1. How do the multiplier and the accelerator interact?

Multiplier

Accelerator

Change in planned AD
(for example I)

Change in Y

AD  Aggregate demand
I    Investment

Y    National income / Output
### 2 How does the *multiplier* work?

#### 21 A numerical example

<table>
<thead>
<tr>
<th>Round</th>
<th>Change in Y</th>
<th>Change in C (MPC = 0.7)</th>
<th>Change in S (MPS = 0.3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (ΔI=1000)</td>
<td>1000</td>
<td>700</td>
<td>300</td>
</tr>
<tr>
<td>2</td>
<td>700</td>
<td>490</td>
<td>210</td>
</tr>
<tr>
<td>3</td>
<td>490</td>
<td>343</td>
<td>147</td>
</tr>
<tr>
<td>4</td>
<td>343</td>
<td>240</td>
<td>103</td>
</tr>
<tr>
<td>5</td>
<td>240</td>
<td>168</td>
<td>72</td>
</tr>
<tr>
<td>all future rounds</td>
<td>560</td>
<td>392</td>
<td>168</td>
</tr>
<tr>
<td>sum</td>
<td>3'333</td>
<td>2'333</td>
<td>1'000</td>
</tr>
</tbody>
</table>

**Multiplier (K):**

\[
K = \frac{1}{1-\text{MPC}} \quad \text{or} \quad K = \frac{1}{\text{MPS}}
\]

**Multiplier with taxes and foreign sector:**

\[
K = \frac{1}{\text{MPS} + \text{MPT} + \text{MPM}}
\]

\text{MPT} = \text{Marginal propensity to tax}  
\text{MPM} = \text{Marginal propensity to import}

**I = Investment**

\[I = \text{Investment}\]

\[\text{Y = Output/National income}\]

\[\text{C = Consumption}\]

\[\text{MPC = Marginal propensity to consume}\]

\[\text{MPS = Marginal propensity to save}\]

#### 22 The multiplier, graphically

The multiplier is calculated as:

\[\text{Multiplier} = \frac{\text{Change in Y}}{\text{Change in AD}}\]

**planned AD**

(without foreign trade)

\[\text{AD} = \text{Y}\]

\[\text{AD1}\]

\[\text{AD2}\]

\[\Delta \text{in AD}\]

\[45^\circ\]

\[\text{Change in Y}\]

\[\text{Y1}\]

\[\text{Y2}\]

\[\text{Y}\]
3 How does the *accelerator* work? A numerical example

<table>
<thead>
<tr>
<th>Year</th>
<th>( Y (= Output) )</th>
<th>Stock of capital ①</th>
<th>Net investment ②</th>
<th>Depreciation ③</th>
<th>Gross investment ④</th>
</tr>
</thead>
<tbody>
<tr>
<td>(0)</td>
<td>(100)</td>
<td>(200)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>100</td>
<td>200</td>
<td>0</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>120</td>
<td>240</td>
<td>40</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>140</td>
<td>280</td>
<td>40</td>
<td>12</td>
<td>52</td>
</tr>
<tr>
<td>4</td>
<td>160</td>
<td>320</td>
<td>40</td>
<td>14</td>
<td>54</td>
</tr>
<tr>
<td>5</td>
<td>160</td>
<td>320</td>
<td>0</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

① Capital - output ratio = 2 : 1
② Net investment = 2 \* change in output (in comparison to the previous year)
③ Depreciation = 0.05 \* Stock of capital (of the previous year)
④ Gross investment = Net investment + depreciation

Remarks

- It can be seen that a (relatively) small increase in \( Y \) (from 100 to 120) causes a big increase in gross investment (from 10 to 50). If, however, \( Y \) stagnates (160/160), gross investment is falling a lot (from 54 to 16). Thus, the accelerator is reinforcing the effects of the multiplier, upwards as well as downwards.

- This reinforcing effect is due to the fact that there is a stock of capital which can be used to produce \( Y \) in the future. If you take only into account net investment, this type of investment may be proportionate to the change in \( Y \). In our case: Net investment = 2 \* change in \( Y \). The same can be observed if you look at the effect of changes in \( Y \) on stocks of goods.