Lecture 8: The Consumption Function

ECON 30020: Intermediate Macroeconomics

Prof. Eric Sims

University of Notre Dame

Spring 2026

Readings

GLS Ch. 9

The Euler Equation

The Euler equation is not a consumption function

It shows a relationship between current and future consumption that must hold if the household is behaving optimally

With log utility, we'd have:

$$\frac{C_{t+1}}{C_t} = \beta(1 + r_t)$$

Here, given β and r_t, we can determine the growth rate of consumption, but not the level

Consumption Function

What we want is a decision rule that determines the level of C_t as a function of things which the household takes as given: Y_t, Y_{t+1}, and r_t

Consumption function:

$$C_t = C^d(Y_t, Y_{t+1}, r_t)$$

Can use indifference curve - budget line diagram to qualitatively figure out how changes in Y_t, Y_{t+1}, and r_t affect C_t (i.e., to sign partial derivatives)

Increases in Y_t and Y_{t+1}

An increase in Y_t or Y_{t+1} causes the budget line to shift outward (parallel shift), expanding the feasible set

In new optimum, household will locate on a higher indifference curve with higher C_t and C_{t+1}

Household wants to increase consumption in both periods when income increases in either period

Consumption Smoothing

A household wants its consumption to be "smooth" relative to its income

Achieves smoothing by adjusting saving behavior: increases S_t when Y_t goes up, reduces S_t (borrows, or saves less) when Y_{t+1} goes up

Can conclude that $\frac{\partial C^d}{\partial Y_t} > 0$ and $\frac{\partial C^d}{\partial Y_{t+1}} > 0$

Further, $\frac{\partial C^d}{\partial Y_t} < 1$

Call this the marginal propensity to consume, MPC

In general, a partial derivative is a function, but we will often treat the MPC as a number

Increase in r_t

Causes budget line to become steeper, pivoting through endowment point

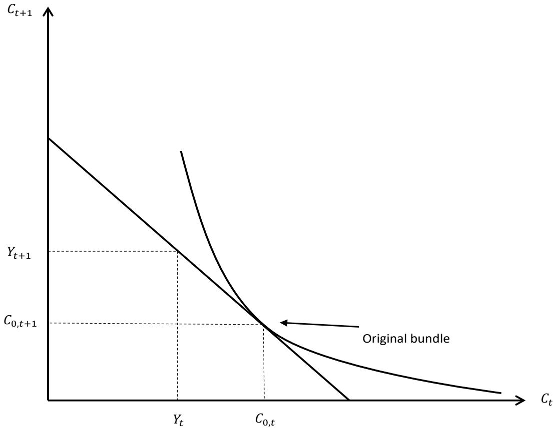
Competing income and substitution effects:

- Substitution effect: how would consumption bundle change when r_t increases and income is adjusted so that household would locate on unchanged indifference curve?
- Income effect: how does change in r_t allow household to locate on a higher/lower indifference curve?

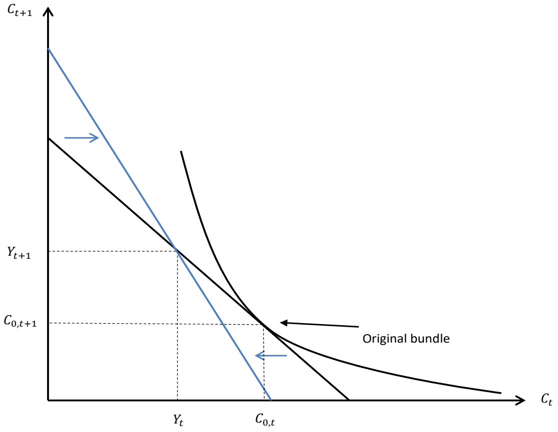
Substitution effect always to reduce C_t, increase S_t

Income effect depends on whether initially a borrower ($C_t > Y_t$, income effect to reduce C_t) or saver ($C_t < Y_t$, income effect to increase C_t)

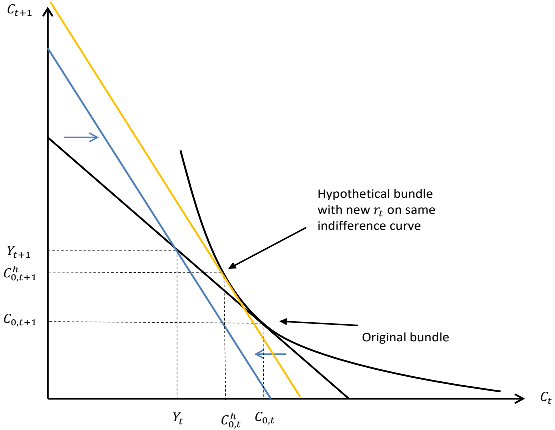
Borrower: Original Bundle



Borrower: Budget Line Pivot

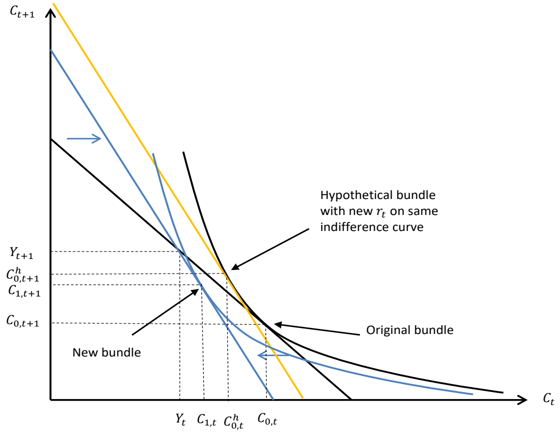


Borrower: Substitution Effect



Sub effect: $\downarrow C_t$, $\uparrow C_{t+1}$

Borrower: Income Plus Sub Effect

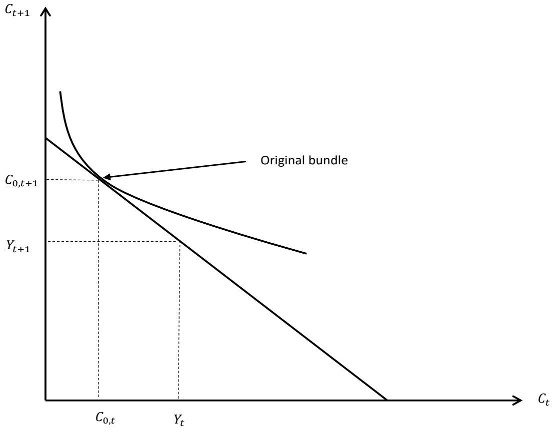


Sub effect: $\downarrow C_t$, $\uparrow C_{t+1}$

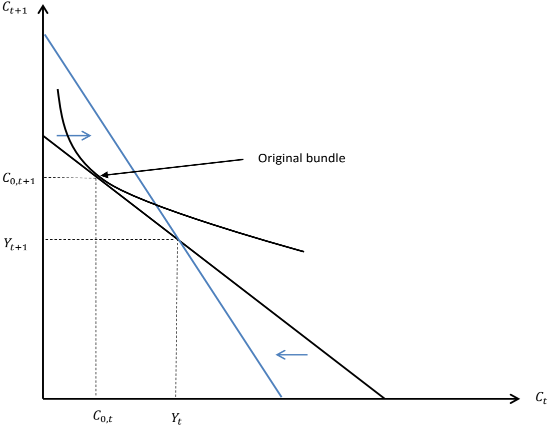
Income effect: $\downarrow C_t$, C_{t+1}

Total effect: $\downarrow C_t$, ambiguous C_{t+1}

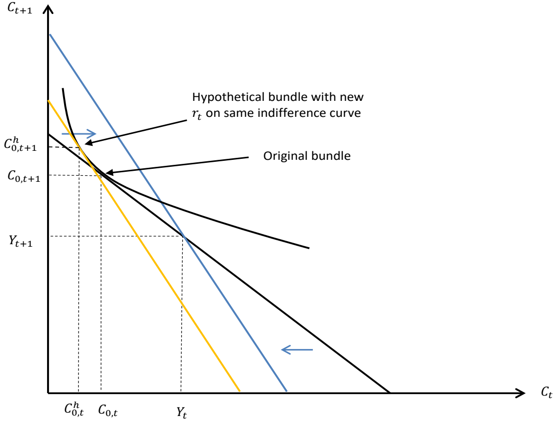
Saver: Original Bundle



Saver: Budget Line Pivot

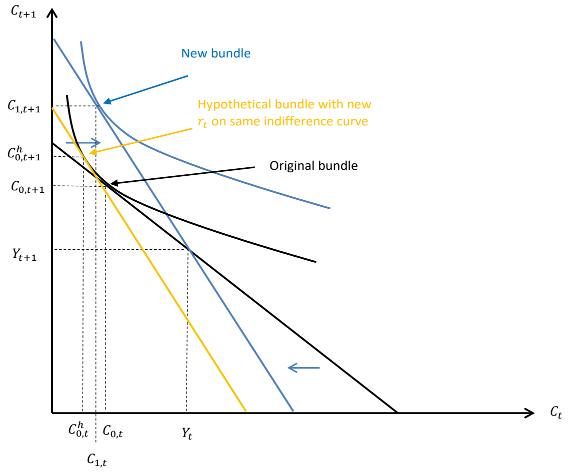


Saver: Substitution Effect



Sub effect: $\downarrow C_t$, $\uparrow C_{t+1}$

Saver: Income Plus Sub Effect



Sub effect: $\downarrow C_t$, $\uparrow C_{t+1}$

Income effect: $\uparrow C_t$, C_{t+1}

Total effect: ambiguous C_t, $\uparrow C_{t+1}$

The Consumption Function

We will assume that the substitution effect always dominates for the interest rate

Qualitative consumption function (with signs of partial derivatives)

$$C_t = C^d(\underset{+}{Y_t}, \underset{+}{Y_{t+1}}, \underset{-}{r_t}).$$

Algebraic Example with Log Utility

Suppose $u(C_t) = \ln C_t$

Euler equation is:

$$C_{t+1} = \beta(1 + r_t)C_t$$

This is one equation in two unknowns (C_{t+1} and C_t)

Combining with IBC (now we have two equations in two unknowns) to derive the consumption function:

$$C_t = \frac{1}{1+\beta}\left[Y_t + \frac{Y_{t+1}}{1+r_t}\right]$$

MPC: $\frac{1}{1+\beta}$. Go through other partials