
APPENDIX A: THEORETICAL SPECIFICATION OF THE SALTER MODEL

This appendix provides more technical information on the SALTER model's theoretical structure described in Chapter 1. A complete list of equations, variables, and coefficients and parameters is included. Equations are found in Table A1, variables in Table A2 and coefficients and parameters in Table A3. The equations of the SALTER model are numbered with a letter S prefix and are grouped by major topic with an additional letter.

A primer for linearising the SALTER model is also provided, along with examples of how particular classes of equations are derived.

A.1 Notation

All lower case variables are measured in percentage or absolute changes. Upper case symbols correspond to the actual levels of variables.

As discussed in Chapter 1, the set of variables is partitioned into an exogenous subset and an endogenous subset. The exogenous variables in a typical long run closure are listed separately in Table A4.

Unless specified otherwise, items described in the tables are indexed by country $z = 1, \dots, S$. The model structure is the same for all S regions modelled.

In general, geographical references are confined to superscripts. Most variables and parameters are specific to one of the S modelled regions and are superscripted z ($z = 1, \dots, S$). Other possible superscripts are D ('domestically produced' — shortened to 'domestic'), I ('imported'), and W ('world').

Geographical references are of necessity more complex when a traded entity needs to be distinguished by both source and destination. The letters $z = 1, \dots, S$ and $s = 1, \dots, S$ have been used to differentiate source from destination regions. A superscript z is used to index import variables where the imports are coming *into* region z . The source of these imports is indexed by a subscript s . A superscript z is also used to index export variables where the exports are being sent *from* region z . The destination of those exports is indexed by a subscript s .

Thus, when looking at variables describing bilateral trade, in which a regional reference appears in both the superscript and subscript, it is useful to remember that exported goods are sent from 'top to bottom' while imported goods are sent from 'bottom to top'.

A matching convention is used in the TABLO code used to implement the model. In the TABLO names (also listed in Table A2) for bilateral trade variables, two regional index letters need to appear side by side. An example from Table A2 is ES(I,Z,S), the TABLO name for the export volume of good i from region z to region s . In interpreting these names, it is useful to remember that exported goods are sent from 'left to right' (outwards, in some sense) while imported goods are sent from 'right to left' (inwards).

Subscripts are also used to specify the commodity (i), factor of production (k) and/or industry (j) characterising the main symbol.

Upper case subscripts generally indicate a particular use in final demand or another macroeconomic aggregate — that is, X ('intermediate demand'), C ('household consumption'), G ('government consumption'), K ('investment demand'), E ('export demand') and Q ('aggregate supply'). An A stands for 'aggregate' and F for 'international transport' or 'freight'.

A.2 Writing SALTER model equations as linear approximations in percentage changes

Most equations in the SALTER model are linear first-order approximations to an underlying level function, and in which the variables are expressed in percentage changes. An underlying production function may be written:

$$Y = f(X_1, X_2)$$

where Y is output and X_1 and X_2 are the levels of inputs 1 and 2 used in production. The above relation may be written as a linear first-order approximation by a process of logarithmic differentiation:

$$y = \varepsilon_1 x_1 + \varepsilon_2 x_2$$

where $y = 100 dY/Y$, $x_1 = 100 dX_1/X_1$ and $x_2 = 100 dX_2/X_2$ are the percentage changes in output, input 1 and input 2, respectively. Parameters ε_1 and ε_2 are the elasticities of output with respect to the use of inputs 1 and 2, respectively. The

linear expression, which treats ε_1 and ε_2 as constant, involves an element of approximation in the event that ε_1 and ε_2 in fact vary as production varies.

Two rules are used extensively in deriving the SALTER system of equations. Using logarithmic differentiation, a product expressed in levels is translated into the sum of the percentage changes in the components of the product. Thus an expression for the value of commodity X such as:

$$V = PX$$

where X is the quantity of a commodity, P its price and V its value, results in the following expression after taking log differentials:

$$d \log V = d \log P + d \log X$$

$$\frac{dV}{V} = \frac{dP}{P} + \frac{dX}{X}$$

and multiplying through by 100 gives

$$v = p + x$$

where v , p and x are the percentage changes in V , P and X , the variables expressed in level terms.

An additive relation in the levels of the variables results in a share-weighted expression when expressed in percentage changes. For example, differentiating the following simple relation between income, consumption and savings:

$$Y = C + S$$

where Y is income, C is consumption and S is savings, yields:

$$dY = dC + dS$$

Taking relative changes, results in:

$$Yy = Cc + Ss$$

where y , c and s are percentage changes in the level variables Y , C and S respectively. Such a relation is sometimes expressed in the SALTER equation system in this form. Alternatively, it may be written as

$$y = S_C c + S_S s$$

where $S_C = C/Y$ and $S_S = S/Y$ are the shares of each component of the levels sum in the levels total.

This rule applies to many national accounting equations; sums of aggregates expressed in levels become share-weighted sums of the percentage changes in the aggregates. This principle applies to aggregations such as that of primary factors (equations SA9–11), many of the national accounting identities (SD group of equations), and even the zero pure profit and market clearing conditions (equations SB1 and SC1).

Calculating changes in demand resulting from a CES aggregating function

A simple example is used to illustrate how the linearised demand functions in equation group SA are derived. In these equations, the decision-maker is assumed to minimise the cost of acquiring a quantity \bar{X} of a commodity by choosing among different sources or varieties of this good (X_1 and X_2). The problem can be written:

$$\begin{aligned} \min Y &= P_1 X_1 + P_2 X_2 \\ \text{s.t. } \bar{X} &= (\beta_1 X_1^\alpha + \beta_2 X_2^\alpha)^{1/\alpha} \end{aligned}$$

The Lagrangian function is written

$$L = Y + \lambda \left[\bar{X} - (\beta_1 X_1^\alpha + \beta_2 X_2^\alpha)^{1/\alpha} \right]$$

where λ is the shadow cost to the objective of an extra unit of the aggregate X defined in the constraint. The first order conditions are:

$$\frac{\partial L}{\partial X_i} = P_i - \lambda \beta_i X_i^{\alpha-1} X^{1-\alpha} = 0$$

Multiplying through by X_i and summing over i gives:

$$Y - \lambda X^{1-\alpha} [\beta_1 X_1^\alpha + \beta_2 X_2^\alpha] = 0$$

Since the square bracket term is equal to X^α this simplifies to:

$$\lambda = \frac{Y}{X} = P$$

where P is the price of aggregate X , since it is the expenditure on X divided by the quantity commodity aggregate. Dividing the first order condition by $P = \lambda$ and rearranging, we get:

$$\frac{P_i}{P} = \beta_i X_i^{\alpha-1} X^{1-\alpha}$$

Let $\sigma = (1 - \alpha)^{-1}$ be the elasticity of substitution between X_1 and X_2 . Taking logarithms, we have

$$\sigma(\ln P_i - \ln P) = \sigma \ln \beta_i + \ln X - \ln X_i$$

Holding σ and β_i constant and differentiating yields the following expression in percentage changes:

$$x_i = x - \sigma(p_i - p)$$

where lower case letters are the percentage change equivalents of the corresponding upper case variables. The Armington part of the intermediate and final demand equations follow this structure.

Calculating price indexes

We use the price of an imported aggregate for consumption to illustrate how price indexes are derived. We want to show:

$$(SA16) \quad p_{Ci}^{Iz} = \sum_{s=1}^S S_{Cis}^{Iz} p_{Cis}^{Iz}$$

We start with the calculation of an aggregate in terms of levels:

$$(1) \quad P_{Ci}^{Iz} C_i^{Iz} = \sum_{s=1}^S P_{Cis}^{Iz} C_{is}^{Iz}$$

The total value of imports for consumption is equal to the sum of imports from all sources. The corresponding percentage change expression is:

$$(2) \quad p_{Ci}^{Iz} + c_i^{Iz} = \sum_{s=1}^S S_{Cis}^{Iz} (p_{Cis}^{Iz} + c_{is}^{Iz})$$

We now show that

$$(3) \quad c_i^{Iz} = \sum_{s=1}^S S_{Cis}^{Iz} c_{is}^{Iz}$$

Using the demands for each disaggregated commodity in equation SA15:

$$(4) \quad c_{is}^{Iz} = c_i^{Iz} - \beta_i^{Iz} (p_{Cis}^{Iz} - p_{Ci}^{Iz})$$

$$(5) \quad \sum_{s=1}^S S_{Cis}^{Iz} c_{is}^{Iz} = \sum_{s=1}^S S_{Cis}^{Iz} \left[c_i^{Iz} - \beta_i^{Iz} \left(p_{Cis}^{Iz} - \sum_{s=1}^S S_{Cis}^{Iz} c_{is}^{Iz} \right) \right]$$

Upon distributing the first sum operator in the right hand side, the round parenthesis term disappears, leaving c_i^{Iz} which we required in equation (3).

Equation (2) can be rewritten by distributing the sum operator:

$$(6) \quad p_{Ci}^{Iz} + c_i^{Iz} = \sum_{s=1}^S S_{Cis}^{Iz} p_{Cis}^{Iz} + \sum_{s=1}^S S_{Cis}^{Iz} c_{is}^{Iz}$$

The second terms on each side of equation (6) are equal; therefore

$$p_{Ci}^{Iz} = \sum_{s=1}^S S_{Cis}^{Iz} p_{Cis}^{Iz}$$

Calculating the change in the contribution of a tax to government revenues

We use the contribution of export taxes to government revenues from commodity taxes as an example of how to derive the contribution equations in group SE. The contribution to government revenues of the export tax on commodity i to region s can be written (in levels):

$$R_{GEis}^z = \frac{E_{Eis}^z T_{Eis}^z}{R_{GT}}$$

where E_{Eis}^z is the taxable value of commodity i exported to region s ; T_{Eis}^z is the corresponding export tax rate; R_{GEis}^z is the contribution of export taxes on commodity i to region s ; and R_{GT} is aggregate commodity tax revenue.

Lower case letters in the following expression are percentage changes in the corresponding level variables except for t_{Eis}^z which is the percentage change in *power* of the export tax applied by region z . The linear expression is:

$$r_{GEis}^z = \frac{E_{Eis}^z T_{Eis}^z}{R_{GT}} \left[exp_{is}^z + p_i^{Dz} + \left(\frac{1 + T_{Eis}^z}{T_{Eis}^z} \right) t_{Eis}^z \right]$$

However, this expression is undefined for $T_{Eis}^z = 0$, so the term $E_{Eis}^z T_{Eis}^z$ is distributed, yielding an expression like equation SE11, where the contribution of all export taxes is calculated as the simple sum of the contribution of taxes on individual commodities. This principle is applied to all equations describing the contribution of taxes to government revenues.

Using shift terms and ratios

Some behavioural rules in the SALTER model are determined using ratios. In many cases, these ratios are used with the closure to define the economic environment under which adaptations are made.

For example, the wage rate in a region may be free to vary or may be held fixed in real or nominal terms. This is captured in equation SD11 as

$$w_L^z = h_W^z cpi^z + h_{WL}^z$$

If the parameter h_W^z is assigned a value of unity and if the shift term h_{WL}^z is set exogenously to zero, the equation simply states that the percentage change in the nominal wage w_L^z equals the percentage change in the consumer price index cpi^z . Thus the wage is held fixed in real terms, by being indexed to the consumer price index. If the parameter h_W^z is assigned a value of zero and if the shift term h_{WL}^z is set exogenously to zero, the equation states instead that the nominal wage is held fixed.

Alternatively, if the parameter h_W^z is assigned a value of unity and if the shift term h_{WL}^z is left free to vary endogenously, this cuts the link between nominal wages and the consumer price index. This is typically used to model wage flexibility in long-run closures of the model.

Technical change

Technical change is allowed to affect the efficiency of:

1. intermediate inputs as a whole;
2. value added as a whole;
3. individual components of value added; and
4. all inputs to production as a whole.

Technical change is modelled through variables a_{ij} where t indicates the type of technical change and j indicates the industry in which technical change occurs. Setting variables $a_{Xj}^z = -1$ ($t = X$ for intermediate inputs) results in a 1 per cent decrease in the requirements for all intermediate inputs per unit of output in industry j (whether domestic or imported). Setting $a_P^z = -1$ ($t = P$ for primary factors) results

in a 1 per cent decrease in the requirements for all primary factors per unit of output in all industries. Setting $a_j^z = -1$ results in a 1 per cent decrease in the requirements for both intermediate inputs and primary factors per unit of output in industry j (see equations SA1–2 and SA6–8).

Technical change is also assumed to affect the use of individual primary factors. As seen in equation SA8, a technical change improving the efficiency of labour in industry j by 1 per cent results in a decrease in labour requirements per unit of output by $1 - \eta_{2j}^z(1 - S_{Lj}^z)$. This value may turn out to be positive or negative, depending on the primary factor substitution elasticities and factor shares. At the same time, however, the use of capital per unit of output in industry j decreases by $\eta_{2j}^z S_{Lj}^z$ according to equation SA7. As the efficiency of labour is increased, labour becomes relatively cheaper than capital in efficiency units, so there is substitution away from capital.

Absolute change variables and ratios

Some variables are defined as the absolute change of a ratio. For example Q_B^{YGz} is the ratio of government held bonds (A_B^{Gz}) to total government receipts (R_D^{Gz}), multiplied by 100, and dQ_B^{YGz} is the absolute change in this ratio variable, measured in percentage points.

Government net interest receipts are equal to the product of the bond rate and government bond ownership. In level form, this can be written as

$$R_D^{Gz} Q_I^{RGz} = R_B^z R_D^{Gz} Q_B^{YGz} = 100 \cdot R_B^z A_B^{Gz}$$

where Q_I^{RGz} is the ratio of net interest income to total government receipts, multiplied by 100, and R_B^z is the rate of return of bonds, measured as a fraction rather than a percentage (eg. where 0.035 denotes a 3.5 per cent real return on bonds).

Differentiating the above equation gives:

$$R_D^{Gz} dQ_I^{RGz} + Q_I^{RGz} dR_D^{Gz} = 100 \cdot A_B^{Gz} dR_B^z + R_B^z Q_B^{YGz} dR_D^{Gz} + R_B^z R_D^{Gz} dQ_B^{YGz}$$

Since $Q_I^{RGz} = R_B^z Q_B^{YGz}$, the second terms on both sides of the equation are equal; simplifying yields equation SE5, where the level of the bond rate R_B in that equation is still measured as a fraction, but where the variable representing the absolute change in the bond rate dR_B^z in that equation is equal to 100. dR_B^z above, and hence is denominated in percentage points. The principles demonstrated in this example are applied in equations SD3, 6, 8, SE1, 5, 13, SG1–3, 8 and 10.

Table A1: Equations in the SALTER model

<i>No</i>	<i>TABLO name</i>	<i>Range</i>	<i>Equation</i>
SA Demands for commodities			
Firm demand for domestic intermediate inputs			
SA1	INT_DEM_DOM	$i = 1, \dots, I$ $j = 1, \dots, J$ $z = 1, \dots, S$	$x_{ij}^{Dz} = q_j^z - \eta_i^z \left(p_{Pij}^{Dz} - p_{Pij}^z \right) + a_j^z + a_{Xj}^z$
Firm demand for imported intermediate inputs			
SA2	INT_DEM_IMP	$i = 1, \dots, I$ $j = 1, \dots, J$ $z = 1, \dots, S$	$x_{ij}^{Iz} = q_j^z - \eta_i^z \left(p_{Pij}^{Iz} - p_{Pij}^z \right) + a_j^z + a_{Xj}^z$
Intermediate demand for imported intermediate inputs, by source			
SA3	INT_DEM_SEC	$i = 1, \dots, I$ $j = 1, \dots, J$ $s = 1, \dots, S$ $z = 1, \dots, S$	$x_{isj}^{Iz} = x_{ij}^{Iz} - \eta_i^{Iz} \left[p_{Pisj}^{Iz} - p_{Pij}^{Iz} \right]$
Producer price of commodity i			
SA4	PR_INT_TOT	$i = 1, \dots, I$ $j = 1, \dots, J$ $z = 1, \dots, S$	$p_{Pij}^z = S_{Pij}^{Dz} p_{Pij}^{Dz} + S_{Pij}^{Iz} p_{Pij}^{Iz}$

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Table A1: Equations in the SALTER model

No	TABLO name	Range	Equation
Producer price of imported commodity i			
SA5	PR_INT_IMP	$i = 1, \dots, I$ $j = 1, \dots, J$ $z = 1, \dots, S$	$p_{Pij}^{Iz} = \sum_{s=1}^S S_{Pisj}^{Iz} p_{Pisj}^{Iz}$
Industry demand for land			
SA6	DEMAND_LAND	$j = 1, \dots, J$ $z = 1, \dots, S$	$f_{Mj}^z = q_j^z - \eta_{2j}^z \left[w_M^z - \sum_{\ell=K,M,L} S_{\ell j}^z w_{\ell j}^z \right] + a_j^z + a_P^z + a_{Mj}^z - \eta_{2j}^z \left[a_{Mj}^z - \sum_{\ell=K,M,L} S_{\ell j}^z a_{\ell j}^z \right]$
Industry demand for capital			
SA7	DEM_CAPITAL	$j = 1, \dots, J$ $z = 1, \dots, S$	$f_{Kj}^z = q_j^z - \eta_{2j}^z \left[w_{Kj}^z - \sum_{\ell=K,M,L} S_{\ell j}^z w_{\ell j}^z \right] + a_j^z + a_P^z + a_{Kj}^z - \eta_{2j}^z \left[a_{Kj}^z - \sum_{\ell=K,M,L} S_{\ell j}^z a_{\ell j}^z \right]$
Industry demand for labour			
SA8	DEM_LABOUR	$j = 1, \dots, J$ $z = 1, \dots, S$	$f_{Lj}^z = q_j^z - \eta_{2j}^z \left[w_L^z - \sum_{\ell=K,M,L} S_{\ell j}^z w_{\ell j}^z \right] + a_j^z + a_P^z + a_{Lj}^z - \eta_{2j}^z \left[a_{Lj}^z - \sum_{\ell=K,M,L} S_{\ell j}^z a_{\ell j}^z \right]$
Aggregate demand for land			
SA9	AGGLAND	$z = 1, \dots, S$	$f_{DM}^z = \sum_{j=1}^J S_{DMj}^z f_{Mj}^z$
Aggregate demand for capital			
SA10	AGGCAP	$z = 1, \dots, S$	$f_{DK}^z = \sum_{j=1}^J S_{DKj}^z f_{Kj}^z$

Aggregate demand for labour

SA11 AGGLAB $z = 1, \dots, S$

$$f_{DL}^z = \sum_{j=1}^J S_{DLj}^z f_{Lj}^z$$

Household demand for commodity aggregates

SA12 HH_DEMAND $i = 1, \dots, I$
 $z = 1, \dots, S$

$$c_i^z = \sum_{h=1}^I \lambda_{ih}^z p_{Ch}^z + \mu_i^z (c_T^z - h_D^z) + h_D^z$$

Household demand for domestic commodities

SA13 CON_DEM_DOM $i = 1, \dots, I$
 $z = 1, \dots, S$

$$c_i^{Dz} = c_i^z - \beta_i^z (p_{Ci}^{Dz} - p_{Ci}^z)$$

Household demand for imported commodity aggregates

SA14 CON_DEM_IMP $i = 1, \dots, I$
 $z = 1, \dots, S$

$$c_i^{Iz} = c_i^z - \beta_i^z (p_{Ci}^{Iz} - p_{Ci}^z)$$

Household demand for imported commodities, by source

SA15 CON_DEM_SEC $i = 1, \dots, I$
 $s = 1, \dots, S$
 $z = 1, \dots, S$

$$c_{is}^{Iz} = c_i^{Iz} - \beta_i^{Iz} (p_{Cis}^{Iz} - p_{Ci}^{Iz})$$

Consumer price of composite imported commodities

SA16 PR_CON_IMP $i = 1, \dots, I$
 $z = 1, \dots, S$

$$p_{Ci}^{Iz} = \sum_{s=1}^S S_{Cis}^{Iz} p_{Cis}^{Iz}$$

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Table A1: Equations in the SALTER model

No	TABLO name	Range	Equation
Price paid by consumers for commodity i			
SA17	PR_CON_TOT	$i = 1, \dots, I$ $z = 1, \dots, S$	$p_{Ci}^z = S_{Ci}^{Iz} p_{Ci}^{Iz} + S_{Ci}^{Dz} p_{Ci}^{Dz}$
Government demand for domestic commodities			
SA18	GOV_USE_DOM	$i = 1, \dots, I$ $z = 1, \dots, S$	$gov_i^{Dz} = g^z - \beta_{Gi}^z (p_{Gi}^{Dz} - p_{Gi}^z)$
Government demand for imported commodity aggregates			
SA19	GOV_USE_IMP	$i = 1, \dots, I$ $z = 1, \dots, S$	$gov_i^{Iz} = g^z - \beta_{Gi}^z (p_{Gi}^{Iz} - p_{Gi}^z)$
Government demand for imported commodities, by source			
SA20	GOV_USE_SEC	$i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	$gov_{is}^{Iz} = gov_i^{Iz} - \beta_{Gi}^{Iz} (p_{Gis}^{Iz} - p_{Gi}^{Iz})$
Price paid by the government for composite imported commodities			
SA21	PR_GOV_IMP	$i = 1, \dots, I$ $z = 1, \dots, S$	$p_{Gi}^{Iz} = \sum_{s=1}^S S_{Gis}^{Iz} p_{Gis}^{Iz}$

Price paid by the government for composite commodities

SA22 PR_GOV_TOT $i = 1, \dots, I$
 $i = 1, \dots, I$
 $i = 1, \dots, I$

$$p_{Gi}^z = S_{Gi}^{Iz} p_{Gi}^{Iz} + S_{Gi}^{Dz} p_{Gi}^{Dz}$$

Investment demand for domestic commodities

SA23 INV_USE_DOM $i = 1, \dots, I$
 $z = 1, \dots, S$

$$inv_i^{Dz} = inv_{TR}^z - \beta_{Ki}^z (p_{Ki}^{Dz} - p_{Ki}^z)$$

Investment demand for imported commodity aggregates

SA24 INV_USE_IMP $i = 1, \dots, I$
 $z = 1, \dots, S$

$$inv_i^{Iz} = inv_{TR}^z - \beta_{Ki}^z (p_{Ki}^{Iz} - p_{Ki}^z)$$

Investment demand for imported commodities, by source

SA25 INV_IMP_SEC $i = 1, \dots, I$
 $s = 1, \dots, S$
 $z = 1, \dots, S$

$$inv_{is}^{Iz} = inv_i^{Iz} - \beta_{Ki}^{Iz} (p_{Kis}^{Iz} - p_{Ki}^{Iz})$$

Price of imported commodities used in investment

SA26 PR_INV_IMP $i = 1, \dots, I$
 $z = 1, \dots, S$

$$p_{Ki}^{Iz} = \sum_{s=1}^S S_{Kis}^{Iz} p_{Kis}^{Iz}$$

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Table A1: Equations in the SALTER model

No	TABLO name	Range	Equation
Price of composite commodities used in investment			
SA27	PR_INV_TOT	$i = 1, \dots, I$ $z = 1, \dots, S$	$p_{Ki}^z = S_{Ki}^{Iz} p_{Ki}^{Iz} + S_{Ki}^{Dz} p_{Ki}^{Dz}$
SB Zero pure profit conditions			
Zero profit condition for each industry			
SB1	ZEROPROFITS	$j = 1, \dots, J$ $z = 1, \dots, S$	$p_j^{Dz} = s_{Qj}^z + \sum_{i=1}^I H_{ij}^{Dz} p_{Pij}^{Dz} + \sum_{i=1}^I H_{ij}^{Iz} p_{Pij}^{Iz} + \sum_{k=1}^K H_{kj}^z w_{kj}^z + a_{Tj}^z$
Aggregated technical change			
SB2	TECHNICAL_CH	$j = 1, \dots, J$ $z = 1, \dots, S$	$a_{Tj}^z = a_j^z + H_{Xj}^z a_{Xj}^z + H_{Pj}^z a_P^z + \sum_{k=1}^K H_{kj}^z a_{kj}^z$
Landed duty-paid price of commodity i imported from source s by region z			
SB3	BASICPIMP	$i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	$p_{is}^{Iz} = p_{is}^{Wz} + e^z + d_{is}^z$
Landed duty-paid price of imported commodity aggregate i			
SB4	AGIMPRICE	$i = 1, \dots, I$ $z = 1, \dots, S$	$p_i^{Iz} = \sum_{s=1}^S S_{Mis}^{Iz} p_{is}^{Iz}$

Producer price of imported intermediate commodities

SB5 PR_INT_SEC $i = 1, \dots, I$
 $j = 1, \dots, J$
 $s = 1, \dots, S$
 $z = 1, \dots, S$

$$p_{Pisj}^{Iz} = p_{is}^{Iz} + t_{ij}^{Iz}$$

Producer price of domestic intermediate commodities

SB6 PR_INT_DOM $i = 1, \dots, I$
 $j = 1, \dots, J$
 $z = 1, \dots, S$

$$p_{Pij}^{Dz} = p_i^{Dz} + t_{ij}^{Dz}$$

Consumer price of imported commodities, by source

SB7 PR_CON_SEC $i = 1, \dots, I$
 $s = 1, \dots, S$
 $z = 1, \dots, S$

$$p_{Cis}^{Iz} = p_{is}^{Iz} + t_{Ci}^{Iz}$$

Consumer price of domestic commodities

SB8 PR_CON_DOM $i = 1, \dots, I$
 $z = 1, \dots, S$

$$p_{Ci}^{Dz} = p_i^{Dz} + t_{Ci}^{Dz}$$

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Table A1: Equations in the SALTER model

No	TABLO name	Range	Equation
Price paid by the government for imported commodities, by source			
SB9	PR_GOV_SEC	$i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	$p_{Gis}^{Iz} = p_{is}^{Iz} + t_{Gi}^{Iz}$
Price paid by the government for domestic commodities			
SB10	PR_GOV_DOM	$i = 1, \dots, I$ $z = 1, \dots, S$	$p_{Gi}^{Dz} = p_i^{Dz} + t_{Gi}^{Dz}$
Price of imported commodities used in investment, by source			
SB11	PR_INV_SEC	$i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	$p_{Kis}^{Iz} = p_{is}^{Iz} + t_{Ki}^{Iz}$
Price of domestic commodities used in investment			
SB12	PR_INV_DOM	$i = 1, \dots, I$ $z = 1, \dots, S$	$p_{Ki}^{Dz} = p_i^{Dz} + t_{Ki}^{Dz}$
Export price (fob) of commodity i exported by z to s			
SB13	PREXPORT	$i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	$p_{Eis}^z = p_i^{Dz} + t_{Eis}^z$

World currency landed duty-free price of imported commodities into region z , by source

SB14 FORCURLDFPR $i = 1, \dots, I$
 $s = 1, \dots, S$
 $z = 1, \dots, S$

$$p_{is}^{Wz} = S_{Vis}^{Wz} (p_{Eiz}^s - e^s) + S_{Fis}^{Wz} p_F$$

Price of international freight (in world currency)

SB15 PRFREIGHT —

$$p_F = \sum_{i=1}^I \sum_{s=1}^S S_{Fis} (p_i^{Ds} - e^s)$$

SC Market clearing conditions

Market clearing condition for domestic commodities

SC1 EQDOMCOM $i = 1, \dots, I$
 $z = 1, \dots, S$

$$q_i^z = \sum_{j=1}^J S_{QXij}^{Dz} x_{ij}^{Dz} + S_{QKi}^{Dz} inv_i^{Dz} + S_{QCi}^{Dz} c_i^{Dz} + S_{QEI}^{Dz} exp_i^z + S_{QGi}^{Dz} gov_i^{Dz}$$

Imports of commodity i from region s

SC2 IMPORTDEMAND $i = 1, \dots, I$
 $s = 1, \dots, S$
 $z = 1, \dots, S$

$$imp_{is}^z = \sum_{j=1}^J S_{MXisj}^{Iz} x_{isj}^{Iz} + S_{MKis}^{Iz} inv_{is}^{Iz} + S_{MCis}^{Iz} c_{is}^{Iz} + S_{MGis}^{Iz} gov_{is}^{Iz}$$

Labour employment rate

SC3 EMP_RATES $z = 1, \dots, S$

$$em_L^z = f_{DL}^z - f_{SL}^z$$

(Continued on next page)

Table A1: Equations in the SALTER model

No	TABLO name	Range	Equation
SD Household income aggregates, supply of primary factors			
Aggregate household income			
SD1	HHOLD_INCOME	$z = 1, \dots, S$	$Y^{Hz} y^{Hz} = Y_L^z y_L^z + Y_P^{Hz} y_P^{Hz} + T_G^z t_G^z$
Labour income			
SD2	LABR_INCOME	$z = 1, \dots, S$	$y_L^z = w_L^z + f_{DL}^z$
Property income			
SD3	PROPY_INCOME	$z = 1, \dots, S$	$Y_P^{Hz} y_P^{Hz} = Y_E^z y_E^z + Y_D^{Hz} dQ_I^{YHz} + Y_I^{Hz} y_D^{Hz}$
Equity income			
SD4	EQY_INCOME	$z = 1, \dots, S$	$Y_E^z y_E^z = F_{DKV}^z f_{DKV}^z + F_{DMV}^z (w_M^z + f_{DM}^z) - DEP^z dep^z$
Gross fixed capital earnings			
SD5	FIXD_CAPL_EARNINGS	$z = 1, \dots, S$	$F_{DKV}^z f_{DKV}^z = \sum_{j=1}^J F_{DKVj}^z (w_{Kj}^z + f_{Kj}^z)$
Household interest income			
SD6	HHOLD_INTT_INCOME	$z = 1, \dots, S$ (M.5.6)	$Y_D^{Hz} dQ_I^{YHz} = A_B^{Hz} dR_B^z + R_B Y_D^{Hz} dQ_B^{YHz}$
Household disposable income			
SD7	HHOLD_DISPBLE_INCOME	$z = 1, \dots, S$	$Y_D^{Hz} y_D^{Hz} = Y^{Hz} y^{Hz} - R_{GY}^z r_{GY}^z$

Disposition of household disposable income

SD8 DISP_NHOLD_INCOME $z = 1, \dots, S$

$$Y_D^{Hz} y_D^{Hz} = C_T^z c_T^z + Y_D^{Hz} dQ_S^{YHz} + S^{Hz} y_D^{Hz}$$

Pre-transfer household disposable income

SD9 HHOLD_PRIVTE_INCME $z = 1, \dots, S$

$$Y_V^{Hz} y_V^{Hz} = Y_L^z y_L^z + Y_P^{Hz} y_P^{Hz} - R_{GY}^z r_{GY}^z,$$

Labour supply

SD10 LAB_SUPPLY $z = 1, \dots, S$

$$f_{SL}^z = \chi_L^z \left[w_L^z - cpi^z - R_{TY}^z t_{YL}^z \right] + h_D^z$$

Wage equation

SD11 WAGES $z = 1, \dots, S$

$$w_L^z = h_W^z cpi^z + h_{WL}^z$$

SE Government budget

Government receipts

SE1 GOVT_RECTS $z = 1, \dots, S$

$$R_D^{Gz} y_{GT}^z = R_{GY}^z r_{GY}^z + R_{GT}^z r_{GT}^z + R_D^{Gz} dQ_I^{RGz} + Y_I^{Gz} y_{GT}^z$$

Income tax

SE2 INCOME_TAX $z = 1, \dots, S$

$$R_{GY}^z r_{GY}^z = T_{YL}^z r_{GYL}^z + T_{YNL}^z r_{GYP}^z$$

(Continued on next page)

Table A1: Equations in the SALTER model

No	TABLO name	Range	Equation
Revenue from tax on labour income			
SE3	TAX_LABR_INCOME	$z = 1, \dots, S$	$r_{GYL}^z = t_{YL}^z + y_L^z$
Revenue from tax on property income			
SE4	TAX_PROPY_INCOME	$z = 1, \dots, S$	$r_{GYP}^z = t_{YP}^z + y_P^{Hz}$
Government net interest receipts			
SE5	GOVT_INTT_RECTS	$z = 1, \dots, S$	$R_D^{Gz} dQ_I^{RGz} = A_B^{Gz} dR_B^z + R_B R_D^{Gz} dQ_B^{YGz},$
Contribution of taxes on intermediate commodity use to commodity tax revenue			
SE6	REVINT	$z = 1, \dots, S$	$r_{GX}^z = \frac{1}{R_{GT}^z} \sum_{j=1}^J \sum_{i=1}^I \left[E_{ij}^{Dz} t_{ij}^{Dz} + T_{ij}^{Dz} (x_{ij}^{Dz} + p_i^{Dz}) \right] + \sum_{s=1}^S \left[E_{isj}^{Iz} t_{ij}^{Iz} + T_{ijs}^{Iz} (x_{isj}^{Iz} + p_{is}^{Iz}) \right]$
Contribution of consumption taxes to commodity tax revenue			
SE7	REVCON	$z = 1, \dots, S$	$r_{GC}^z = \frac{1}{R_{GT}^z} \sum_{i=1}^I \left[E_{Ci}^{Dz} t_{Ci}^{Dz} + T_{Ci}^{Dz} (c_i^{Dz} + p_i^{Dz}) \right] + \sum_{s=1}^S \left[E_{Cis}^{Iz} t_{Ci}^{Iz} + T_{Cis}^{Iz} (c_{is}^{Iz} + p_{is}^{Iz}) \right]$
Contribution of taxes on government commodity purchases to commodity tax revenue			
SE8	REVGGOV	$z = 1, \dots, S$	$r_{GG}^z = \frac{1}{R_{GT}^z} \sum_{i=1}^I \left[E_{Gi}^{Dz} t_{Gi}^{Dz} + T_{Gi}^{Dz} (gov_i^{Dz} + p_i^{Dz}) \right] + \sum_{s=1}^S \left[E_{Gis}^{Is} t_{Gi}^{Is} + T_{Gis}^{Is} (gov_{is}^{Is} + p_{is}^{Is}) \right]$
Contribution of investment taxes to commodity tax revenue			

SE9 REVINV $z = 1, \dots, S$
$$r_{GK}^z = \frac{1}{R_{GT}^z} \sum_{i=1}^I \left[E_{Ki}^{Dz} t_{Ki}^{Dz} + T_{Ki}^{Dz} \left(inv_i^{Dz} + p_i^{Dz} \right) + \sum_{s=1}^S \left[E_{Kis}^{Is} t_{Ki}^{Is} + T_{Kis}^{Is} \left(inv_{is}^{Is} + p_{is}^{Is} \right) \right] \right]$$

Contribution of industry taxes net of subsidies to commodity tax revenue

SE10 REVINDT $z = 1, \dots, S$
$$r_{GI}^z = \frac{1}{R_{GT}^z} \sum_{j=1}^J \left[E_{Qj}^z s_{Qj}^z + S_{Qj}^z \left(q_j^z + p_j^{Dz} \right) \right]$$

Contribution of export taxes on commodity i exported to region s to commodity tax revenue

SE11 REVEXP $z = 1, \dots, S$
$$r_{GE}^z = \frac{1}{R_{GT}^z} \sum_{i=1}^I \sum_{s=1}^S \left[E_{Eis}^z t_{Eis}^z + T_{Eis}^z \left(exp_{is}^z + p_i^{Dz} \right) \right]$$

Contribution of import duties to commodity tax revenue

SE12 REVIMP $z = 1, \dots, S$
$$r_{GD}^z = \frac{1}{R_{GT}^z} \sum_{i=1}^I \sum_{s=1}^S \left[E_{Mis}^z d_{is}^z + D_{is}^z \left(imp_{is}^z + p_{is}^{Wz} + e^z \right) \right]$$

Disposition of government receipts

SE13 DISPN_GOVT_RECTS $z = 1, \dots, S$
$$R_D^{Gz} y_{GT}^z = O_G^z o_G^z + R_D^{Gz} dQ_S^{YGz} + S^{Gz} y_{GT}^z$$

Current government outlays

SE14 GOVT_CURRNT_OUTLS $z = 1, \dots, S$
$$O_G^z o_G^z = Z_G^z z_G^z + T_G^z t_G^z,$$

Commodity tax revenue net of industry subsidies

SE15 GOVREVCOMM $z = 1, \dots, S$
$$r_{GT}^z = r_{GC}^z + r_{GX}^z + r_{GG}^z + r_{GK}^z + r_{GI}^z + r_{GE}^z + r_{GD}^z$$

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Table A1: Equations in the SALTER model

No	TABLO name	Range	Equation
Labour income tax rate			
SE16	RATE_TAX_LABR_INCOME	$z = 1, \dots, S$	$t_{YL}^z = h_{YTR}^z + h_{LYT}^z$
Property income tax rate			
SE17	RATE_TAX_PROPY_INCOME	$z = 1, \dots, S$	$t_{YP}^z = h_{YTR}^z + h_{PYT}^z$
Transfer payments from governments to households			
SE18	TRANSFERS_GOVT_HHOLD	$z = 1, \dots, S$	$t_G^z = h_{GHT}^z + y_V^{Hz}$

SF International trade

Demand by region s for commodity exports of region z

SF1	EMPREGSEC	$i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	$exp_{is}^z = imp_{iz}^s$
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Aggregate imports, by commodity, at landed duty-free prices in world currency

SF2	IMPFOBCOMM	$i = 1, \dots, I$ $z = 1, \dots, S$	$imp_i^z = \sum_{s=1}^S S_{Mis}^z (p_{is}^{Wz} + imp_{is}^z)$
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Aggregate imports, from region s to region z , at landed duty-free prices in world currency

SF3 IMP_FOB_SEC $s = 1, \dots, S$
 $z = 1, \dots, S$

$$imps_s^z = \sum_{i=1}^I S_{MSis}^z (p_{is}^{Wz} + imp_{is}^z)$$

Import volume index, basic value weights

SF4 IMPT_VOLE_IND $i = 1, \dots, I$
 $z = 1, \dots, S$

$$imp_{IVi}^z = \sum_{s=1}^S S_{MERis}^z imp_{is}^z$$

Aggregate exports in value from region z at fob prices, by commodity

SF5 EXPFOBCOMM $i = 1, \dots, I$
 $z = 1, \dots, S$

$$expi_i^z = \sum_{s=1}^S S_{EIs}^z (p_{Eis}^z + exp_{is}^z) + S_{EIFi}^z (p_i^{Dz} + F_i^z)$$

Aggregate exports by region z to region s at fob prices, by destination

SF6 EXPFOBSEC $s = 1, \dots, S$
 $z = 1, \dots, S$

$$exp_s^z = \sum_{i=1}^I S_{ESis}^z (p_{Eis}^z + exp_{is}^z)$$

Region z export volume of commodity i

SF7 EXPORTDEMAND $i = 1, \dots, I$
 $z = 1, \dots, S$

$$exp_i^z = \sum_{s=1}^S S_{Eis}^z exp_{is}^z + (S_{EFi}^z F_i^z)$$

Aggregate imports at landed duty-free prices in world currency

SF8 IMPFOB $z = 1, \dots, S$

$$imp_A^z = \sum_{i=1}^I \sum_{s=1}^S S_{MTis}^z (p_{is}^{Wz} + imp_{is}^z)$$

Real aggregate imports

SF9 REALIMP $z = 1, \dots, S$

$$imp_{AR}^z = imp_A^z - ipi^z$$

(Continued on next page)

Table A1: Equations in the SALTER model

No	TABLO name	Range	Equation
Aggregate exports at fob prices			
SF10	EXPFOBZ	$z = 1, \dots, S$	$\exp_A^z = \sum_{i=1}^I \sum_{s=1}^S S_{EAis}^z (p_{Eis}^z + \exp_{is}^z) + \sum_{i=1}^I S_{EAFi}^z (p_i^{Dz} + F_i^z)$
Real aggregate exports			
SF11	REALEXP	$z = 1, \dots, S$	$\exp_{AR}^z = \exp_A^z - epi^z$
Terms of trade			
SF12	TERMS_OF_TRADE	$z = 1, \dots, S$	$tt^z = epi^z - e^z - ipi^z$
Contribution to terms of trade of price variation between commodities			
SF13	CONTRN_TTRADE_COMMY	$z = 1, \dots, S$	$C_1^z = \sum_{i=1}^I C_{1i}^z$
Contribution to cttcr of commodity i			
SF14	CTTCR_REG_COM	$i = 1, \dots, I$ $z = 1, \dots, S$	$C_{1i}^z = (S_{ETi}^z - S_{MTi}^z) (wepi_i^z - wpi_i^z)$
Contribution to terms of trade of export variety price variation			
SF15	CONTRN_TTRADE_VAR_X	$z = 1, \dots, S$	$C_2^z = \sum_{i=1}^I C_{2i}^z$
Contribution to cttvrx of commodity i			
SF16	CTTVXR_REG_COM	$i = 1, \dots, I$ $z = 1, \dots, S$	$C_{2i}^z = S_{ETi}^z (epi_i^z - wepi_i^z)$

Contribution to terms of trade of import variety price variation

SF17 CONTRN_TTRADE_VAR_M $z = 1, \dots, S$

$$C_3^z = \sum_{i=1}^I C_{3i}^z$$

Contribution to cttvmr of commodity i

SF18 CTTVMR_REG_COM $i = 1, \dots, I$
 $z = 1, \dots, S$

$$C_{3i}^z = S_{MTi}^z (mpi_i^z - wepi_i^z)$$

Price index for exports, by region and commodity

SF19 EXPT_PRICE_REG_COM $i = 1, \dots, I$
 $z = 1, \dots, S$

$$epi_i^z = \sum_{s=1}^S S_{EIs}^z p_{EIs}^z + S_{EIFi}^z p_i^{Dz} - e^z$$

World price index for exports, by commodity

SF20 EXPT_PRICE_COM $i = 1, \dots, I$

$$wepi_i^z = \sum_{z=1}^S S_{ERi}^z epi_i^z$$

World export price index

SF21 WORLD_EXPT_PRINDEX —

$$WEXP_T wpi = \sum_{z=1}^S EXP_{CC}^z (epi^z - e^z)$$

Price index for imports of non-margin commodities, by region and commodity

SF22 IMPRINDEX_NONTRD $i = 1, \dots, I$
 $z = 1, \dots, S$

$$mpi_i^z = \sum_{s=1}^S S_{MPiz}^s (p_{Eiz}^s - e^s) + S_{MFi}^z p_F$$

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Table A1: Equations in the SALTER model

No	TABLO name	Range	Equation
Demand for freight			
SF23	DEMAND_FREIGHT	$i = 1, \dots, I$ $z = 1, \dots, S$	$F_i^z = F_W + \beta_F \left[p_F - (p_i^{Dz} - e^z) \right]$
Total demand for world freight			
SF24	WORLD_FREIGHT	—	$F_W = \sum_{i=1}^I \sum_{s=1}^S \sum_{z=1}^Z S_{Fis}^z \exp_{is}^z$
Export volume index, basic value weights, excluding intra-region exports and margins exports			
SF25	EXPT_VOLE_IDX	$i = 1, \dots, I$ $z = 1, \dots, S$	$\exp_{IVi}^z = \sum_{s=1}^S S_{EERis}^z \exp_{is}^z$
Duty rate			
SF26	DUTY_RATE	$i = 1, \dots, I$ $z = 1, \dots, S$ $s = 1, \dots, S$	$d_{is}^z = h_{MDAi}^z + h_{MDis}^z$
Export tax rate			
SF27	EXPORT_TAX_RATE	$i = 1, \dots, I$ $z = 1, \dots, S$ $s = 1, \dots, S$	$t_{Eis}^z = h_{XTAi}^z + h_{XTis}^z$

SG International capital mobility

World net ownership of bonds

SG1 OWNPN_BONDS —

$$Y^W dQ_B^Y + A_B y^W = \sum_{z=1}^S \left(\frac{Y^z}{E^z} dQ_B^{Yz} + \frac{A_B^z}{E^z} y^z - \frac{A_B^z}{E^z} e^z \right)$$

Net ownership of bonds in region z

SG2 OWNPN_BONDS_REG $z = 1, \dots, S$

$$Y^z dQ_B^{Yz} + A_B^z y^z = Y_D^{Hz} dQ_B^{YHz} + A_B^{Hz} y_D^{Hz} + R_D^{Gz} dQ_B^{YGz} + A_B^{Gz} y_{GT}^z$$

Household wealth composition

SG3 HHOLD_OWNP_BONDS_REG $z = 1, \dots, S$

$$A^{Hz} a^{Hz} = A_E^{Hz} a_E^{Hz} + Y_D^{Hz} dQ_B^{YHz} + A_B^{Hz} y_D^{Hz}$$

Equity in productive assets

SG4 EQY $z = 1, \dots, S$

$$A_E^{Hz} a_E^{Hz} = S_K^{Az} a_K^z + S_M^{Az} a_M^z$$

Equity price index

SG5 EQY_PRICE_INDX $z = 1, \dots, S$

$$A_E^{Hz} p_E^z = S_K^{Az} pci^z + S_M^{Az} pmr^z$$

Value of physical capital

SG6 VALUE_CAPL $z = 1, \dots, S$

$$a_K^z = pci^z + f_{DK}^z$$

(Continued on next page)

Table A1: Equations in the SALTER model

No	TABLO name	Range	Equation
Value of farm land			
SG7	VALUE_LAND	$z = 1, \dots, S$	$a_M^z = pmr^z + f_{DM}^z$
Household wealth accumulation			
SG8	HHOLD_WEALTH_ACCN	$z = 1, \dots, S$	$A^{Hz} a^{Hz} = (A^{Hz} - C_1^{Hz} S^{Hz} T) p_A^{Hz} + C_1^{Hz} Y_D^{Hz} T dQ_S^{YHz}$ $+ C_1^{Hz} S^{Hz} T cpi^z + C_2^{Hz} S^{Hz} T (y_D^{Hz} - cpi^z)$
Household asset price index			
SG9	HHOLD_ASST_PRINDX	$z = 1, \dots, S$	$A^{Hz} p_A^{Hz} = A_E^{Hz} p_E^z + A_B^{Hz} (wcpi + e^z)$
Government wealth accumulation			
SG10	GOVT_WEALTH_ACCN	$z = 1, \dots, S$	$R_D^{Gz} dQ_B^{YGz} + A_B^{Gz} y_{GT}^z = (A_B^{Gz} - C_1^{Gz} S^{Gz} T) (wcpi + e^z) + C_1^{Gz} R_D^{Gz} T dQ_S^{YGz}$ $+ C_1^{Gz} S^{Gz} T zpi^z + C_2^{Gz} S^{Gz} T (y_{GT}^z - zpi^z)$
International interest parity			
SG11	INTERNL_INTT_PARY	$z = 1, \dots, S$	$dR_B^z = dR_B$
Equity bond parity			
SG12	EQY_BOND_PARY	$z = 1, \dots, S$	$dR_E^z = dR_B^z + dF_{RE}^z$

Abnormal rate of return on capital

SG13 ABNL_RETN_CAPL

$j = 1, \dots, J$
 $z = 1, \dots, S$

$$dR_{Kj}^z = dR_E^z + dR_{Aj}^z$$

Rental price of capital

SG14 RENTL_PRICE_CAPL

$j = 1, \dots, J$
 $z = 1, \dots, S$

$$dR_{Kj}^z = R_{Kj}^z (w_{Kj}^z - pci^z)$$

Rental price of land

SG15 PRICE_LAND

$z = 1, \dots, S$

$$dR_E^z = R_B (w_M^z - pmr^z)$$

Expected rate of change in average rate of return on capital

SG16 EXPD_RATE_RETN_CAPL

$z = 1, \dots, S$

$$d\dot{R}_K^{Ez} = \alpha^z R_{KG}^z J^z (inv_{TR}^z - f_{DK}^z) + \alpha^z (J^z - R_D^z - H_K^z) dR_K^z$$

Average rate of return on capital

SG17 AVGE_RATE_RETN_CAPL

$z = 1, \dots, S$

$$dR_K^z = \sum_{j=1}^J S_{DKj}^z dR_{Kj}^z + \sum_{j=1}^J R_{Kj}^z S_{DKj}^z f_{Kj}^z - R_{KG}^z f_{DK}^z$$

Equilibrating rates of return on capital

SG18 EQN_RATE_RETN_CAPL

$z = 1, \dots, S$

$$d\dot{R}_K^{Ez} = d\dot{R}_E^{Ez} - \lambda_K^z dR_A^z$$

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Table A1: Equations in the SALTER model

No	TABLO name	Range	Equation
Average rate of abnormal return on capital			
SG19	AVGE_ABNL_RETN_CAPL	$z = 1, \dots, S$	$dR_A^z = \sum_{j=1}^J S_{DKj}^z dR_{Aj}^z + \sum_{j=1}^J R_{Aj}^z S_{DKj}^z f_{Kj}^z - R_A^z f_{DK}^z$
Expected rate of change in rate of return on equity			
SG20	EXPD_RATE_RETN_EQY	$z = 1, \dots, S$	$d\dot{R}_E^{Ez} = d\dot{R}_B^{Ez} + d\dot{F}_{RE}^z$
Expected rate of change in bond rate			
SG21	EXPD_BOND_RATE	$z = 1, \dots, S$	$d\dot{R}_B^{Ez} = d\dot{R}_B^E$

SH National macroeconomic indicators

Expenditure on gross domestic product

SH1	EXPRESS_GDP	$z = 1, \dots, S$	$GDP_E^z \quad gdp_E^z = C_T^z \quad c_T^z + Z_G^z \quad z_G^z + INV_T^z \quad inv_T^z + EXP_A^z \quad exp_A^z - IMP_A^z (e^z + imp_A^z)$
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Gross domestic product at factor cost

SH2	GDPFACTCOST	$z = 1, \dots, S$	$gdp_F^z = S_{GDPL}^z (w_L^z + f_{DL}^z) + \sum_{j=1}^J S_{GDPKj}^z (w_{Kj}^z + f_{Kj}^z) + S_{GDPM}^z (w_M^z + f_{DM}^z)$
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Gross national expenditure

SH3	GROSS_NATL_EXPRESS	$z = 1, \dots, S$	$NE_G^z \quad ne_G^z = C_T^z \quad c_T^z + Z_G^z \quad z_G^z + INV_T^z \quad inv_T^z$
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Aggregate net primary factor income

$$\text{SH4 NET_FACT_INC} \quad z = 1, \dots, S \quad y_F^z = S_{YL}^z (w_L^z + f_{DL}^z) + \sum_{j=1}^J S_{YKj}^z (w_{Kj}^z + f_{Kj}^z) + S_{YM}^z (w_M^z + f_{DM}^z) - S_{YD}^z \text{dep}^z$$

Real GDP

$$\text{SH5 REAL_GDP} \quad z = 1, \dots, S \quad GDP_E^z \text{gdp}_R^z = C_T^z c_{TR}^z + Z_G^z g^z + INV_T^z \text{inv}_{TR}^z + EXP_A^z \text{exp}_{AR}^z - IMP_A^z \text{imp}_{AR}^z$$

Real gross national expenditure

$$\text{SH6 REAL_GNE} \quad z = 1, \dots, S \quad NE_G^z \text{ne}_{GR}^z = C_T^z c_{TR}^z + Z_G^z g^z + INV_T^z \text{inv}_{TR}^z$$

Real net national expenditure

$$\text{SH7 R_NAT_EXP} \quad z = 1, \dots, S \quad ne_{NR}^z = S_{CNE}^z c_{TR}^z + S_{INE}^z \text{inv}_{TR}^z - S_{DNE}^z (\text{dep}^z - \text{pci}^z) + S_{GNE}^z g^z$$

Real aggregate household disposable income

$$\text{SH8 REALDISPY} \quad z = 1, \dots, S \quad y_{dR}^z = y_D^{Hz} - \text{cpi}^z$$

Real aggregate household consumption expenditure

$$\text{SH9 REALCONS} \quad z = 1, \dots, S \quad c_{TR}^z = c_T^z - \text{cpi}^z$$

Aggregate nominal investment

$$\text{SH10 AGGINV} \quad z = 1, \dots, S \quad \text{inv}_T^z = \text{inv}_{TR}^z + \text{pci}^z$$

Depreciation of the capital stock

$$\text{SH11 DEP_CAPITAL} \quad z = 1, \dots, S \quad \text{dep}^z = f_{DK}^z + \text{pci}^z$$

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Table A1: Equations in the SALTER model

No	TABLO name	Range	Equation
Real government purchases of commodities			
SH12	GOVDEMCOM	$z = 1, \dots, S$	$g^z = z_G^z - zpi^z$
Consumer price index			
SH13	WALCPI	$z = 1, \dots, S$	$cpi^z = \sum_{i=1}^I S_{CTi}^{Dz} p_{Ci}^{Dz} + \sum_{i=1}^I \sum_{s=1}^S S_{CTis}^{Iz} p_{Cis}^{Iz}$
Price index for investment goods			
SH14	PURPCAP	$z = 1, \dots, S$	$pci^z = \sum_{i=1}^I S_{KTi}^{Dz} p_{Ki}^{Dz} + \sum_{i=1}^I S_{KTi}^{Iz} p_{Ki}^{Iz}$
Price index for government purchases			
SH15	GOVPRCOM	$z = 1, \dots, S$	$zpi^z = \sum_{i=1}^I S_{GTi}^{Dz} p_{Gi}^{Dz} + \sum_{i=1}^I S_{GTi}^{Iz} p_{Gi}^{Iz}$
Price index for exports (fob)			
SH16	EXPPRIND	$z = 1, \dots, S$	$epi^z = \sum_{i=1}^I \sum_{s=1}^S S_{EAis}^z p_{Eis}^z + \sum_{i=1}^I S_{EAFi}^z p_i^{Dz}$
Landed duty-free price index for imports (cif, world currency)			
SH17	IMPPRIND	$z = 1, \dots, S$	$ipi^z = \sum_{i=1}^I \sum_{s=1}^S S_{MTis}^z p_{is}^{Wz}$
Primary factor price index			
SH18	FACTOR_PRICE_INDEX	$z = 1, \dots, S$	$gpi_F^z = S_{GDPL}^z w_L^z + \sum_{j=1}^J S_{GDPKj}^z w_{Kj}^z + S_{GDPM}^z w_M^z$

Gross domestic product price index

$$\text{SH19 PRICE_INDEX_GDP} \quad z = 1, \dots, S \quad GDP_E^z gpi_E^z = C_T^z cpi^z + Z_G^z zpi^z + INV_T^z pci^z + EXP_A^z epi^z - IMP_A^z (e^z + ipi^z)$$

Price index for gross national expenditure

$$\text{SH20 PRICE_INDX_GNE} \quad z = 1, \dots, S \quad NE_G^z gnepi^z = C_T^z cpi^z + Z_G^z zpi^z + INV_T^z pci^z$$

Primary factor employment

$$\text{SH21 PRIMY_FACTR_EMPLT} \quad z = 1, \dots, S \quad gdp_{FR}^z = gdp_F^z - gpi_F^z$$

Gross domestic product, nominal

$$\text{SH22 GROSS_DOMC_PRODT} \quad z = 1, \dots, S \quad GDP_E^z gdp_N^z = Y_L^z (w_L^z + f_{DL}^z) + F_{DKV}^z f_{DKV}^z + F_{DMV}^z (w_M^z + f_{DM}^z) + R_{GT}^z r_{GT}^z$$

Gross national product

$$\text{SH23 GROSS_NATL_PRODT} \quad z = 1, \dots, S \quad NP_G^z gnp_N^z = GDP_E^z gdp_N^z + GDP_E^z dQ_{GDP}^{YAz} + Y_I^z gdp_N^z$$

National income

$$\text{SH24 NATL_INCOME} \quad z = 1, \dots, S \quad Y^z y^z = Y_F^z y_F^z + Y^z dQ_I^{Yz} + Y_I^z y^z + R_{GT}^z r_{GT}^z$$

Net interest income

$$\text{SH25 INTT_INCOME_REGN} \quad z = 1, \dots, S \quad Y^z dQ_I^{Yz} = A_B^z dR_B^z + R_B^z Y^z dQ_B^{Yz}$$

National consumption expenditure

(Continued on next page)

Table A1: Equations in the SALTER model

No	TABLO name	Range	Equation
SH26	NATL_CONSN_EXPRES	$z = 1, \dots, S$	$C_N^z c_N^z = C_T^z c_T^z + Z_G^z z_G^z$
National saving			
SH27	NAT_SAVINGS	$z = 1, \dots, S$	$Y^z dQ_S^{Yz} + SAV^z y^z = Y_D^{Hz} dQ_S^{YHz} + S^{Hz} y_D^{Hz} + R_D^{Gz} dQ_S^{YGz} + S^{Gz} y_{GT}^z$
National consumption price index			
SH28	NATL_CONSN_PRINDX	$z = 1, \dots, S$	$C_N^z ncpi^z = C_T^z cpi^z + Z_G^z zpi^z$
Real national income in region z			
SH29	REAL_NATL_INCOME	$z = 1, \dots, S$	$y^z = ncpi^z + y_R^z$

SI Instruments to define different economic environments

Ratio of public to private expenditure

SI1	PRIV_PUB	$z = 1, \dots, S$	$c_{TR}^z = g^z - h_{GPE}^z$
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Ratio of net income from abroad to GDP

SI2	RATIO_YCAB_GDP	$z = 1, \dots, S$	$GDP_E^z dQ_{GDP}^{YAz} + Y_I^z gdp_N^z = Y^z dQ_I^{Yz} + Y_I^z y^z$
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Ratio of government current account surplus to GDP

SI3	RATIO_GCUAS_GDP	$z = 1, \dots, S$	$GDP_E^z dQ_{GDP}^{CAz} + S^{Gz} gdp_N^z = R_D^{Gz} dQ_S^{YGz} + S^{Gz} y_{GT}^z$
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Ratio of net capital inflow to GDP

SI4 RATIO_NET_CAPL_INFLW $z = 1, \dots, S$

$$DEP^z dep^z + Y^z dQ_S^{Yz} + SAV^z y^z + GDP_E^z dQ_{GDP}^{KAz} + KA^z gdp_N^z = INV_T^z inv_T^z$$

Ratio of balance of trade to GDP

SI5 RATIO_BAL_TRADE_GDP $z = 1, \dots, S$

$$GDP_E^z dQ_{GDP}^{BTz} + TB^z gdp_N^z = EXP_A^z exp_A^z - IMP_A^z (e^z + imp_A^z)$$

SJ Global macroeconomic indicators

World gross product

SJ1 WORLD_GROSS_PRODUCT —

$$WGP wgp_N = \sum_{z=1}^S GDP_E^z gdp_N^z$$

World income

SJ2 WORLD_INCOME —

$$Y^W y^W = \sum_{z=1}^S \frac{Y^z}{E^z} y^z$$

World consumption price index

SJ3 WORLD_CONSN_PRINDX —

$$C^W wcp_i = \sum_{z=1}^S \frac{C_N^z}{E^z} (ncpi^z - e^z)$$

Real world income

SJ4 WORLD_REAL_INCOME —

$$y^W = wcp_i + y_R^W$$

(Continued on next page)

Table A1: Equations in the SALTER model

No	TABLO name	Range	Equation
World net income from abroad			
SJ5	WORLD_NET_Y_ABROAD	—	$WGP dW_{GDP}^{YB} + WBY wgp_N = \sum_{z=1}^S GDP_E^z dQ_{GDP}^{YAz} + \sum_{z=1}^S Y_I^z gdp_N^z$
World net capital inflow			
SJ6	WORLD_NET_CAPL_INFLOW	—	$WGP dW_{GDP}^{KA} + WKA wgp_N = \sum_{z=1}^S GDP_E^z dQ_{GDP}^{KAz} + \sum_{z=1}^S KA^z gdp_N^z$
World capital stock			
SJ7	WORLD_CAPL_STOCK	—	$WKS wks_R = \sum_{z=1}^S \frac{S_K^{Az}}{E^z} f_{DK}^z$
World real investment			
SJ8	WORLD_REAL_INVT	—	$WIE winv_R = \sum_{z=1}^S \frac{INV_T^z}{E^z} inv_{TR}^z$
World factor price index			
SJ9	WGDPFEQ	—	$gpi_F^W = \sum_{z=1}^S S_{WGDP}^z gpi_F^z$

Table A2: Variables in the SALTER model

<i>Variable</i>	<i>Range</i>	<i>TABLO name</i>	<i>Description</i>
Disaggregated quantities			
c_i^z	$i = 1, \dots, I$ $z = 1, \dots, S$	CONT(I,Z)	Consumer demand for aggregate commodity i in region z (real)
c_i^{Dz}	# $i = 1, \dots, I$ $z = 1, \dots, S$	COND(I,Z)	Consumer demand for domestic commodity i in region z (real)
c_i^{Iz}	# $i = 1, \dots, I$ $z = 1, \dots, S$	CONI(I,Z)	Consumer demand for imported aggregate commodity i in region z (real)
c_{is}^{Iz}	# $i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	CONIS(I,Z,S)	Consumer demand for imported commodity i from source s in region z (real)
exp_i^z	$i = 1, \dots, I$ $z = 1, \dots, S$	E(I,Z)	Aggregate exports of commodity i from region z (real)
exp_{is}^z	# $i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	ES(I,Z,S)	Export demand for commodity i from region z , by region s (real)
F_i^z	$i = 1, \dots, I$ $z = 1, \dots, S$	FZD(I,Z)	Demand for freight services of commodity i from region z (real)
f_{Kj}^z	$j = 1, \dots, J$ $z = 1, \dots, S$	K(J,Z)	Demand by industry j in region z for capital (real)
f_{Lj}^z	$j = 1, \dots, J$ $z = 1, \dots, S$	L(J,Z)	Demand by industry j in region z for labour (real)
f_{Mj}^z	$j = 1, \dots, J$ $z = 1, \dots, S$	M(J,Z)	Demand by industry j in region z for land (real)
gov_i^{Dz}	# $i = 1, \dots, I$ $z = 1, \dots, S$	GOVD(I,Z)	Government demand for domestic commodity i in region z (real)
gov_i^{Iz}	# $i = 1, \dots, I$ $z = 1, \dots, S$	GOVI(I,Z)	Government demand for aggregate imported commodity i in region z (real)
gov_{is}^{Iz}	# $i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	GOVIS(I,Z,S)	Government demand for imported commodity i from source s in region z (real)
imp_{is}^z	$i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	IMPS(I,Z,S)	Imports of commodity i from source s to region z (real)
inv_i^{Dz}	# $i = 1, \dots, I$ $z = 1, \dots, S$	INVD(I,Z)	Investment demand for domestic commodity i in region z (real)

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Table A2: Variables in the SALTER model (continued)

Variable	Range	TABLO name	Description
inv_i^{Iz}	# $i = 1, \dots, I$ $z = 1, \dots, S$	INVI(I,Z)	Investment demand for imported aggregate commodity i in region z (real)
inv_{is}^{Iz}	# $i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	INVIS(I,Z,S)	Investment demand for imported commodity i from source s in region z (real)
q_j^z	$j = 1, \dots, J$ $z = 1, \dots, S$	Q(J,Z)	Supply of commodity j in region z (real)
x_{ij}^{Dz}	# $i = 1, \dots, I$ $j = 1, \dots, J$ $z = 1, \dots, S$	INTD(I,J,Z)	Demand by industry j in region z for domestic commodity i (real)
x_{ij}^{Iz}	# $i = 1, \dots, I$ $j = 1, \dots, J$ $z = 1, \dots, S$	INTI(I,J,Z)	Demand by industry j in region z for imported aggregate commodity i (real)
x_{isj}^{Iz}	# $i = 1, \dots, I$ $j = 1, \dots, J$ $s = 1, \dots, S$ $z = 1, \dots, S$	INTIS(I,J,Z,S)	Demand by industry j in region z for imported commodity i from source s (real)

Prices and price indices

cpi^z	$z = 1, \dots, S$	CPI(Z)	Consumer price index in region z
e^z	$z = 1, \dots, S$	ER(Z)	Exchange rate (local currency price of world currency)
epi^z	$z = 1, \dots, S$	EPI(Z)	Export price index (fob) in region z
epi_i^z	$i = 1, \dots, I$ $z = 1, \dots, S$	PXRC(I,Z)	Price index for exports, by source and commodity
$gnepi^z$	$z = 1, \dots, S$	GNEPI(Z)	Price index for gross national expenditure in region z
gpi_E^z	$z = 1, \dots, S$	GDPPI(Z)	Price index for expenditure on gross domestic product in region z
gpi_F^z	$z = 1, \dots, S$	PFPI(Z)	Primary factor price index in region z
ipi^z	$z = 1, \dots, S$	IMPPI(Z)	Price index of imports (cif) in region z (landed duty-free in world currency)
mpi_i^z	$i = 1, \dots, I$ $z = 1, \dots, S$	PMRC(I,Z)	Price index for imports of commodity i into region z , at source weights
$ncpi^z$	$z = 1, \dots, S$	IPCR(Z)	National consumption price index in region z

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Table A2: Variables in the SALTER model (continued)

Variable	Range	TABLO name	Description
p_E^z	# $z = 1, \dots, S$	IPER(Z)	Equity price index for productive assets in region z
p_F	—	PT	Price of freight (in world currency)
p_A^{Hz}	$z = 1, \dots, S$	IPAHR(Z)	Price index for household sector financial assets in region z
p_i^{Dz}	$i = 1, \dots, I$ $z = 1, \dots, S$	PD(I,Z)	Basic price of domestic commodity i in region z
p_i^{Iz}	$i = 1, \dots, I$ $z = 1, \dots, S$	PII(I,Z)	Landed duty-paid price of aggregate imported commodity i in region z
p_{is}^{Iz}	$i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	PI(I,Z,S)	Landed duty-paid price of commodity i from source s in region z
p_{Ci}^z	# $i = 1, \dots, I$ $z = 1, \dots, S$	PCONT(I,Z)	Price of aggregate commodity i paid by consumers in region z
p_{Ci}^{Dz}	# $i = 1, \dots, I$ $z = 1, \dots, S$	PCOND(I,Z)	Price of domestic commodity i paid by consumers in region z
p_{Ci}^{Iz}	# $i = 1, \dots, I$ $z = 1, \dots, S$	PCONI(I,Z)	Price of imported commodity i paid by consumers in region z
p_{Cis}^{Iz}	# $i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	PCONIS(I,Z,S)	Price of imported commodity i from source s paid by consumers in region z
p_{Eis}^z	# $i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	PES(I,Z,S)	Export price of commodity i from source z to destination s (fob basis)
p_{Gi}^z	# $i = 1, \dots, I$ $z = 1, \dots, S$	PGOVT(I,Z)	Price of commodity i paid by the government in region z
p_{Gi}^{Dz}	# $i = 1, \dots, I$ $z = 1, \dots, S$	PGOVD(I,Z)	Price of domestic commodity i purchased by the government in region z
p_{Gi}^{Iz}	# $i = 1, \dots, I$ $z = 1, \dots, S$	PGOVI(I,Z)	Price of imported aggregate commodity i purchased by the government in region z
p_{Gis}^{Iz}	# $i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	PGOVIS(I,Z,S)	Price of imported commodity i from source s purchased by the government in region z
p_{Ki}^z	# $i = 1, \dots, I$ $z = 1, \dots, S$	PINVT(I,Z)	Price of commodity i used for investment in region z

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Table A2: Variables in the SALTER model (continued)

Variable	Range	TABLO name	Description
p_{Ki}^{Dz}	# $i = 1, \dots, I$ $z = 1, \dots, S$	PINVD(I,Z)	Price of domestic commodity i used for investment in region z
p_{Ki}^{Iz}	# $i = 1, \dots, I$ $z = 1, \dots, S$	PINVI(I,Z)	Price of imported aggregate commodity i used for investment in region z
p_{Kis}^{Iz}	# $i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	PINVIS(I,Z,S)	Price of imported commodity i from source s used for investment in region z
p_{Pij}^z	# $i = 1, \dots, I$ $j = 1, \dots, J$ $z = 1, \dots, S$	PINTT(I,J,Z)	Price of aggregate commodity i paid by industry j in region z
p_{Pij}^{Dz}	# $i = 1, \dots, I$ $j = 1, \dots, J$ $z = 1, \dots, S$	PINTD(I,J,Z)	Price of domestic commodity i paid by industry j in region z
p_{Pij}^{Iz}	# $i = 1, \dots, I$ $j = 1, \dots, J$ $z = 1, \dots, S$	PINTI(I,J,Z)	Price of imported commodity i paid by industry j in region z
p_{Pisj}^{Iz}	# $i = 1, \dots, I$ $j = 1, \dots, J$ $s = 1, \dots, S$ $z = 1, \dots, S$	PINTIS(I,J,Z,S)	Price of imported commodity i from source s paid by industry j in region z
p_{is}^{Wz}	# $i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	PWS(I,Z,S)	World price of commodity i from source s imported by region z
pci^z	$z = 1, \dots, S$	PCAP(Z)	Price index of capital in region z
pmr^z	$z = 1, \dots, S$	PNR(Z)	Stock price of land in region z
w_L^z	$z = 1, \dots, S$	W(Z)	Nominal wage rate in region z
w_M^z	$z = 1, \dots, S$	RM(Z)	Rental price of land in region z
w_{Kj}^z	$j = 1, \dots, J$ $z = 1, \dots, S$	RP(J,Z)	Rental price of capital in industry j in region z
zpi^z	$z = 1, \dots, S$	PG(Z)	Price index for government expenditure in region z
National macroeconomic aggregates			
c_N^z	$z = 1, \dots, S$	ECR(Z)	National consumption expenditure in region z (nominal)

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Table A2: Variables in the SALTER model (continued)

Variable	Range	TABLO name	Description
c_T^z	$z = 1, \dots, S$	CT(Z)	Aggregate nominal household consumption expenditure in region z
c_{TR}^z	$z = 1, \dots, S$	CTR(Z)	Real aggregate household consumption in region z
C_1^z	$z = 1, \dots, S$	CTTCR(Z)	Contribution to terms of trade in region z of price variation between commodities
C_{1i}^z	$i = 1, \dots, I$ $z = 1, \dots, S$	CTTCRC(I,Z)	Contribution to cttcr of commodity i in region z
C_2^z	$z = 1, \dots, S$	CTTVXR(Z)	Contribution to terms of trade in region z of export variety price variation
C_{2i}^z	$i = 1, \dots, I$ $z = 1, \dots, S$	CTTVXRC(I,Z)	Contribution to cttvrx of commodity i in region z
C_3^z	$z = 1, \dots, S$	CTTVMR(Z)	Contribution to terms of trade in region z of import variety price variation
C_{3i}^z	$i = 1, \dots, I$ $z = 1, \dots, S$	CTTVMRC(I,Z)	Contribution to cttvmr of commodity i in region z
dQ_I^{Yz}	$z = 1, \dots, S$	QYIR(Z)	Ratio of net interest income to national income in region z (absolute change measured in percentage points)
dQ_I^{RGz}	$z = 1, \dots, S$	QRGIR(Z)	Ratio of government net interest receipts to total government receipts in region z (absolute change measured in percentage points)
dQ_I^{YHz}	$z = 1, \dots, S$	QYHIR(Z)	Ratio of household net interest income to household disposable income in region z (absolute change measured in percentage points)
dQ_S^{Yz}	$z = 1, \dots, S$	QYSR(Z)	National saving-income ratio in region z (absolute change measured in percentage points)
dQ_{GDP}^{BTz}	$z = 1, \dots, S$	BTS(Z)	Ratio of balance of trade to gdp in region z
dQ_{GDP}^{CAz}	$z = 1, \dots, S$	GCASS(Z)	Ratio of government current account surplus to gdp in region z (absolute change measured in percentage points)
dQ_{GDP}^{KAz}	$z = 1, \dots, S$	NKIS(Z)	Ratio of net capital inflow to gdp in region z (absolute change measured in percentage points)
dQ_{GDP}^{YAz}	$z = 1, \dots, S$	NYAS(Z)	Ratio of net income from abroad to gdp in region z (absolute change measured in percentage points)

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Table A2: Variables in the SALTER model (*continued*)

<i>Variable</i>	<i>Range</i>	<i>TABLO name</i>	<i>Description</i>
dep^z	$z = 1, \dots, S$	DEPR(Z)	Depreciation of capital in region z (nominal)
em_L^z	$z = 1, \dots, S$	EM(Z)	Rate of employment in region z
f_{DK}^z	$z = 1, \dots, S$	KT(Z)	Aggregate demand for capital in region z
f_{DL}^z	$z = 1, \dots, S$	LT_(Z)	Aggregate demand for labour in region z
f_{DM}^z	$z = 1, \dots, S$	MT(Z)	Aggregate demand for land in region z
f_{SL}^z	$z = 1, \dots, S$	LS(Z)	Aggregate labour supply in region z
f_{DKV}^z	$z = 1, \dots, S$	FKE(Z)	Aggregate fixed capital earnings in region z (nominal)
gdp_E^z	$z = 1, \dots, S$	GDPE(Z)	Expenditure on gross domestic product in region z (nominal)
gdp_F^z	$z = 1, \dots, S$	GDPFC(Z)	Gross domestic product at factor cost in region z (nominal)
gdp_N^z	$z = 1, \dots, S$	GDP(Z)	Gross domestic product in region z (nominal)
gdp_R^z	$z = 1, \dots, S$	GDPR(Z)	Real gdp in region z
gdp_{FR}^z	$z = 1, \dots, S$	PFE(Z)	Real primary factor employment in region z
inv_T^z	$z = 1, \dots, S$	INVT(Z)	Aggregate nominal investment in region z
inv_{TR}^z	$z = 1, \dots, S$	INVTR(Z)	Real aggregate investment in region z
ne_G^z	$z = 1, \dots, S$	GNE(Z)	Gross national expenditure in region z (nominal)
ne_{GR}^z	$z = 1, \dots, S$	GNER(Z)	Real gross national expenditure in region z
ne_{NR}^z	$z = 1, \dots, S$	NEXPR(Z)	Real net national expenditure in region z
tt^z	$z = 1, \dots, S$	TT(Z)	Terms of trade of region z
y^z	$z = 1, \dots, S$	Y_R(Z)	Nominal income in region z
y_E^z	$z = 1, \dots, S$	YER(Z)	Equity income in region z (nominal)
y_F^z	$z = 1, \dots, S$	YFN(Z)	Aggregate net primary factor income in region z (nominal)
y_L^z	# $z = 1, \dots, S$	YLR(Z)	Labour income in region z (nominal)
y_R^z	$z = 1, \dots, S$	YR_R(Z)	Real income in region z

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Table A2: Variables in the SALTER model (continued)

Variable	Range	TABLO name	Description
y_{dR}^z	$z = 1, \dots, S$	YDR(Z)	Real aggregate household disposable income in region z
y^{Hz}	$z = 1, \dots, S$	YHR(Z)	Aggregate nominal household income in region z
y_D^{Hz}	$z = 1, \dots, S$	YHDR(Z)	Household disposable income in region z (nominal)
y_P^{Hz}	$z = 1, \dots, S$	YHPR(Z)	Household property income in region z (nominal)
y_V^{Hz}	# $z = 1, \dots, S$	YHVR(Z)	Household pre-transfer income in region z
Government budget aggregates			
g^z	$z = 1, \dots, S$	GC(Z)	Aggregate real government spending on commodities in region z
o_G^z	$z = 1, \dots, S$	OGR(Z)	Government current outlays in region z (nominal)
r_{GC}^z	$z = 1, \dots, S$	GRCON(Z)	Contribution of consumption taxes to aggregate revenue from commodity taxes in region z
r_{GD}^z	$z = 1, \dots, S$	GRDUT(Z)	Contribution of import duties to aggregate revenue from commodity taxes in region z
r_{GE}^z	$z = 1, \dots, S$	GREXP(Z)	Contribution of export taxes to aggregate revenue from commodity taxes in region z
r_{GG}^z	$z = 1, \dots, S$	GRGOV(Z)	Contribution of taxes on government commodity purchases to aggregate revenue from commodity taxes in region z
r_{GI}^z	$z = 1, \dots, S$	GRSUB(Z)	Contribution of indirect industry taxes net of subsidies to aggregate government revenue in region z
r_{GK}^z	$z = 1, \dots, S$	GRINV(Z)	Contribution of investment taxes to aggregate revenue from commodity taxes in region z
r_{GT}^z	$z = 1, \dots, S$	RC(Z)	Aggregate commodity tax revenues in region z
r_{GX}^z	$z = 1, \dots, S$	GRINT(Z)	Contribution of taxes on intermediate commodity use to aggregate revenue from commodity taxes in region z
r_{GY}^z	$z = 1, \dots, S$	RTYR(Z)	Income tax revenue in region z (nominal)
r_{GYL}^z	# $z = 1, \dots, S$	RTYLR(Z)	Tax revenue on labour income in region z (nominal)
r_{GYP}^z	# $z = 1, \dots, S$	RTYPR(Z)	Tax revenue on property income in region z (nominal)
t_G^z	$z = 1, \dots, S$	UGHR(Z)	Government transfer payments to households in region z (nominal)

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Table A2: Variables in the SALTER model (*continued*)

Variable	Range	TABLO name	Description
y_{GT}^z	$z = 1, \dots, S$	RGR(Z)	Government receipts in region z (nominal)
z_G^z	$z = 1, \dots, S$	ZG(Z)	Government spending on goods and services in region z (nominal)
Trade aggregates			
exp_A^z	$z = 1, \dots, S$	ET(Z)	Aggregate exports at fob prices in region z
exp_{AR}^z	$z = 1, \dots, S$	ETR(Z)	Real aggregate exports in region z
exp_i^z	$i = 1, \dots, I$ $z = 1, \dots, S$	EI(I, Z)	Aggregate exports of commodity i at fob prices from region z
exp_s^z	$s = 1, \dots, S$ $z = 1, \dots, S$	ETS(S, Z)	Aggregate exports (fob prices) from region z to region s
exp_{IVi}^z	$i = 1, \dots, I$ $z = 1, \dots, S$	IVXSC(I, Z)	Exports volume index in region z , basic value weights excluding intra-region exports and margin exports
imp_A^z	$z = 1, \dots, S$	IMPT(Z)	Aggregate imports at landed duty-free prices in world currency in region z
imp_{AR}^z	$z = 1, \dots, S$	IMPTR(Z)	Real aggregate imports in region z
imp_i^z	$i = 1, \dots, I$ $z = 1, \dots, S$	IMPI(I, Z)	Aggregate imports of commodity i by region z (landed duty-free in world currency)
imp_s^z	$s = 1, \dots, S$ $z = 1, \dots, S$	IMPTS(Z, S)	Aggregate imports from region s to region z (landed duty-free in world currency)
imp_{IVi}^z	$i = 1, \dots, I$ $z = 1, \dots, S$	IVMDC(I, Z)	Import volume index in region z , basic value weights excluding intra-region imports
National asset holdings and rates of return			
a_K^z	# $z = 1, \dots, S$	AKR(Z)	Value of physical capital in region z
a_M^z	# $z = 1, \dots, S$	ANR(Z)	Value of land in region z
a^{Hz}	$z = 1, \dots, S$	AHR(Z)	Household wealth in region z (nominal)
a_E^{Hz}	$z = 1, \dots, S$	AER(Z)	Equity in productive assets in region z
dQ_B^{Yz}	$z = 1, \dots, S$	QYBR(Z)	Bond-income ratio in region z (absolute change measured in percentage points)

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Table A2: Variables in the SALTER model (continued)

Variable	Range	TABLO name	Description
dQ_B^{YGz}	$z = 1, \dots, S$	QRGBR(Z)	Government bond-income ratio in region z (absolute change measured in percentage points)
dQ_B^{YHz}	$z = 1, \dots, S$	QYHBR(Z)	Household bond-income ratio in region z (absolute change measured in percentage points)
$d\dot{R}_B^E$		ERCRB	Expected rate of change in world bond rate (absolute change measured in percentage points per year)
dR_A^z	$z = 1, \dots, S$	RAR(Z)	Average rate of abnormal return on capital in region z (absolute change measured in percentage points)
dR_{Aj}^z	$j = 1, \dots, J$ $z = 1, \dots, S$	RARI(J,Z)	Rate of abnormal return on capital in industry j in region z (absolute change measured in percentage points)
$d\dot{R}_B^{Ez}$	# $z = 1, \dots, S$	ERCRBR(Z)	Expected rate of change in world bond rate in region z (absolute change measured in percentage points per year)
$d\dot{R}_E^{Ez}$	# $z = 1, \dots, S$	ERCRER(Z)	Expected rate of change in required rate of return on equity in region z (absolute change measured in percentage points per year)
$d\dot{R}_K^{Ez}$	$z = 1, \dots, S$	ERCRKR(Z)	Expected rate of change in rate of return on capital in region z (absolute change measured in percentage points per year)
dF_{RE}^z	$z = 1, \dots, S$	FRER(Z)	Equity premium in region z (absolute change measured in percentage points)
$d\dot{F}_{RE}^z$	$z = 1, \dots, S$	ERCFRER(Z)	Expected rate of change in equity premium in region z (absolute change measured in percentage points per year)
dR_B^z	# $z = 1, \dots, S$	RBR(Z)	Real bond rate in region z (absolute change measured in percentage points)
dR_E^z	# $z = 1, \dots, S$	RER(Z)	Normal rate of return on equity in region z (absolute change measured in percentage points)
dR_K^z	$z = 1, \dots, S$	RKR(Z)	Average rate of return on capital in region z (absolute change measured in percentage points)
dR_{Kj}^z	# $j = 1, \dots, J$ $z = 1, \dots, S$	RKRI(J,Z)	Rate of return on capital in industry j in region z (absolute change measured in percentage points)
Policy instruments			
d_{is}^z	# $i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	D(I,Z,S)	Power of the duty applied to imported commodity i from source s in all uses in region z

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Table A2: Variables in the SALTER model (continued)

Variable	Range	TABLO name	Description
dQ_S^{YGz}	$z = 1, \dots, S$	QRGSR(Z)	Government saving ratio in region z (absolute change measured in percentage points)
dQ_S^{YHz}	$z = 1, \dots, S$	QYHSR(Z)	Household saving ratio in region z (absolute change measured in percentage points)
h_{GHT}^z	$z = 1, \dots, S$	FUGHR(Z)	Government-to-household transfer shift term in region z
h_{LYT}^z	$z = 1, \dots, S$	FTYLR(Z)	Labour income tax rate shift in region z
h_{PYT}^z	$z = 1, \dots, S$	FTYPR(Z)	Property income tax rate shift in region z
h_{YTR}^z	$z = 1, \dots, S$	FTYR(Z)	Income tax rate shift in region z
h_{MDAi}^z	$i = 1, \dots, I$ $z = 1, \dots, S$	FDDC(I,Z)	Import duty rate shift for destination z and commodity i
h_{MDis}^z	$i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	FDDCS(I,Z,S)	Import duty rate shift for destination z , commodity i and source s
h_{XTAi}^z	$i = 1, \dots, I$ $z = 1, \dots, S$	FTESC(I,Z)	Export tax shift for source z and commodity i
h_{Xtis}^z	$i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	FTESCD(I,Z,S)	Export tax shift for source z , commodity i and destination s
s_{Qj}^z	$j = 1, \dots, J$ $z = 1, \dots, S$	SQ(J,Z)	Power of industry indirect taxes net of subsidies on industry j in region z
t_{YL}^z	# $z = 1, \dots, S$	TYLR(Z)	Rate of tax on labour income in region z
t_{YP}^z	# $z = 1, \dots, S$	TYPR(Z)	Rate of tax on property income in region z
t_{ij}^{Dz}	$i = 1, \dots, I$ $j = 1, \dots, J$ $z = 1, \dots, S$	TINTD(I,J,Z)	Power of the ad valorem tax applied to domestic commodity i purchased by industry j in region z
t_{ij}^{Iz}	$i = 1, \dots, I$ $j = 1, \dots, J$ $z = 1, \dots, S$	TINTI(I,J,Z)	Power of the ad valorem tax applied to imported commodity i purchased by industry j in region z
t_{Ci}^{Dz}	$i = 1, \dots, I$ $z = 1, \dots, S$	TCOND(I,Z)	Power of the ad valorem tax applied to household consumption of domestic commodity i in region z
t_{Ci}^{Iz}	$i = 1, \dots, I$ $z = 1, \dots, S$	TCONI(I,Z)	Power of the ad valorem tax applied to household consumption of imported commodity i in region z

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Table A2: Variables in the SALTER model (*continued*)

Variable	Range	TABLO name	Description
t_{Eis}^z	$i = 1, \dots, I$ $s = 1, \dots, S$ $z = 1, \dots, S$	TE(I,Z,S)	Power of the ad valorem tax applied to domestic commodity i from region z when exported to destination s
t_{Gi}^{Dz}	$i = 1, \dots, I$ $z = 1, \dots, S$	TGOVD(I,Z)	Power of the ad valorem tax applied to domestic commodity i purchased by the government in region z
t_{Gi}^{Iz}	$i = 1, \dots, I$ $z = 1, \dots, S$	TGOVI(I,Z)	Power of the ad valorem tax applied to imported commodity i purchased by the government in region z
t_{Ki}^{Dz}	$i = 1, \dots, I$ $z = 1, \dots, S$	TINVD(I,Z)	Power of the ad valorem investment tax applied to domestic commodity i in region z
t_{Ki}^{Iz}	$i = 1, \dots, I$ $z = 1, \dots, S$	TINVI(I,Z)	Power of the ad valorem investment tax applied to imported commodity i in region z
Modelling instruments			
a_j^z	$j = 1, \dots, J$ $z = 1, \dots, S$	B1(J,Z)	Output augmenting technical change in industry j in region z
a_P^z	$z = 1, \dots, S$	BP(Z)	Primary factor augmenting technical change in region z
a_{Kj}^z	$j = 1, \dots, J$ $z = 1, \dots, S$	BK(J,Z)	Capital-augmenting technical change in industry j in region z
a_{Lj}^z	$j = 1, \dots, J$ $z = 1, \dots, S$	BL(J,Z)	Labour-augmenting technical change in industry j in region z
a_{Mj}^z	$j = 1, \dots, J$ $z = 1, \dots, S$	BM(J,Z)	Land-augmenting technical change in industry j in region z
a_{Tj}^z	# $j = 1, \dots, J$ $z = 1, \dots, S$	BJ(J,Z)	Aggregate technical change in industry j in region z
a_{Xj}^z	$j = 1, \dots, J$ $z = 1, \dots, S$	BI(J,Z)	Aggregate intermediate input augmenting technical change in industry j in region z
h_D^z	$z = 1, \dots, S$	H(Z)	Population in region z
h_{WL}^z	$z = 1, \dots, S$	H4(Z)	Variable used to disconnect wages from the consumer price index in region z
h_{GPE}^z	$z = 1, \dots, S$	HG(Z)	Shift term for ratio of real public to private expenditure in region z
Global variables			
dQ_B^Y		QYB	World bond-income ratio (absolute change measured in percentage points)

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Table A2: Variables in the SALTER model (*continued*)

<i>Variable</i>	<i>Range</i>	<i>TABLO name</i>	<i>Description</i>
dR_B		RB	World real bond rate (absolute change measured in percentage points)
dW_{GDP}^{KA}		WNKIS	Ratio of world net capital inflow to world gdp (absolute change measured in percentage points)
dW_{GDP}^{YB}		WNYAS	Ratio of world net interest income to world gdp (absolute change measured in percentage points)
F_W		FW	World demand for freight
gpi_F^W		WPFPI	World primary factor price index
$wcpi$		IPC	World consumption price index
$wepi_i$	$i = 1, \dots, I$	PXC(I)	World price index for exports, by commodity
wgp_N		WGP	World gross product (nominal)
$winv_R$		WINVTR	World investment (real)
wks_R		WKT	World capital stock (real)
wpi		WEPI	World price index
y^W		Y	World nominal income
y_R^W		YR	World real income

Variable normally condensed out

Table A3: Coefficients and parameters in the SALTER model

Equation	Parameter	TABLO name	Description
SA1,2	η_i^z	ETA(I,Z)	Elasticity of substitution in production between domestic commodity i and imported aggregate commodity i in region z
SA3	η_i^{Iz}	ETAI(I,Z)	Elasticity of substitution in production between commodity i imported from different sources in region z
SA4	S_{Pij}^{Dz}	SD(I,J,Z)	Share of domestic commodity i in the aggregate use of commodity i by industry j in region z
SA4	S_{Pij}^{Iz}	SI(I,J,Z)	Share of imported commodity i in the aggregate use of commodity i by industry j in region z
SA5	S_{Pisj}^{Iz}	SIS(I,J,Z,S)	Share of imported commodity i from source s in the aggregate use of imports of the commodity by industry j in region z
SA6,7,8	η_{2j}^z	SIGMA(J,Z)	Elasticity of substitution between primary factors in industry j in region z
SA6,7,8	S_{mj}^z	SM(J,Z) SR(J,Z) SW(J,Z)	Share of primary factor m in all primary factors used by industry j in region z
SA9,10,11, SG17,19	S_{Dkj}^z	SMT(J,Z) SKT(J,Z) SLT(J,Z)	Share of industry j 's use of primary factor k in the aggregate use of factor k in region z
SA12	λ_{ih}^z	LAMBDA(I,H,Z)	Elasticity of household demand for commodity i with respect to the price of commodity h in region z
SA12	μ_i^z	MU(I,Z)	Elasticity of household demand for commodity i with respect to aggregate household consumption expenditure in region z
SA13,14	β_i^z	BETA(I,Z)	Elasticity of substitution in household consumption in region z between domestic commodity i and imported aggregate commodity i
SA15	β_i^{Iz}	BETAI(I,Z)	Elasticity of substitution in household consumption in region z between commodities imported from different sources
SA16	S_{Cis}^{Iz}	SCIGIS(I,Z,S)	Share of imported commodity i from source s in household demand for aggregate imported commodity i in region z
SA17	S_{Ci}^{Dz}	SCIGD(I,Z)	Share of domestic commodity i in household demand for aggregate commodity i in region z

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Table A3: Coefficients and parameters in the SALTER model (*continued*)

<i>Equation</i>	<i>Parameter</i>	<i>TABLO name</i>	<i>Description</i>
SA17	S_{Ci}^{Iz}	SCIGI(I,Z)	Share of imported commodity aggregate i in household demand for aggregate commodity i in region z
SA18,19	β_{Gi}^z	GRHO(I,Z)	Elasticity of substitution in government consumption in region z between domestic commodity i and imported aggregate commodity i
SA20	β_{Gi}^{Iz}	GETAI(I,Z)	Elasticity of substitution in government consumption in region z between commodities imported from different sources
SA21	S_{Gis}^{Iz}	SGVI(I,Z,S)	Share of imported commodity i from source s in government demand for aggregate imported commodity i in region z
SA22	S_{Gi}^{Dz}	SGD(I,Z)	Share of domestic commodity i in government consumption of aggregate commodity i in region z
SA22	S_{Gi}^{Iz}	SGI(I,Z)	Share of imported aggregate commodity i in government consumption of aggregate commodity i in region z
SA23,24	β_{Ki}^z	RHO(I,Z)	Elasticity of substitution in investment demand in region z between domestic commodity i and imported aggregate commodity i
SA25	β_{Ki}^{Iz}	IETAI(I,Z)	Elasticity of substitution in investment demand in region z between commodities imported from different sources
SA26	S_{Kis}^{Iz}	SINI(I,Z,S)	Share of imported commodity i from source s in investment use of imported commodity i in region z
SA27	S_{Ki}^{Dz}	SDINV(I,Z)	Share of domestic commodity i in investment use of aggregate commodity i in region z
SA27	S_{Ki}^{Iz}	SIINV(I,Z)	Share of imported aggregate commodity i in investment use of aggregate commodity i in region z
SB1	H_{ij}^{Dz}	HXD(I,J,Z)	Share of domestic intermediate commodity i in total costs of industry j in region z
SB1	H_{ij}^{Iz}	HXI(I,J,Z)	Share of imported intermediate commodity aggregate i in total costs of industry j in region z
SB1,2	H_{kj}^z	HL(J,Z) HK(J,Z) HM(J,Z)	Share of primary factor k in total costs of industry j in region z

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Table A3: Coefficients and parameters in the SALTER model (*continued*)

Equation	Parameter	TABLO name	Description
SB2	H_{Xj}^z	HX(J,Z)	Share of aggregate intermediate input use in total costs of industry j in region z
SB2	H_{Pj}^z	HP(J,Z)	Share of aggregate primary factor use in total costs of industry j in region z
SB4	S_{Mis}^{Iz}	SIT2(I,Z,S)	Share of imported commodity i from source s in imports of aggregate commodity i by region z (landed duty-paid basis)
SB14	S_{Vis}^{Wz}	SWB(I,Z,S)	Share of the fob value in the landed duty-free value of commodity i from source s in region z
SB14	S_{Fis}^{Wz}	SWM(I,Z,S)	Share of the international freight cost in the landed duty-free value of commodity i from source s in region z
SB15	S_{Fis}	SMF(I,S)	Share of international freight services of commodity i supplied by region s in the total world value of all international freight services
SC1	S_{QXij}^{Dz}	SXD(I,J,Z)	Share of intermediate use by industry j in aggregate demand for domestically produced commodity i in region z
SC1	S_{QCi}^{Dz}	SCID(I,Z)	Share of household consumption in aggregate demand for domestically produced commodity i in region z
SC1	S_{QEi}^{Dz}	SED(I,Z)	Share of exports in aggregate demand for domestically produced commodity i in region z
SC1	S_{QGi}^{Dz}	SGOVD(I,Z)	Share of government use in aggregate demand for domestically produced commodity i in region z
SC1	S_{QKi}^{Dz}	SINVD(I,Z)	Share of investment use in aggregate demand for domestically produced commodity i in region z
SC2	S_{MXisj}^{Iz}	SXI(I,J,Z,S)	Share of intermediate demand by industry j in imports of commodity i from source s in region z
SC2	S_{MKis}^{Iz}	SINVI(I,Z,S)	Share of investment demand in imports of commodity i from source s in region z
SC2	S_{MCis}^{Iz}	SCH(I,Z,S)	Share of consumption demand in imports of commodity i from source s in region z
SC2	S_{MGis}^{Iz}	SGOVI(I,Z,S)	Share of government demand in imports of commodity i from source s in region z

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Table A3: Coefficients and parameters in the SALTER model (*continued*)

<i>Equation</i>	<i>Parameter</i>	<i>TABLO name</i>	<i>Description</i>
SD1,3,9	Y_P^{Hz}	YCHHPPR(Z)	Household property income, by region
SD1,3,SE14	T_G^z	URGVHHR(Z)	Government transfers to private households in region z (level)
SD1,7	Y^{Hz}	YCHHR(Z)	Aggregate household income, by region
SD1,9,SH22	Y_L^z	LTT(Z)	Labour income, by region
SD3	Y_I^{Hz}	YCHHITR(Z)	Net interest income of households, by region
SD3,4	Y_E^z	YCEQR(Z)	Equity income, by region
SD4,5,SH22	F_{DKV}^z	KTT(Z)	Aggregate fixed capital earnings, by region
SD4,SH22	F_{DMV}^z	MTT(Z)	Aggregate returns to land, by region
SD4,SI4	DEP^z	DEPRL(Z)	Value of depreciation, by region
SD5	F_{DKVj}^z	CAP(J,Z)	Fixed capital earnings, by region and industry
SD6,SG2,3,9	A_B^{Hz}	ASHHBDR(Z)	Net household ownership of bonds, by region
SD6,SE5, SG15,SH25	R_B	RTBD	World real bond rate
SD7,9,SE1,2	R_{GY}^z	RVTXYCR(Z)	Income tax revenue, by region
SD8,SH1,3,5,6, 19,20,26,28	C_T^z	CTT(Z)	Aggregate household consumption expenditure, by region
SD8,SG8,SH27	S^{Hz}	SVT(Z)	Household savings, by region
SD9	Y_V^{Hz}	YCHHPVR(Z)	Household pre-transfer income, by region
SD10	χ_L^z	DL(Z)	Elasticity of labour supply to real after-tax wages in region z
SD10	R_{TY}^z	RTYYD(Z)	Ratio of income tax on labour to after-tax labour income in region z
SD11	h_W^z	H3(Z)	Wage indexation parameter in region z
SE1,5,13,SG2, 10,SH27,SI3	R_D^{Gz}	RCGVR(Z)	Government receipts, by region

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Table A3: Coefficients and parameters in the SALTER model (*continued*)

Equation	Parameter	TABLO name	Description
SE1	Y_I^{Gz}	RCGVITR(Z)	Government net interest receipts, by region
SE1,6-12, SH22,24	R_{GT}^z	GRCOMT(Z)	Total government revenue from commodity taxes, by region
SE2	T_{YNL}^z	RVTXYCPPR(Z)	Tax on property income, by region
SE2	T_{YL}^z	RVTXYCLBR(Z)	Tax on labour income, by region
SE5,SG2,10	A_B^{Gz}	ASGVR(Z)	Net government ownership of bonds, by region
SE6	E_{ij}^{Dz}	DINT(I,J,Z) + TRD(I,J,Z)	Tax-inclusive expenditure on intermediate use of domestic commodity i by industry j in region z (level)
SE6	E_{is}^{Iz}	IINTS(I,J,Z,S) + TNRIS(I,J,Z,S)	Tax-inclusive expenditure on intermediate use of commodity i imported from source s by industry j in region z (level)
SE6	T_{ij}^{Dz}	TRD(I,J,Z)	Taxes paid on intermediate use of domestic commodity i by industry j in region z (level)
SE6	T_{ijs}^{Iz}	TNRIS(I,J,Z,S)	Taxes paid on intermediate use of imported commodity i from source s by industry j in region z
SE7	E_{Ci}^{Dz}	DCON(I,Z) + TCRD(I,Z)	Tax-inclusive household consumption expenditure on domestic commodity i in region z (level)
SE7	E_{Cis}^{Iz}	ICONS(I,Z,S) + TCRIS(I,Z,S)	Tax-inclusive household consumption expenditure on commodity i imported from source s in region z (level)
SE7	T_{Ci}^{Dz}	TCRD(I,Z)	Taxes paid on household consumption of domestic commodity i in region z (level)
SE7	T_{Cis}^{Iz}	TCRIS(I,Z,S)	Taxes paid on household consumption of imported commodity i from source s in region z (level)
SE8	E_{Gi}^{Dz}	DGOV(I,Z) + TGRD(I,Z)	Tax-inclusive government expenditure on domestic commodity i in region z (level)
SE8	E_{Gis}^{Iz}	IGOV(S,I,Z,S) + TGRIS(I,Z,S)	Tax-inclusive government expenditure on commodity i imported from source s in region z (level)
SE8	T_{Gi}^{Dz}	TGRD(I,Z)	Taxes paid on domestic commodity i purchased by the government in region z (level)
SE8	T_{Gis}^{Iz}	TGRIS(I,Z,S)	Taxes paid on imported commodity i from source s purchased by the government in region z (level)

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Table A3: Coefficients and parameters in the SALTER model (*continued*)

Equation	Parameter	TABLO name	Description
SE9	E_{Ki}^{Dz}	INV(I,Z) + TIRD(I,Z)	Tax-inclusive investment expenditure on domestic commodity i in region z (level)
SE9	E_{Kis}^{Iz}	IINVS(I,Z,S) + TIRIS(I,Z,S)	Tax-inclusive investment expenditure on commodity i imported from source s in region z (level)
SE9	T_{Ki}^{Dz}	TIRD(I,Z)	Taxes paid on domestic commodity i used in investment in region z (level)
SE9	T_{Kis}^{Iz}	TIRIS(I,Z,S)	Taxes paid on imported commodity i from source s used in investment in region z (level)
SE10	E_{Qj}^z	COSTINP(J,Z)	Total costs of industry j in region z (level)
SE10	S_{Qj}^z	TSR(J,Z)	Indirect taxes net of subsidies provided by industry j in region z (level)
SE11	E_{Eis}^z	VALEXP(I,Z,S)	Tax-inclusive value of exports of commodity i from region z to destination s (level)
SE11	T_{Eis}^z	TER(I,Z,S)	Taxes paid on exports of commodity i from region z to destination s (level)
SE12	E_{Mis}^z	IMPLS(I,Z,S) + DR(I,Z,S)	Tax-inclusive value of imports of commodity i from source s to region z (level)
SE12	D_{is}^z	DR(I,Z,S)	Duty paid on imported commodity i from source s in region z (level)
SE13,14	O_G^z	OLGVR(Z)	Government current outlays, by region
SE13,SG10, SH27,SI3	S^{Gz}	SPGVR(Z)	Government surplus on current account, by region
SE14,SH1,3,5, 6,19,20,26,28	Z_G^z	AG(Z)	Government current spending on goods and services in region z (level)
SF2	S_{Mis}^z	SITI(I,Z,S)	Share of imports of commodity i from source s in total imports of commodity i by region z
SF3	S_{MSis}^z	SITS(I,Z,S)	Share of imports of commodity i from region s in total imports from region s by region z
SF4	S_{MERis}^z	SMPBVETDC_S(I,Z,S)	Share of imports of commodity i from source s in total imports of commodity i by region z (in basic values)
SF5,19	S_{Eis}^z	SES(I,Z,S)	Share of non-margins exports of commodity i from region z to region s in total exports of commodity i from region z (fob basis)

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Table A3: Coefficients and parameters in the SALTER model (*continued*)

<i>Equation</i>	<i>Parameter</i>	<i>TABLO name</i>	<i>Description</i>
SF5,19	S_{EIFi}^z	SESM(I,Z)	Share of margins exports of commodity i from region z in total exports of commodity i from region z (fob basis)
SF6	S_{ESis}^z	SETTS(I,Z,S)	Share of exports of commodity i in total exports from region z to region s
SF7	S_{Eis}^z	STES(I,Z,S)	Share of non-margins exports of commodity i to region s in total aggregate exports of commodity i by region z (in basic values)
SF7	S_{EFi}^z	SFES(I,Z)	Share of margins exports of commodity i from region z in total exports of commodity i from region z (in basic values)
SF8,SH17	S_{MTis}^z	SIT(I,Z,S)	Share of imports of commodity i from region s in total imports by region z (at landed duty-free prices in world currency)
SF10,SH16	S_{EAls}^z	SETTNM(I,Z,S)	Share of non-margins exports (fob) of commodity i from region z to region s in total exports (fob) of region z
SF10,SH16	S_{EAFi}^z	SETTM(I,Z)	Share of margins exports (fob) of commodity i from region z in total exports (fob) from region z
SF14,16	S_{ETi}^z	S_XPBDR_C(I,Z)	Share of exports of commodity i from region z in total exports from region z (fob basis)
SF14,18	S_{MTi}^z	S_MPSCR_C(I,Z)	Share of imports of commodity i in total imports into region z (computed of source)
SF20	S_{ERi}^z	S_XPBDC_R(I,Z)	Share of exports of commodity i from region z in total world exports of commodity i (in world currency)
SF21	EXP_{CC}^z	XPBDR(Z)	Total exports (fob) from region z , expressed in world currency
SF21	$WEXP_T$	XPBD	Total exports (fob) from all regions, expressed in world currency
SF22	S_{MPiz}^s	S_MPSCRC_S(S,I,Z)	Share of imports of commodity i from source s in total imports of commodity i by region z (computed at source)
SF22	S_{MFi}^z	S_MPSCRC_T(I,Z)	Share of freight in imports of commodity i by region z (computed at source)

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Table A3: Coefficients and parameters in the SALTER model (*continued*)

<i>Equation</i>	<i>Parameter</i>	<i>TABLO name</i>	<i>Description</i>
SF23	β_F	BT	Elasticity of substitution between freight sources
SF24	S_{Fis}^z	SFS(I,Z,S)	Share of freight services of commodity i exported from region z to region s in total freight services on exports
SF25	S_{EERis}^z	SXPBVETSC_D(I,Z,S)	Share of exports (excluding margin exports and intra-region exports) of commodity i from region z to region s in total extra-region non-margin exports of commodity i from region z (basic values)
SG1	A_B	ASBD	World net ownership of bonds
SG1,2,SH25	A_B^z	ASBDR(Z)	Net ownership of bonds in region z
SG1,SJ2	Y^W	YC	World nominal income
SG1,2,SH24, 25,27,SI2,4, SJ2	Y^z	YCR(Z)	Nominal income in region z
SG1,SJ2,3,7,8	E^z	ECRT(Z)	Exchange rate in region z (local currency price of world currency)
SG2,3,8,SH27	Y_D^{Hz}	YCHHDPR(Z)	Household disposable income, by region
SG3,4,5,8	A_E^{Hz}	ASEQR(Z)	Equity in productive assets in region z
SG3,8,9	A^{Hz}	ASHHR(Z)	Household wealth in region z
SG4,5,SJ7	S_K^{Az}	ASKPR(Z)	Value of capital in region z
SG4,5	S_M^{Az}	ASLNR(Z)	Value of land in region z
SG8	C_1^{Hz}	CEACWTHH01R(Z)	Coefficient capturing quasi-dynamics in household wealth accumulation, defined in McDougall (1993b)
SG8	C_2^{Hz}	CEACWTHH02R(Z)	Coefficient capturing quasi-dynamics in household wealth accumulation, defined in McDougall (1993b)
SG8,10	T	LGPRSM	Length of the simulation interval
SG10	C_1^{Gz}	CEACWTGV01R(Z)	Coefficient capturing quasi-dynamics in government wealth accumulation, defined in McDougall (1993b)
SG10	C_2^{Gz}	CEACWTGV02R(Z)	Coefficient capturing quasi-dynamics in government wealth accumulation, defined in McDougall (1993b)

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Table A3: Coefficients and parameters in the SALTER model (*continued*)

Equation	Parameter	TABLO name	Description
SG14,17	R_{Kj}^z	RTKPGRR(J,Z)	Gross rate of return on capital in industry j in region z
SG16	α^z	EL_ERCRK_K_R(Z)	Elasticity of expected rate of return on capital with respect to capital stock in region z (a general equilibrium elasticity calculated by model simulation (McDougall 1993b), the value for which is negative)
SG16	J^z	RTIVKPR(Z)	Ratio of gross investment to the existing capital stock, by region
SG16	R_D^z	RTDPR(Z)	Depreciation rate, by region
SG16	H_K^z	GTSSKPR(Z)	Steady state capital stock growth rate (measured as actual growth rate of capital stock)
SG16,17	R_{KG}^z	RTKPGRR(Z)	Average gross rate of return on capital in region z
SG18	λ_K^z	CEAJRTKPR(Z)	Coefficient of adjustment in returns to capital, by region
SG19	R_{Aj}^z	RTKPANRI(J,Z)	Rate of abnormal return on capital, by region and industry
SG19	R_A^z	RTKPANR(Z)	Average rate of abnormal return on capital, by region
SH1,5,19,22, 23,SI2,3,4,5, SJ1,5,6	GDP_E^z	GDPL(Z)	Gross domestic product, by region
SH1,3,5,6,19, 20,SI4,SJ8	INV_T^z	INVTT(Z)	Aggregate investment spending, by region
SH1,5,19,SI5	IMP_A^z	IMPTT(Z)	Total imports (cif), by region
SH1,5,19,SI5	EXP_A^z	EXPFOB(Z)	Total exports (fob), by region
SH2,18	S_{GDPKj}^z	SKGDP(J,Z)	Share of capital in industry j in gross domestic product at factor cost in region z
SH2,18	S_{GDPL}^z	SLGDP(Z)	Share of labour in gross domestic product at factor cost in region z
SH2,18	S_{GDPM}^z	SMGDP(Z)	Share of land in gross domestic product at factor cost in region z
SH3,6,20	NE_G^z	GNEL(Z)	Gross national expenditure, by region

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Table A3: Coefficients and parameters in the SALTER model (*continued*)

<i>Equation</i>	<i>Parameter</i>	<i>TABLO name</i>	<i>Description</i>
SH4	S_{YL}^z	SLYF(Z)	Share of labour in aggregate net factor income in region z
SH4	S_{YKj}^z	SKYF(J,Z)	Share of gross capital earnings in industry j in aggregate net factor income in region z
SH4	S_{YM}^z	SMYF(Z)	Share of land in aggregate net factor income in region z
SH4	S_{YD}^z	SDDDF(Z)	Ratio of depreciation to aggregate net factor income in region z
SH7	S_{CNE}^z	SCNEXP(Z)	Share of household expenditure in net national expenditure in region z
SH7	S_{INE}^z	SINEXP(Z)	Share of gross investment spending in net national expenditure in region z
SH7	S_{DNE}^z	SDNEXP(Z)	Ratio of depreciation to net national expenditure in region z
SH7	S_{GNE}^z	SGNEXP(Z)	Share of government expenditure in net national expenditure in region z
SH13	S_{CTi}^{Dz}	SCTD(I,Z)	Share of domestic commodity i in aggregate household demand in region z
SH13	S_{CTis}^{Iz}	SCTI(I,Z,S)	Share of imported commodity i from source s in aggregate household demand in region z
SH14	S_{KTI}^{Dz}	SIDT(I,Z)	Share of domestic commodity i in aggregate investment expenditure in region z
SH14	S_{KTI}^{Iz}	SIIT(I,Z)	Share of imported aggregate commodity i in aggregate investment expenditure in region z
SH15	S_{GTi}^{Dz}	SGDT(I,Z)	Share of domestic commodity i in aggregate government purchases of commodities in region z
SH15	S_{GTi}^{Iz}	SGIT(I,Z)	Share of imported aggregate commodity i in aggregate government purchases of commodities in region z
SH23	NP_G^z	GNPL(Z)	Gross national product, by region
SH23,24,S12, SJ5	Y_I^z	YCITR(Z)	Net interest income, by region
SH24	Y_F^z	YFNT(Z)	Net factor income in region z

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Table A3: Coefficients and parameters in the SALTER model (*continued*)

<i>Equation</i>	<i>Parameter</i>	<i>TABLO name</i>	<i>Description</i>
SH26,28,SJ3	C_N^z	EPCSR(Z)	National consumption expenditure, by region
SH27,SJ4	SAV^z	SVR(Z)	Saving, by region
SI4,SJ6	KA^z	NCIL(Z)	Net capital inflow, by region
SI5	TB^z	BTL(Z)	Domestic currency value of the trade surplus, by region
SJ1,5,6	WGP	WGPL	World gross product
SJ3	C^W	EPCS	World consumption expenditure
SJ5	WBY	YCIT	World net interest income
SJ6	WKA	WNCIL	World net capital inflow
SJ7	WKS	ASKP	World capital stock
SJ8	WIE	WINVT	World investment expenditure
SJ9	S_{WGP}^z	SWGDPFC(Z)	Share of region z in world gross product at factor cost

Table A4: Exogenous variables in a long-run closure of the SALTER model

Variable	Range	TABLO name	Description
em_L^z	$z = 1, \dots, S$	EM(Z)	Rate of employment in region z
f_{DM}^z	$z = 1, \dots, S$	MT(Z)	Aggregate demand for land in region z
dQ_B^Y	—	QYB	World bond-income ratio (absolute change measured in percentage points)
dR_{Aj}^z	$j = 1, \dots, S$ $z = 1, \dots, S$	RARI(J,Z)	Rate of abnormal return on capital in industry j in region z (absolute change measured in percentage points)
dF_{RE}^z	$z = 1, \dots, S$	FRER(Z)	Equity premium in region z (absolute change measured in percentage points)
$d\dot{F}_{RE}^{Ez}$	$z = 1, \dots, S$	ERCFRER(Z)	Expected rate of change in the equity premium in region z (absolute change measured in percentage points per year)
$dQ_S^{YH_z}$	$z = 1, \dots, S$	QYHSR(Z)	Ratio of household saving to disposable income in region z (absolute change measured in percentage points)
h_{GPE}^z	$z = 1, \dots, S$	HG(Z)	Shift term for ratio of real public to private expenditure in region z
h_{GHT}^z	$z = 1, \dots, S$	FUGHR(Z)	Government-to-household transfer shift term in region z
$dQ_S^{YG_z}$	$z = 1, \dots, S$	QRGSR(Z)	Ratio of government savings to aggregate government receipts in region z (absolute change measured in percentage points)
h_{LYT}^z	$z = 1, \dots, S$	FTYLr(Z)	Labour income tax rate shift in region z
h_{PYT}^z	$z = 1, \dots, S$	FTYPR(Z)	Property income tax rate shift in region z
h_{MDAi}^z	$i = 1, \dots, I$ $z = 1, \dots, S$	FDDC(I,Z)	Import duty rate shift for commodity i imported by region z (irrespective of source)
h_{MDis}^z	$i = 1, \dots, I$ $z = 1, \dots, S$ $s = 1, \dots, S$	FDDCS(I,Z,S)	Import duty rate shift for commodity i imported by region z from region s

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Table A4: Exogenous variables in a long-run closure of the SALTER model (*continued*)

Variable	Range	TABLO name	Description
h_{XTAi}^z	$i = 1, \dots, I$ $z = 1, \dots, S$	FTESC(I,Z)	Export tax shift for commodity i exported by region z (irrespective of destination)
h_{Xtis}^z	$i = 1, \dots, I$ $z = 1, \dots, S$ $s = 1, \dots, S$	FTESCD(I,Z,S)	Export tax shift for commodity i exported by region z to region s
s_{Qj}^z	$j = 1, \dots, J$ $z = 1, \dots, S$	SQ(J,Z)	Power of industry indirect taxes net of subsidies on industry j in region z
t_{ij}^{Dz}	$i = 1, \dots, I$ $j = 1, \dots, J$ $z = 1, \dots, S$	TINTD(I,J,Z)	Power of the ad valorem tax applied to domestic commodity i purchased by industry j in region z
t_{ij}^{Iz}	$i = 1, \dots, I$ $j = 1, \dots, J$ $z = 1, \dots, S$	TINTI(I,J,Z)	Power of the ad valorem tax applied to imported commodity i purchased by industry j in region z
t_{Ci}^{Dz}	$i = 1, \dots, I$ $z = 1, \dots, S$	TCOND(I,Z)	Power of the ad valorem tax applied to the consumption of domestic commodity i in region z
t_{Ci}^{Iz}	$i = 1, \dots, I$ $z = 1, \dots, S$	TCONI(I,Z)	Power of the ad valorem tax applied to the consumption of imported commodity i in region z
t_{Gi}^{Dz}	$i = 1, \dots, I$ $z = 1, \dots, S$	TGOVD(I,Z)	Power of the ad valorem tax applied to domestic commodity i purchased by the government in region z
t_{Gi}^{Iz}	$i = 1, \dots, I$ $z = 1, \dots, S$	TGOVI(I,Z)	Power of the ad valorem tax applied to imported commodity i purchased by the government in region z
t_{Ki}^{Dz}	$i = 1, \dots, I$ $z = 1, \dots, S$	TINVD(I,Z)	Power of the ad valorem investment tax applied to domestic commodity i in region z
t_{Ki}^{Iz}	$i = 1, \dots, I$ $z = 1, \dots, S$	TINVI(I,Z)	Power of the ad valorem investment tax applied to imported commodity i in region z
a_j^z	$j = 1, \dots, J$ $z = 1, \dots, S$	B1(J,Z)	Output augmenting technical change in industry j in region z
a_P^z	$z = 1, \dots, S$	BP(Z)	Primary factor augmenting technical change in region z
a_{Lj}^z	$j = 1, \dots, J$ $z = 1, \dots, S$	BL(J,Z)	Labour-augmenting technical change in industry j in region z
a_{Kj}^z	$j = 1, \dots, J$ $z = 1, \dots, S$	BK(J,Z)	Capital-augmenting technical change in industry j in region z

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Table A4: Exogenous variables in a long-run closure of the SALTER model (*continued*)

<i>Variable</i>	<i>Range</i>	<i>TABLO name</i>	<i>Description</i>
a_{Mj}^z	$j = 1, \dots, J$ $z = 1, \dots, S$	BM(J,Z)	Land-augmenting technical change in industry j in region z
a_{Xj}^z	$j = 1, \dots, J$ $z = 1, \dots, S$	BI(J,Z)	Aggregate intermediate input augmenting technical change in industry j in region z
h_D^z	$z = 1, \dots, S$	H(Z)	Population in region z
e^z	$z = 1, \dots, S$	ER(Z)	Exchange rate (local currency price of world currency)
gpi_F^W	—	WPFPI	World primary factor price index

