Macroeconomics — Exercise 1 — Solutions

October 2005

1. One may summarize the three firms in a little table:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>sales</td>
<td>600</td>
<td>2000</td>
<td>400</td>
</tr>
<tr>
<td>wages</td>
<td>440</td>
<td>1200</td>
<td>260</td>
</tr>
<tr>
<td>intermediate</td>
<td>0</td>
<td>600</td>
<td>0</td>
</tr>
<tr>
<td>operating surplus</td>
<td>160</td>
<td>200</td>
<td>140</td>
</tr>
</tbody>
</table>

(a) The value added is sales (production, gross output) minus intermediate consumption, i.e. $2000 - 600 = 1400$. Wages are not intermediate consumption, as workers are not goods used up or transformed in the production process. You may check by the fact that the operating surplus is the value added minus wages, i.e. $200 = 1400 - 1200$.

(b) GDP is the value added by all firms, i.e. $600 + 1400 + 400 = 2400$. Or, alternatively, all final sales $0 + 2000 + 400$, as A goods do not reach the consumers’ market. Or, alternatively, all primary income, i.e. wages plus operating surplus $440 + 1200 + 260 + 160 + 200 + 140 = 2400$.

(c) GDP cannot change, as the value added of firm A/B is the sum of the values added by A and B. Final sales are also constant. The operating surplus of A/B will be 360, and its value added will be 2000.

2. This example shows how to exploit the basic accounting identities in order to obtain ‘missing’ variables.

(a) From Account 0, GDP is defined as the sum of the demand components $GDP = C + C_P + I + X - Im$. Therefore,

$GDP = 1100 + 350 + 380 + 750 - 600 = 1980$.

GNI is GDP plus the balance of primary incomes. Here, this balance is passive at -100, therefore

$GNI = 1980 + 50 - 150 = 1880$.

Consumption of fixed capital is GNI-NNI and therefore $1880 - 1455 = 425$. NDP at basic prices is GDP minus the depreciation and minus the production taxes (these are all proportional product taxes) and therefore

$NDP($factor prices$) = 1980 - 425 - 120 = 1435$. 

Wages can be determined as GDP minus the gross operating surplus minus production taxes. Unfortunately, we do not know whether the given operating surplus is gross or net. If it is gross, then
\[
\text{wages} = 1980 - 435 - 120 = 1425.
\]

If it is net, then we can use NDP at factor prices, which is already net of depreciation and production taxes to obtain
\[
\text{wages} = 1435 - 435 = 1000.
\]

(b) Southland with a GDP of 400 must have a GNI of 500. There are more Southlanders working in Northland than Northlanders working in Southland. It appears that Southland is the smaller and less attractive economy. Then, it is typical that the balance of primary wage incomes is positive.

3. Examples like these can be solved in two ways. Either all accounts are compiled for the total economy or accounts are determined for sectors or even single agents, which are then added up (aggregated) in a second step.

(a) *Net domestic product* evolves directly from the production account.
\[
\text{NDP} = \text{(output)} - \text{(intermediate consumption)} - \text{(consumption of fixed capital)}
\]

Components of output in this example are: 25,000 euro of raw materials (either produced in mining or taken from inventories), 15,000 euro of consumer goods, and 10,000 euro of ‘goods’, yields 50,000 euro of total production by unit A. 20,000 euro of goods, 10,000 euro of machinery, 5,000 euro of consumer goods, yields 35,000 euro of production by unit B. PH produces ‘public consumption’ of 35,000 euro (the goods purchased plus wages paid plus depreciation according to the SNA definition). We obtain a total production of 120,000 euro *inclusive of production taxes*, i.e. at market prices.

A difficulty is that output should be calculated at *basic prices*, without ‘proportional’ product taxes but including payroll-type taxes. Because the tax imposed in this economy is proportional, one may have to subtract it. This would yield \(45,000 + 31,500 + 32,000 = 108,500\) euro.

Intermediate consumption by A consists of 10,000 euro from A’s own inventories, which are not taxed. B uses 20,000 euro (18,000 net taxes) of raw materials, and PH uses up the 30,000 euro (27,000 net taxes) of goods purchased from A and B. Thus, intermediate consumption amounts to 55,000 euro. The machine purchased by A is not intermediate consumption, as it is not used up in production.

Subtracting intermediate consumption from total output yields GDP at 53,500 euro at basic prices or 60,000 euro at market prices. All transaction taxes paid are 11,500 euro, which amount is added to basic 53,500. NDP is obtained by subtracting the depreciation of 5,000 euro and amounts to 55,000 euro.

Of certain interest is the decomposition according to Account 0. Investment derives from the newly installed machinery at unit A.
(10,000 euro) and the inventory investment of A (-10,000 euro) and of B (5,000 euro). Therefore, investment is at 5,000 euro in the total economy. On the other hand, consumption derives from private consumption (20,000 euro) and public consumption (35,000 euro). Again, the sum of all terms is GDP of 60,000 euro.

(b) The disposable income of the household sector is defined as household income minus income taxes, which is 29,000 euro minus 2,900 euro or 26,100 euro. One may discuss whether public-sector wages are to be taxed but we assume that they are. Because all profits are retained, households receive wage income only.