wood products	-2.11	12.90	359	369	-11	514
Pulp, paper and printing	-11.45	4.39	312	521	-210	364
Chemicals, rubber and plastic	-5.58	10.33	2222	2502	-280	2936
Petroleum and coal products	-53.42	8.18	1531	3132	-1601	1654
Non-metallic mineral products	16.29	13.82	869	542	327	955
Primary iron and steel	-6.94	6.49	1059	1218	-159	1249
Other metals and products	-0.03	8.04	563	563	-1	837
Transport industries	-41.03	2.97	337	1406	-1068	508
Other machinery and equipment	-21.51	7.59	2234	3754	-1520	4538
Other manufacturing	-15.74	7.00	185	301	-116	219
Electricity, gas and water(b)	0.00	7.23	634	634	0	634
Construction(b)	0.00	14.45	4026	4026	0	4026
Trade and transport(b)	0.00	8.22	3518	3518	0	3518
Other services - private(b)	0.00	15.06	4986	4986	0	4990
Other services - government(b)	0.00	5.94	1951	1951	0	1951
Other services - ownership of dwellings(b)	0.00	14.34	894	894	0	894

Source: NERAM and SALTER database
(a) "Income" is defined by value added, that is payments to labour, capital and land
(b) Non-traded good

Table A2.7: ASSISTANCE ESTIMATES CALCULATED BY NERAM FOR THE EC

SALTER industry	*Income(a) from protection* %	*Nominal rate of protection* %	*Gross subsidy equivalent* US$b	*Gross tax equivalent* US$b	*Net subsidy equivalent* US$b	*Consumer tax equivalent* US$b
Paddy rice	117.64	131.25	1214	122	1093	1521
Non-grain crops	-2.22	0.00	0	892	-892	0
Wheat	52.50	32.06	6371	513	5858	6547
Coarse grains	60.98	44.62	6643	1225	5418	7120
Wool	-18.22	0.00	0	38	-38	0
Other livestock products	114.11	115.30	87749	12382	75367	87749
Forestry(b)	0.00	7.22	490	490	0	490
Fishing	-3.45	6.75	1340	1609	-269	1588
Coal	5.74	0.30	94	-982	1076	154
Oil and gas	-28.08	-1.29	-477	3822	-4299	-477
Other minerals	-14.48	1.09	3003	11172	-8169	3173
Meat and milk products(b)	0.00	28.80	49359	49359	0	52538
Other food products	-2.88	9.32	21321	22989	-1668	23140
Beverages and tobacco	14.90	16.49	14439	6656	7783	14876
Spinning, weaving, dying, textiles	5.63	8.93	11738	8928	2810	13571
Wearing apparel	10.84	11.23	6788	4245	2542	7739
Leather, fur and their products	-6.21	3.41	1475	2485	-1011	1921
Lumber and wood products	-4.98	3.13	3675	5706	-2031	4250
Pulp, paper and printing	5.07	7.83	12580	9634	2946	14321
Chemicals, rubber and plastic	-5.84	3.94	15759	22955	-7196	18054
Petroleum and coal products	56.20	27.76	51244	22792	28452	55368
Non-metallic mineral products	1.10	6.61	8888	8258	630	9287
Primary iron and steel	7.30	7.07	2758	1499	1259	5840
Other metals and products	-2.00	3.17	5910	7503	-1593	7389
Transport industries	-3.02	3.26	9515	12884	-3369	11170
Other machinery and equipment	4.21	6.91	33627	24463	9163	47309
Other manufacturing	-6.08	1.77	903	1963	-1059	1560
Electricity, gas and water(b)	0.00	8.42	12596	12596	0	12610
Construction(b)	0.00	4.20	24277	24277	0	24277
Trade and transport(b)	0.00	4.22	41720	41720	0	41724
Other services - private(b)	0.00	3.26	43151	43151	0	43177
Other services - government(b)	0.00	4.27	34641	34641	0	34641
Other services - ownership of dwellings(b)	0.00	2.27	7095	7095	0	7095

Source: NERAM and SALTER database
(a) "Income" is defined by value added, that is payments to labour, capital and land
(b) Non-traded good

Table A2.8: ASSISTANCE ESTIMATES CALCULATED BY NERAM FOR ASEAN

SALTER industry	*Income(a) from protection* %	*Nominal rate of protection* %	*Gross subsidy equivalent* US$b	*Gross tax equivalent* US$b	*Net subsidy equivalent* US$b	*Consumer tax equivalent* US$b
Paddy rice	5.73	0.01	1	-835	837	1
Non-grain crops	-2.31	0.00	0	518	-518	0
Wheat	0.00	0.00	0	0	0	0
Coarse grains	-5.58	-2.67	-55	34	-89	-60
Wool	0.00	0.00	0	0	0	0
Other livestock products	18.41	14.76	876	156	720	876
Forestry(b)	0.00	5.06	202	202	0	202
Fishing	9.46	12.07	619	253	366	728
Coal	-10.45	0.24	9	267	-258	432
Oil and gas	-4.70	2.22	232	615	-383	467
Other minerals	-19.22	3.50	103	439	-336	313
Meat and milk products(b)	0.00	7.05	331	331	0	481
Other food products	-10.34	0.13	67	1254	-1187	79
Beverages and tobacco	-14.73	21.86	1165	1426	-261	1363
Spinning, weaving, dying, textiles	28.76	26.77	1740	1194	546	3568
Wearing apparel	-13.70	15.20	1335	1758	-422	1484
Leather, fur and their products	0.18	11.06	222	220	1	425
Lumber and wood products	-5.63	6.63	789	999	-211	890
Pulp, paper and printing	3.24	10.52	317	277	40	633
Chemicals, rubber and plastic	-4.91	7.93	662	769	-106	2588
Petroleum and coal products	-17.95	4.71	493	749	-255	762
Non-metallic mineral products	32.76	21.17	641	311	331	968
Primary iron and steel	-34.35	0.67	6	79	-73	615
Other metals and products	-12.08	10.54	894	1157	-263	2272
Transport industries	14.72	18.00	2179	1586	593	3881
Other machinery and equipment	-24.27	2.05	590	2749	-2159	6673
Other manufacturing	-16.72	5.25	330	666	-336	883
Electricity, gas and water(b)	0.00	7.49	237	237	0	237
Construction(b)	0.00	10.23	2662	2662	0	2662
Trade and transport(b)	0.00	6.45	3284	3284	0	3621
Other services - private(b)	0.00	5.88	1123	1123	0	1291
Other services - government(b)	0.00	2.98	658	658	0	720
Other services - ownership of dwellings(b)	0.00	5.82	519	519	0	580

Source: NERAM and SALTER database
(a) "Income" is defined by value added, that is payments to labour, capital and land
(b) Non-traded good

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