THE INPUT-OUTPUT CORE: DETERMINATION OF INVENTORY INVESTMENT AND OTHER BUSINESS OUTPUT IN THE ECONOMTERIC MODEL KOSMOS

by

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April 1994

Each productive sector in KOSMOS is subject to an identity which equates the sum of all inputs into the productive process with the sum of all uses of the output. Since the sector balances in KOSMOS are expressed in terms of the product (good) produced by the sector in question, the "inputs" include also the supply of the same product by other sectors (when applicable). The resulting product balances give us the standard equilibrium conditions which state that supply equals the sum of demand and inventory change (when applicable). This is best illustrated by means of an extended input-output table, shown below in Table 1.

The rows in the table show uses of the product and the columns show inputs. Since there are only two market-oriented, productive sectors in KOSMOS, the input-output table proper has the dimensions 2x2. This is the upper left part of Table 1, which has Industry and Other Business as both row and column headings. The input-output table proper shows intermediate production, to be used as an input in any of the two productive sectors.

The entry which shows the contribution of Other Business to Industry includes, besides the intermediate production IN21, the trade margins TM. Trade margins denote production of retail and wholesale trade services. In the Swedish input-output tables they are treated like a tax which adds to the market value of the product. Here, since the model is to be consistent with the national accounts framework, trade margins are included in value added. Thus, we treat them as an (service) input into the production of goods. Since Industry mainly produces goods and Other Business services, the trade margins are assumed to be part of the value added of Other Business which is provided as an input to Industry.

The input-output table proper is further extended by a number of columns representing different types of final demand: purchases by public sector, private consumption, gross investment, inventory investment and exports (fob). Purchases by public sector actually represent each sector's input into the production of public services and are thus comparable to intermediate production. They are here included among the components of final demand, since the public sector is not considered to be a productive sector in the input-output sense.

The number of rows in the original input-output table is extended by inputs which do not come from other domestic, productive sectors and by taxes (and subsidies) which transform producer prices into market prices. The additional inputs are: sales by public sector, imports (cif), value added and discrepancy.

The sales by the public sector are the market-oriented part of the public sector's output, i.e. that part of public services which actually is sold in the market. They are introduced in this way, since - as already mentioned - the public sector is not included explicitly in the table. The entry also includes sales by non-profit organisations included in the household sector.

The input 'value added' stands here for two entries usually included in the input-output context. The first one is wages and salaries including employers' contributions and not-product-connected indirect taxes (net of not-product-connected subsidies). The second one is gross trading surplus.

Finally, the discrepancy is an errors-and-omissions term which accounts for the fact that for each sector the column sum should equal the row sum (cf the section on the discrepancy in GDP computation). The discrepancy is computed as a residual. In the Swedish input-output tables it is included in the inventory investment entry.

The indirect taxes (and subsidies), levied on the products, are: VAT and the net value of customs, excise and other indirect taxes and subsidies. Customs, other indirect taxes and subsidies are for simplicity shown in the table as one net entry, although in the model they are separated.

As already mentioned, the table is expressed in terms of the products (i.e. commodity x commodity) at market prices. For this reason, practically all inventory investment is attributed to Industry, although a large part of it can be held by retailers in the Other Business sector. The entry II2 is not explicitly set to zero, since the model allows for exogenous inventories of mainly agricultural products in Other Business. Analogously, the gross investment term I1 denotes investments in the industrial product rather than investments of the Industry sector.

The fact that the sum of all inputs, including gross trading surplus, has to be equal to total output, gives us the above mentioned equality between the column sum and the row sum for each sector. These two identities are shown in Table 1. They can subsequently be transformed to give the identities for gross output, value added or any other item to be computed as a residual. In KOSMOS, the product balance identity for Industry is employed to compute (as a residual) inventory investment. The corresponding identity for Other Business is employed to determine value added (i.e. output).

Gross output can be obtained from the identities in Table 1 by noting that

$$Q1 = VA1 + IN11 + IN21$$

and

$$Q2 = VA2 + IN22 + IN12,$$

where Q1 and Q2 are gross output in Industry and Other Business, respectively. The gross output identities take then the form:

$$Q1 = IN11+IN12+IN1p+CP1+I1+II1+E1-TM-M1-VAT1-ST1-DIS1$$

and

$$Q2 = IN21+TM+IN22+IN2p+CP2+I2+II2+E2-INp2-M2-VAT2-ST2-DIS2.$$

Noting that intermediate production for the use of the sector itself, IN11 and IN22 respectively, cancels out in the sector balance identities, we get the following expressions for value added:

$$VA1 = IN12+IN1p+CP1+I1+II1+E1-IN21-TM-M1-VAT1-ST1-DIS1$$

and

$$VA2 = IN21+TM+IN2p+CP2+I2+II2+E2-IN12-INp2-M2-VAT2-ST2-DIS2.$$

Inventory investment in Industry is obtained from the first value added identity as:

$$II1 = VA1+IN21+TM+M1+VAT1+ST1+DIS1-IN12-IN1p-CP1-I1-E1.$$

The input volumes, INij (i,j = 1,2), are defined as

$$INij = cij*VAj,$$

where cij (i,j = 1,2) correspond to input-output coefficients but are defined in terms of value added rather than gross output. In fact, they are proportional to the input-output coefficients, the constant of proportionality being the ratio Qj/VAj (j = 1,2). In outside-sample simulations these coefficients are assumed to be constant and equal to the latest value known.

Literature

Input-output tables for Sweden 1985 [1992], Stockholm: Statistics Sweden.

Table Z.1 Outline of the model's extended input-output table

	Industry	Other Business	Purchases by Public Sector	Private consumption	Gross investment	Inventory inv.	Export fob
Industry	IN11	IN12	IN1p	CP1	I1	II1	E1
Other Business	IN21 +TM	IN22	IN2p	CP2	I2	II2	E2
Sale by Public Sector	0	INp2					
Import cif	M1	M2					
VAT	VAT1	VAT2					
Customs oth.tax subsidy	ST1	ST2					
Value added	VA1	VA2					
Discrepancy	DIS1	DIS2					

Balance identity for Industry:

IN11+IN12+IN1p+CP1+I1+II1+E1 =IN11+IN21+TM+M1+VAT1+ST1+VA1+DIS1

Balance identity for Other Business:

IN21+TM+IN22+IN2p+CP2+I2+II2+E2
= IN12+IN22+INp2+M2+VAT2+ST2+VA2+DIS2

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