**Macroeconomics / Global Economics**

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**The Balanced Budget Multiplier**

Consider a closed economy (no foreign sector) where the short-run equilibrium in the goods market is described by the following condition

$$Y = C + I + G,$$

where $Y$ is output (income), $C$ is consumption, $I$ denotes investments and $G$ public spending. Consumption is described by a simple function of the type:

$$C = c_0 + c_1 (Y - T),$$

where $c_0 > 0$ denotes the subsistence level of consumption, $0 < c_1 < 1$ is the marginal propensity to consume and $T$ denotes taxes. Combining these two equations we obtain the equilibrium level of output, namely:

$$Y = \frac{1}{1 - c_1} (c_0 - c_1 T + I + G). \tag{1}$$

**I experiment**

Consider the following policy experiment. We assume that the level of public spending $G$ increases by $\Delta G$. The new level of public spending is then $G\prime = G + \Delta G$.

Using the fact that in equilibrium a condition analogous to (1) must hold, the new level of output, say $Y\prime = \Delta Y + Y$, will be equal to:

$$\begin{aligned} Y\prime &= \frac{1}{1 - c_1} (c_0 - c_1 T + I + G') \\ Y\prime &= \frac{1}{1 - c_1} \left( c_0 - c_1 T + I + \underbrace{G + \Delta G}_{G'} \right) \end{aligned}$$

The above equation can be re-written as

$$Y\prime = \frac{\Delta G}{1 - c_1} + \underbrace{\frac{1}{1 - c_1} (c_0 - c_1 T + I + G)}_{Y}$$

where the second term in the right hand side, $\frac{1}{1-c_1}(c_0 - c_1T + I + G)$, is $Y$ (the initial level of output before the policy experiment). Therefore the above equation can be expressed as follows

$$\begin{aligned}
Y' &= \frac{\Delta G}{1-c_1} + Y, \\
Y' - Y &= \frac{\Delta G}{1-c_1} \\
\Delta Y &= Y' - Y = \frac{\Delta G}{1-c_1}
\end{aligned}$$

In this case the multiplier is equal to $\frac{1}{1-c_1} > 1$ : by increasing public spending by $\Delta G$ we are able to increase output by $\frac{1}{1-c_1}\Delta G$.

**II experiment**

Consider now a different experiment. As before we assume that the level of public spending $G$ increases by $\Delta G$, so that the new level of public spending is then $G\prime = G + \Delta G$. We further assume that also taxes $T$ increase, by an amount $\Delta T$. The new level of taxes is then $T\prime = T + \Delta T$.

Using the fact that in equilibrium a condition analogous to (1) must hold, the new level of output, say $Y\prime$, will be equal to:

$$\begin{aligned}
Y\prime &= \frac{1}{1-c_1}(c_0 - c_1T' + I + G') \\
Y\prime &= \frac{1}{1-c_1}\left(c_0 - c_1(T + \Delta T) + I + \underbrace{G + \Delta G}_{G'}\right)
\end{aligned}$$

The above equation can be re-written as

$$Y\prime = \frac{\Delta G}{1-c_1} - c_1\frac{\Delta T}{1-c_1} + \underbrace{\frac{1}{1-c_1}(c_0 - c_1T + I + G)}_{Y}$$

where the second term in the right hand side, $\frac{1}{1-c_1}(c_0 - c_1T + I + G)$, is $Y$ (the initial level of output before the policy experiment). Therefore the above equation can be expressed as follows

$$Y' = \frac{\Delta G}{1-c_1} - c_1\frac{\Delta T}{1-c_1} + Y.$$

Under the assumption that $\Delta T = \Delta G$ (which implies that **the increase in public spending is fully financed by an increase in taxes so as to leave the government balanced budget unchanged**), the above condition becomes

$$\begin{aligned} Y' &= \frac{\Delta G}{1-c_1} - c_1 \frac{\Delta G}{1-c_1} + Y \\ Y' &= \frac{\Delta G}{1-c_1}(1-c_1) + Y \end{aligned}$$

which further simplifies to

$$\begin{aligned} Y' &= \Delta G + Y, \\ Y' - Y &= \Delta G, \\ \Delta Y &= \Delta G. \end{aligned}$$

**In this case the multiplier is found to be equal to** $1$ : by increasing public spending by $\Delta G$ we are able to increase output by $\Delta G$.

We have so shown that the **balanced budget multiplier** is equal to 1 (one-to-one relationship between public spending and output)**.** In this case, in fact, disposable income does not change (i.e.$Y\prime - T\prime = Y - T$), consumption stays constant and the cumulative mechanism on output is not operative.