Appendix

Models of Government Expenditure Multipliers

In the neoclassical world, labor is paid whatever the last unit contributes (its marginal product), which means that an increase in the quantity of labor lowers wages. In the SNM, people care about two things: consumption, which they like, and hours worked, which they do not like. People make choices based on consumption and hours worked, and they evaluate their levels of consumption and work both currently and in the future (although the further into the future, the less these things are of concern).

The choices that people make in this case have to satisfy a relation called the intratemporal first-order condition, which can often be described mathematically with the following equation: where *w* is the wage, *c* is consumption and *h* is hours worked.

$$w\ c^{-\sigma} = \theta\ h^{\frac{1}{\psi}}$$

The Greek letters are positive parameters that describe the details of people's preferences:

> σ tells us how unwilling people are to tolerate fluctuation over time in consumption.
> θ tells us how much they dislike work relative to leisure.
> ψ expresses the responsiveness of hours worked to small changes in the wage rate.

We see from this expression that a simultaneous decrease in the wage rate and increase in hours worked requires a drop in consumption. If this intratemporal condition applies, this result is inevitable.

Still, that is not enough to ensure an increase in hours, and a reduction of the wage could very well be accommodated by a reduction both in hours worked and in consumption.

For hours worked to increase, something else is also necessary: an increase in the interest rate. This can be seen from the other relation that people's choices have to satisfy, the intertemporal first-order condition that is described in this equation:

$$\left(\frac{h}{h'}\right)^{\frac{1}{\psi}} = \beta\ (1 + r')\ \frac{w}{w'}$$

> Variables displayed with a "prime" (as in *h′* instead of a simple *h*) denote values of the variable in the following period.

The letter r is the interest rate.
The Greek letter β, a positive parameter between 0 and 1, indicates patience—the willingness to delay consumption.

We can see from this equation that in order for hours worked today to be larger than hours worked tomorrow, the interest rate has to be large enough so that $\beta *(1+r')[w/(w')] > 1$, even when wages today are lower than wages tomorrow, $[w/(w')] > 1$.

In normal times, $\beta *(1+r) = 1$, so this requires that the interest rate next period is much larger than it is normally. The problem is that interest rates are the marginal productivity of capital, so high interest rates require capital to be lower than usual, and this means that investment today has to be low.