

Deflation of Supply and Use Tables (WP1 Austria)

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1. Methodolgy

Starting point of this data set are the supply tables in basic prices including imports (c.i.f.) and margins (1988-2004) at current prices and the use tables in purchaser prices (1988-2004) at current prices.

The deflation methodology chosen follows the lines of Timmer (2005), so that we start from the following variables:

VY_{jt} nominal gross output value at basic price in industry j

VII_{jt} nominal total intermediate inputs at purchase price in industry j

Y_{jt} real gross output value at basic price in industry j

II_{jt} real total intermediate inputs at purchase price in industry j

VX_{ijt} intermediate input i by industry j

$PY_{jt} = \frac{VY_{jt}}{Y_{jt}}$ gross output price index of industry j

Ideally import as well as export prices by commodities i would be additionally available: P_{it}^M and P_{it}^{EX} . An extended deflation procedure in line with the methodologies proposed by EUROSTAT is presented by Simpson 2005 and additionally takes into account consumer price information by commodities.

The first step according to Timmer (2005) is the derivation of price indices by commodities by assuming that the price index of all products produced by industry j are equal to the gross output price index of industry j, i.e. $PY_{ijt} = PY_{jt} \quad \forall i \text{ in } j$. Then by multiplying the industry output price vector with the domestic supply matrix we get prices by commodities:

$$PY_{it} = \sum_j \frac{VY_{ijt}}{\sum_j VY_{ijt}} PY_{ijt} \quad \forall i$$

An additional feature of this methodology is to get by with limited (aggregated) information on the link between basic and purchaser prices. That means that deflation of the supply side is carried out according to the basic price concept and deflation of the use side according to the purchaser price concept. On the other hand the philosophy of the methodology is to use information of price discrimination for the same commodity among users. That applies especially to users and producers of commodities within the country and abroad.

The first step consists of calculating supply at constant prices by deflating commodity output VY_{it} by the domestic commodity price PY_{it} and the column vector of commodity imports M_{it} by the import price index P_{it}^M . The sum of Y_{it} and M_{it} gives real total supply measured at the basic prices concept. The commodity balance in nominal terms can be reformulated by taking into account trade and transport margins as well as taxes net subsidies by products as *ad valorem* margin or tax rates:

$$VU_{it} = PY_{it} (1 + tr_i + tt_i) \sum_j Y_{ijt} + P_{it}^M (1 + tr_i + tt_i) M_{it}$$

Here VU_{it} represents the value of total uses by commodity i measured at purchaser prices. One possible direct way to proceed would be to deflate each commodity use in an industry and in a final demand category by the weighted sum of the margin and tax rates-augmented prices. That in turn would require the appropriate weights for each user as for example given by the detailed import matrices for intermediate and final use. Instead of that we proceed by taking into account that especially for one use category (exports) a different price index applies than to the others. In the case of the availability of export prices we therefore proceed by deflating exports at purchaser prices (VEX_i) by the export price index augmented by margin and tax rates:

$$EX_{it} = \frac{VEX_{it}}{P_{it}^{EX} (1 + tr_i + tt_i)}$$

Note that we assume here the same margin and tax rate for all users, i.e. we get by with the column vectors of these variables and do not require detailed margin and tax matrices. In the case that export prices are not available or (as in the case of Austria) not equally reliable and plausible like import prices, the domestic price index PY_{it} can be used instead. The methodology is closed by deriving the implicit margin augmented - price index for intermediate demand from commodity balances:

$$PX_{it} (1 + tr_i + tt_i) = \frac{VU_{it} - VEX_{it}}{\sum_j Y_{ijt} + M_{it} - EX_{it}}$$

The use matrix at purchaser prices (*excluding* exports) is then deflated by this implicit price index in order to arrive at real intermediate use measured at basic prices. This basic methodology can be extended by additionally using price information for private consumption and treat this variable like exports (s.: Simpson, 2005). Note that the compensatory accounting for trade and transport margins is made in the corresponding price indices of services (trade and transport), so that summing up by industry we get the total of intermediate inputs including these margins. Therefore concerning the margins there is no difference between total intermediate inputs by *industry* measured at basic prices and measured at purchaser prices. Obviously that does not apply to taxes net subsidies, which have been considered in the deflators by tax rates tt_i . This is one important source for differences between real intermediate inputs from this procedure and the values from National Accounts. For Austria National Accounts contain time series (1976 to 2004) for volume indices of total intermediate inputs (at purchaser prices) by NACE-60 categories. These volume indices have been converted to absolute numbers (in mill. €) at previous years prices and have been added to the EUKLEMS database. The methodology described here allows us to derive another value for intermediate inputs by industry and the question arises how to deal with upcoming differences. In general we could consider several adjustment steps to the totals from National Accounts. One would be to simply normalize intermediate inputs to match the total

intermediate input volume index from the National Accounts, as proposed by Timmer (2005). A different way would be to first normalize the final demand categories to the totals from National Accounts and then adjust the intermediate demand matrix to the new row and column margins.

2. Empirical Results

In the case of Austria no such normalization has taken place in a first instance but a comparative analysis has been undertaken with total intermediate inputs by industry I_{jt} resulting from this methodology and the corresponding data from National Accounts. The comparison focuses on the manufacturing industries. For the selected manufacturing industries (Table 1) we observe an (absolute) difference in the annual growth rate of intermediates between 1988 and 2004 of 0.6 percent between the deflated use tables-data and the National Accounts data.

Table 1: Annual rates of change (%) in total real intermediate inputs by industry (1988 – 2004)

	Deflated Use Tables	National Accounts	Difference
Food and beverages	-0,4	-0,9	-0,4
Textiles	0,7	1,0	0,3
Wearing Apparel, Dressing	-0,7	-2,0	-1,2
Leather, leather and footwear	2,0	3,2	1,1
Wood and of Wood and Cork	5,0	5,0	0,0
Pulp and paper	2,4	1,7	-0,7
Rubber and plastics	3,8	3,3	-0,6
Other Non-Metallic Mineral	0,9	1,6	0,7
Basic metals	2,7	3,3	0,6
Fabricated metal	5,5	5,9	0,5
Machinery nec	5,5	5,5	0,0
Office, accounting and computing machinery	18,0	17,7	-0,3
Motor vehicles, trailers and semi-trailers	10,9	9,8	-1,1
Manufacturing nec	1,7	1,0	-0,6

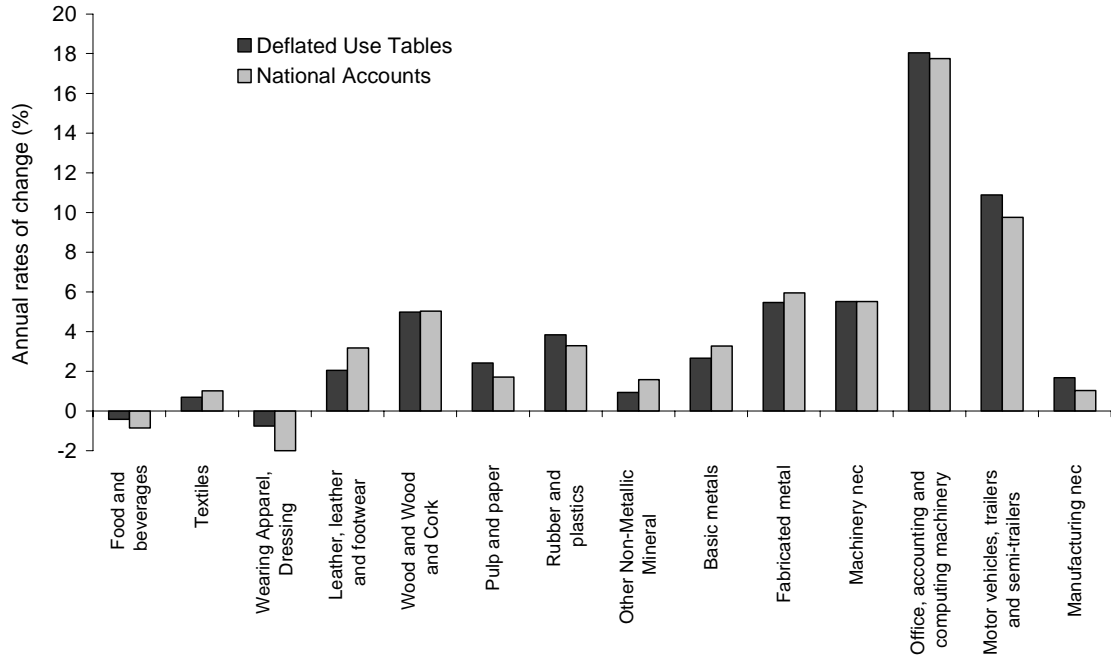
We find some industries with large differences in growth rates of more than one percentage point per year (absolute), like "Leather and footwear" and "Motor vehicles"

and some industries without any difference like "Wood" and "Machinery nec". Positive and negative differences are almost balanced for the selected industries, which also holds, when service industries are included in the comparison. There are direct and straightforward consequences of the differences in intermediate input dynamics for the results from growth accounting: a higher growth rate from deflated use tables *ceteris paribus* reduces the contribution of TFP growth and vice versa.

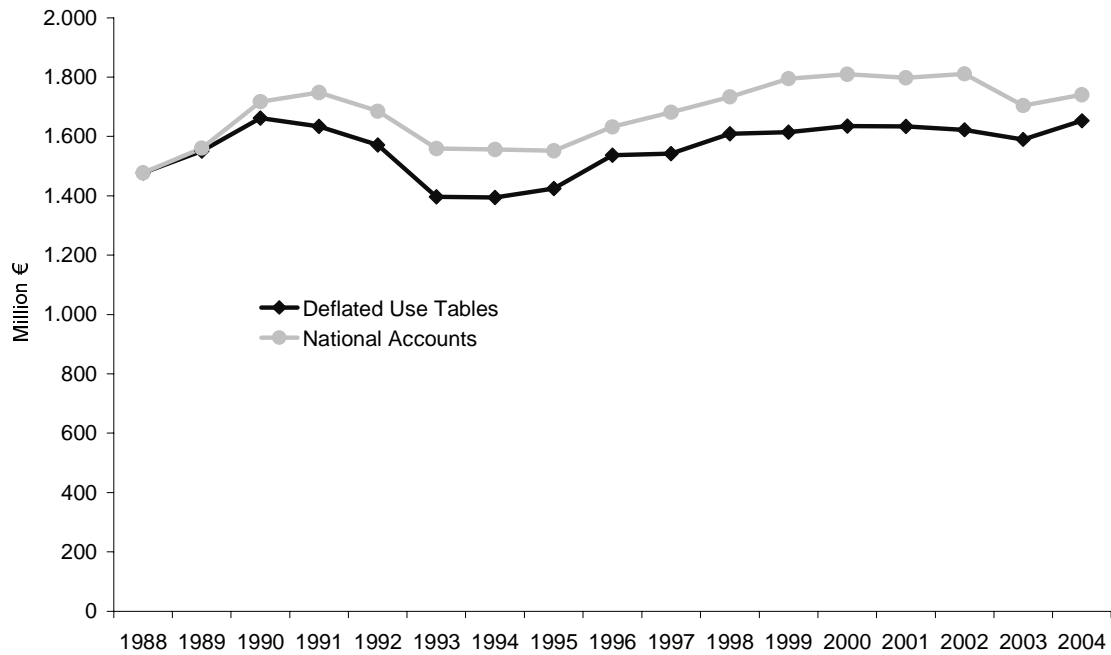
Besides these differences in average annual growth rates the development over time of the deflated use table series and the National Accounts series is very similar. It exhibits a gap which is partly caused by the taxes net subsidies item. The other source of this gap is the statistical difference between the two methodologies. Therefore in industries where the taxes net subsidies item is important (like "Food and beverages") the National Accounts numbers always exceed the deflated use tables-numbers. In most industries the gap widens or narrows over time. As already mentioned the picture is similar for the service industries but with a larger variance across the differences.

Taking into account that there is a factual reason for the difference between the results of the deflation procedure and the National Account numbers (namely the taxes net subsidies item) an adjustment in order to match the totals of National Accounts should be considered. That would again result in an imbalance on the commodity side, which could be considered by adding it to the statistical difference vector or by adjusting the implicit deflator for domestic use (total use minus exports).

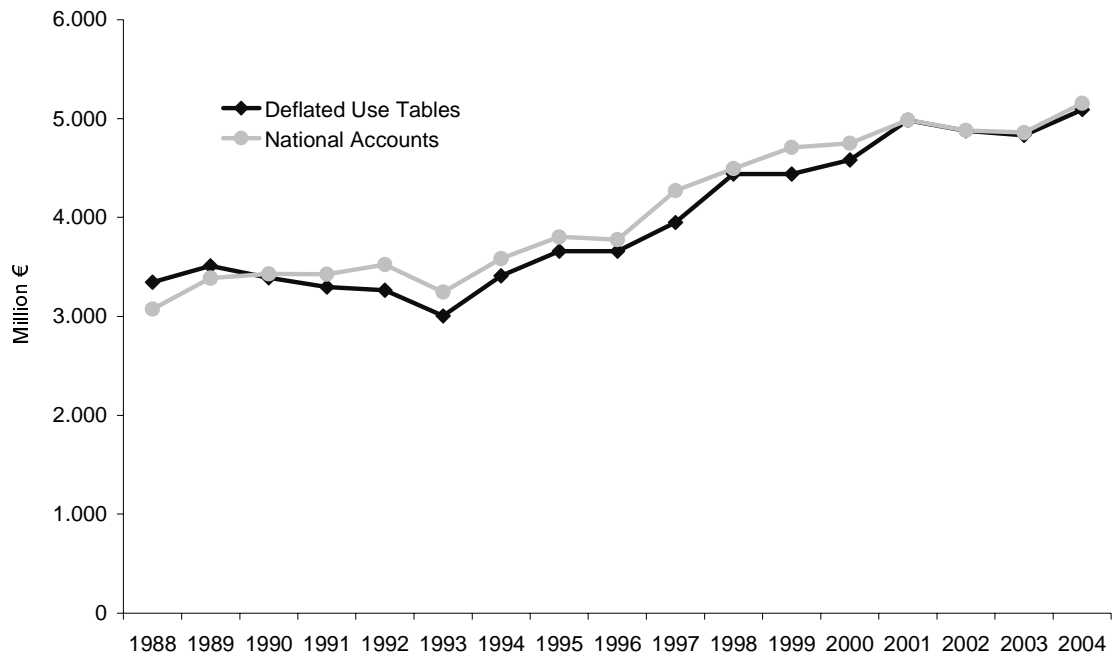
Graph 1: Annual rates of change (%) in total real intermediate inputs by industry (1988 – 2004)



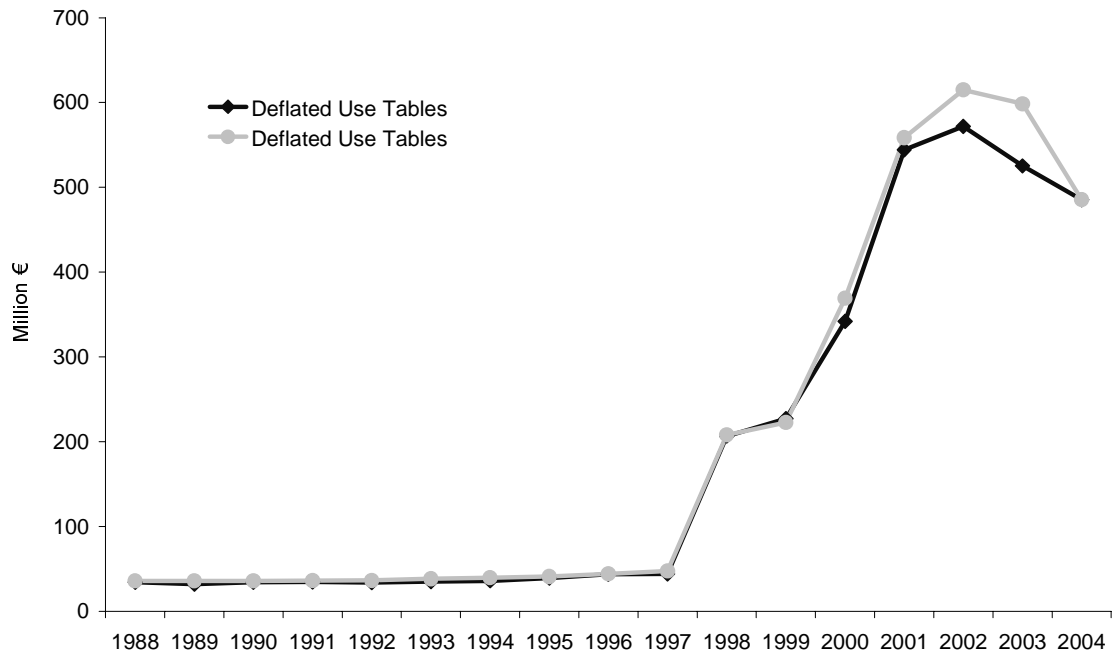
Graph 2: Real intermediate inputs: "Textiles" (1988 – 2004)



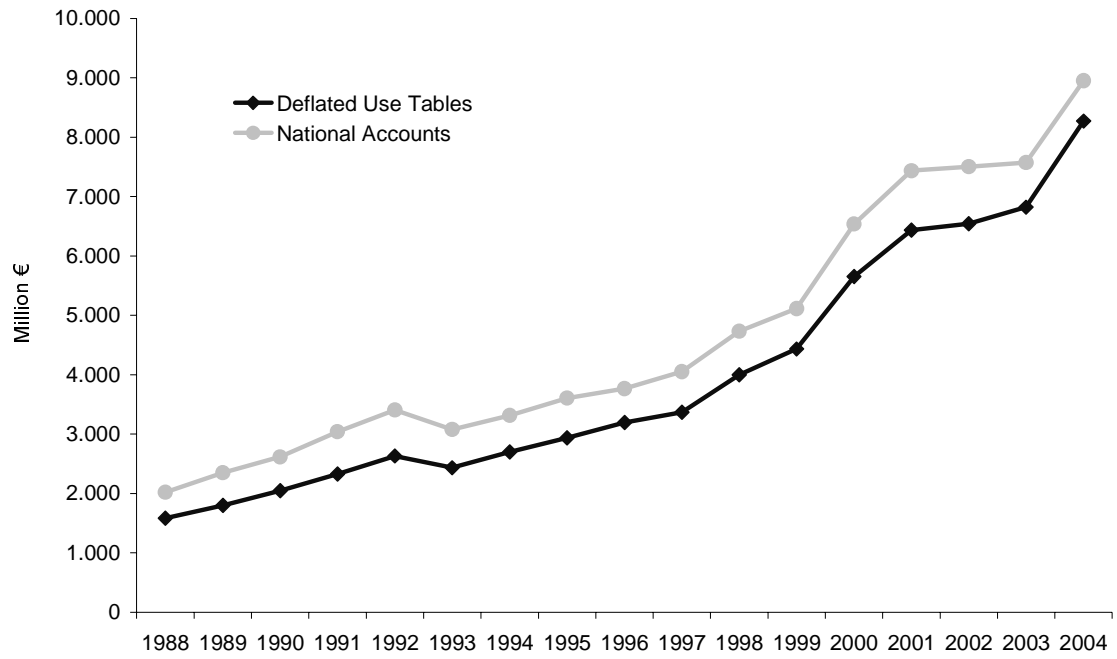
Graph 3: Real intermediate inputs: "Basic metals" (1988 – 2004)



Graph 4: Real intermediate inputs: "Office, accounting and computer machinery" (1988 – 2004)



Graph 5: Real intermediate inputs: "Motor vehicles, trailers and semi-trailers" (1988 – 2004)



References

Simpson, L. H., (2005), Experience with Supply and Use and Input-Output Tables for Constant Price Estimation of Annual National Accounts in Different Countries, paper prepared for the 15th International Input-Output Conference, 27 June – 1 July 2005, Beijing.

Timmer, M., (2005), EUKLEMS Road Map WP1, October 2005.