1 Introduction

This appendix provides all the equations of the model. Note that there are two versions of the household block: (1) the standard version where a LES utility function is assumed for all commodities; (2) the hybrid version where transport, car, housing and energy consumption are modeled separately.

In this appendix, t is the time operator that may be omitted when no confusion arises, e.g. $Z = Z_t$. Variables in first difference are referred as : $\Delta(Z_t) = Z_t - Z_{t-1}$. Therefore the logarithm difference of a variable is approximatively its growth rate: $\Delta(\log Z_t) \approx Z_t / Z_{t-1} - 1$. All parameters written in Greek letter are positive. n as an exponent refers to the notional value of a given variable that is the optimal value desired by the maximization agent: e.g. Z^n is the notional value of variable Z. Because of adjustment constraint, effective values adjust slowly to their notional value.

1.1 Sets

1.2 Exogenous variables

2 Supply-Use equilibrium

This section provides the equations defining the supply use - equilibrium for the domestic and imported products and at the aggregate level. It also derives the GDP according to various definitions. All equations are therefore accounting identity.

Each identity is expressed in value and in volume. The value equation defines therefore a price index. By convention, the variable Z is always expressed in volume. PZ is its price. Therefore the quantity expressed in value is $Z^{VAL} = PZ * Z$. In most case, values are expresed as $PZ * Z$. When there is a risk that a variable in volume is equal to zero in simulation, we shall defined value as Z^{VAL} to avoid a division by zero issue. A typical exemple would be the value-added of sector s: $VA_s^{VAL} = PY_s\, Y_s - PCI_s\, CI_s$.

2.1 Use side

2.1.1 Domestic and foreign equilibrium for commodities c (value & volume):

Market price for the domestically produced commodity c

$$PQD_c \, QD_c = PMGRD_c \, MGRD_c + PCID_c \, CID_c + PCHD_c \, CHD_c \\ + PGD_c \, GD_c + PID_c \, ID_c + PXD_c \, XD_c + PDSD_c \, DSD_c$$

(2.1)

Quantity of domestically produced commodity c expressed at market price

$$QD_c = MGRD_c + CID_c + CHD_c + GD_c + ID_c + XD_c + DSD_c \quad (2.2)$$

Market price for imported commodity c

$$PQM_c \, QM_c = PMGRM_c \, MGRM_c + PCIM_c \, CIM_c + PCHM_c \, CHM_c \\ + PGM_c \, GM_c + PIM_c \, IM_c + PXM_c \, XM_c + PDSM_c \, DSM_c$$

(2.3)

Quantity of imported commodity c expressed at market price

$$QM_c = MGRM_c + CIM_c + CHM_c + GM_c + IM_c + XM_c + DSM_c \quad (2.4)$$

2.1.2 Margins received (value & volume):

The margins received by commodity m corresponds to the margins supplied by this commodity. By definition, the margins received is the sum of the margins paid (or used) on the commodities c.

The margins paid on domestic and imported products ($MGPD_{m,c}$ and $MGPM_{m,c}$) are defined with behavorial equations in the producer block. They follow the domestic and imported production of commodity c (YQ_c and M_c) more or less proportionnally depending on the possibility of substitutions between margins. The margins paid are then aggregated to define the margins recieved, MGR_m. The latter is then disagrated between the domestic and

imported margins recieved ($MGRD_c$ and $MGRM_c$). See specification in the producer block.

Market price of the margins received by commodity m

$$PMGR_m \ MGR_m = \sum_c PMGP_{m,c} \ MGP_{m,c} \qquad (2.5)$$

Margins received by commodity m, expressed at market price

$$MGR_m = \sum_c MGP_{m,c} \qquad (2.6)$$

The margins received correspond to the sum of the margins paid to commodity m over all the commodities c

Market price of the margins received by commodity m (for verification)

$$PMGR_c^{bis} \ MGR_c^{bis} = PMGRD_c \ MGRD_c + PMGRM_c \ MGRM_c \quad (2.7)$$

Same variable as $PMGR_c$ above to check the accounting consistency.

Margins received by commodity m, expressed at market price (for verification)

$$MGR_c^{bis} = MGRD_c + MGRM_c \qquad (2.8)$$

Same variable as MGR_c above to check the accounting consistency.

2.1.3 Aggregation of imports and domestic production for commodity c per use, expressed at market price (value & volume)

This subsection aggregates imports and domestic production for commodity c for various uses. It does not do it for Exports, Households and Government final consumption (X, CH and G) because these aggregates are already

defined in behaviour equations (see Trade international, Consumer and Governement blocks). Expressed on value, this subsection also defines the prices indexes at market price for commodity c per use as a weighted average of imported and domestic production per uses: *i.e.* for Q (production of commodities), CI (intermediary consumption), I (private investment) and DS (change in inventories).

Market price of the production of commodity c

$$PQ_c\,Q_c = PQD_c\,QD_c + PQM_c\,QM_c \tag{2.9}$$

Production of commodity c, expressed at market price

$$Q_c = QD_c + QM_c \tag{2.10}$$

Market price of the intermediate consumption of commodity c

$$PCI_c\,CI_c = PCID_c\,CID_c + PCIM_c\,CIM_c \tag{2.11}$$

Intermediate consumption of commodity c, expressed at market price

$$CI_c = CID_c + CIM_c \tag{2.12}$$

Market price of the investment in commodity c

$$PI_c\,I_c = PID_c\,ID_c + PIM_c\,IM_c \tag{2.13}$$

Investment in commodity c, expressed at market price

$$I_c = ID_c + IM_c \tag{2.14}$$

Market price of the change in inventories of commodity c

$$PDS_c\,DS_c = PDSD_c\,DSD_c + PDSM_c\,DSM_c \tag{2.15}$$

Change in inventories of commodity c, expressed at market price

$$DS_c = DSD_c + DSM_c \tag{2.16}$$

2.1.4 Agregation on sectors: production of commodity c per use for domestic and imported products, expressed at market price (value & volume)

This subsection provides the aggregates for commodity c for various uses, for domestic and imported products. They are calculated through the aggregation of the corresponding sectoral data on the sector index.

Market price for the domestically produced commodity c used as intermediary consumption

$$PCID_c \, CID_c = \sum_s PCID_{c,s} \, CID_{c,s} \qquad (2.17)$$

Quantity of domestically produced commodity c used as intermediary consumption, expressed at market price

$$CID_c = \sum_s CID_{c,s} \qquad (2.18)$$

Market price for imported commodity c used as intermediary consumption

$$PCIM_c \, CIM_c = \sum_s PCIM_{c,s} \, CIM_{c,s} \qquad (2.19)$$

Quantity of imported commodity c used as intermediary consumption, expressed at market price

$$CIM_c = \sum_s CIM_{c,s} \qquad (2.20)$$

Market price for domestically produced commodity c used as investment

$$PID_c \, ID_c = \sum_s PID_{c,s} \, ID_{c,s} \qquad (2.21)$$

Quantity of imported commodity c used as investment, expressed at market price

$$ID_c = \sum_s ID_{c,s} \tag{2.22}$$

Market price for imported commodity c used as investment

$$PIM_c\, IM_c = \sum_s PIM_{c,s}\, IM_{c,s} \tag{2.23}$$

Quantity of imported commodity c used as investment, expressed at market price

$$IM_c = \sum_s IM_{c,s} \tag{2.24}$$

2.1.5 Agregation on commodities: imported, domestic and aggregate intermediate consumption and investment of sector s, expressed at market price (value & volume)

This subsection provides the intermediate consumption and investment of sector s (imported, domestically produced and aggregated). They are calculated through the aggregation of the corresponding sectoral data on the commodity index.

Market price of domestically produced intermediate consumption of sector s

$$PCID_s\, CID_s = \sum_c PCID_{c,s}\, CID_{c,s} \tag{2.25}$$

Domestically produced intermediate consumption of sector s, expressed at basic price, expressed at market price

$$CID_s = \sum_c CID_{c,s} \tag{2.26}$$

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Market price of imported intermediate consumption of sector s

$$PCIM_s \, CIM_s = \sum_c PCIM_{c,s} \, CIM_{c,s} \qquad (2.27)$$

Imported intermediate consumption of sector s, expressed at market price

$$CIM_s = \sum_c CIM_{c,s} \qquad (2.28)$$

Market price of intermediate consumption of sector s

$$PCI_s \, CI_s = PCID_s \, CID_s + PCIM_s \, CIM_s \qquad (2.29)$$

Intermediate consumption of sector s, expressed at market price

$$CI_s = CID_s + CIM_s \qquad (2.30)$$

Market price of intermediate consumption of sector s (for verification)

$$PCI^{bis}.CI^{bis} = \sum_s PCI_s \, CI_s \qquad (2.31)$$

Intermediate consumption of sector s, expressed at market price (for verification)

$$CI^{bis} = \sum_s CI_s \qquad (2.32)$$

Market price of domestically produced investment of sector s

$$PID_s \, ID_s = \sum_c PID_{c,s} \, ID_{c,s} \qquad (2.33)$$

Domestically produced investment of sector s, expressed at market price

$$ID_s = \sum_c ID_{c,s} \tag{2.34}$$

Market price of imported investment of sector s

$$PIM_s\, IM_s = \sum_c PIM_{c,s}\, IM_{c,s} \tag{2.35}$$

Imported investment of sector s, expressed at market price

$$IM_s = \sum_c IM_{c,s} \tag{2.36}$$

Market price of investment of sector s

$$PI_s\, I_s = PID_s\, ID_s + PIM_s\, IM_s \tag{2.37}$$

Investment of sector s, expressed at market price

$$I_s = ID_s + IM_s \tag{2.38}$$

Market price of investment of sector s (for verification)

$$PI^{bis}.I^{bis} = \sum_s PI_s\, I_s \tag{2.39}$$

Investment of sector s, expressed at market price (for verification)

$$I^{bis} = \sum_s I_s \tag{2.40}$$

2.1.6 Aggregation on commodities: imports and domestic aggregate production per use, expressed at market price (value & volume)

This subsection provides the aggregate production for various uses, for domestic and imported products. They are calculated through the aggregation of commodity c production per use on the commodity index.

Aggregate market price for domestically produced commodities

$$PQD.QD = \sum_c PQD_c \, QD_c \qquad (2.41)$$

Aggregate domestically produced commodities, expressed at market price

$$QD = \sum_c QD_c \qquad (2.42)$$

Aggregate market price for imported commodities

$$PQM.QM = \sum_c PQM_c \, QM_c \qquad (2.43)$$

Aggregate imported commodities, expressed at market price

$$QM = \sum_c QM_c \qquad (2.44)$$

Aggregate market price for the margins received on domestically produced commodities

$$PMGRD.MGRD = \sum_c PMGRD_c \, MGRD_c \qquad (2.45)$$

Aggregate margins received on domestically produced commodities, expressed at market price

$$MGRD = \sum_c MGRD_c \qquad (2.46)$$

Aggregate market price for the margins received on imported commodities

$$PMGRM.MGRM = \sum_c PMGRM_c \, MGRM_c \qquad (2.47)$$

Aggregate margins received on imported commodities, expressed at market price

$$MGRM = \sum_c MGRM_c \qquad (2.48)$$

Aggregate market price for domestically produced intermediate consumption

$$PCID.CID = \sum_c PCID_c \, CID_c \qquad (2.49)$$

Aggregate domestically produced intermediate consumption, expressed at market price

$$CID = \sum_c CID_c \qquad (2.50)$$

Aggregate market price for imported intermediate consumption

$$PCIM.CIM = \sum_c PCIM_c \, CIM_c \qquad (2.51)$$

Aggregate imported intermediate consumption, expressed at market price

$$CIM = \sum_c CIM_c \qquad (2.52)$$

Aggregate market price for domestically produced households final consumption

$$PCHD.CHD = \sum_c PCHD_c \, CHD_c \qquad (2.53)$$

Aggregate domestically produced final consumption, expressed at market price

$$CHD = \sum_c CHD_c \qquad (2.54)$$

Aggregate market price for imported households final consumption

$$PCHM.CHM = \sum_c PCHM_c \, CHM_c \qquad (2.55)$$

Aggregate imported households final consumption, expressed at market price

$$CHM = \sum_c CHM_c \qquad (2.56)$$

Aggregate market price for domestically produced Government final consumption

$$PGD.GD = \sum_c PGD_c \, GD_c \qquad (2.57)$$

Aggregate domestically produced Government final consumption, expressed at market price

$$GD = \sum_c GD_c \qquad (2.58)$$

Aggregate market price for imported Government final consumption

$$PGM.GM = \sum_c PGM_c \, GM_c \qquad (2.59)$$

Aggregate imported Government final consumption, expressed at market price

$$GM = \sum_c GM_c \qquad (2.60)$$

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Aggregate market price for domestically produced investment

$$PID.ID = \sum_c PID_c\, ID_c \qquad (2.61)$$

Aggregate domestically produced investment, expressed at market price

$$ID = \sum_c ID_c \qquad (2.62)$$

Aggregate market price for imported investment

$$PIM.IM = \sum_c PIM_c\, IM_c \qquad (2.63)$$

Aggregate imported investment, expressed at market price

$$IM = \sum_c IM_c \qquad (2.64)$$

Aggregate market price for domestically produced exports

$$PXD.XD = \sum_c PXD_c\, XD_c \qquad (2.65)$$

Aggregate domestically produced exports, expressed at market price

$$XD = \sum_c XD_c \qquad (2.66)$$

Aggregate market price for imported exports (re-exports)

$$PXM.XM = \sum_c PXM_c\, XM_c \qquad (2.67)$$

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Aggregate imported exports (re-exports), expressed at market price

$$XM = \sum_c XM_c \qquad (2.68)$$

Aggregate market price for domestically produced change in inventories

$$PDSD.DSD = \sum_c PDSD_c \, DSD_c \qquad (2.69)$$

Aggregate domestically produced change in inventories, expressed at market price

$$DSD = \sum_c DSD_c \qquad (2.70)$$

Aggregate market price for imported change in inventories

$$PDSM.DSM = \sum_c PDSM_c \, DSM_c \qquad (2.71)$$

Aggregate imported change in inventories, expressed at market price

$$DSM = \sum_c DSM_c \qquad (2.72)$$

2.1.7 Aggregation of domestic and imported production per use, expressed at market price (value & volume)

This subsection provides the aggregate production for various uses by summing the corresponding domestic and imported aggregates.

Aggregate market price for production

$$PQ.Q = PQD.QD + PQM.QM \qquad (2.73)$$

Aggregate production, expressed at market price

$$Q = QD + QM \tag{2.74}$$

Aggregate market price for recieved margins

$$PMGR.MGR = PMGRD.MGRD + PMGRM.MGRM \tag{2.75}$$

Aggregate recieved margins

$$MGR = MGRD + MGRM \tag{2.76}$$

Aggregate market price for intermediate consumption

$$PCI.CI = PCID.CID + PCIM.CIM \tag{2.77}$$

Aggregate intermediate consumption, expressed at market price

$$CI = CID + CIM \tag{2.78}$$

Aggregate market price for household final (consumer price index)

$$PCH.CH = PCHD.CHD + PCHM.CHM \tag{2.79}$$

Aggregate household final consumption, expressed at market price

$$CH = CHD + CHM \tag{2.80}$$

Aggregate market price for Government final consumption

$$PG.G = PGD.GD + PGM.GM \tag{2.81}$$

Aggregate Government final consumption, expressed at market price

$$G = GD + GM \tag{2.82}$$

Aggregate market price for investment

$$PI.I = PID.ID + PIM.IM \qquad (2.83)$$

Aggregate investment, expressed at market price

$$I = ID + IM \qquad (2.84)$$

Aggregate market price for exports

$$PX.X = PXD.XD + PXM.XM \qquad (2.85)$$

Aggregate exports, expressed at market price

$$X = XD + XM \qquad (2.86)$$

Aggregate market price for change in inventories

$$PDS.DS = PDSD.DSD + PDSM.DSM \qquad (2.87)$$

Aggregate change in inventories, expressed at market price

$$DS = DSD + DSM \qquad (2.88)$$

2.2 Supply side

2.2.1 Domestic and foreign equilibrium for commodities c (value & volume):

Production of commodity c, expressed at basic price

$$YQ_c \, PYQ_c + NTAXPD_c^{VAL} + PMGPD_c \, MGPD_c = PQD_c \, QD_c \quad (2.89)$$

Basic price of the production of commodity c (for verification)

$$PYQ_c^{bis} \, YQ_c + NTAXPD_c^{VAL} + PMGPD_c \, MGPD_c = PQD_c \, QD_c \quad (2.90)$$

This price is already defined as a weighted average of the production price of the sectors producing commodity c in the price block: $PYQ.YQ = \sum_c PYQ_c \, YQ_c$. To verify accountancy consistancy, we define it here under an alias name.

Production of commodity c, expressed at basic price (for verification)

$$YQ_c^{bis} + NTAXPD_c + MGPD_c = QD_c \quad (2.91)$$

Same variable as YQ_c above to check the accounting consistency.

Imports of commodity c, expressed at basic price

$$M_c \, PM_c + NTAXPM_c^{VAL} + PMGPM_c \, MGPM_c = PQM_c \, QM_c \quad (2.92)$$

Basic price of imports of commodity c (for verification)

$$PM_c^{bis} \, M_c + NTAXPM_c^{VAL} + PMGPM_c \, MGPM_c = PQM_c \, QM_c \quad (2.93)$$

This price is already defined in the price block as $PM_c = EXR.PWD_c$. To verify accountancy consistancy, we define it here under an alias name.

Imports of commodity c, expressed at basic price (for verification)

$$M_c^{bis} + NTAXPM_c + MGPM_c = QM_c \quad (2.94)$$

Same variable as M_c above to check the accounting consistency.

2.2.2 Margins paid (value & volume)

Price of the margins paid on domestically produced commodity c

$$PMGPD_c \, MGPD_c = \sum_m PMGPD_{m,c} \, MGPD_{m,c} \qquad (2.95)$$

Margins paid on the domestically produced commodity c

$$MGPD_c = \sum_m MGPD_{m,c} \qquad (2.96)$$

Price of the margins paid on imported commodity c

$$PMGPM_c \, MGPM_c = \sum_m PMGPM_{m,c} \, MGPM_{m,c} \qquad (2.97)$$

Margins paid on imported commodity c

$$MGPM_c = \sum_m MGPM_{m,c} \qquad (2.98)$$

Price of the margins paid to commodity m on commodity c

$$PMGP_{m,c} \, MGP_{m,c} = PMGPD_{m,c} \, MGPD_{m,c} + PMGPM_{m,c} \, MGPM_{m,c} \qquad (2.99)$$

Margins paid to commodity m on commodity c

$$MGP_{m,c} = MGPD_{m,c} + MGPM_{m,c} \qquad (2.100)$$

2.2.3 Aggregation on commodities: supply side aggregates (value & volume)

Aggregate price of the margins paid on domestically produced commodity

$$PMGPD.MGPD = \sum_c PMGPD_c \, MGPD_c \qquad (2.101)$$

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Margins paid on domestically produced commodities

$$MGPD = \sum_c MGPD_c \qquad (2.102)$$

Aggregate price of the margins paid on imported commodities

$$PMGPM.MGPM = \sum_c PMGPM_c \, MGPM_c \qquad (2.103)$$

Margins paid on imported commodities

$$MGPM = \sum_c MGPM_c \qquad (2.104)$$

Aggregate basic price of domestic production

$$PYQ.YQ = \sum_c PYQ_c \, YQ_c \qquad (2.105)$$

Domestic production, expressed at basic price

$$YQ = \sum_c YQ_c \qquad (2.106)$$

Aggregate basic price of imports

$$PM.M = \sum_c PM_c \, M_c \qquad (2.107)$$

Imports, expressed at basic price

$$M = \sum_c M_c \qquad (2.108)$$

2.2.4 Supply indicators of sector s (value & volume):

Production of sector s, expressed at basic price

$$Y_s = \sum_c Y_{c,s} \tag{2.109}$$

The production price of sector s is defined in the producer block as a behavour equation. It can not therefore be defined here as an index.

Value-added of sector s expressed in value

$$VA_s^{VAL} = PY_s\, Y_s - PCI_s\, CI_s \tag{2.110}$$

Value-added of sector s

$$VA_s = Y_s - CI_s \tag{2.111}$$

Gross operating surplus of sector s expressed in value

$$
\begin{aligned}
GOS_s^{VAL} \\
= VA_s^{VAL} - PWAGES_s\, WAGES_s - PRSSC_s\, RSSC_s - NTAXI_s^{VAL}
\end{aligned}
\tag{2.112}
$$

The standard definition of the Gross Operating Surplus (GOS) generally include tax on profits. For simplicity, we assume that $NTAXI_s$ includes all net taxes on capital (i.e. tax on production and profits). In our definition, the tax on profit is therefore excluded from the GOS. This should be taken into account if one wants to use the GOS as a basis for the tax on profits.

Gross operating surplus of sector s

$$GOS_s = VA_s - WAGES_s - RSSC_s - NTAXI_s \tag{2.113}$$

Net operating surplus of sector s expressed in value

$$NOS_s^{VAL} = GOS_s^{VAL} - PK_{s,t-1}\, \delta_s\, F_{K,s,t-1} \tag{2.114}$$

Net operating surplus of sector s

$$NOS_s = GOS_s - PK_{s,t_0-1}\, \delta_s\, F_{K,s,t-1} \tag{2.115}$$

2.2.5 Aggregation on sectors: supply indicators of all sectors (value & volume)

Basic price of aggregate production

$$PY.Y = \sum_s PY_s \, Y_s \tag{2.116}$$

Aggregate production, expressed at basic price

$$Y = \sum_s Y_s \tag{2.117}$$

Value-added price

$$PVA.VA = \sum_s VA_s^{VAL} \tag{2.118}$$

Aggregate value-added

$$VA = \sum_s VA_s \tag{2.119}$$

Gross wage index paid by sectors

$$PWAGES.WAGES = \sum_s PWAGES_s \, WAGES_s \tag{2.120}$$

The gross wage includes employees (but not employers)' social contribution

Aggregate gross wages paid by sectors

$$WAGES = \sum_s WAGES_s \tag{2.121}$$

Price of the aggregate gross operating surplus

$$PGOS.GOS = \sum_s GOS_s^{VAL} \tag{2.122}$$

Aggregate gross operating surplus

$$GOS = \sum_s GOS_s \tag{2.123}$$

Price of the aggregate net operating surplus

$$PNOS.NOS = \sum_s NOS_s^{VAL} \tag{2.124}$$

Aggregate net operating surplus

$$NOS = \sum_s NOS_s \tag{2.125}$$

2.3 Gross Domestic Product (GDP)

In this subsection, GDP is calculated according to different approaches. All approaches lead to same result.

2.3.1 Expenditure approach

Price of GDP (expenditure definition)

$$PGDP.GDP = PCH.CH + PG.G + PI.I + PX.X + PDS.DS - PM.M \tag{2.126}$$

According to expenditure approach, GDP is calculated as the sum of the different components in the final uses of goods and services.

GDP (expenditure definition)

$$GDP = CH + G + I + X + DS - M \tag{2.127}$$

Price of GDP of commodity c (expenditure definition)

$$\begin{aligned} PGDP_c\, GDP_c = {} & PCH_c\, CH_c + PG_c\, G_c + PI_c\, I_c \\ & + PX_c\, X_c + PDS_c\, DS_c - PM_c\, M_c \end{aligned} \tag{2.128}$$

GDP of commodity c (expenditure definition)

$$GDP_c = CH_c + G_c + I_c + X_c + DS_c - M_c \qquad (2.129)$$

Price of GDP (expenditure definition, for verification)

$$PGDP^{bis}.GDP^{bis} = \sum_c PGDP_c\, GDP_c \qquad (2.130)$$

GDP (expenditure definition, for verification)

$$GDP^{bis} = \sum_c GDP_c \qquad (2.131)$$

2.3.2 Production approach

Price of GDP (production definition)

$$PGDP^{ter}.GDP^{ter} = PVA.VA + PNTAXP.NTAXP \qquad (2.132)$$

According to production approach, GDP is calculated as the sum of the value added plus the total net taxes on commodities.

GDP (production definition)

$$GDP^{ter} = VA + NTAXP \qquad (2.133)$$

2.3.3 Income approach

Price of GDP (income definition)

$$PGDP4.GDP4 = PGOS.GOS + PWAGES.WAGES + PRSSC.RSSC \\ + NTAXI^{VAL} + PNTAXP.NTAXP$$
$$(2.134)$$

According to the income approach, GDP is calculated as the sum of all the economic incomes (from labor and capital) corrected by the social and taxes

transfers.

GDP (income definition)

$$GDP4 = GOS + WAGES + RSSC + NTAXI + NTAXP \quad (2.135)$$

3 Prices

This file provides the equations defining the prices.

Domestic production price of commodity c

$$PYQ_c \, YQ_c = \sum_s PY_s \, Y_{c,s} \quad (3.1)$$

Notional production price of sector s

$$PY_s^n = CU_s^n \, (1 + \mu_s) \quad (3.2)$$

Notional mark-up of the sector s

$$\Delta \left(\log 1 + \mu_s^n \right) = \rho^{\mu,Y} . \Delta \left(\log CUR_s \right) \quad (3.3)$$

Notional mark-up of the sector s (definition 2)

$$\Delta \left(\log 1 + \mu_s^{n2} \right) = \rho^{\mu,Y} . \left(\Delta \left(\log Y_s \right) - \Delta \left(\log Y_{s,t-1} \right) \right) \quad (3.4)$$

Production capacity of the sector s

$$\Delta \left(\log YCAP_s \right) = \sum_f \varphi_{f,s,t-1} \, \Delta \left(\log F_{f,s} \, PROG_{f,s} \right)$$
$$+ \alpha_s^{YCAP,Y} \, \left(\log Y_{s,t-1} - \log YCAP_{s,t-1} \, CUR_{s,t_0} \right) \quad (3.5)$$

Capacity Utilisation ratio of the sector s

$$CUR_s = \frac{Y_s}{YCAP_s} \quad (3.6)$$

Average mark-up on commodity c

$$(1 + \mu_c) = PYQ_c \, \frac{YQ_c}{\left(\sum_s CU_s \, Y_{c,s}\right)} \tag{3.7}$$

Notional unit cost of production in sector s

$$CU_s^n \, Y_s = \sum_f C_{f,s} \, F_{f,s}^n + NTAXI_s^{VAL} \tag{3.8}$$

To define the notional price, it is preferable to use the notional unit cost of production instead of the effective one. This lead to a more stable dynamic and gives a better representation of anticipation.

Unit cost of production in sector s

$$CU_s \, Y_s = \sum_f C_{f,s} \, F_{f,s} + NTAXI_s^{VAL} \tag{3.9}$$

Labor cost in sector s

$$C_{L,s} = W_s \, (1 + RRSSC_s) \tag{3.10}$$

Capital cost in sector s

$$C_{K,s} = PK_s \, (\delta_s + r_s) \tag{3.11}$$

It is preferable to calculate the user cost of capital based on the price of capital rather than on the price of investment. Indeed the price of the average capital installed is lower than the one of investment because of inflation. Using the price of investment tend to over estimate the cost of capital because it assumes that the debt contracted to finance past investments is indexed on inflation which is not the case in reality.

Price of capital in sector s

$$PK_s \, F_{K,s} = (1 - \delta_s) \, PK_{s,t-1} \, F_{K,s,t-1} + PI_s \, I_s \tag{3.12}$$

The price of capital is calibrated by rewriting this equation in the long run. It is always smaller than 1 because it is calibrated as follows:

$$PK_s = \frac{PI_s * (Rdep_s + GR^{REAL}) * (1 + GR^{PRICES})}{(Rdep_s - 1 + (1 + GR^{REAL}) * (1 + GR^{PRICES}))}$$

Energy costs in sector s

$$C_{E,s} = PE_s \tag{3.13}$$

In first approximation the cost of energy correspond to the energy price. However if the producer is forward looking, she will integrate the anticipation of price increase in it definition of the user cost of energy. In this case the specification becomes TO BE INTEGRATED

Materials costs in sector s

$$C_{MAT,s} = PMAT_s \tag{3.14}$$

3.0.1 Aggregate costs for capital, labor, energy and material

Aggregate cost of capital

$$C_K \ F_K = \sum_s C_{K,s} \ F_{K,s} \tag{3.15}$$

Aggregate cost of labor

$$C_L \ F_L = \sum_s C_{L,s} \ F_{L,s} \tag{3.16}$$

Aggregate cost of energy

$$C_E \ F_E = \sum_s C_{E,s} \ F_{E,s} \tag{3.17}$$

Aggregate cost of materials

$$C_{MAT} \ F_{MAT} = \sum_s C_{MAT,s} \ F_{MAT,s} \tag{3.18}$$

Gross wages paid by sector s including employees (but not employers)' social contribution

$$WAGES_s \, PWAGES_s = W_s \, F_{L,s} \tag{3.19}$$

To derive the volume, we assume that the price is the consumer price.

Price Index for gross wages

$$PWAGES_s = P \tag{3.20}$$

3.0.2 Prices of commodity c according to the different demand source

Price of commodity c for household final consumption expenditure

$$PCH_c \, CH_c = PCHD_c \, CHD_c + PCHM_c \, CHM_c \tag{3.21}$$

Price of commodity c for government final consumption expenditure

$$PG_c \, G_c = PGD_c \, GD_c + PGM_c \, GM_c \tag{3.22}$$

Price of commodity c for exports use

$$PX_c \, X_c = PXD_c \, XD_c + PXM_c \, XM_c \tag{3.23}$$

Price of commodity c for sector s for intermediary consumption use

$$PCI_{c,s} \, CI_{c,s} = PCID_{c,s} \, CID_{c,s} + PCIM_{c,s} \, CIM_{c,s} \tag{3.24}$$

Materials price for sector s

$$PMAT_s \, F_{MAT,s} = \sum_{cm} PCI_{cm,s} \, CI_{cm,s} \tag{3.25}$$

Energy price for sector s

$$PE_s \, F_{E,s} = \sum_{ce} PCI_{ce,s} \, CI_{ce,s} \qquad (3.26)$$

Selling price of commodity c

$$PYQS_c \, YQS_c = PYQ_c \, YQ_c + PMGPD_c \, MGPD_c + NTAXPD_c^{VAL} \quad (3.27)$$

YQS_c is the volume of the production expressed at market price. It should not be seen as a composite of several "goods": production at base price, margins and taxes. Its does not increase when the volume of the margins and taxes increase. The price does instead. This is equivalent to assuming that YQS_c is always proportionnal to and YQ_c since the volume of margins and taxes depends on the latter. Writing it following the specification composite of several goods, $YQS_c = YQ_c + MGPD_c + NTAXPD_c$, would lead to inacurate results since a decrease in the quantity of margins used per unit of production would not lead to a decrease of the selling price.

Quantity of domestically produced commodity c expressed at selling price

$$\Delta \left(\log YQS_c \right) = \Delta \left(\log YQ_c \right) \qquad (3.28)$$

Selling price for imported commodity c

$$PMS_c \, MS_c = PM_c \, M_c + NTAXPM_c^{VAL} + PMGPM_c \, MGPM_c \quad (3.29)$$

Quantity of imported commodity c expressed at selling price

$$\Delta \left(\log MS_c \right) = \Delta \left(\log M_c \right) \qquad (3.30)$$

Price of the margins paid to commodity m on domestically produced commodity c

$$PMGPD_{m,c} \, MGR_m = PMGRD_m \, MGRD_m + PMGRM_m \, MGRM_m \qquad (3.31)$$

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We assume that the margins paid on domestic and imported commodities can be produced by domestic and foreign (using the import share of the margin received). The price of the margins paid to commodity m is assumed commun to all commodity c.

Price of the margins paid to commodity m on imported commodity c

$$PMGPM_{m,c} = PMGPD_{m,c} \qquad (3.32)$$

This price is the same as the one paid on domestic commodity because of the assumption given in the previous equation.

Price of margins received on domestically produced commodity c

$$PMGRD_c = PYQS_c \qquad (3.33)$$

Price of margins received on imported commodity c

$$PMGRM_c = PMS_c \qquad (3.34)$$

3.0.3 Price of intermediary raw material consumption domestically produced c of sector s

Price of domestically produced commodity c for sector s for intermediate consumption use

$$PCID_{c,s} = PYQS_c \qquad (3.35)$$

Price of imported commodity c for sector s for intermediate consumption use

$$PCIM_{c,s} = PMS_c \qquad (3.36)$$

Price of domestically produced commodity c for households final consumption expenditure

$$PCHD_c = PYQS_c \qquad (3.37)$$

Price of imported commodity c for households final consumption expenditure

$$PCHM_c = PMS_c \qquad (3.38)$$

Price of domestically produced commodity c for government final consumption expenditure

$$PGD_c = PYQS_c \qquad (3.39)$$

Price of imported commodity c for government final consumption expenditure

$$PGM_c = PMS_c \qquad (3.40)$$

Price of domestically produced commodity c for investment use

$$PID_{c,s} = PYQS_c \qquad (3.41)$$

Price of imported commodity c for investment use

$$PIM_{c,s} = PMS_c \qquad (3.42)$$

Price of domestically produced commodity c for export use

$$PXD_c = PYQS_c \qquad (3.43)$$

Price of imported commodity c for export use

$$PXM_c = PMS_c \qquad (3.44)$$

Price of domestically produced commodity c for change in inventories use

$$PDSD_c = PYQS_c \qquad (3.45)$$

Price of imported commodity c for change in inventories use

$$PDSM_c = PMS_c \qquad (3.46)$$

Price of imported commodity c

$$PM_c = EXR.PWD_c \qquad (3.47)$$

Notional wage in sector s

$$
\begin{aligned}
\Delta\left(\log W_s^n\right) = {}& \rho_s^{W,Cons} + \rho_s^{W,P}\,\Delta\left(\log P\right) + \rho_s^{W,Pe}\,\Delta\left(\log P^e\right) \\
& + \rho_s^{W,PROG}\,\Delta\left(\log PROG_s^L\right) - \rho_s^{W,U}\,\left(UnR - DNAIRU\right) \\
& - \rho_s^{W,DU}\,\Delta\left(UnR\right) + \rho_s^{W,L}\,\Delta\left(\log F_{L,s} - \log F_L\right)
\end{aligned}
$$
$$(3.48)$$

In order to have a $NAIRU$ that is not predetermined, we have to assume that the constant is a function of the unemployment rate:

$$d(\rho_s^{W,Cons}) = 0.9 * \rho_s^{W,U} * d(UnR)$$

Average wage

$$W.F_L = \left(\sum_s W_s\, F_{L,s}\right) \qquad (3.49)$$

Consumer Price Index

$$P = PCH \qquad (3.50)$$

3.0.4   "Original" Taylor rule

Notional interest rate of the Central Bank (Taylor rule)

$$\Delta\left(R^n\right) = \rho^{Rdir,Cons} + \rho^{Rdir,P}.\Delta\left(\frac{\Delta\left(P\right)}{P_{t-1}}\right) - \rho^{Rdir,UnR}.\Delta\left(UnR\right) \quad (3.51)$$

This general specification combines various wage equation found in the literature: the Phillips curve and the WS curve. The WS curve la Layard et al. (2005) requires the following constraints :
$$\rho_s^{WP} = \rho_s^{W,PROG} = 1, \rho_s^{W,U} = \rho_s^{W,Cons} = 0$$

Interest rate paid on capital by sector s

$$\Delta(R_s) = \Delta(R) \tag{3.52}$$

We assume a constant premiun on the interest rate of the Central Bank

Interest rate paid by the Governement on its debt

$$\Delta\left(r^{DEBT,G}\right) = \Delta(r) \tag{3.53}$$

We assume a constant premiun on the interest rate of the Central Bank

4 Producer

This file provides the equations defining the producer behaviour. Equation are behavioral. They are not used to calibrate the initial value of variables. They may be inverted to calibrate a parameter.

4.1 Margins

Margins paid to commodity m on the domestic commodity c

$$\Delta(\log MGPD_{m,c}) = \Delta(\log YQ_c) + \Delta\left(SUBST_{m,c}^{MGPD}\right) \tag{4.1}$$

The growth in demand for margins follows the growth of aggregate demand for the commodity c and a substitution term

Notional substitution between margin-making sectors m for the domestically produced commodity c

$$SUBST_{m,c}^{n,MGPD} = \sum_{mm} -\sigma_{m,mm,c}^{MGPD} \; \varphi_{mm,c,t-1}^{MGPD} \; \varDelta \left(\log PMGPD_{m,c} \right.$$
$$\left. - \log PMGPD_{mm,c} \right) \quad (4.2)$$

Market share of the margin-making sector m for the commodity c

$$\varphi_{m,c}^{MGPD} = PMGPD_{m,c} \; \frac{MGPD_{m,c}}{\left(\sum_{mm} PMGPD_{mm,c} \; MGPD_{mm,c} \right)} \quad (4.3)$$

Margins paid to commodity m on the imported commodity c

$$\varDelta \left(\log MGPM_{m,c} \right) = \varDelta \left(\log M_c \right) + \varDelta \left(SUBST_{m,c}^{MGPM} \right) \quad (4.4)$$

Notional substitution effect between the margin-making sector m and the over margin-makings sectors mm for the imported commodity c

$$SUBST_{m,c}^{n,MGPM} = \sum_{mm} -\sigma_{m,mm,c}^{MGPM} \; \varphi_{mm,c,t-1}^{MGPM} \; \varDelta \left(\log PMGPM_{m,c} \right.$$
$$\left. - \log PMGPM_{mm,c} \right) \quad (4.5)$$

share of the margin type m on total margins paid on the domestic commodity c

$$\varphi_{m,c}^{MGPM} = PMGPM_{m,c} \; \frac{MGPM_{m,c}}{\left(\sum_{mm} PMGPM_{mm,c} \; MGPM_{mm,c} \right)} \quad (4.6)$$

4.2 Production factors

Production of commodity c by sector s

$$Y_{c,s} = PhiY_{c,s} \; YQ_c \quad (4.7)$$

We assume that each activity s may produce more than one commodity c. Therefore the production Y of commodity c by the activity s depends on the

parameter $\varphi_{c,s}^Y$ which represents the share of sector s in the total production of commodity c.

Demand for production factor f of sector s

$$\Delta \left(\log F_{f,s}^n \right) = \Delta \left(\log Y_s \right) - \Delta \left(\log PROG_{f,s} \right) + \Delta \left(SUBST_{f,s}^F \right) \quad (4.8)$$

Notional substitution effect between the input f and the over inputs ff

$$\Delta \left(SUBST_{f,s}^{n,F} \right) = \sum_{ff} -ES_{f,ff,s}\, \varphi_{ff,s,t-1}\, \Delta \left(\log \frac{C_{f,s}}{PROG_{f,s}} - \log \frac{C_{ff,s}}{PROG_{ff,s}} \right)$$

$$(4.9)$$

Share of production factor f of sector s

$$\varphi_{f,s} = \frac{C_{f,s}\, F_{f,s}^n}{\sum_{ff} C_{ff,s}\, F_{ff,s}^n} \quad (4.10)$$

4.2.1 Aggregate production factors for capital, labor, energy and material

Aggregate capital input

$$F_K = \sum_s F_{K,s} \quad (4.11)$$

Aggregate labor input

$$F_L = \sum_s F_{L,s} \quad (4.12)$$

Aggregate energy input

$$F_E = \sum_s F_{E,s} \quad (4.13)$$

Aggregate materials input

$$F_{MAT} = \sum_s F_{MAT,s} \qquad (4.14)$$

Investment use of commodity c by sector s

$$\Delta\left(\log I_{c,s}\right) = \Delta\left(\log IA_s\right) \qquad (4.15)$$

For a given sector, we assume that the investment structure is fixed over time. In other words, the investment good is a composite of several commodities in fixed proportion.

Energy input demand by type of energy ce by sector s

$$\Delta\left(\log CI_{ce,s}\right) = \Delta\left(\log F_{E,s}\right) + \Delta\left(SUBST_{ce,s}^{CI}\right) \qquad (4.16)$$

Notional substitution effect between the energy commodity ce and the over energy commodities cee for the sector s

$$\Delta\left(SUBST_{ce,s}^{n,CI}\right) = \sum_{cee} -\sigma_{ce,cee,s}^{NRJ}\,\varphi_{E,cee,s,t-1}\,\Delta\left(\log PCI_{ce,s} - \log PCI_{cee,s}\right)$$

$$(4.17)$$

Share of energy input ce on total energy use by sector s

$$\varphi_{E,ce,s} = \frac{PCI_{ce,s}\,CI_{ce,s}}{\sum_{cee} PCI_{cee,s}\,CI_{cee,s}} \qquad (4.18)$$

Demand for material commodity cmo by sector s

$$\Delta\left(\log CI_{cmo,s}\right) = \Delta\left(\log F_{MAT,s}\right) \qquad (4.19)$$

Intermediary consumption that are not transport or energy commodities are not substitutables (Leontief technology)

Demand for transport commodities by sector s

$$\Delta\left(\log TRSP_s\right) = \Delta\left(\log F_{MAT,s}\right) \tag{4.20}$$

Demand for transport commodity ct by sector s

$$\Delta\left(\log CI_{ct,s}\right) = \Delta\left(\log TRSP_s\right) + \Delta\left(SUBST_{ct,s}^{CI}\right) \tag{4.21}$$

Notional substitution effect between the transport ct and the over transports mt for the sector s

$$\Delta\left(SUBST_{ct,s}^{n,CI}\right) = \sum_{ctt} -\sigma_{ct,ctt,s}^{TRSP}\,\varphi_{ctt,s,t-1}^{TRSP}\,\Delta\left(\log PCI_{ct,s} - \log PCI_{ctt,s}\right) \tag{4.22}$$

Share for transport ct use in total transport by sector s

$$\varphi_{ct,s}^{TRSP} = \frac{PCI_{ct,s}\,CI_{ct,s}}{\sum_{ctt} PCI_{ctt,s}\,CI_{ctt,s}} \tag{4.23}$$

Technical progress of the production factor f in the sector s

$$PROG_{f,s} = PROG_{f,s,t-1}\left(1 + GR_{f,s}^{PROG}\right) \tag{4.24}$$

Endogenous energy efficiency

$$\begin{aligned}GR_{E,s}^{PROG} = GR_{E,s,t_0}^{PROG} + \rho^{PROG,E,PE}.\left(\log PE_s - \log P\right.\\ > 0\left.\right)\,\Delta\left(\log PE_s - \log P\right)\end{aligned} \tag{4.25}$$

This specification states that the productivity gain of energy input in the sector s for the energy type ce depends on a steady-state trend (exogenous) and a price-induced component. This component is equal to a $\rho^{PROG,E,PE}$ share of the log-difference between the level of the general energy price index for the sector s to the general level of prices.

5 Consumer

5.1 Households' Income

Disposable income before tax in value

$$DISPINC^{BT,VAL} = PWAGES.WAGES + PROP^{INC,H,VAL} \\ + SOC^{BENF,VAL} + TRSF^{HH,VAL} \quad (5.1)$$

The disposable income before tax is used as base for the income tax.

Disposable income after tax in value

$$DISPINC^{AT,VAL} = DISPINC^{BT,VAL} - INC^{SOC,TAX,VAL} \quad (5.2)$$

The definition of the disposable income after tax corresponds to the definition of "gross disposable income" defined in the annual account by institutional sector of Eurostat (b.6.g).

Income & Social Taxes in value

$$INC^{SOC,TAX,VAL} = RINC^{SOC,TAX}.DISPINC^{BT,VAL} \quad (5.3)$$

Property incomes in value

$$PROP^{INC,H,VAL,n} = \varphi^{PROP^{INC,H}}.PNOS.NOS \quad (5.4)$$

Social benefits in value

$$SOC^{BENF,VAL} = RR^{POP}.W.PROG^L.P.POP + RR^{Un}.W.Un \quad (5.5)$$

5.2 Households' Expenditure

Aggregate notional households final consumption in value

$$CH^{n,VAL} = DISPINC^{AT,VAL}.(1 - MPS^n) \quad (5.6)$$

Notional marginal propensity to save

$$\Delta\left(MPS^n\right) = \rho^{MPS,R}.\Delta\left(R - \frac{\Delta\left(P\right)}{P_{t-1}}\right) + \rho^{MPS,UnR}.\Delta\left(UnR\right) \quad (5.7)$$

Households final consumption of commodity c

$$\left(CH_c^n - NCH_c\right) PCH_c = \varphi_c^{MCH}\left(CH^{n,VAL} - PNCH.NCH\right) \quad (5.8)$$

Price of necessary households consumption of commodity c

$$PNCH.NCH = \sum_c PNCH_c\, NCH_c \quad (5.9)$$

Necessary households final consumption of commodity c

$$NCH = \sum_c NCH_c \quad (5.10)$$

Share of commodity c in the marginal household consumption

$$\Delta\left(\log\varphi_c^{MCH}\right) = \left(1 - \sigma^{LESCES}\right).\Delta\left(\log\frac{PCH_c}{PCH^{CES}}\right) \quad (5.11)$$

Share of commodity c in the household consumption

$$\varphi_c^{CH} = \frac{CH_c}{CH} \quad (5.12)$$

Consumption price

Households savings in value

$$SAV^{H,VAL} = DISPINC^{AT,VAL} - PCH.CH \quad (5.13)$$

Households savings rate

$$RSAV^{H,VAL} = \frac{SAV^{H,VAL}}{DISPINC^{AT,VAL}} \quad (5.14)$$

Households savings stock

$$Stock^{SAV,H,VAL} = Stock_{t-1}^{SAV,H,VAL} + SAV^{H,VAL} \quad (5.15)$$

6 Government

6.1 Taxes

We assume that the volume of the tax varies only when the volume of the taxe bases (e.g. production, consumption) varies. Hence an increase in the tax rate does not increase the volume of the tax but increases its price. This is coherent with the specification of the price of the tax bases: increasing the tax rate on production increases the production price but not production.

Net taxes on domestically produced commodity c in value

$$NTAXPD_c^{VAL} = RNTAXPD_c \, PYQ_c \, YQ_c \qquad (6.1)$$

Net taxes on domestically produced commodity c in volume

$$NTAXPD_c = RNTAXPD_{c,t_0} \, YQ_c \qquad (6.2)$$

Net taxes on imported commodity c in value

$$NTAXPM_c^{VAL} = RNTAXPM_c \, PM_c \, M_c \qquad (6.3)$$

Net taxes on imported commodity c in volume

$$NTAXPM_c = RNTAXPM_{c,t_0} \, M_c \qquad (6.4)$$

Net taxes on commodity c in value

$$NTAXP_c^{VAL} = NTAXPD_c^{VAL} + NTAXPM_c^{VAL} \qquad (6.5)$$

Net taxes on commodity c in volume

$$NTAXP_c = NTAXPD_c + NTAXPM_c \qquad (6.6)$$

Aggregate net taxes on commodity c in value

$$PNTAXP.NTAXP = \sum_c NTAXP_c^{VAL} \qquad (6.7)$$

Aggregate net taxes on commodity c in volume

$$NTAXP = \sum_c NTAXP_c \tag{6.8}$$

Net taxes on production of sector s in value

$$NTAXI_s^{VAL} = RNTAXI_s \, PY_s \, Y_s \tag{6.9}$$

Net taxes on production of sector s in volume

$$NTAXI_s = RNTAXI_{s,t_0} \, Y_s \tag{6.10}$$

Aggregate net taxes on production (value & volume)

Net taxes on production in value

$$NTAXI^{VAL} = \sum_s NTAXI_s^{VAL} \tag{6.11}$$

Net taxes on production in volume

$$NTAXI = \sum_s NTAXI_s \tag{6.12}$$

Employers' social security contribution paid by sector s expressed in consumer price

$$RSSC_s \, PRSSC_s = W_s \, F_{L,s} \, RRSSC_s \tag{6.13}$$

RSSC stands for employers' Social Security Contribution

Price of RSSC for sector s

$$PRSSC_s = P \tag{6.14}$$

Total employers' social security contribution expressed in consumer price

$$PRSSC.RSSC = \sum_s PRSSC_s\, RSSC_s \qquad (6.15)$$

Price of RSSC

$$RSSC = \sum_s RSSC_s \qquad (6.16)$$

Average employers' social security contribution rate

$$RRSSC = PRSSC.\frac{RSSC}{(W.F_L)} \qquad (6.17)$$

Government final consumption expenditure of commodity c

$$\Delta\left(\log G_c\right) = \Delta\left(\log EXPG\right) \qquad (6.18)$$

Notional Property incomes of the Government in value

$$PROP^{INC,G,VAL,n} = \varphi^{PROP^{INC,G}}.PNOS.NOS \qquad (6.19)$$

Incomes of the Government in value

$$INC^{G,VAL} = PNTAXP.NTAXP + NTAXI^{VAL} + INC^{SOC,TAX,VAL}$$
$$+ PRSSC.RSSC + PROP^{INC,G,VAL} \qquad (6.20)$$

Spendings of the Government in value

$$SPEND^{G,VAL} = PG.G + SOC^{BENF,VAL} + DEBT_{t-1}^{G,VAL}\left(\varphi_{t-1}^{RD^G} + r_{t-1}^{DEBT,G}\right) \qquad (6.21)$$

Savings of the Government in value (Net lending/borrowing: published deficit/savings of the Government)

$$SAV^{G,VAL} = INC^{G,VAL} - SPEND^{G,VAL} \qquad (6.22)$$

Primary balance of the Government in value (deficit).

$$Bal^{G,Prim,VAL} = SAV^{G,VAL} + DEBT_{t-1}^{G,VAL} \left(\varphi_{t-1}^{RD^G} + r_{t-1}^{DEBT,G} \right) \qquad (6.23)$$

It corresponds to the savings excluding the reimbursement and the interest on the debt.

Primary balance of the Government in value (deficit)from an alternative expression

$$Bal^{G,Prim,VAL,bis} = INC^{G,VAL} - \left(PG.G + SOC^{BENF,VAL} \right) \qquad (6.24)$$

It corresponds to the saving excluding the reimbursement but not the interest on the debt.

Total balance of the Government in value (deficit)

$$Bal^{G,Tot,VAL} = Bal^{G,Prim,VAL} - DEBT_{t-1}^{G,VAL} \; r_{t-1}^{DEBT,G} \qquad (6.25)$$

Government's debt in value

$$DEBT^{G,VAL} = DEBT_{t-1}^{G,VAL} \left(1 - \varphi_{t-1}^{RD^G} \right) - SAV^{G,VAL} \qquad (6.26)$$

It corresponds to the previous year debt minus the reimbursement of the debt and the government savings.

Government's savings rate in value (in percent of GDP)

$$RSAV^{G,VAL} = \frac{SAV^{G,VAL}}{(PGDP.GDP)} \qquad (6.27)$$

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Primary balance of the Government in value (in percent of GDP)

$$RBal^{G,Prim,VAL} = \frac{Bal^{G,Prim,VAL}}{(PGDP.GDP)} \qquad (6.28)$$

Total balance of the Government in value (in percent of GDP)

$$RBal^{G,Tot,VAL} = \frac{Bal^{G,Tot,VAL}}{(PGDP.GDP)} \qquad (6.29)$$

Ratio of the Government's debt in value (in percent of GDP)

$$RDEBT^{G,VAL} = \frac{DEBT^{G,VAL}}{(PGDP.GDP)} \qquad (6.30)$$

7 International Trade

This file provides the equations defining the allocation between domestic and imported goods per use. The differentiation per use allows for distinguishing import share per use and therefore a more realistic representation of the economy than model that assume a common import share. Indeed, the import share of export is generally smaller than for consumption.

7.1 Domestic demand

Received margins on domestically produced commodity m

$$MGRD_m = \left(1 - \varphi_m^{MGRM}\right) MGR_m \qquad (7.1)$$

Private final consumption of domestically produced commodity c

$$CHD_c = \left(1 - \varphi_c^{CHM}\right) CH_c \qquad (7.2)$$

Public final consumption of domestically produced commodity c

$$GD_c = \left(1 - \varphi_c^{GM}\right) G_c \qquad (7.3)$$

Margins received from imported commodity m

$$MGRM_m = \varphi_m^{MGRM} \ MGR_m \qquad (7.4)$$

Private final consumption of imported commodity c

$$CHM_c = \varphi_c^{CHM} \ CH_c \qquad (7.5)$$

Public final consumption of imported commodity c

$$GM_c = \varphi_c^{GM} \ G_c \qquad (7.6)$$

Import share of commodity c **on received margins**

$$\varphi_m^{MGRM} = \frac{1}{\left(1 + \frac{MGRD_m}{MGRM_{m,t_0}} \ \exp SUBST_m^{MGRM}\right)} \qquad (7.7)$$

Import share of commodity c **for household final consumption**

$$\varphi_c^{CHM} = \frac{1}{\left(1 + \frac{CHD_c}{CHM_{c,t_0}} \ \exp SUBST_c^{CHM}\right)} \qquad (7.8)$$

Import share φ_c **of commodity** c **on the governement final consumption**

$$\varphi_c^{GM} = \frac{1}{\left(1 + \frac{GD_c}{GM_{c,t_0}} \ \exp SUBST_c^{GM}\right)} \qquad (7.9)$$

Notional substitution effect induced by a change in the relative price between imported and domestically produced commodity c **for margins received**

$$\Delta\left(SUBST_c^{n,MGRM}\right) = -\sigma_c^{MGRM} \ \Delta\left(\log PMGRD_c - \log PMGRM_c\right) \quad (7.10)$$

Notional substitution effect induced by a change in the relative price between imported and domestically produced commodity c

for households final consumption

$$\Delta\left(SUBST_c^{n,CHM}\right) = -\sigma_c^{CHM} \; \Delta\left(\log PCHD_c - \log PCHM_c\right) \quad (7.11)$$

Notional substitution effect induced by a change in the relative price between imported and domestically produced commodity c for government final consumption

$$\Delta\left(SUBST_c^{n,GM}\right) = -\sigma_c^{GM} \; \Delta\left(\log PGD_c - \log PGM_c\right) \quad (7.12)$$

Intermediary consumption from sector s in domestically produced commodity c

$$CID_{c,s} = \left(1 - \varphi_{c,s}^{CIM}\right) \; CI_{c,s} \quad (7.13)$$

Investment from sector s in domestically produced commodity c

$$ID_{c,s} = \left(1 - \varphi_{c,s}^{IM}\right) \; I_{c,s} \quad (7.14)$$

Intermediary consumption from sector s in imported commodity c

$$CIM_{c,s} = \varphi_{c,s}^{CIM} \; CI_{c,s} \quad (7.15)$$

Investment from sector s in imported commodity c

$$IM_{c,s} = \varphi_{c,s}^{IM} \; I_{c,s} \quad (7.16)$$

Import share of intermediary consumption from sector s in domestically produced commodity c

$$\varphi_{c,s}^{CIM} = \frac{1}{\left(1 + \frac{CID_{c,s}}{CIM_{c,s,t_0}} \; \exp SUBST_{c,s}^{CIM}\right)} \quad (7.17)$$

Import share of intermediary consumption from sector s in imported commodity c

$$\varphi_{c,s}^{IM} = \frac{1}{\left(1 + \frac{ID_{c,s}}{IM_{c,s,t_0}} \; \exp SUBST_{c,s}^{IM}\right)} \quad (7.18)$$

Notional substitution effect induced by a change in the relative price between imported and domestic intermediary consumption in commodity c from the sector s

$$\Delta\left(SUBST_{c,s}^{n,CIM}\right) = -\sigma_{c,s}^{CIM}\ \Delta\left(\log PCID_{c,s} - \log PCIM_{c,s}\right) \quad (7.19)$$

Notional substitution effect induced by a change in the relative price between imported and domestic investment in commodity c from the sector s

$$\Delta\left(SUBST_{c,s}^{n,IM}\right) = -\sigma_{c,s}^{IM}\ \Delta\left(\log PID_{c,s} - \log PIM_{c,s}\right) \quad (7.20)$$

7.2   Exports

Exports of domestically produced commodity c

$$XD_c = \left(1 - \varphi_c^{XM}\right)\ X_c \quad (7.21)$$

Exports of imported commodity c

$$XM_c = \varphi_c^{XM}\ X_c \quad (7.22)$$

Import share of commodity c exports

$$\varphi_c^{XM} = \frac{1}{\left(1 + \frac{XD_c}{XM_{c,t_0}}\ \exp SUBST_c^{XM}\right)} \quad (7.23)$$

Notional substitution effect induced by a change in the relative price between imported and domestic products c for exports

$$\Delta\left(SUBST_c^{n,XM}\right) = -\sigma_c^{XM}\ \Delta\left(\log PXD_c - \log PXM_c\right) \quad (7.24)$$

Foreign demand for exports of commmodity c

$$\Delta\left(\log X_c\right) = \Delta\left(\log WD_c\right) + \Delta\left(SUBST_c^X\right) \quad (7.25)$$

Notional substitution effect induced by a change in the relative price between export prices and (converted in domestic currency) international prices for the commodity c

$$\Delta \left(SUBST_c^{n,X} \right) = -\sigma_c^X \, \Delta \left(\log PX_c - \log EXR.PWD_c \right) \qquad (7.26)$$

Balance of trade of commodity c

$$Bal_c^{Trade,VAL} = PX_c \, X_c - PM_c \, M_c \qquad (7.27)$$

Aggregate balance of trade

$$Bal^{Trade,VAL} = \sum_c Bal_c^{Trade,VAL} \qquad (7.28)$$

Balance of trade (in percent of GDP)

$$RBal^{Trade,VAL} = \frac{Bal^{Trade,VAL}}{(PGDP.GDP)} \qquad (7.29)$$

8 Demography

Working-age population

$$\Delta \left(\log WAPop \right) = \Delta \left(\log POP \right) \qquad (8.1)$$

The working age population linearly grows with the total population.

Labor force

$$LF = PARTR.WAPop \qquad (8.2)$$

The Labor force depends on a participation rate of the working-age population.

Labor force participation ratio

$$\Delta \left(PARTR^n \right) = \Delta \left(PARTR^{trend} \right) - \rho^{PART,UnR}.\Delta \left(UnR \right) \qquad (8.3)$$

Because of discouraged worker effect, the participation ratio depends generally negatively on the unemployment rate.

Employment (ILO definition)

$$\Delta \left(\log empl \right) = \Delta \left(\log F_L \right) \qquad (8.4)$$

In general, labor according to the national account differs from the employment according to the ILO definition. One reason is that labor is expressed in FTE (full time equivalent). To calculate the unemployment rate, one needs to use the employment according to the ILO definition. We assume that the average work duration is constant over time, implying stability of the employment to labor ratio.

Unemployment

$$Un = LF - Empl \qquad (8.5)$$

Unemployment is determined as the difference between the total active population with the one which is employed.

Unemployment rate

$$UnR = \frac{Un}{LF} \qquad (8.6)$$

The Unemployment rate is defined as the ratio between the total unemployment and the active population.

9 Greenhouse gases emissions

This file provides the equations defining the path of GreenHouse Gases (GHG) emissions. All emission types are expressed in CO2-equivalent to

facilitate aggregation. For the same emission type (e.g. CO2), several equation are defined depending on the emission basis: intermediary consumption, household consumption or production.

Emissions ghg related to the intermediary consumption of of commodity c by sector s

$$\Delta \left(\log EMS_{ghg,c,s}^{CI} \right) = \Delta \left(\log CI_{c,s}\, IEMS_{ghg,c,s}^{CI} \right) \tag{9.1}$$

In practice only a few intermediaries generate emissions (e.g. coal, gas, petrol). IEMS˙CI[ghg,c,s] is the corresponding emission intensity calibrated to 1 in the baseyear. It may change over time because of the increase of the share of biofuels.

Emissions ghg related to the materials consumption of sector s

$$\Delta \left(\log EMS_{ghg,s}^{MAT} \right) = \Delta \left(\log F_{MAT,s}\, IEMS_{ghg,s}^{MAT} \right) \tag{9.2}$$

This mainly corresponds to the CO2 emissions from decarbonation.

Emissions ghg related to the final production of sector s

$$\Delta \left(\log EMS_{ghg,s}^{Y} \right) = \Delta \left(\log Y_{s}\, IEMS_{ghg,s}^{Y} \right) \tag{9.3}$$

This mainly correspond to the emissions from agriculture.

Emissions ghg related to the household consumption c

$$\Delta \left(\log EMS_{ghg,c}^{CH} \right) = \Delta \left(\log CH_{c}\, IEMS_{ghg,c}^{CH} \right) \tag{9.4}$$

Emissions ghg related to the intermediary consumption of commodity c

$$EMS_{ghg,c}^{CI} = \sum_{s} EMS_{ghg,c,s}^{CI} \tag{9.5}$$

Emissions ghg related to the intermediary consumption by sector s

$$EMS^{CI}_{ghg,s} = \sum_c EMS^{CI}_{ghg,c,s} \qquad (9.6)$$

Emissions of the greehouse gas ghg **related to the intermediary consumption**

$$EMS^{CI}_{ghg} = \sum_s EMS^{CI}_{ghg,s} \qquad (9.7)$$

Aggregation by sector s.

Emissions of the greehouse gas ghg **related to the intermediary consumption**

$$EMS^{CI,bis}_{ghg} = \sum_c EMS^{CI}_{ghg,c} \qquad (9.8)$$

Aggregation by commodity c.

Emissions of the greehouse gas ghg **related to the total material consumption**

$$EMS^{MAT}_{ghg} = \sum_s EMS^{MAT}_{ghg,s} \qquad (9.9)$$

Emissions of the greehouse gas ghg **related to the final production**

$$EMS^{Y}_{ghg} = \sum_s EMS^{Y}_{ghg,s} \qquad (9.10)$$

Emissions of the greehouse gas ghg **related to the household final consumption**

$$EMS^{CH}_{ghg} = \sum_c EMS^{CH}_{ghg,c} \qquad (9.11)$$

Aggregate emissions of the greehouse gas ghg

$$EMS_{ghg} = EMS_{ghg}^{CI} + EMS_{ghg}^{MAT} + EMS_{ghg}^{Y} + EMS_{ghg}^{CH} \quad (9.12)$$

Aggregate emissions related to the intermediary consumption

$$EMS^{CI} = \sum_{ghg} EMS_{ghg}^{CI} \quad (9.13)$$

Aggregate emissions related to the material consumption

$$EMS^{MAT} = \sum_{ghg} EMS_{ghg}^{MAT} \quad (9.14)$$

Aggregate emissions related to the final production

$$EMS^{Y} = \sum_{ghg} EMS_{ghg}^{Y} \quad (9.15)$$

Aggregate emissions related to the households final consumption

$$EMS^{CH} = \sum_{ghg} EMS_{ghg}^{CH} \quad (9.16)$$

Aggregate emissions

$$EMS = EMS^{CI} + EMS^{MAT} + EMS^{Y} + EMS^{CH} \quad (9.17)$$

Aggregate emissions by type of substance

$$EMS^{bis} = \sum_{ghg} EMS_{ghg} \quad (9.18)$$

10   Other equations

10.1   Adjustment equations and anticipation

Mark-up in the sector s

$$\mu_s = \alpha_s^\mu \, \mu_s^n + (1 - \alpha_s^\mu) \, \mu_{s,t-1} \tag{10.1}$$

Expected inflation.

$$\Delta \left(\log P^e \right) = \alpha^{Pe,P1} . \Delta \left(\log P_{t-1} \right) + \left(1 - \alpha^{Pe,P1} \right) . \Delta \left(\log P_{t-1}^e \right) \tag{10.2}$$

This equation defines the expected inflation and not the expected price. P^e does not necessary converge to P. If the wage equation is a WS curve, even in the very long term it may not converge.

Expected production

$$\Delta \left(\log Y_s^e \right) = \alpha_s^{Ye,Y} \, \Delta \left(\log Y_s \right) + \left(1 - \alpha_s^{Ye,Y} \right) \, \Delta \left(\log Y_{s,t-1}^e \right) \tag{10.3}$$

Quantity of Labor, Energy and Material inputs in sector s

$$\log F_{f,s} = \alpha_{f,s}^{0,F} \, \log F_{f,s}^n + \left(1 - \alpha_{f,s}^{0,F} \right) \, \left(\log F_{f,s,t-1} + \Delta \left(\log F_{f,s}^e \right) \right) \tag{10.4}$$

Expected quantity of Labor, Energy and Material inputs in sector s

$$\Delta \left(\log F_{f,s}^e \right) = \alpha_{f,s}^{1,F} \, \Delta \left(\log F_{f,s,t-1}^e \right) + \alpha_{f,s}^{2,F} \, \Delta \left(\log F_{f,s,t-1} \right) + \alpha_{f,s}^{3,F} \, \Delta \left(\log F_{f,s}^n \right) \tag{10.5}$$

Capital stock of sector s

$$F_{K,s} = (1 - \delta_s) \, F_{K,s,t-1} + IA_s \tag{10.6}$$

Investment in sector s

$$\Delta\left(\log IA_s\right) = \alpha_s^{IA,Ye}\,\Delta\left(\log Y_s^e\right) + \alpha_s^{IA,IA1}\,\Delta\left(\log IA_{s,t-1}\right)$$
$$+ \alpha_s^{IA,SUBST}\,\Delta\left(SUBST_{K,s}^F\right) \qquad (10.7)$$
$$+ \alpha_s^{IA,Kn}\left(\log F_{K,s,t-1}^n - \log F_{K,s,t-1}\right)$$

Households final consumption of commodity c

$$\log CH_c = \alpha_c^{0,CH}\,\log CH_c^n + \left(1 - \alpha_c^{0,CH}\right)\left(\log CH_{c,t-1} + \Delta\left(\log CH_c^e\right)\right) \quad (10.8)$$

Expected households final consumption of commodity c

$$\Delta\left(\log CH_c^e\right) = \alpha_c^{1,CH}\,\Delta\left(\log CH_{c,t-1}^e\right) + \alpha_c^{2,CH}\,\Delta\left(\log CH_{c,t-1}\right) \quad (10.9)$$
$$+ \alpha_c^{3,CH}\,\Delta\left(\log CH_c^n\right)$$

Production price of sector s

$$\log PY_s = \alpha_s^{0,PY}\,\log PY_s^n + \left(1 - \alpha_s^{0,PY}\right)\left(\log PY_{s,t-1} + \Delta\left(\log PY_s^e\right)\right) \quad (10.10)$$

Expected production priceof sector s

$$\Delta\left(\log PY_s^e\right) = \alpha_s^{1,PY}\,\Delta\left(\log PY_{s,t-1}^e\right) + \alpha_s^{2,PY}\,\Delta\left(\log PY_{s,t-1}\right) \quad (10.11)$$
$$+ \alpha_s^{3,PY}\,\Delta\left(\log PY_s^n\right)$$

Wages of the sector s

$$\Delta\left(\log W_s\right) = \alpha_s^{W,Wn}\,\Delta\left(\log W_s^n\right) + \alpha_s^{W,W1}\,\Delta\left(\log W_{s,t-1}\right) - \alpha_s^{W,W1Wn1}\,\log\frac{W_{s,t-1}}{W_{s,t-1}^n}$$
$$(10.12)$$

Labor participation ratio

$$PARTR = \alpha^{0,PARTR}.PARTR^n + \left(1 - \alpha^{0,PARTR}\right).PARTR_{t-1} \quad (10.13)$$

Interest rate

$$R = \alpha^{0,R}.R^n + \left(1 - \alpha^{0,R}\right).R_{t-1} \tag{10.14}$$

Households property income in value

$$
\begin{aligned}
\log PROP^{INC,H,VAL} = {} & \alpha^{0,PROP,INC,H,VAL}.\log PROP^{INC,H,VAL,n} \\
& + \left(1 - \alpha^{0,PROP,INC,H,VAL}\right).\left(\log PROP_{t-1}^{INC,H,VAL}\right. \\
& \left. + \Delta\left(\log PROP^{INC,H,VAL,e}\right)\right)
\end{aligned}
\tag{10.15}
$$

Expected Households property income in value

$$
\begin{aligned}
\Delta\left(\log PROP^{INC,H,VAL,e}\right) = {} & \alpha^{1,PROP,INC,H,VAL}.\Delta\left(\log PROP_{t-1}^{INC,H,VAL,e}\right) \\
& + \alpha^{2,PROP,INC,H,VAL}.\Delta\left(\log PROP_{t-1}^{INC,H,VAL}\right) \\
& + \alpha^{3,PROP,INC,H,VAL}.\Delta\left(\log PROP^{INC,H,VAL,n}\right)
\end{aligned}
\tag{10.16}
$$

Government property incomes in value

$$
\begin{aligned}
\log PROP^{INC,G,VAL} = {} & \alpha^{0,PROP,INC,G,VAL}.\log PROP^{INC,G,VAL,n} \\
& + \left(1 - \alpha^{0,PROP,INC,G,VAL}\right).\left(\log PROP_{t-1}^{INC,G,VAL}\right. \\
& \left. + \Delta\left(\log PROP^{INC,G,VAL,e}\right)\right)
\end{aligned}
\tag{10.17}
$$

Expected Government property incomes in value

$$
\begin{aligned}
\Delta\left(\log PROP^{INC,G,VAL,e}\right) = {} & \alpha^{1,PROP,INC,G,VAL}.\Delta\left(\log PROP_{t-1}^{INC,G,VAL,e}\right) \\
& + \alpha^{2,PROP,INC,G,VAL}.\Delta\left(\log PROP_{t-1}^{INC,G,VAL}\right) \\
& + \alpha^{3,PROP,INC,G,VAL}.\Delta\left(\log PROP^{INC,G,VAL,n}\right)
\end{aligned}
\tag{10.18}
$$

10.2 Substitutions

Substitution effect of the production factor f in the sector s

$$SUBST_{f,s}^{F} = \alpha_{f,s}^{6,F} \ SUBST_{f,s}^{n,F} + \left(1 - \alpha_{f,s}^{6,F}\right) \ SUBST_{f,s,t-1}^{F} \quad (10.19)$$

Substitution effect of the domestic margin paid m for the commodity c

$$SUBST_{m,c}^{MGPD} = \alpha_{m,c}^{6,MGPD} \ SUBST_{m,c}^{n,MGPD} + \left(1 - \alpha_{m,c}^{6,MGPD}\right) \ SUBST_{m,c,t-1}^{MGPD}$$
$$(10.20)$$

Substitution effect on the imported margin paid m for the commodity c

$$SUBST_{m,c}^{MGPM} = \alpha_{m,c}^{6,MGPM} \ SUBST_{m,c}^{n,MGPM} + \left(1 - \alpha_{m,c}^{6,MGPM}\right) \ SUBST_{m,c,t-1}^{MGPM}$$
$$(10.21)$$

Substitution effect on the energy intermediate consumption ce in the sector s

$$SUBST_{ce,s}^{CI} = \alpha_{ce,s}^{6,CI} \ SUBST_{ce,s}^{n,CI} + \left(1 - \alpha_{ce,s}^{6,CI}\right) \ SUBST_{ce,s,t-1}^{CI} \quad (10.22)$$

Substitution effect on the transportation intermediate consumption ce in the sector s

$$SUBST_{ct,s}^{CI} = \alpha_{ct,s}^{6,CI} \ SUBST_{ct,s}^{n,CI} + \left(1 - \alpha_{ct,s}^{6,CI}\right) \ SUBST_{ct,s,t-1}^{CI} \quad (10.23)$$

Substitution effect on the imported margin received for the commodity m

$$SUBST_{m}^{MGRM} = \alpha_{m}^{6,MGRM} \ SUBST_{m}^{n,MGRM} + \left(1 - \alpha_{m}^{6,MGRM}\right) \ SUBST_{m,t-1}^{MGRM}$$
$$(10.24)$$

Substitution effect on the imported households final consumption for the commodity c

$$SUBST_c^{CHM} = \alpha_c^{6,CHM} \; SUBST_c^{n,CHM} + \left(1 - \alpha_c^{6,CHM}\right) \; SUBST_{c,t-1}^{CHM} \quad (10.25)$$

Substitution effect on the imported government final consumption for the commodity c

$$SUBST_c^{GM} = \alpha_c^{6,GM} \; SUBST_c^{n,GM} + \left(1 - \alpha_c^{6,GM}\right) \; SUBST_{c,t-1}^{GM} \quad (10.26)$$

Substitution effect on the government final consumption for the imported commodity c

$$SUBST_c^{XM} = \alpha_c^{6,XM} \; SUBST_c^{n,XM} + \left(1 - \alpha_c^{6,XM}\right) \; SUBST_{c,t-1}^{XM} \quad (10.27)$$

Substitution effect on the intermediate consumption for the imported commodity c in the sector s

$$SUBST_{c,s}^{CIM} = \alpha_{c,s}^{6,CIM} \; SUBST_{c,s}^{n,CIM} + \left(1 - \alpha_{c,s}^{6,CIM}\right) \; SUBST_{c,s,t-1}^{CIM} \quad (10.28)$$

Substitution effect on the investment for the imported commodity c in the sector s

$$SUBST_{c,s}^{IM} = \alpha_{c,s}^{6,IM} \; SUBST_{c,s}^{n,IM} + \left(1 - \alpha_{c,s}^{6,IM}\right) \; SUBST_{c,s,t-1}^{IM} \quad (10.29)$$

Substitution effect on the exports of the commodity c

$$SUBST_c^{X} = \alpha_c^{6,X} \; SUBST_c^{n,X} + \left(1 - \alpha_c^{6,X}\right) \; SUBST_{c,t-1}^{X} \quad (10.30)$$

11 Glossary

$Bal^{G,Prim,VAL}$	Primary balance of the Government in value (deficit).
$Bal^{G,Prim,VAL,bis}$	Primary balance of the Government in value (deficit)from an alternative expression
$Bal^{G,Tot,VAL}$	Total balance of the Government in value (deficit)
$Bal^{Trae,VAL}$	Aggregate balance of trade
$Bal_c^{Trae,VAL}$	Balance of trade of commodity c
$C_{E,s}$	Energy costs in sector s
C_E	Aggregate cost of energy
$C_{K,s}$	Capital cost in sector s
C_K	Aggregate cost of capital
$C_{L,s}$	Labor cost in sector s
C_L	Aggregate cost of labor
$C_{MAT,s}$	Materials costs in sector s
C_{MAT}	Aggregate cost of materials
CH	Aggregate household final consumption, expressed at market price
CH_c	Households final consumption of commodity c
CH_c^e	Expected households final consumption of commodity c
CH_c^n	Households final consumption of commodity c
$CH^{n,VAL}$	Aggregate notional households final consumption in value
CHD	Aggregate domestically produced final consumption, expressed at market price
CHD_c	Private final consumption of domestically produced commodity c

CHM	Aggregate imported households final consumption, expressed at market price
CHM_c	Private final consumption of imported commodity c
CI	Aggregate intermediate consumption, expressed at market price
CI_c	Intermediate consumption of commodity c, expressed at market price
$CI_{ce,s}$	Energy input demand by type of energy ce by sector s
$CI_{cmo,s}$	Demand for material commodity cmo by sector s
$CI_{ct,s}$	Demand for transport commodity ct by sector s
CI_s	Intermediate consumption of sector s, expressed at market price
CI^{bis}	Intermediate consumption of sector s, expressed at market price (for verification)
CID	Aggregate domestically produced intermediate consumption, expressed at market price
$CID_{c,s}$	Intermediary consumption from sector s in domestically produced commodity c
CID_c	Quantity of domestically produced commodity c used as intermediary consumption, expressed at market price
CID_s	Domestically produced intermediate consumption of sector s, expressed at basic price, expressed at market price
CIM	Aggregate imported intermediate consumption, expressed at market price
$CIM_{c,s}$	Intermediary consumption from sector s in imported commodity c

CIM_c	Quantity of imported commodity c used as intermediary consumption, expressed at market price
CIM_s	Imported intermediate consumption of sector s, expressed at market price
CU_s	Unit cost of production in sector s
CU_s^n	Notional unit cost of production in sector s
CUR_s	Capacity Utilisation ratio of the sector s
$DEBT^{G,VAL}$	Government's debt in value
$DISPINC^{AT,VAL}$	Disposable income after tax in value
$DISPINC^{BT,VAL}$	Disposable income before tax in value
DS	Aggregate change in inventories, expressed at market price
DS_c	Change in inventories of commodity c, expressed at market price
DSD	Aggregate domestically produced change in inventories, expressed at market price
DSM	Aggregate imported change in inventories, expressed at market price
$empl$	Employment (ILO definition)
EMS	Aggregate emissions
EMS_{ghg}	Aggregate emissions of the greehouse gas ghg
EMS^{CH}	Aggregate emissions related to the households final consumption
$EMS_{ghg,c}^{CH}$	Emissions ghg related to the household consumption c
EMS_{ghg}^{CH}	Emissions of the greehouse gas ghg related to the household final consumption
EMS^{CI}	Aggregate emissions related to the intermediary consumption

$EMS^{CI}_{ghg,c,s}$	Emissions ghg related to the intermediary consumption of of commodity c by sector s
$EMS^{CI}_{ghg,c}$	Emissions ghg related to the intermediary consumption of commodity c
$EMS^{CI}_{ghg,s}$	Emissions ghg related to the intermediary consumption by sector s
EMS^{CI}_{ghg}	Emissions of the greehouse gas ghg related to the intermediary consumption
$EMS^{CI,bis}_{ghg}$	Emissions of the greehouse gas ghg related to the intermediary consumption
EMS^{MAT}	Aggregate emissions related to the material consumption
$EMS^{MAT}_{ghg,s}$	Emissions ghg related to the materials consumption of sector s
EMS^{MAT}_{ghg}	Emissions of the greehouse gas ghg related to the total material consumption
EMS^{Y}	Aggregate emissions related to the final production
$EMS^{Y}_{ghg,s}$	Emissions ghg related to the final production of sector s
EMS^{Y}_{ghg}	Emissions of the greehouse gas ghg related to the final production
EMS^{bis}	Aggregate emissions by type of substance
F_E	Aggregate energy input
$F_{f,s}$	Quantity of Labor, Energy and Material inputs in sector s
$F_{K,s}$	Capital stock of sector s
F_K	Aggregate capital input
F_L	Aggregate labor input
F_{MAT}	Aggregate materials input

$F^e_{f,s}$	Expected quantity of Labor, Energy and Material inputs in sector s
$F^n_{f,s}$	Demand for production factor f of sector s
G	Aggregate Government final consumption, expressed at market price
G_c	Government final consumption expenditure of commodity c
GD	Aggregate domestically produced Government final consumption, expressed at market price
GD_c	Public final consumption of domestically produced commodity c
GDP	GDP (expenditure definition)
GDP_c	GDP of commodity c (expenditure definition)
$GDP4$	GDP (income definition)
GDP^{bis}	GDP (expenditure definition, for verification)
GDP^{ter}	GDP (production definition)
GM	Aggregate imported Government final consumption, expressed at market price
GM_c	Public final consumption of imported commodity c
GOS	Aggregate gross operating surplus
GOS_s	Gross operating surplus of sector s
GOS^{VAL}_s	Gross operating surplus of sector s expressed in value
$GR^{PROG}_{E,s}$	Endogenous energy efficiency
I	Aggregate investment, expressed at market price
$I_{c,s}$	Investment use of commodity c by sector s
I_c	Investment in commodity c, expressed at market price

I_s	Investment of sector s, expressed at market price
IA_s	Investment in sector s
I^{bis}	Investment of sector s, expressed at market price (for verification)
ID	Aggregate domestically produced investment, expressed at market price
$ID_{c,s}$	Investment from sector s in domestically produced commodity c
ID_c	Quantity of imported commodity c used as investment, expressed at market price
ID_s	Domestically produced investment of sector s, expressed at market price
IM	Aggregate imported investment, expressed at market price
$IM_{c,s}$	Investment from sector s in imported commodity c
IM_c	Quantity of imported commodity c used as investment, expressed at market price
IM_s	Imported investment of sector s, expressed at market price
$INC^{G,VAL}$	Incomes of the Government in value
$INC^{SOC,TAX,VAL}$	Income & Social Taxes in value
LF	Labor force
M	Imports, expressed at basic price
M_c	Imports of commodity c, expressed at basic price
μ_c	Average mark-up on commodity c
μ_s	Mark-up in the sector s
μ_s^n	Notional mark-up of the sector s
μ_s^{n2}	Notional mark-up of the sector s (definition 2)

M_c^{bis}	Imports of commodity c, expressed at basic price (for verification)
$MGP_{m,c}$	Margins paid to commodity m on commodity c
$MGPD$	Margins paid on domestically produced commodities
$MGPD_c$	Margins paid on the domestically produced commodity c
$MGPD_{m,c}$	Margins paid to commodity m on the domestic commodity c
$MGPM$	Margins paid on imported commodities
$MGPM_c$	Margins paid on imported commodity c
$MGPM_{m,c}$	Margins paid to commodity m on the imported commodity c
MGR	Aggregate recieved margins
MGR_m	Margins received by commodity m, expressed at market price
MGR_c^{bis}	Margins received by commodity m, expressed at market price (for verification)
$MGRD$	Aggregate margins received on domestically produced commodities, expressed at market price
$MGRD_m$	Received margins on domestically produced commodity m
$MGRM$	Aggregate margins received on imported commodities, expressed at market price
$MGRM_m$	Margins received from imported commodity m
MPS^n	Notional marginal propensity to save
MS_c	Quantity of imported commodity c expressed at selling price
NCH	Necessary households final consumption of commodity c

NOS	Aggregate net operating surplus
NOS_s	Net operating surplus of sector s
NOS_s^{VAL}	Net operating surplus of sector s expressed in value
$NTAXI$	Net taxes on production in volume
$NTAXI_s$	Net taxes on production of sector s in volume
$NTAXI^{VAL}$	Net taxes on production in value
$NTAXI_s^{VAL}$	Net taxes on production of sector s in value
$NTAXP$	Aggregate net taxes on commodity c in volume
$NTAXP_c$	Net taxes on commodity c in volume
$NTAXP_c^{VAL}$	Net taxes on commodity c in value
$NTAXPD_c$	Net taxes on domestically produced commodity c in volume
$NTAXPD_c^{VAL}$	Net taxes on domestically produced commodity c in value
$NTAXPM_c$	Net taxes on imported commodity c in volume
$NTAXPM_c^{VAL}$	Net taxes on imported commodity c in value
P	Consumer Price Index
P^e	Expected inflation.
$PARTR$	Labor participation ratio
$PARTR^n$	Labor force participation ratio
PCH	Aggregate market price for household final (consumer price index)
PCH_c	Price of commodity c for household final consumption expenditure
PCH^{CES}	Consumption price
$PCHD$	Aggregate market price for domestically produced households final consumption

$PCHD_c$	Price of domestically produced commodity c for households final consumption expenditure
$PCHM$	Aggregate market price for imported households final consumption
$PCHM_c$	Price of imported commodity c for households final consumption expenditure
PCI	Aggregate market price for intermediate consumption
$PCI_{c,s}$	Price of commodity c for sector s for intermediary consumption use
PCI_c	Market price of the intermediate consumption of commodity c
PCI_s	Market price of intermediate consumption of sector s
PCI^{bis}	Market price of intermediate consumption of sector s (for verification)
$PCID$	Aggregate market price for domestically produced intermediate consumption
$PCID_{c,s}$	Price of domestically produced commodity c for sector s for intermediate consumption use
$PCID_c$	Market price for the domestically produced commodity c used as intermediary consumption
$PCID_s$	Market price of domestically produced intermediate consumption of sector s
$PCIM$	Aggregate market price for imported intermediate consumption
$PCIM_{c,s}$	Price of imported commodity c for sector s for intermediate consumption use
$PCIM_c$	Market price for imported commodity c used as intermediary consumption

$PCIM_s$	Market price of imported intermediate consumption of sector s
PDS	Aggregate market price for change in inventories
PDS_c	Market price of the change in inventories of commodity c
$PDSD$	Aggregate market price for domestically produced change in inventories
$PDSD_c$	Price of domestically produced commodity c for change in inventories use
$PDSM$	Aggregate market price for imported change in inventories
$PDSM_c$	Price of imported commodity c for change in inventories use
PE_s	Energy price for sector s
PG	Aggregate market price for Government final consumption
PG_c	Price of commodity c for government final consumption expenditure
PGD	Aggregate market price for domestically produced Government final consumption
PGD_c	Price of domestically produced commodity c for government final consumption expenditure
$PGDP$	Price of GDP (expenditure definition)
$PGDP_c$	Price of GDP of commodity c (expenditure definition)
$PGDP4$	Price of GDP (income definition)
$PGDP^{bis}$	Price of GDP (expenditure definition, for verification)
$PGDP^{ter}$	Price of GDP (production definition)
PGM	Aggregate market price for imported Government final consumption

PGM_c	Price of imported commodity c for government final consumption expenditure
$PGOS$	Price of the aggregate gross operating surplus
$\varphi_{E,ce,s}$	Share of energy input ce on total energy use by sector s
$\varphi_{f,s}$	Share of production factor f of sector s
φ_c^{CH}	Share of commodity c in the household consumption
φ_c^{CHM}	Import share of commodity c for household final consumption
$\varphi_{c,s}^{CIM}$	Import share of intermediary consumption from sector s in domestically produced commodity c
φ_c^{GM}	Import share φ_c of commodity c on the governement final consumption
$\varphi_{c,s}^{IM}$	Import share of intermediary consumption from sector s in imported commodity c
φ_c^{MCH}	Share of commodity c in the marginal household consumption
$\varphi_{m,c}^{MGPD}$	Market share of the margin-making sector m for the commodity c
$\varphi_{m,c}^{MGPM}$	share of the margin type m on total margins paid on the domestic commodity c
φ_m^{MGRM}	Import share of commodity c on received margins
$\varphi_{ct,s}^{TRSP}$	Share for transport ct use in total transport by sector s
φ_c^{XM}	Import share of commodity c exports
PI	Aggregate market price for investment
PI_c	Market price of the investment in commodity c
PI_s	Market price of investment of sector s

PI^{bis}	Market price of investment of sector s (for verification)
PID	Aggregate market price for domestically produced investment
$PID_{c,s}$	Price of domestically produced commodity c for investment use
PID_c	Market price for domestically produced commodity c used as investment
PID_s	Market price of domestically produced investment of sector s
PIM	Aggregate market price for imported investment
$PIM_{c,s}$	Price of imported commodity c for investment use
PIM_c	Market price for imported commodity c used as investment
PIM_s	Market price of imported investment of sector s
PK_s	Price of capital in sector s
PM	Aggregate basic price of imports
PM_c	Price of imported commodity c
$PMAT_s$	Materials price for sector s
PM_c^{bis}	Basic price of imports of commodity c (for verification)
$PMGP_{m,c}$	Price of the margins paid to commodity m on commodity c
$PMGPD$	Aggregate price of the margins paid on domestically produced commodity
$PMGPD_c$	Price of the margins paid on domestically produced commodity c
$PMGPD_{m,c}$	Price of the margins paid to commodity m on domestically produced commodity c

$PMGPM$	Aggregate price of the margins paid on imported commodities
$PMGPM_c$	Price of the margins paid on imported commodity c
$PMGPM_{m,c}$	Price of the margins paid to commodity m on imported commodity c
$PMGR$	Aggregate market price for recieved margins
$PMGR_m$	Market price of the margins received by commodity m
$PMGR_c^{bis}$	Market price of the margins received by commodity m (for verification)
$PMGRD$	Aggregate market price for the margins received on domestically produced commodities
$PMGRD_c$	Price of margins received on domestically produced commodity c
$PMGRM$	Aggregate market price for the margins received on imported commodities
$PMGRM_c$	Price of margins received on imported commodity c
PMS_c	Selling price for imported commodity c
$PNCH$	Price of necessary households consumption of commodity c
$PNOS$	Price of the aggregate net operating surplus
$PNTAXP$	Aggregate net taxes on commodity c in value
PQ	Aggregate market price for production
PQ_c	Market price of the production of commodity c
PQD	Aggregate market price for domestically produced commodities
PQD_c	Market price for the domestically produced commodity c

PQM	Aggregate market price for imported commodities
PQM_c	Market price for imported commodity c
$PROG_{f,s}$	Technical progress of the production factor f in the sector s
$PROP^{INC,G,VAL}$	Government property incomes in value
$PROP^{INC,G,VAL,e}$	Expected Government property incomes in value
$PROP^{INC,G,VAL,n}$	Notional Property incomes of the Government in value
$PROP^{INC,H,VAL}$	Households property income in value
$PROP^{INC,H,VAL,e}$	Expected Households property income in value
$PROP^{INC,H,VAL,n}$	Property incomes in value
$PRSSC$	Total employers' social security contribution expressed in consumer price
$PRSSC_s$	Price of RSSC for sector s
PVA	Value-added price
$PWAGES$	Gross wage index paid by sectors
$PWAGES_s$	Price Index for gross wages
PX	Aggregate market price for exports
PX_c	Price of commodity c for exports use
PXD	Aggregate market price for domestically produced exports
PXD_c	Price of domestically produced commodity c for export use
PXM	Aggregate market price for imported exports (re-exports)
PXM_c	Price of imported commodity c for export use
PY	Basic price of aggregate production
PY_s	Production price of sector s

PY_s^e	Expected production priceof sector s
PY_s^n	Notional production price of sector s
PYQ	Aggregate basic price of domestic production
PYQ_c	Domestic production price of commodity c
PYQ_c^{bis}	Basic price of the production of commodity c (for verification)
$PYQS_c$	Selling price of commodity c
Q	Aggregate production, expressed at market price
Q_c	Production of commodity c, expressed at market price
QD	Aggregate domestically produced commodities, expressed at market price
QD_c	Quantity of domestically produced commodity c expressed at market price
QM	Aggregate imported commodities, expressed at market price
QM_c	Quantity of imported commodity c expressed at market price
R	Interest rate
R_s	Interest rate paid on capital by sector s
$r^{DEBT,G}$	Interest rate paid by the Governement on its debt
R^n	Notional interest rate of the Central Bank (Taylor rule)
$RBal^{G,Prim,VAL}$	Primary balance of the Government in value (in percent of GDP)
$RBal^{G,Tot,VAL}$	Total balance of the Government in value (in percent of GDP)
$RBal^{Trae,VAL}$	Balance of trade (in percent of GDP)
$RDEBT^{G,VAL}$	Ratio of the Government's debt in value (in percent of GDP)

$RRSSC$	Average employers' social security contribution rate
$RSAV^{G,VAL}$	Government's savings rate in value (in percent of GDP)
$RSAV^{H,VAL}$	Households savings rate
$RSSC$	Price of RSSC
$RSSC_s$	Employers' social security contribution paid by sector s expressed in consumer price
$SAV^{G,VAL}$	Savings of the Government in value (Net lending/borrowing: published deficit/savings of the Government)
$SAV^{H,VAL}$	Households savings in value
$SOC^{BENF,VAL}$	Social benefits in value
$SPEND^{G,VAL}$	Spendings of the Government in value
$Stock^{SAV,H,VAL}$	Households savings stock
$SUBST_c^{CHM}$	Substitution effect on the imported households final consumption for the commodity c
$SUBST_{ce,s}^{CI}$	Substitution effect on the energy intermediate consumption ce in the sector s
$SUBST_{ct,s}^{CI}$	Substitution effect on the transportation intermediate consumption ce in the sector s
$SUBST_{c,s}^{CIM}$	Substitution effect on the intermediate consumption for the imported commodity c in the sector s
$SUBST_{f,s}^{F}$	Substitution effect of the production factor f in the sector s
$SUBST_c^{GM}$	Substitution effect on the imported government final consumption for the commodity c
$SUBST_{c,s}^{IM}$	Substitution effect on the investment for the imported commodity c in the sector s

$SUBST_{m,c}^{MGPD}$	Substitution effect of the domestic margin paid m for the commodity c
$SUBST_{m,c}^{MGPM}$	Substitution effect on the imported margin paid m for the commodity c
$SUBST_{m}^{MGRM}$	Substitution effect on the imported margin received for the commodity m
$SUBST_{c}^{n,CHM}$	Notional substitution effect induced by a change in the relative price between imported and domestically produced commodity c for households final consumption
$SUBST_{ce,s}^{n,CI}$	Notional substitution effect between the energy commodity ce and the over energy commodities cee for the sector s
$SUBST_{ct,s}^{n,CI}$	Notional substitution effect between the transport ct and the over transports mt for the sector s
$SUBST_{c,s}^{n,CIM}$	Notional substitution effect induced by a change in the relative price between imported and domestic intermediary consumption in commodity c from the sector s
$SUBST_{f,s}^{n,F}$	Notional substitution effect between the input f and the over inputs ff
$SUBST_{c}^{n,GM}$	Notional substitution effect induced by a change in the relative price between imported and domestically produced commodity c for government final consumption
$SUBST_{c,s}^{n,IM}$	Notional substitution effect induced by a change in the relative price between imported and domestic investment in commodity c from the sector s
$SUBST_{m,c}^{n,MGPD}$	Notional substitution between margin-making sectors m for the domestically produced commodity c

$SUBST_{m,c}^{n,MGPM}$	Notional substitution effect between the margin-making sector m and the over margin-makings sectors mm for the imported commodity c
$SUBST_c^{n,MGRM}$	Notional substitution effect induced by a change in the relative price between imported and domestically produced commodity c for margins received
$SUBST_c^{n,X}$	Notional substitution effect induced by a change in the relative price between export prices and (converted in domestic currency) international prices for the commodity c
$SUBST_c^{n,XM}$	Notional substitution effect induced by a change in the relative price between imported and domestic products c for exports
$SUBST_c^X$	Substitution effect on the exports of the commodity c
$SUBST_c^{XM}$	Substitution effect on the government final consumption for the imported commodity c
$TRSP_s$	Demand for transport commodities by sector s
Un	Unemployment
UnR	Unemployment rate
VA	Aggregate value-added
VA_s	Value-added of sector s
VA_s^{VAL}	Value-added of sector s expressed in value
W	Average wage
W_s	Wages of the sector s
W_s^n	Notional wage in sector s
$WAGES$	Aggregate gross wages paid by sectors
$WAGES_s$	Gross wages paid by sector s including employees (but not employers)' social contribution
$WAPop$	Working-age population

X	Aggregate exports, expressed at market price
X_c	Foreign demand for exports of commmodity c
XD	Aggregate domestically produced exports, expressed at market price
XD_c	Exports of domestically produced commodity c
XM	Aggregate imported exports (re-exports), expressed at market price
XM_c	Exports of imported commodity c
Y	Aggregate production, expressed at basic price
$Y_{c,s}$	Production of commodity c by sector s
Y_s	Production of sector s, expressed at basic price
Y_s^e	Expected production
$YCAP_s$	Production capacity of the sector s
YQ	Domestic production, expressed at basic price
YQ_c	Production of commodity c, expressed at basic price
YQ_c^{bis}	Production of commodity c, expressed at basic price (for verification)
YQS_c	Quantity of domestically produced commodity c expressed at selling price