Translator Policy Variable Module Methodology

DETAILED INDUSTRY

Interface

User selects aggregate industry and detailed industry.
User enters direct output change in millions of nominal dollars ($DOUTN^k_{i,t}$).

Convert from nominal dollars to real dollars:

$$DOUT^k_{i,t} = DOUTN^k_{i,t} / (DEF^u_{I,t} * OMG^k_{I,t})$$

Where,

$DOUT^k_{i,t}$ = direct output change in region k, for detailed industry i, in year t, in millions of real dollars

$DOUTN^k_{i,t}$ = direct output change (entered by user) in region k, for detailed industry i, in year t, in millions of nominal dollars.

$DEF^u_{I,t}$ = national deflator for aggregate industry I, in year t

$OMG^k_{I,t}$ = relative cost of production in region k (from baseline), for aggregate industry I, in year t

The region's relative cost of production converts from local nominal dollars to national nominal dollars, while the national deflator converts from national nominal dollars to national real dollars.

Policy Variable Calculations

Calculate the direct change in industry employment, adjusting for productivity differences between the detailed industry and the aggregate industry:

$$EPOL8^k_{i,t} = DOUT^k_{i,t} * EPV^k_{I,t} * (EPV^u_{i,T} / EPV^u_{I,T})$$

Where,

$EPOL8^k_{i,t}$ = policy variable of direct employment change in region k, for detailed industry i, in year t, in thousands of jobs

$EPV^k_{I,t}$ = labor productivity (employees per thousand dollars of output) in region k (from baseline), for aggregate industry I, in year t

$EPV^u_{i,T}$ = national labor productivity for detailed industry i, in base year T

$EPV^u_{I,T}$ = national labor productivity for aggregate industry I, in base year T

Nullify all investment associated with this employment:

$$EPOL2^k_{i,t} = EPOL8^k_{i,t}$$

Where,

$EPOL2^k_{i,t}$ = policy variable of direct employment change for which all associated investment is to be nullified, in region k, for detailed industry i, in year t, in thousands of jobs

Calculate additional change in industry output (without employment, investment, and compensation), adjusting for productivity differences between the detailed industry and the aggregate industry:

$$SALPOL6^k_{I,t} = DOUT^k_{i,t} - (EPOL8^k_{i,t} / EPV^k_{I,t})$$

Where,

$SALPOL6^k_{I,t}$ = policy variable of additional change in output (without employment, investment, and compensation) to capture the productivity difference between the detailed industry and the aggregate industry, in region k, for aggregate industry I, in year t

Add investment associated with direct change in output (change sign because using the nullify variable to adjust for the capital intensity of the detailed industry relative to the aggregate industry:

$$SALPOL2^k_{i,t} = -DOUT^k_{i,t} * (CAPINT^u_{i,t} / CAPINT^u_{I,t})$$

Where,

$SALPOL2^k_{i,t}$ = policy variable of change in investment associated with direct change in industry output, in region k, for detailed industry i, in year t.
$CAPINT^u_{i,t}$ = national capital intensity of detailed industry i, in base year T
$CAPINT^u_{I,t}$ = national capital intensity of aggregate industry I, in base year T

Adjust compensation for rate differences between detailed industry and aggregate industry:

$$WSDAPV2^k_{I,t} = EPOL8^k_{i,t} * CR^k_{I,t} * ((CR^u_{i,T} / CR^u_{I,T}) - 1)$$

Where,

$WSDAPV2^k_{I,t}$ = policy variable of change in compensation adjusting for difference between detailed industry and aggregate industry, for region k, in aggregate industry I, for year t
$CR^k_{I,t}$ = compensation rate in region k (from baseline), for aggregate industry I, in year t
$CR^u_{i,T}$ = national compensation rate for detailed industry i, in base year T
$CR^u_{I,T}$ = national compensation rate for aggregate industry I, in base year T

Calculate the intermediate demand adjustments for differences between detailed industry and aggregate industry:

$$\text{DEMPOL2}^k_{J,t} = \text{DOUT}^k_{i,t} * (A^u_{J,i,T} - A^u_{J,I,T})$$

Where,

$\text{DEMPOL2}^k_{J,t}$ = policy variable of change in intermediate demand adjusting for difference between detailed industry and aggregate industry, in region k, for aggregate industry J, in year t

$A^u_{J,i,T}$ = technical coefficient from national input-output matrix in base year T (portion of the total inputs of detailed industry i required to be purchased from aggregate industry J)

$A^u_{J,I,T}$ = technical coefficient from national input-output matrix in base year T (portion of the total inputs of aggregate industry I required to be purchased from aggregate industry J)

Calculate the state and local government demand adjustment for difference between detailed industry and aggregate industry:

$$\text{FDPVG}^k_{SLG,t} = \text{DOUTN}^k_{i,t} * (A^u_{SLG,i,T} - A^u_{SLG,I,T})$$

Where,

$\text{FDPVG}^k_{SLG,t}$ = policy variable of change in state and local government final demand adjusting for difference between detailed industry and aggregate industry, in region k, in year t

Calculate value added adjustment for difference between detailed industry and aggregate industry:

$$\text{VALPOL}^k_{I,t} = \text{DOUT}^k_{i,t} * [(1 - \sum A^u_{J,i,T}) - (1 - \sum A^u_{J,I,T})]$$

Where,

$\text{VALPOL}^k_{I,t}$ = policy variable of change in value added adjusting for difference between detailed industry and aggregate industry, in region k, in aggregate industry I, for year t

$\sum$ = summation of all J industries from 1, NS (number of model sectors)

TOURISM

Interface

User selects type of tourism spending.
User enters amount of direct tourism spending change in millions of nominal dollars $(DOUTN^k_{i,t})$.

Policy Variable Calculations

Calculate the exogenous final demand by industry associated with the specific type of tourism spending:

$$DEMPOL^k_{J,t} = DOUTN^k_{i,t} * TCOEF_{i,j,T} * MARGIN_{j,T}$$

Where,

$DEMPOL^k_{J,t}$ = policy variable of change in exogenous final demand adjusting for difference between detailed category and aggregate category, in region k, for aggregate industry J, in year t
category i, in year t
$DOUTN^k_{i,t}$ = direct tourism spending change (entered by user) in region k, for detailed category i, in year t, in millions of nominal dollars.
$TCOEF_{i,j,T}$ = distribution of spending by industry for each type of tourism dollar
$MARGIN_{j,T}$ = discount applied to retail trade industry only to remove portion representing markup

FARM

<u>**Interface**</u>

User selects detailed farm industry.
User enters direct output change in millions of nominal dollars ($DOUTN^k_{i,t}$).

Convert from nominal dollars to real dollars:

$$DOUT^k_{i,t} = DOUTN^k_{i,t} / DEF^u_{I,t}$$

Where,
> $DOUT^k_{i,t}$ = direct output change in region k, for detailed farm industry i, in year t, in millions of real dollars
> $DOUTN^k_{i,t}$ = direct output change (entered by user) in region k, for detailed farm industry i, in year t, in millions of nominal dollars.
> $DEF^u_{I,t}$ = national deflator for aggregate farm industry I, in year t

The national deflator converts from national nominal dollars to national real dollars.

<u>**Policy Variable Calculations**</u>

Calculate the direct change in farm employment, adjusting for productivity differences between the detailed industry and the aggregate industry:

$$EFPV^k_t = DOUT^k_{i,t} * EPV^k_{I,t} * (EPV^u_{i,T} / EPV^u_{I,T})$$

Where,
> $EFPV^k_t$ = policy variable of direct employment change in region k, for detailed farm industry i, in year t, in thousands of jobs
> $EPV^k_{I,t}$ = labor productivity (employees per thousand dollars of output) in region k (from baseline), for aggregate farm industry I, in year t
> $EPV^u_{i,T}$ = national labor productivity for detailed farm industry i, in base year T
> $EPV^u_{I,T}$ = national labor productivity for aggregate farm industry I, in base year T

Calculate additional change in farm industry output (without employment, investment, and compensation), adjusting for productivity differences between the detailed farm industry and the aggregate farm industry:

$$SALPOL6F^k_t = DOUT^k_{i,t} - (EFPV^k_{i,t} / EPV^k_t)$$

Where,
> $SALPOL6F^k_t$ = policy variable of additional change in farm output (without employment, investment, and compensation) to capture the productivity difference between the detailed farm industry and the aggregate farm industry, in region k, in year t

Adjust compensation for rate differences between detailed farm industry and aggregate farm industry:

$$WFPV^k_t = EFPV^k_t * CR^k_{I,t} * ((CR^u_{i,T} / CR^u_{I,T}) - 1)$$

Where,

$WFPV^k_t$ = policy variable of change in compensation adjusting for difference between detailed farm industry and aggregate farm industry, for region k, for year t

$CR^k_{I,t}$ = compensation rate in region k (from baseline), for aggregate farm industry I, in year t

$CR^u_{i,T}$ = national compensation rate for detailed farm industry i, in base year T

$CR^u_{I,T}$ = national compensation rate for aggregate farm industry I, in base year T

Calculate the intermediate demand adjustments for differences between detailed farm industry and aggregate farm industry:

$$DEMPOL2^k_{J,t} = DOUT^k_{i,t} * (A^u_{J,i,T} - A^u_{J,I,T})$$

Where,

$DEMPOL2^k_{J,t}$ = policy variable of change in intermediate demand adjusting for difference between detailed farm industry and aggregate farm industry, in region k, for aggregate industry J, in year t

$A^u_{J,i,T}$ = technical coefficient from national input-output matrix in base year T (portion of the total inputs of detailed farm industry i required to be purchased from aggregate industry J)

$A^u_{J,I,T}$ = technical coefficient from national input-output matrix in base year T (portion of the total inputs of aggregate farm industry I required to be purchased from aggregate industry J)

Calculate the state and local government demand adjustment for difference between detailed farm industry and aggregate farm industry:

$$FDPVG^k_{SLG,t} = DOUTN^k_{i,t} * (A^u_{SLG,i,T} - A^u_{SLG,I,T})$$

Where,

$FDPVG^k_{SLG,t}$ = policy variable of change in state and local government final demand adjusting for difference between detailed farm industry and aggregate farm industry, in region k, in year t

Calculate value added adjustment for difference between detailed farm industry and aggregate farm industry:

$$VALPOLF^k_t = DOUT^k_{i,t} * [(1 - \sum A^u_{J,i,T}) - (1 - \sum A^u_{J,T})]$$

Where,

$VALPOLF^k_t$ = policy variable of change in value added adjusting for difference between detailed farm industry and aggregate farm industry, in region k, for year t

$\sum$ = summation of all J industries from 1, NS (number of model sectors)

EQUIPMENT

<u>**Interface**</u>

User selects detailed equipment category.
User enters direct equipment change in millions of nominal dollars ($DOUTN^k_{i,t}$).

<u>**Policy Variable Calculations**</u>

Assign direct equipment change:

$$FDPVI^k_{i,t} = DOUTN^k_{i,t}$$

Where,

$FDPVI^k_{i,t}$ = policy variable of direct equipment change in region k, for detailed category i, in year t
$DOUTN^k_{i,t}$ = direct equipment change (entered by user) in region k, for detailed category i, in year t, in millions of nominal dollars.

Calculate the exogenous final demand adjustments for differences between detailed category and aggregate category:

$$DEMPOL^k_{J,t} = DOUTN^k_{i,t} * (A^u_{J,i,T} - A^u_{J,I,T})$$

Where,

$DEMPOL^k_{J,t}$ = policy variable of change in exogenous final demand adjusting for difference between detailed category and aggregate category, in region k, for aggregate industry J, in year t
$A^u_{J,i,T}$ = technical coefficient from national input-output matrix in base year T (portion of the total equipment of detailed category i required to be purchased from aggregate industry J)
$A^u_{J,I,T}$ = technical coefficient from national input-output matrix in base year T (portion of the total equipment of aggregate category I required to be purchased from aggregate industry J)

Calculate the state and local government demand adjustment for difference between detailed category and aggregate category:

$$FDPVG^k_{SLG,t} = DOUTN^k_{i,t} * (A^u_{SLG,i,T} - A^u_{SLG,I,T})$$

Where,

$FDPVG^k_{SLG,t}$ = policy variable of change in state and local government final demand adjusting for difference between detailed category and aggregate category, in region k, in year t