Consumption and Savings Model

ECO 305: Intermediate Macroeconomics

Goals

1. Describe how consumers make consumption and savings decisions, considering their well being *in the future*
2. Describe how consumer decisions for savings, current consumption, future consumption are affected by,
   - changes in the interest rate
   - temporary changes in current income
   - changes in future income
   - changes in permanent income
3. Predict how borrowers versus savers are affected by changes in interest rates
4. Predict how government expenditure and tax policies affect consumer decisions

Reading and Exercises

- Williamson, Chapter 9, pp. 306-321: Consumption and savings decisions
- Williamson, Chapter 9, pp. 321-324: Effects on decisions from changes in income
- Williamson, Chapter 9, pp. 327-332: Effects on decisions from changes in interest rates for savers and borrowers
- Williamson, Chapter 9, pp. 337-343: Ricardian Equivalence
- **Canvas Quiz due Wed 11:59 PM**. Multiple-choice, 15 questions, unlimited attempts allowed, only best score counts
- **Homework/In-class Exercise due Fri 11:59 PM**. We will work together in class on Thursday

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Two-Period Consumption/Savings Model Setup

- Two variables over two periods: current consumption and future consumption
- Consumers maximize utility, derived from current and future consumption, subject to budget constraints
- Endowment economy: Consumers have everything given to them $y - t$ today, $y' - t'$ in the future
- Consumers can save or borrow in the current period (negative outcome for saving)
- Consumers either consume saved money in future period, or pay back borrowed money in future period

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Intertemporal Budget Constraint

Budget Constraints

- Current period:

$$c + s = y - t$$

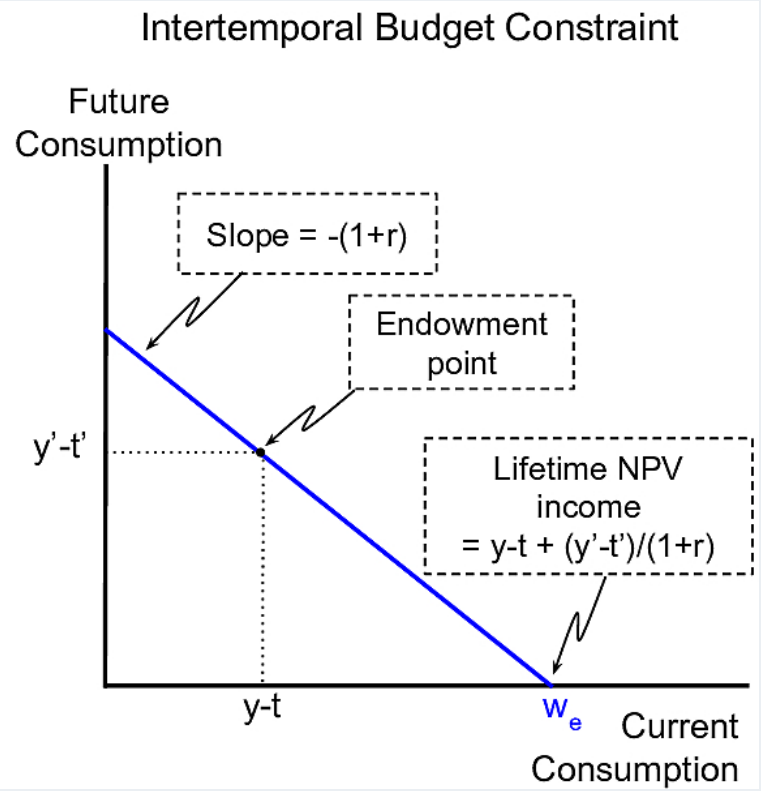
- Future period:

$$c' = y' - t' + (1 + r)s$$

- r: real interest rate
- Combining:

$$c + \frac{c'}{1+r} = y - t + \frac{y' - t'}{1+r}$$

Graphical Budget Constraint



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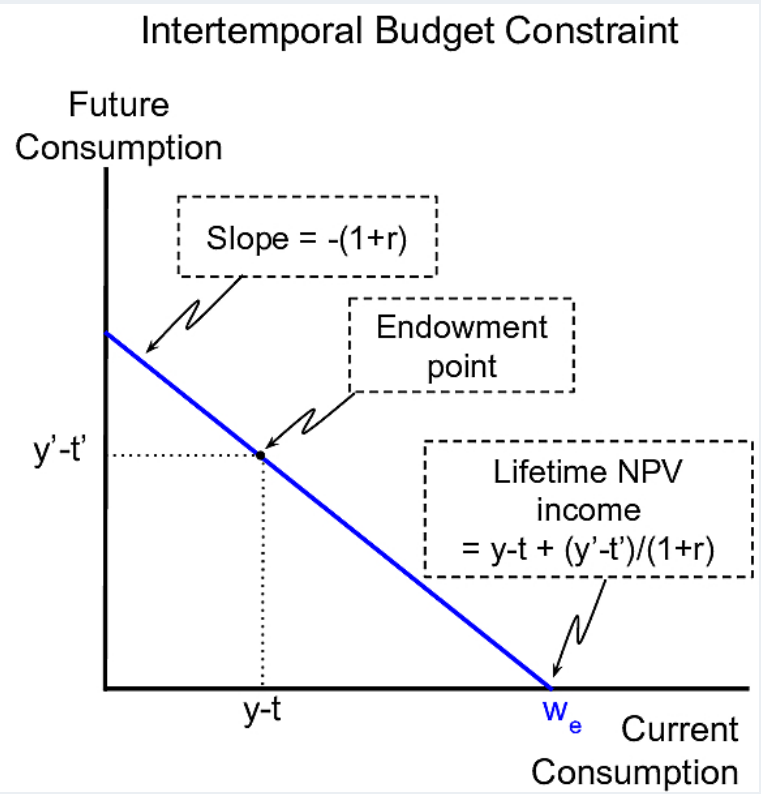

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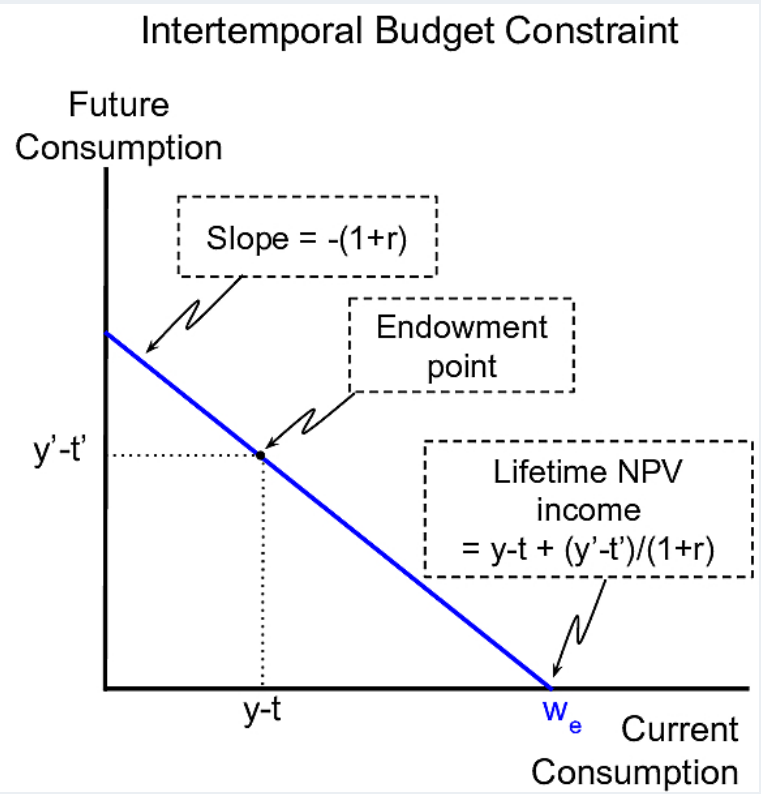

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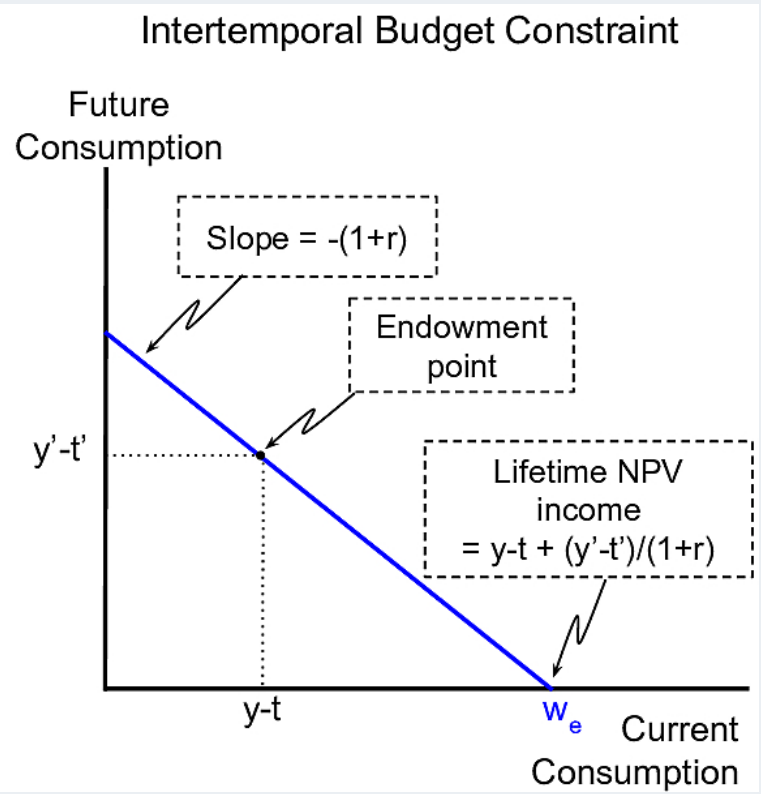

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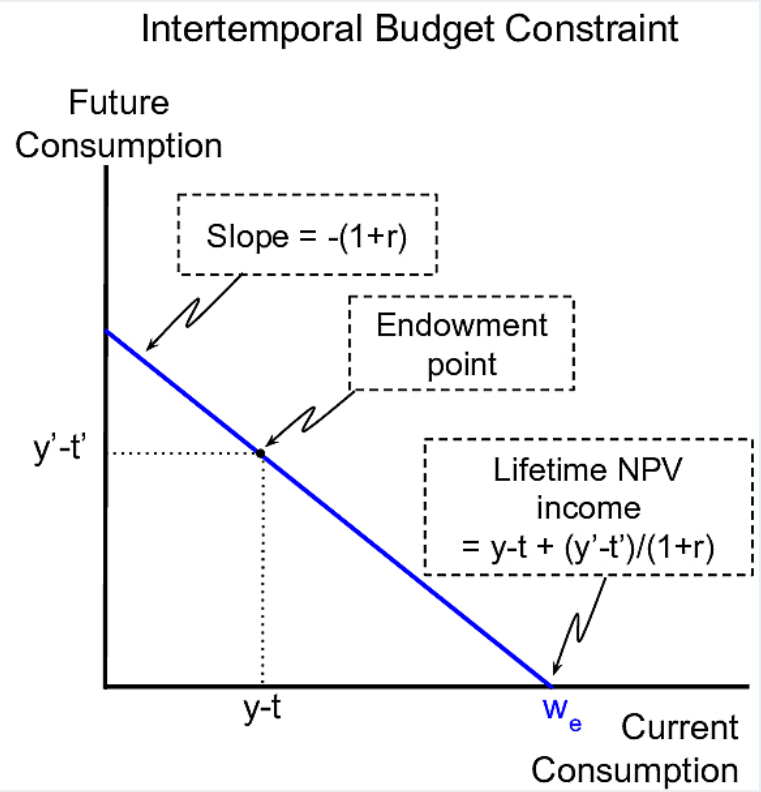
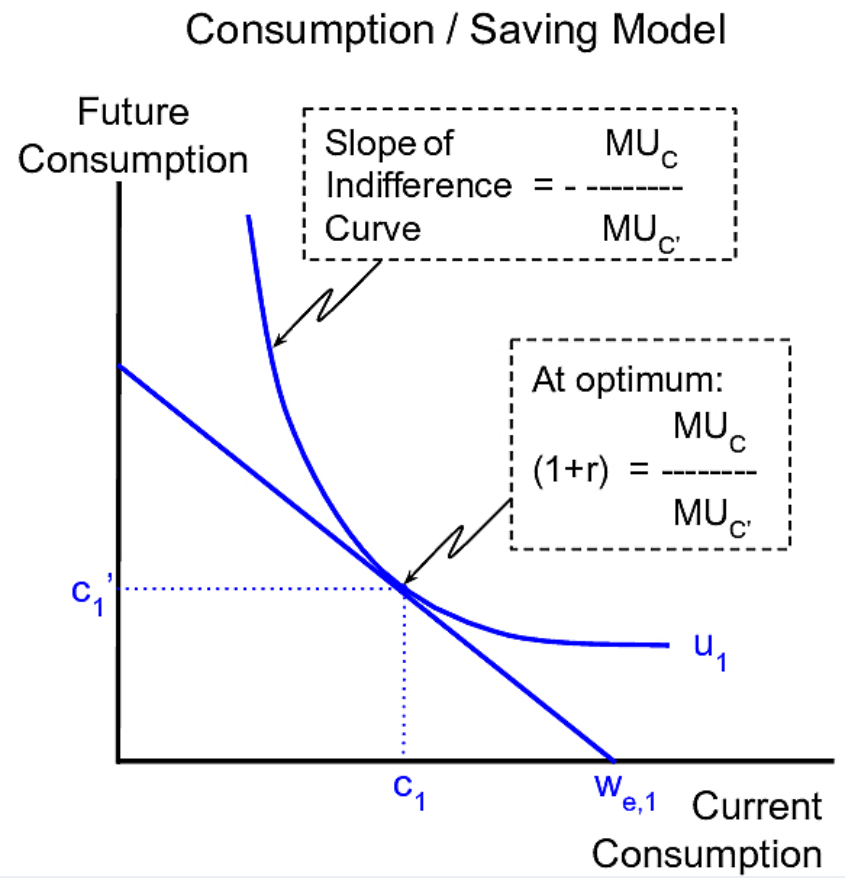


Utility Maximization

Consumer Decision

- Choice variables: current and future consumption
- Given variables: endowments y and y', taxes t and t', interest rate, r
- Maximize utility: reach highest utility curve possible
- Maximize utility where indifference curve is just tangent to budget constraint

Graphical Utility Maximization



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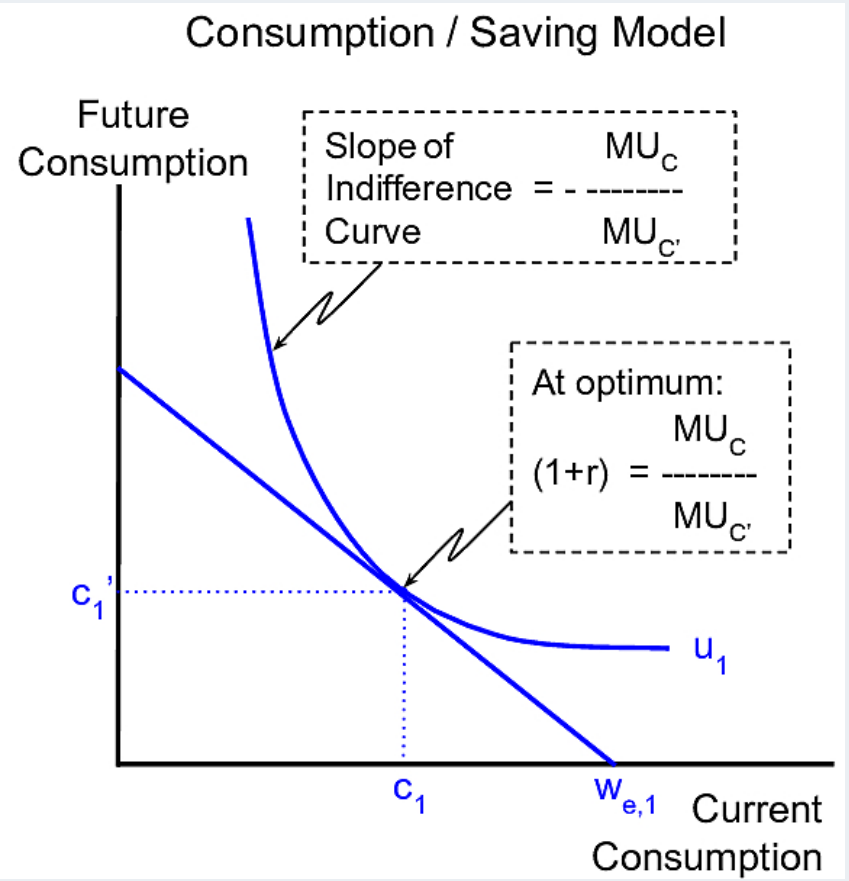

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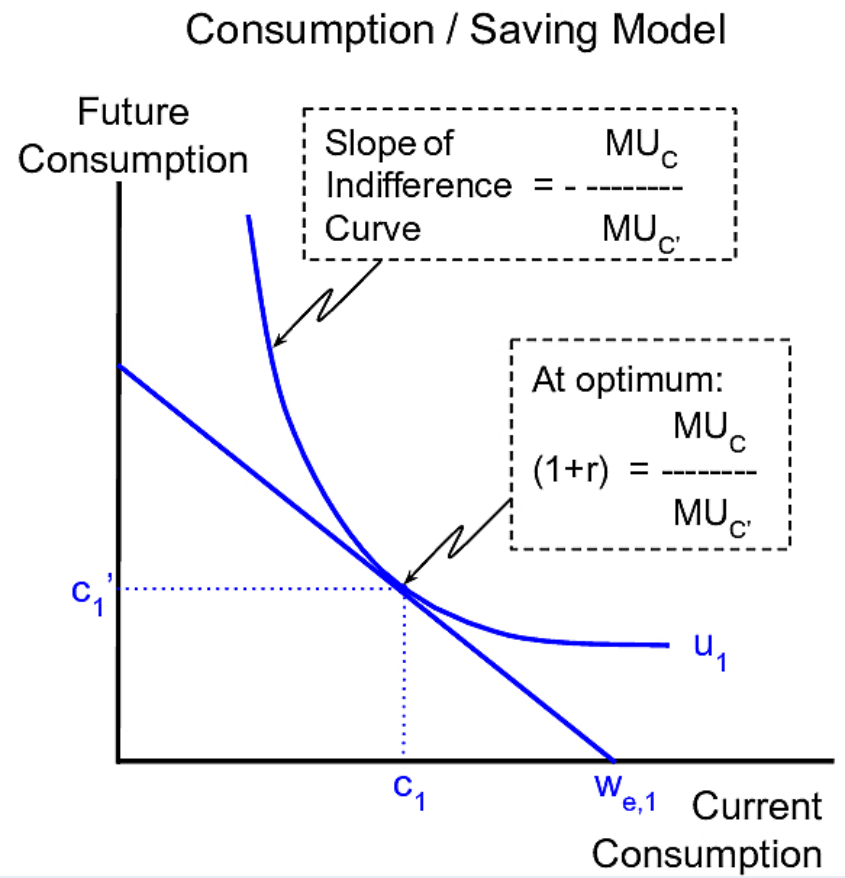

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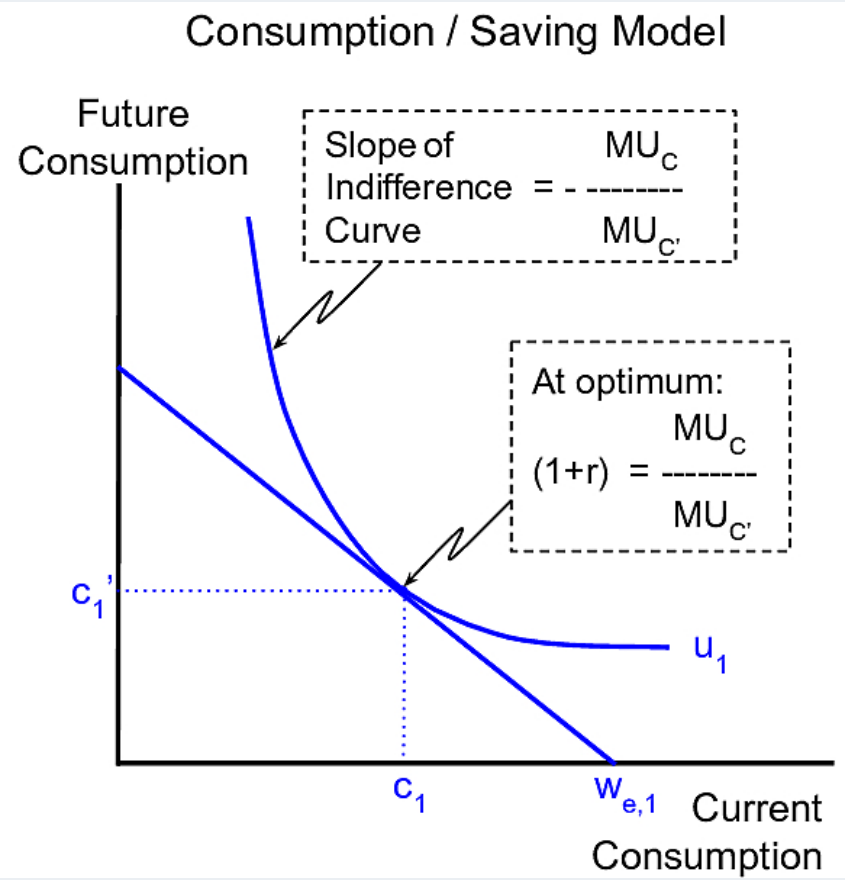

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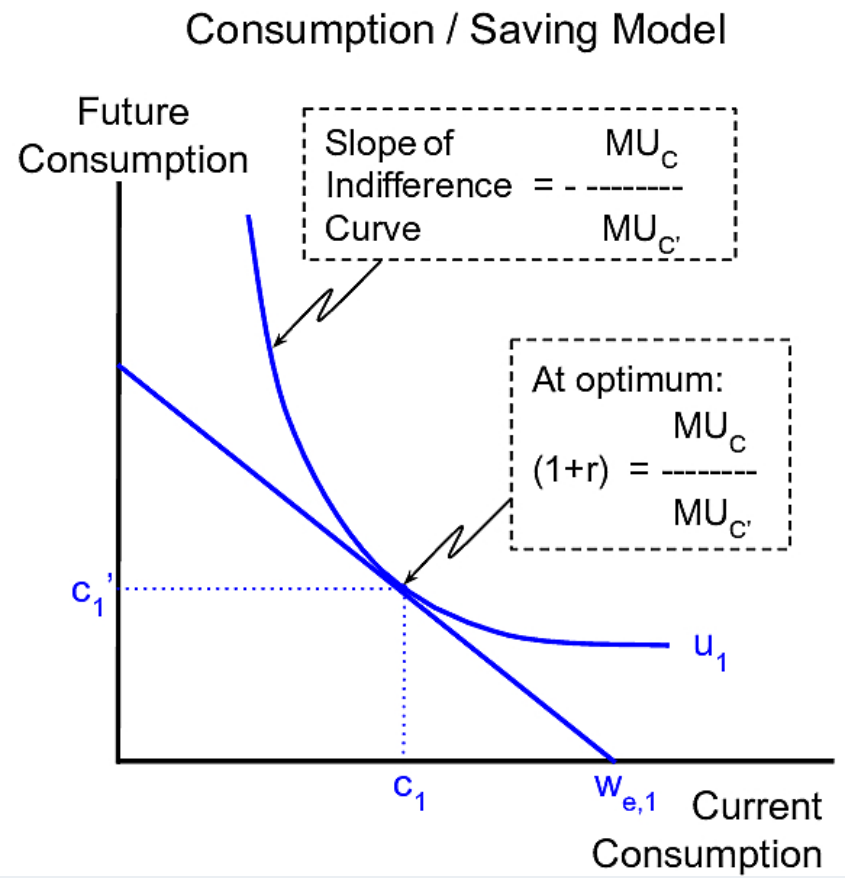

Savers Versus Borrwers

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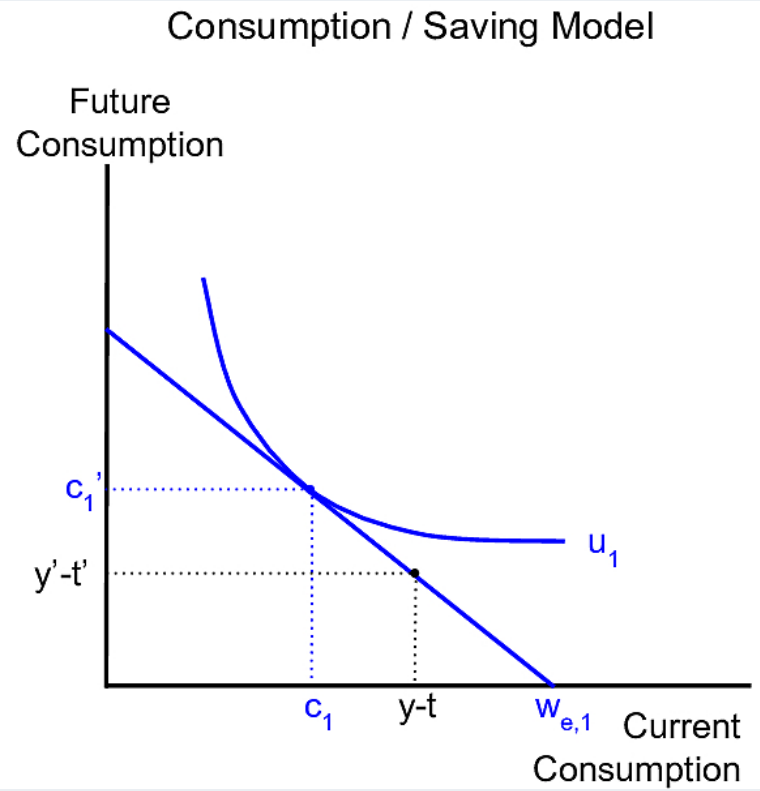

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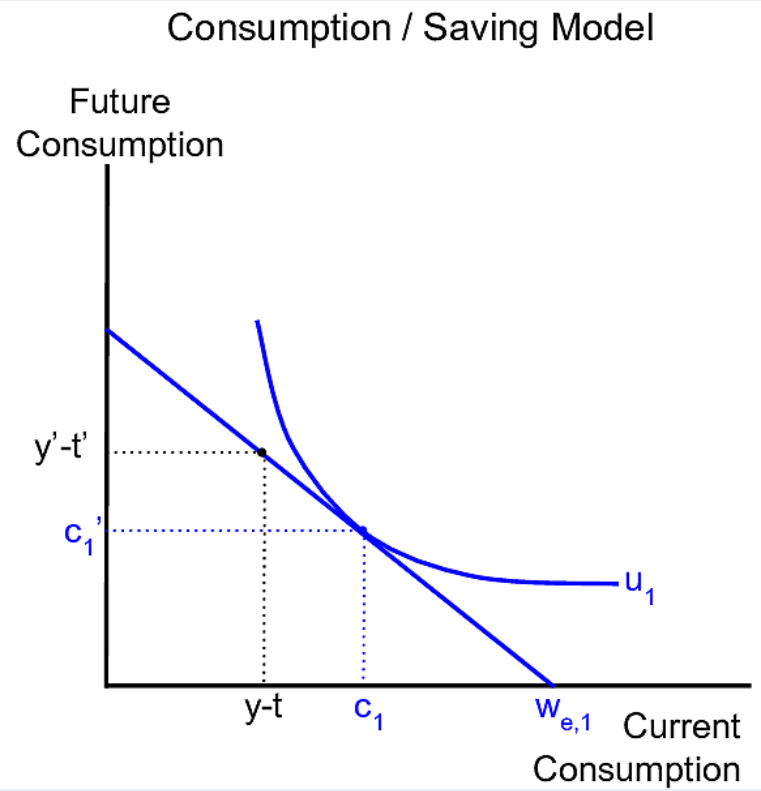
Consumer is a Borrower



$c > y - t$, saving is negative

Temporary Increase in Income

Temporary Increase in Income

- Suppose income increases in the current period ($\uparrow y$), but expected to be temporary (i.e. no change in y')
- Budget shifts outward, horizontal distance equal to the change in y
- Consumption smoothing: Both c and c' increase
- Savings increases: $\Delta c < \Delta y$

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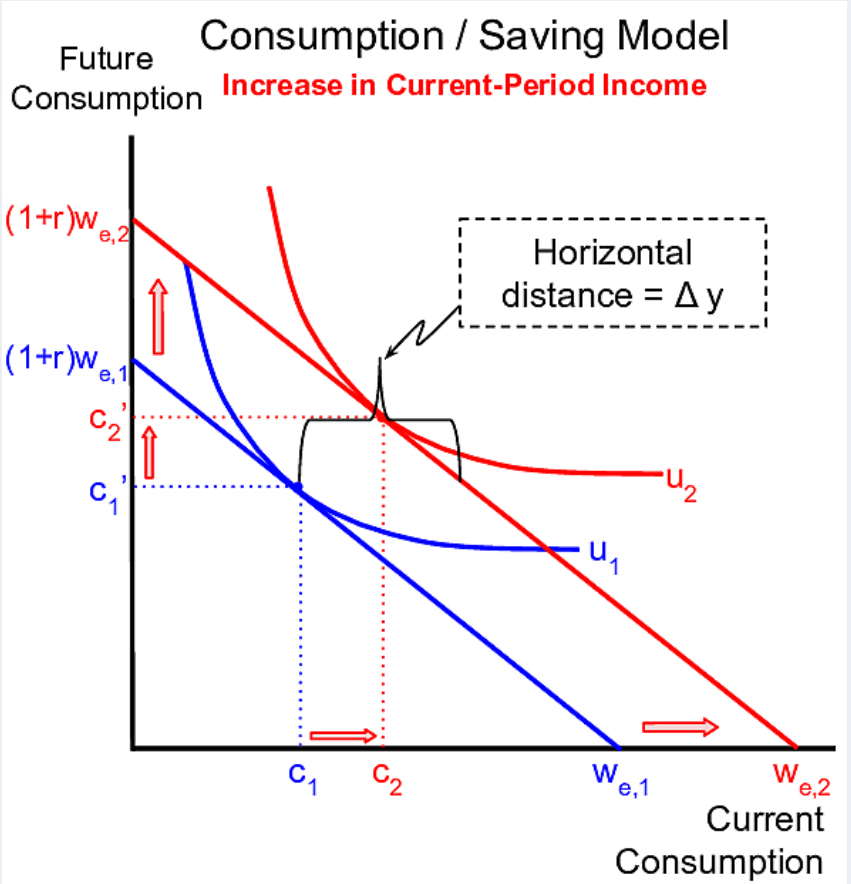

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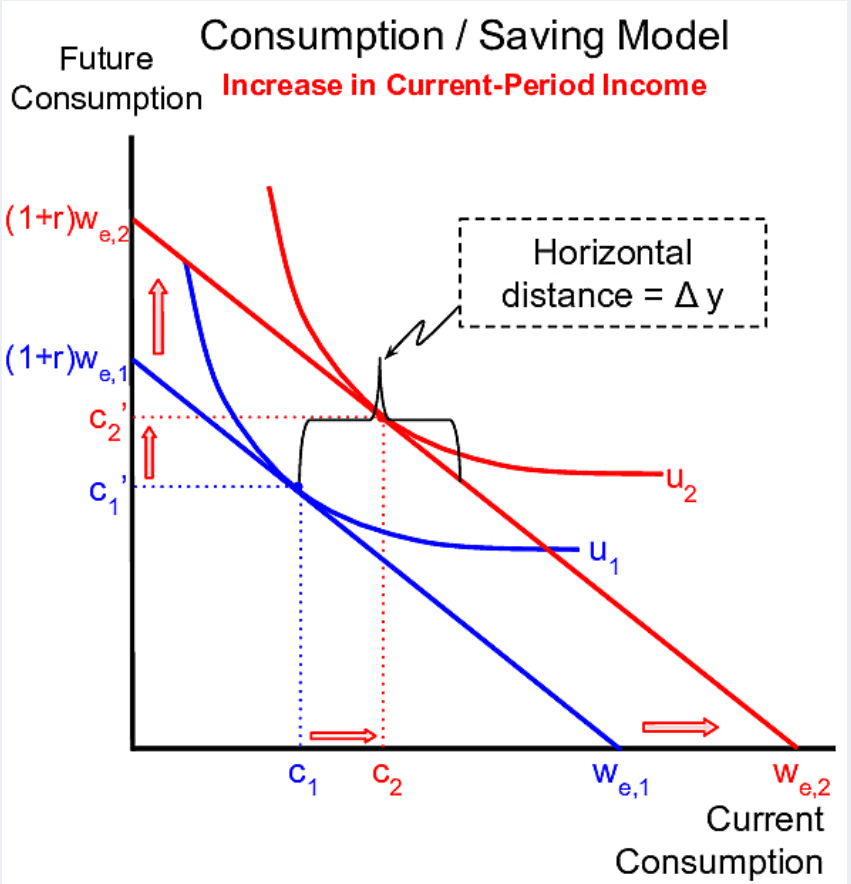

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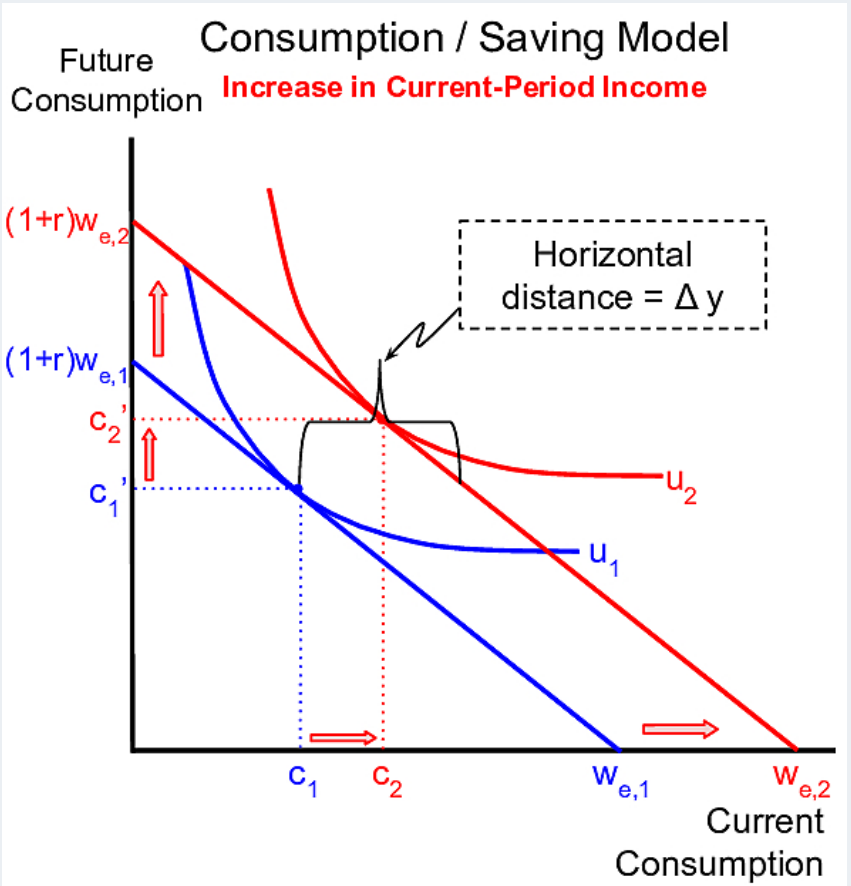

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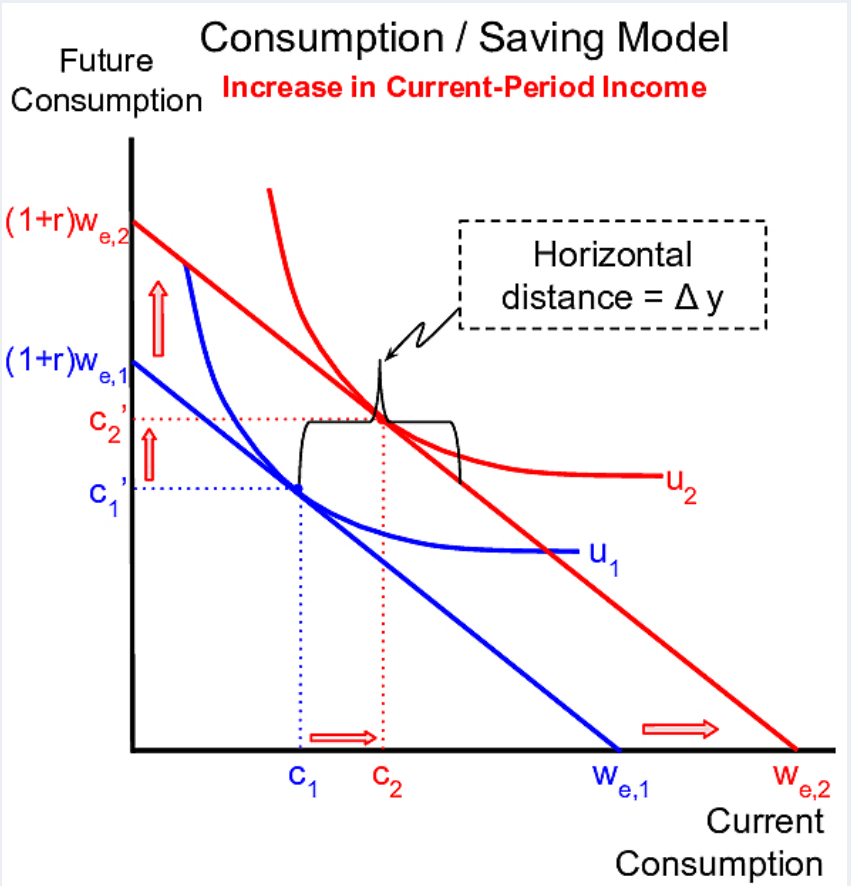

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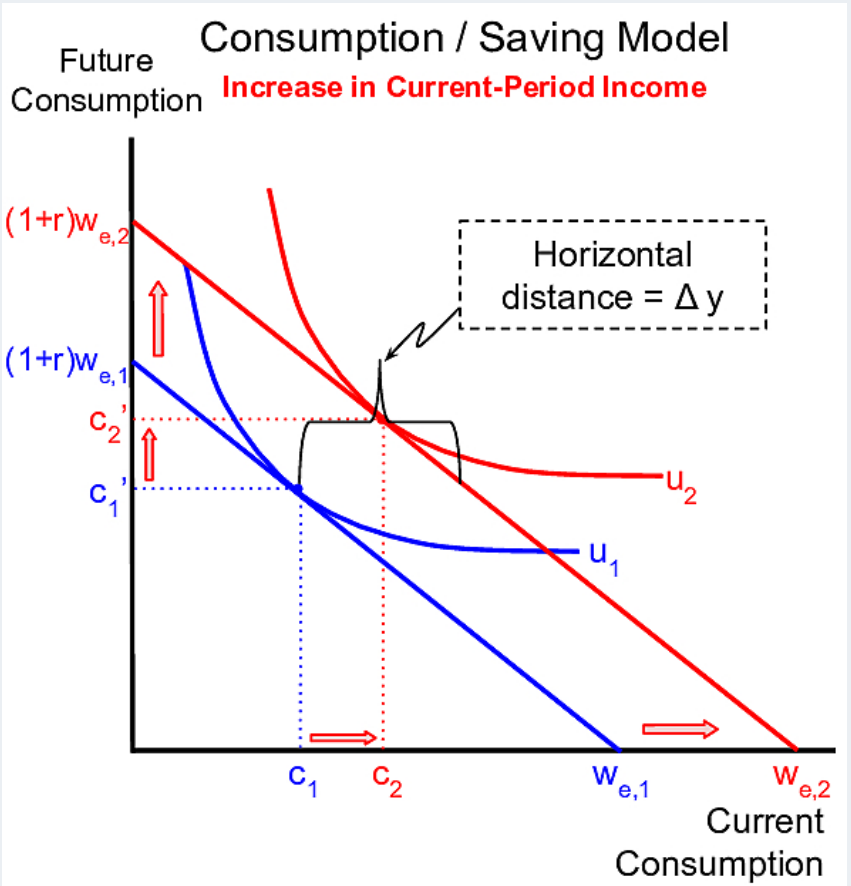

Increase in Expected Future Income

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- Budget shifts outward, vertical distance equal to the change in y'
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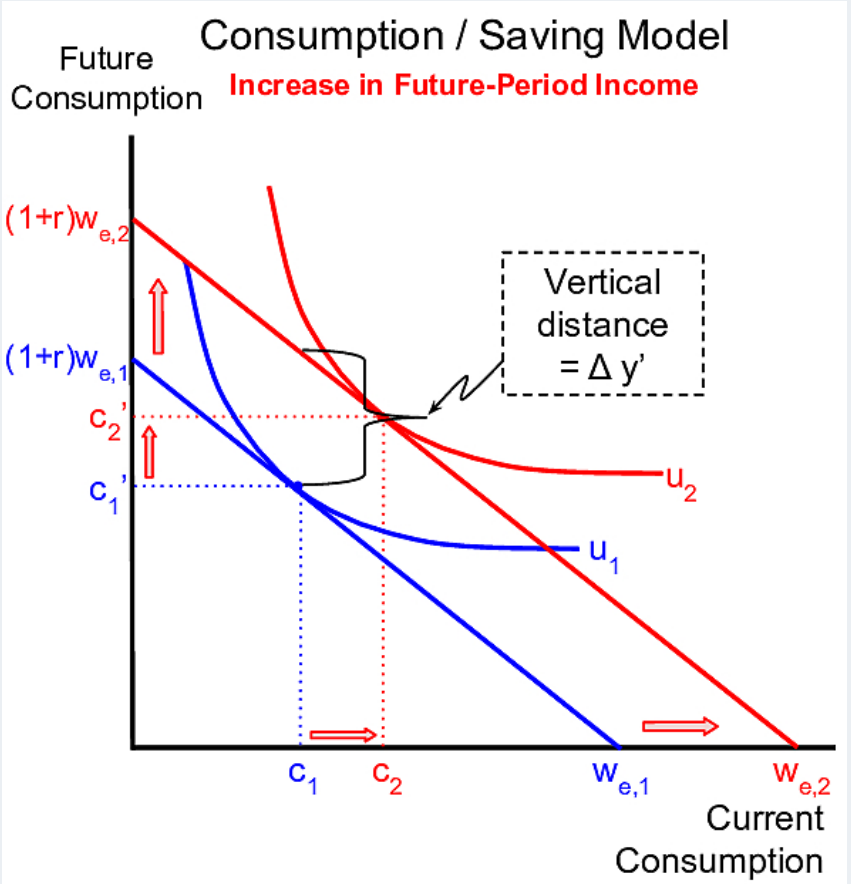

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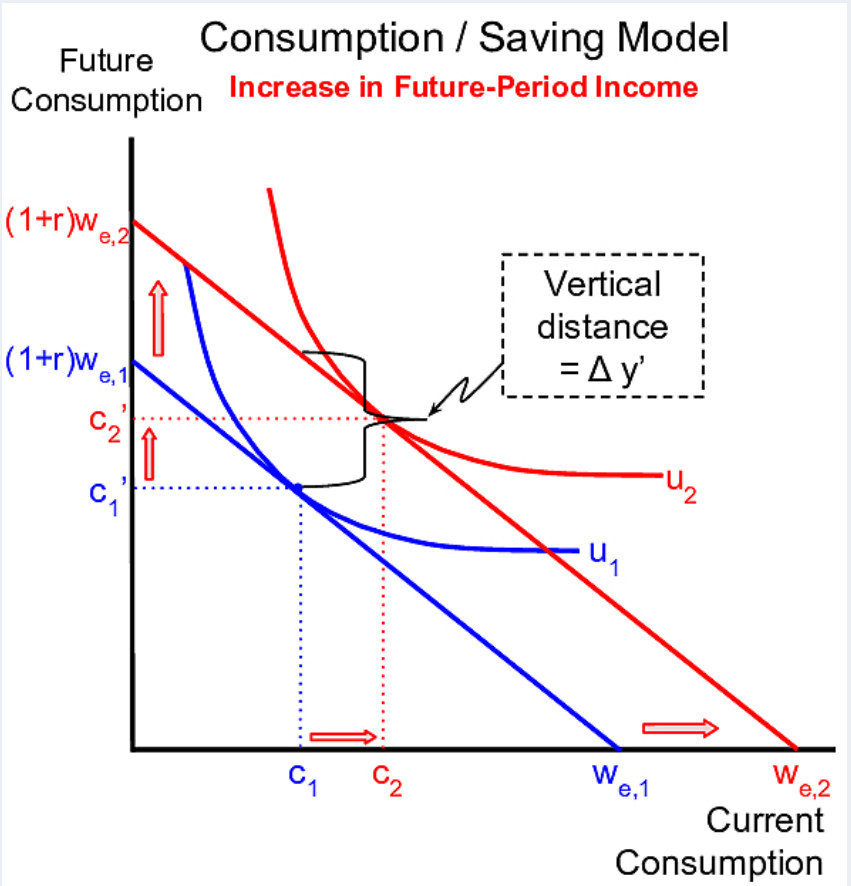

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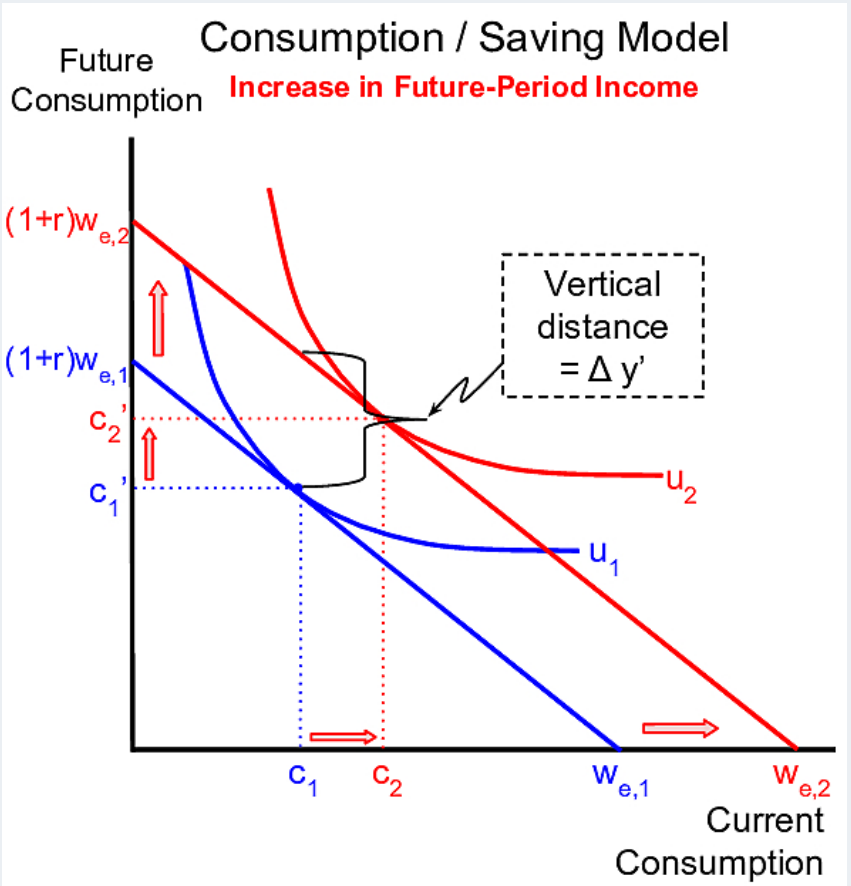

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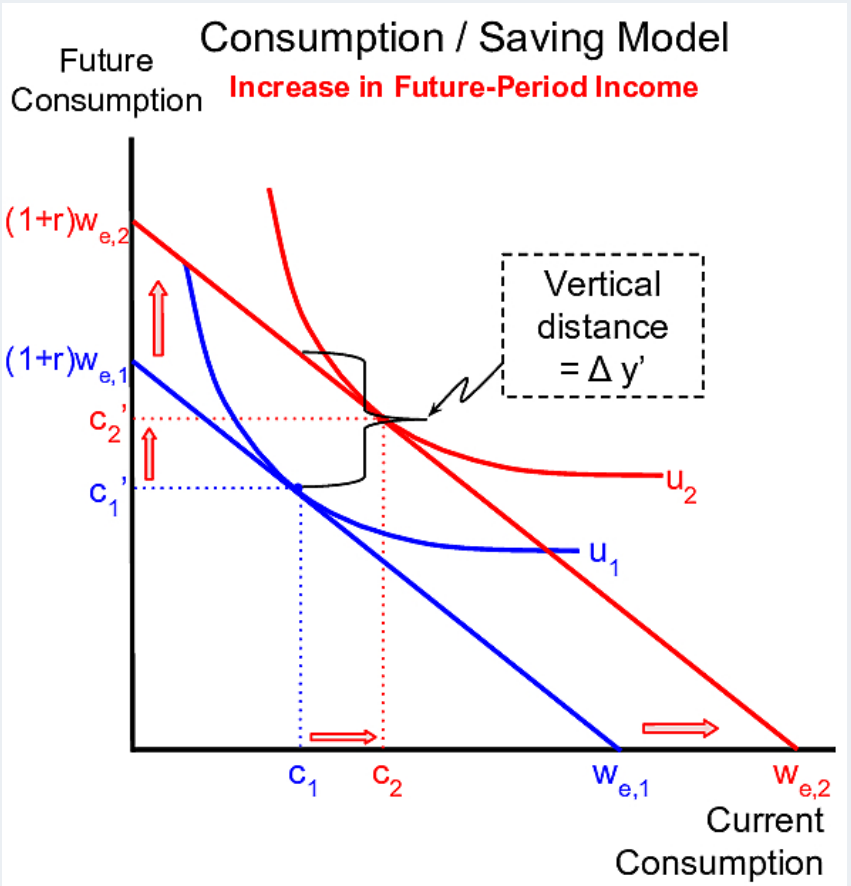

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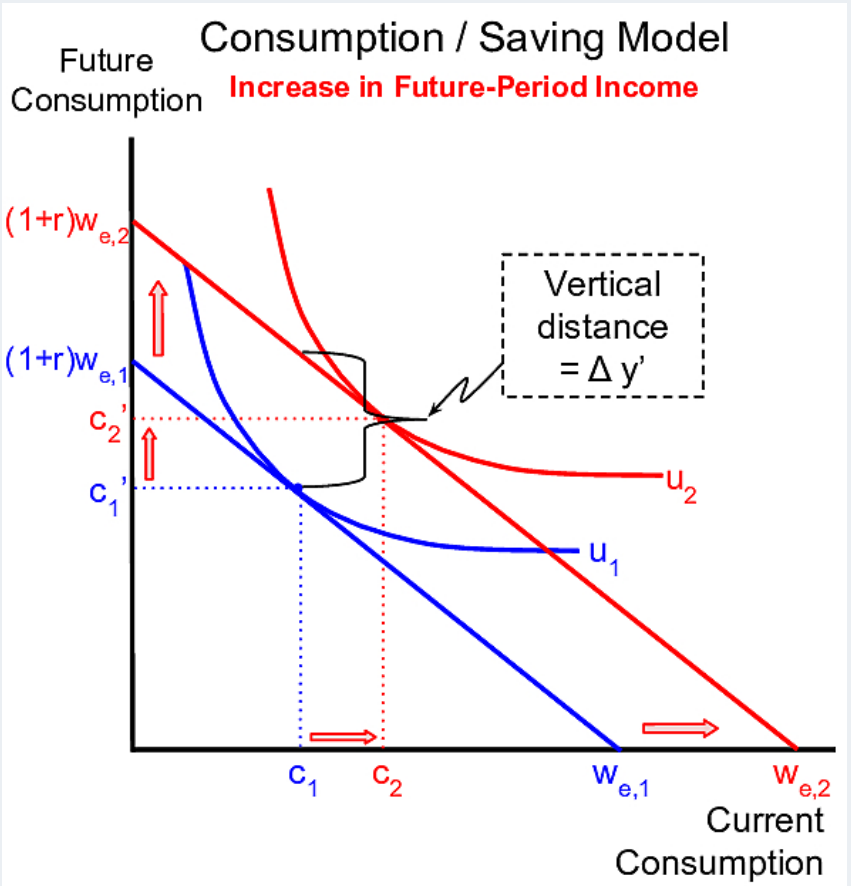

Permanent Increase in Income

Permanent Increase in Income

- Suppose income increases in the current and future period by the same amount ($\Delta y = \Delta y'$)
- Budget shifts outward, twice.
- Horizontal distance $= \Delta y$, vertical distance $= \Delta y'$
- No consumption smoothing: Both c and c' increase by full $\Delta y = \Delta y'$
- No change in savings: All increase in income goes to consumption

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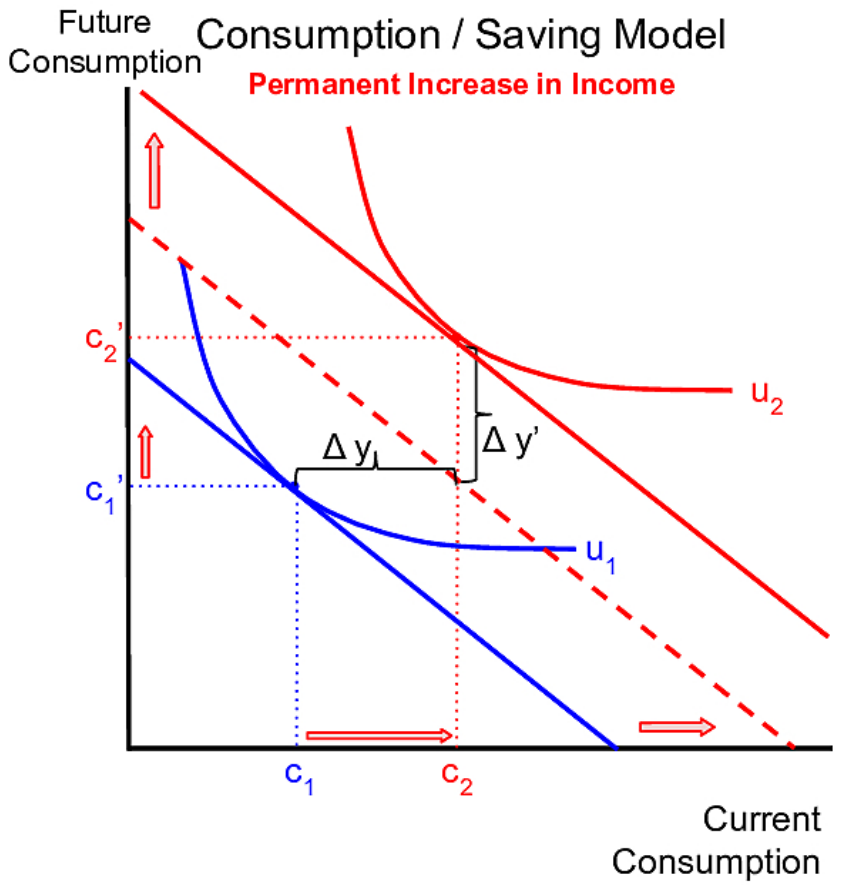

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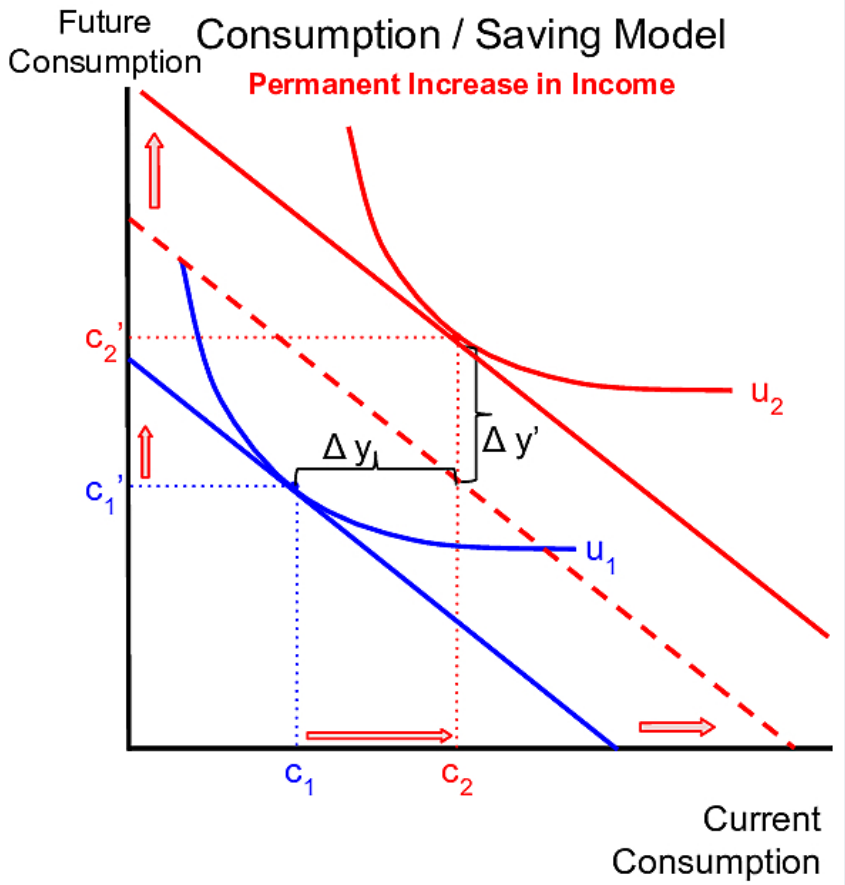

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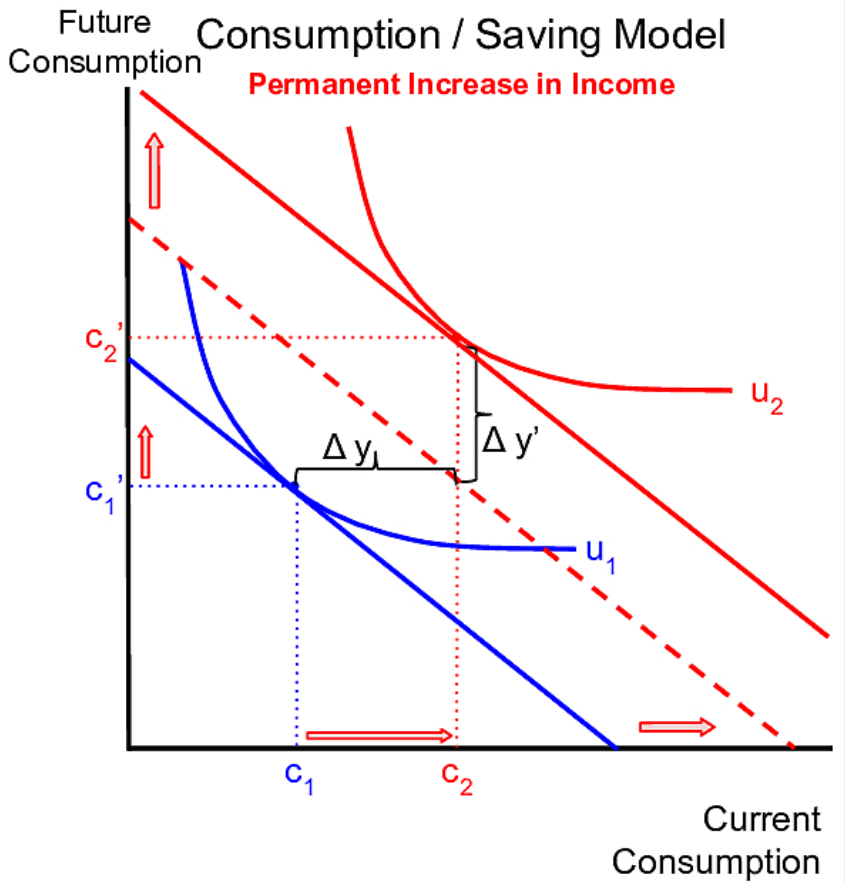

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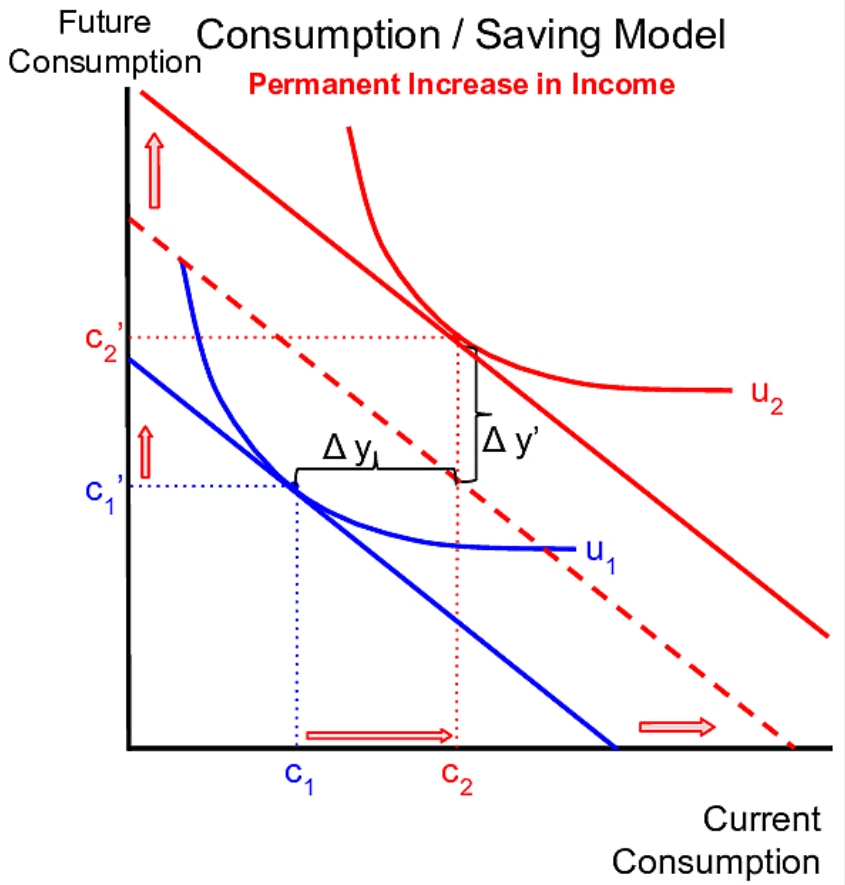

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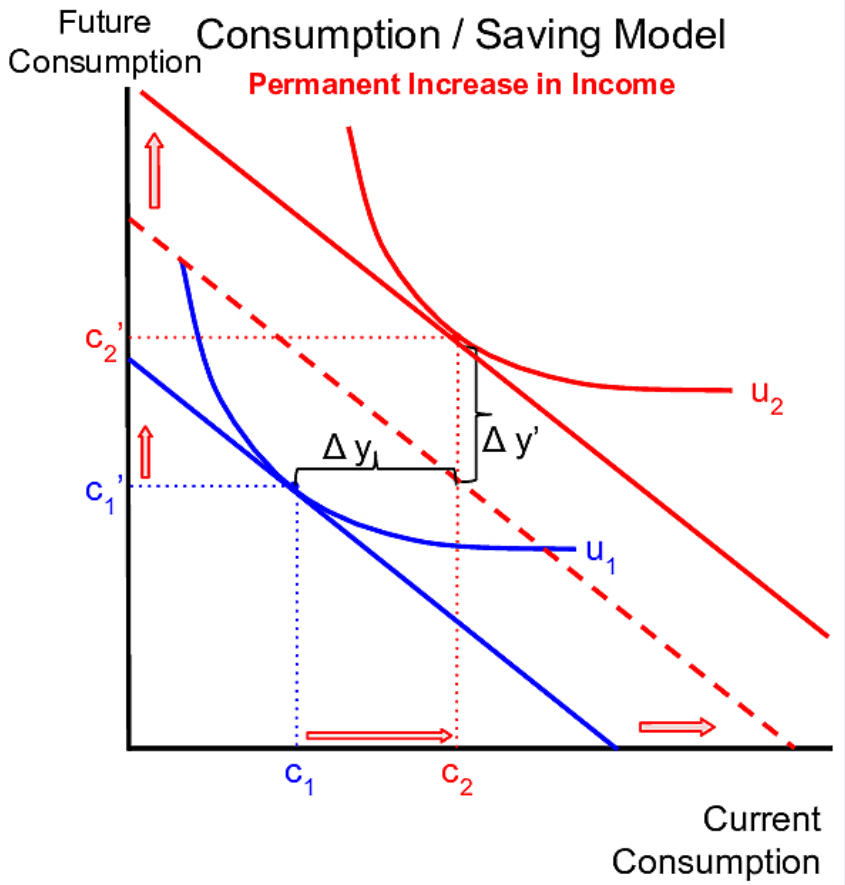

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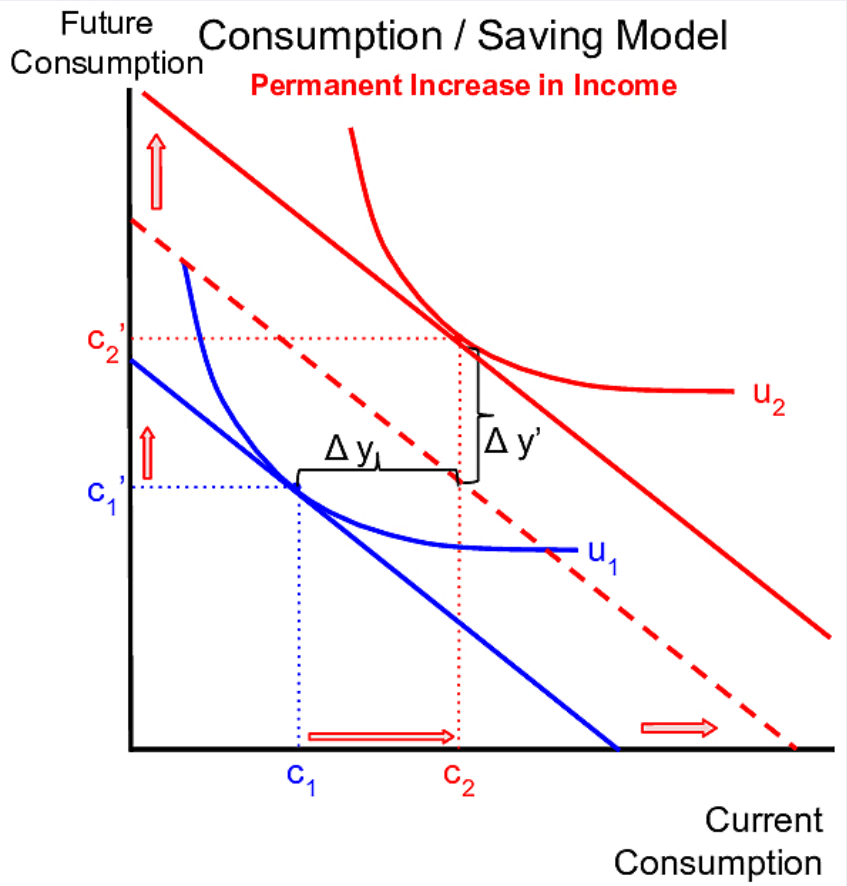

Increase in Interest Rate on Borrowers

Increase in Interest Rate

- Causes a pivot in the budget constraint at the endowment point
- Substitution effect: Current consumption more expensive, $\downarrow c, \uparrow c'$
- *Negative* income effect for borrowers: $\downarrow c, \downarrow c'$
- Current consumption decreases
- Indeterminate impact on future consumption
- Saving increases (i.e. borrowing decreases)

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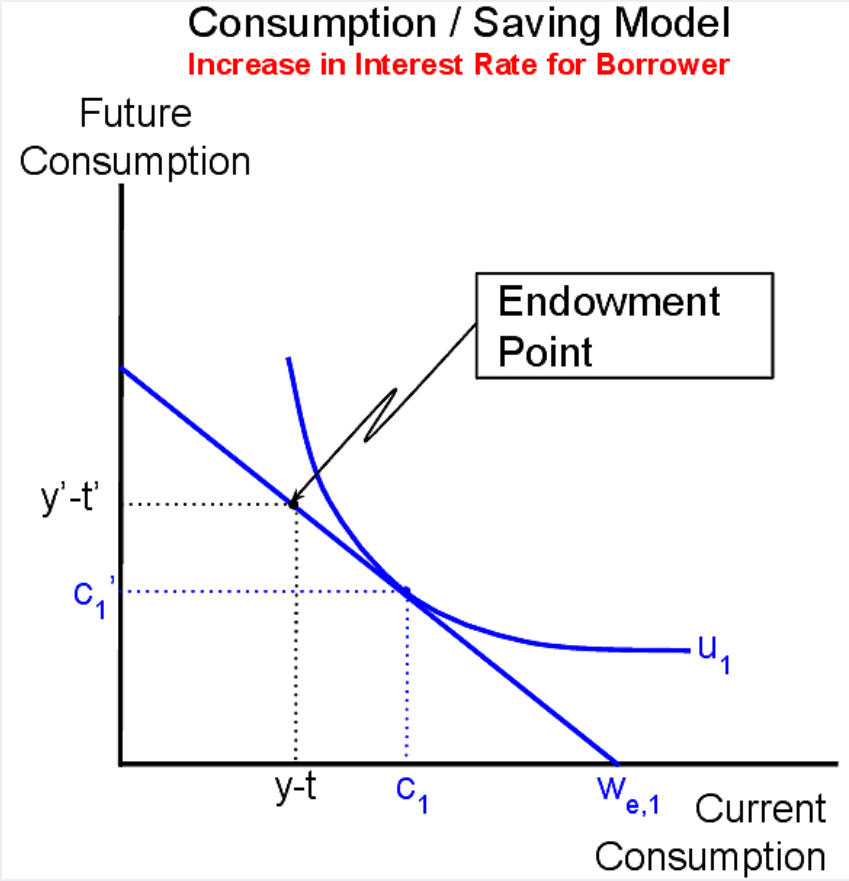

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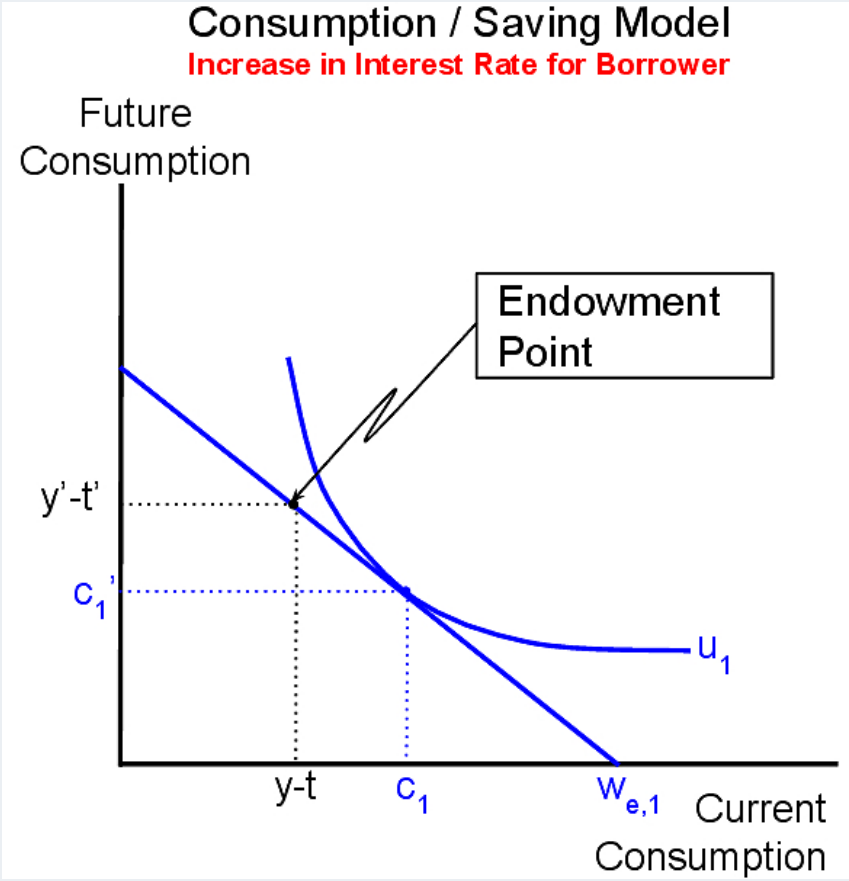

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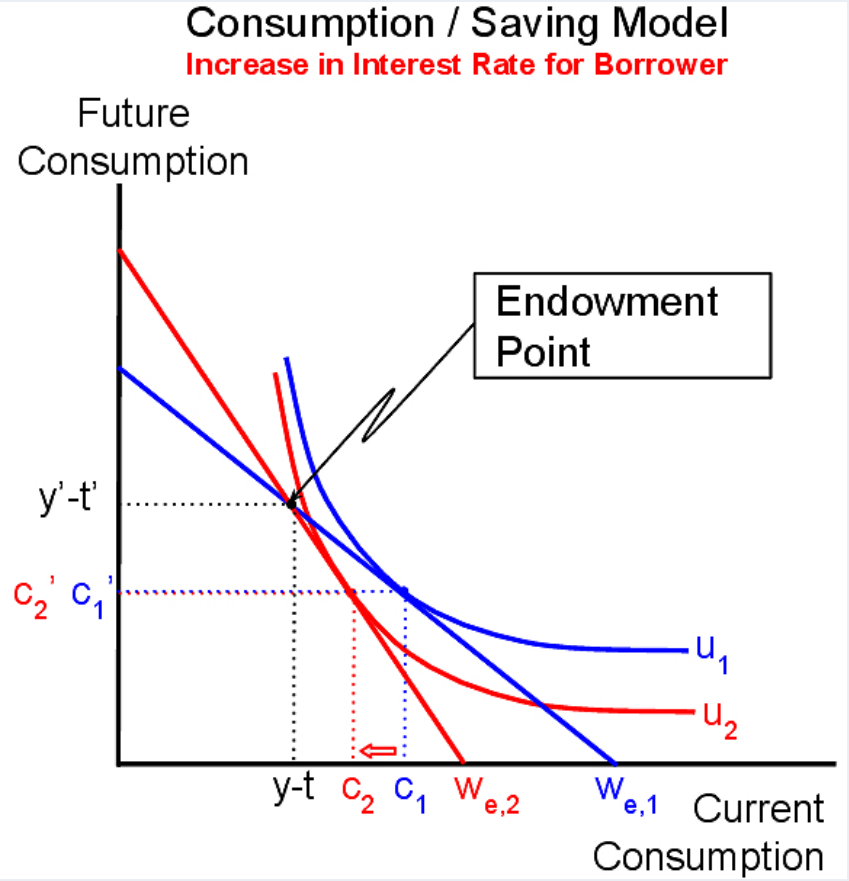

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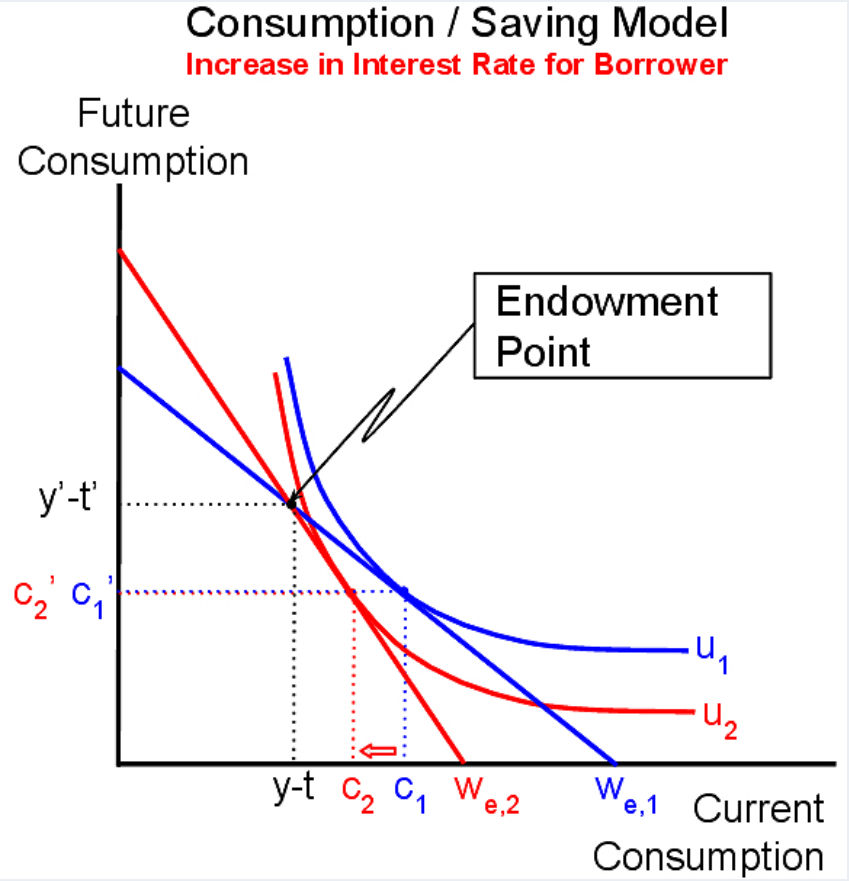

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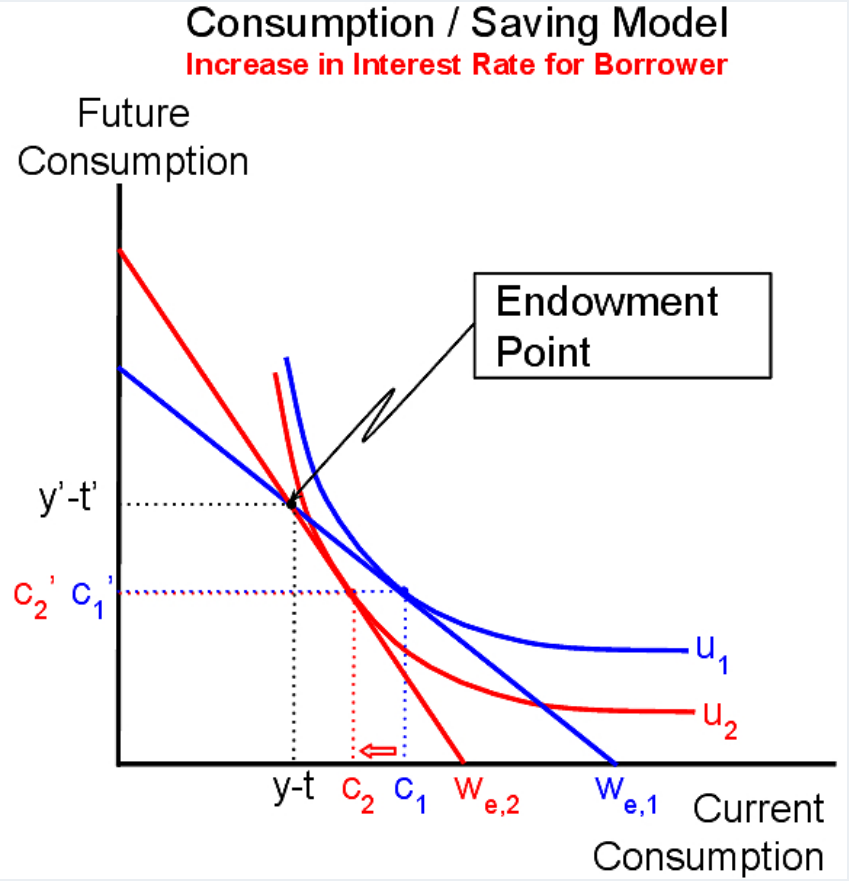

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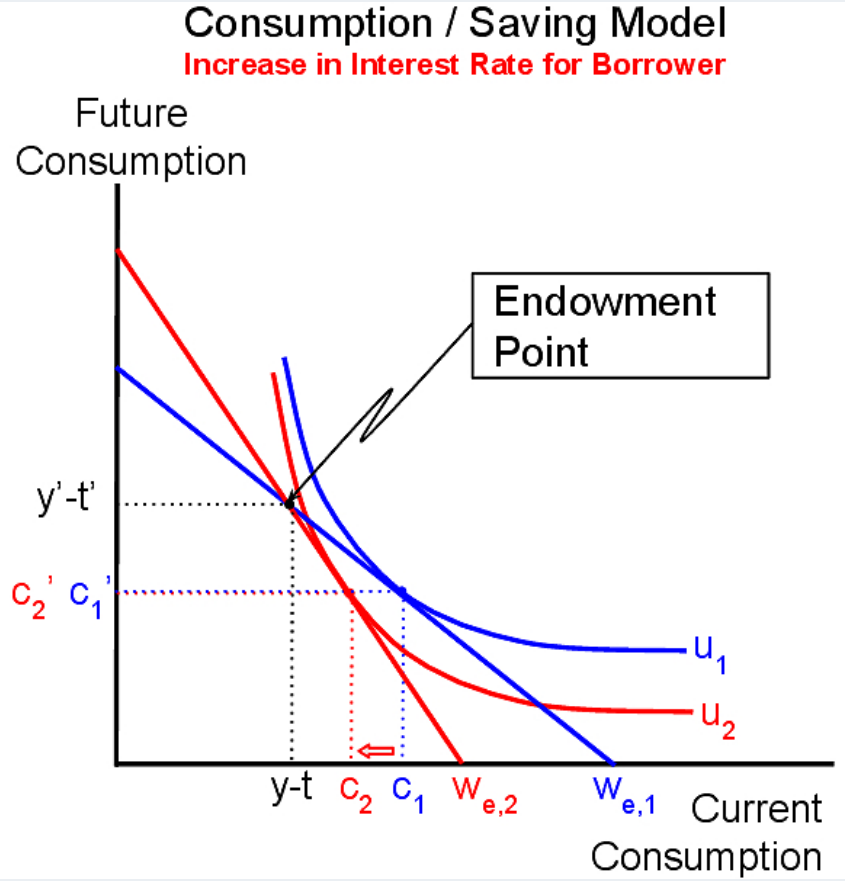

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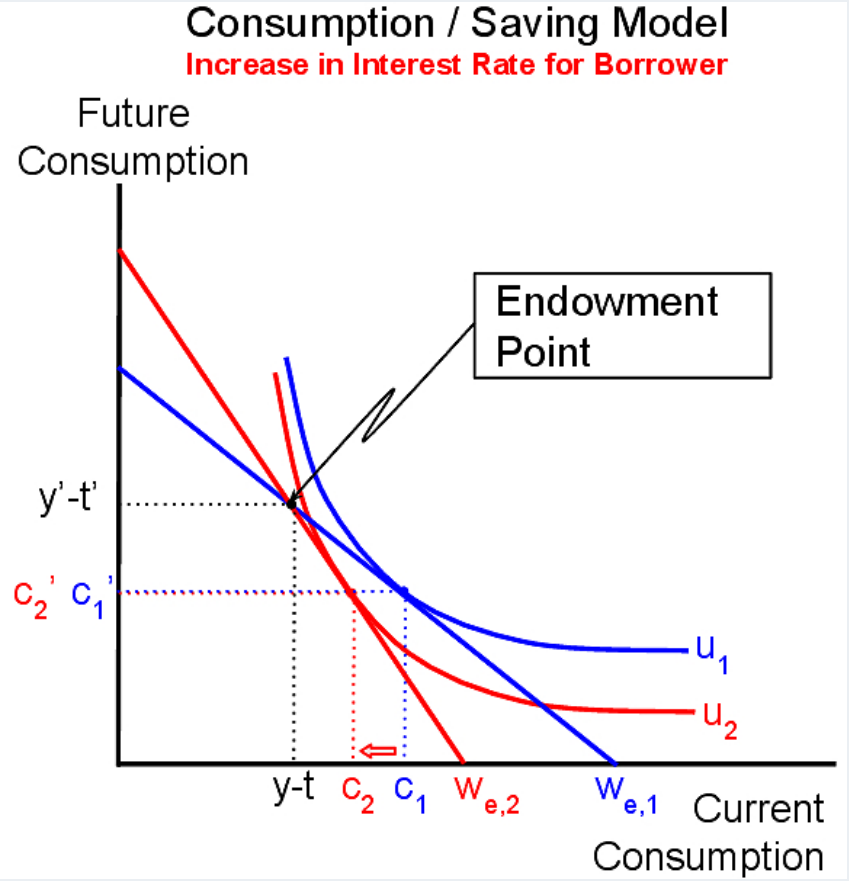

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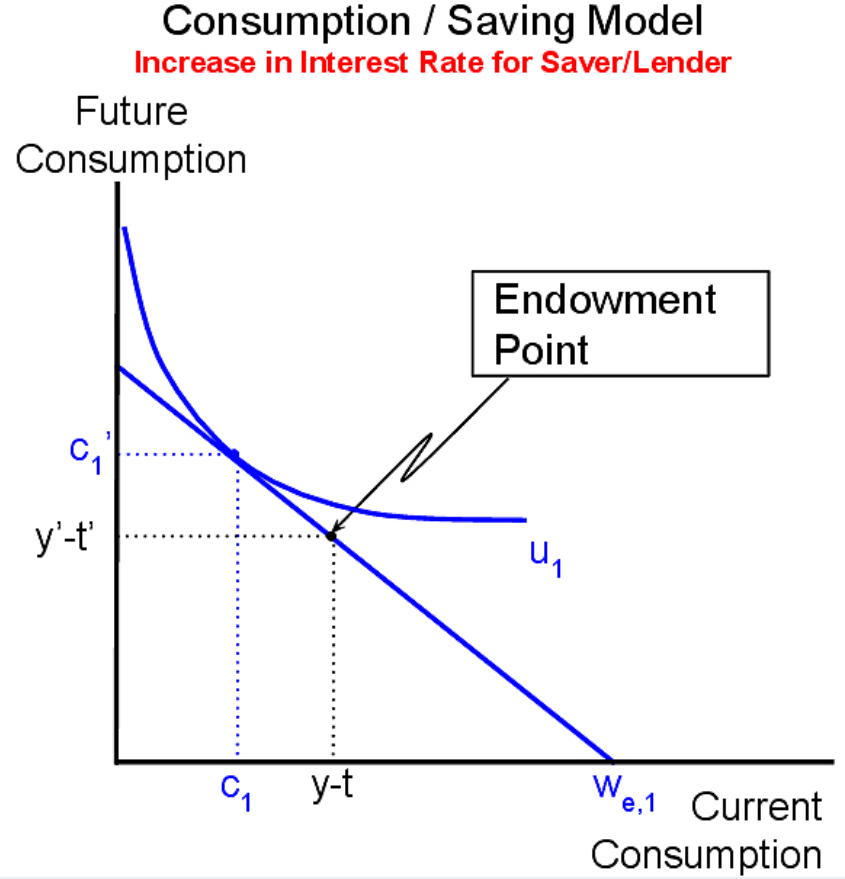

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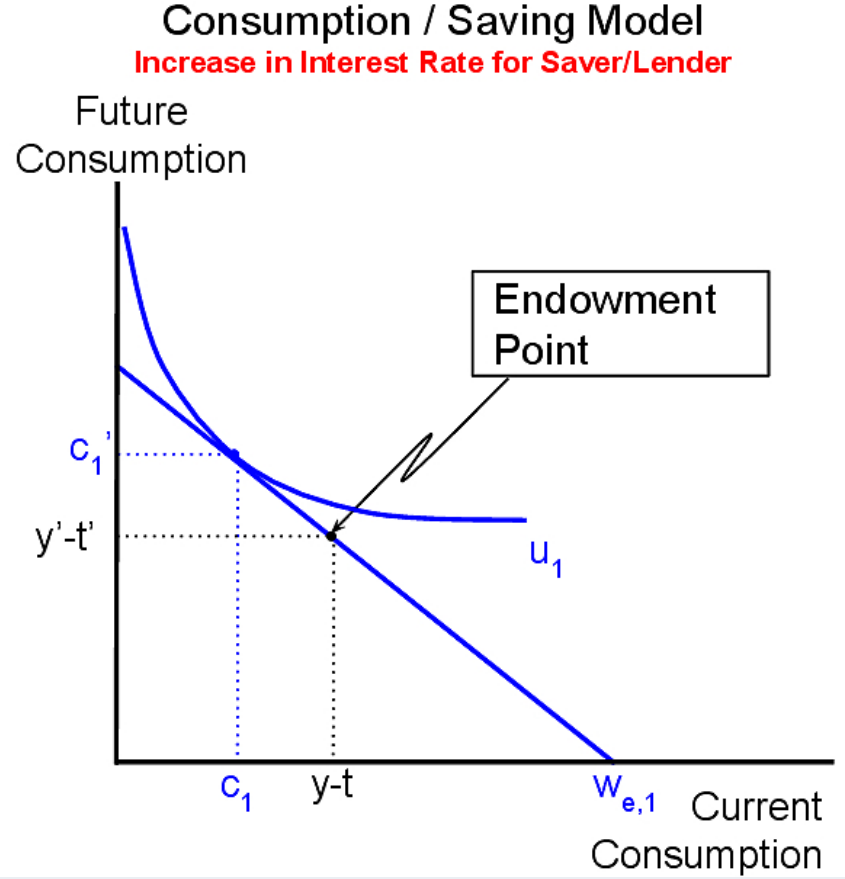

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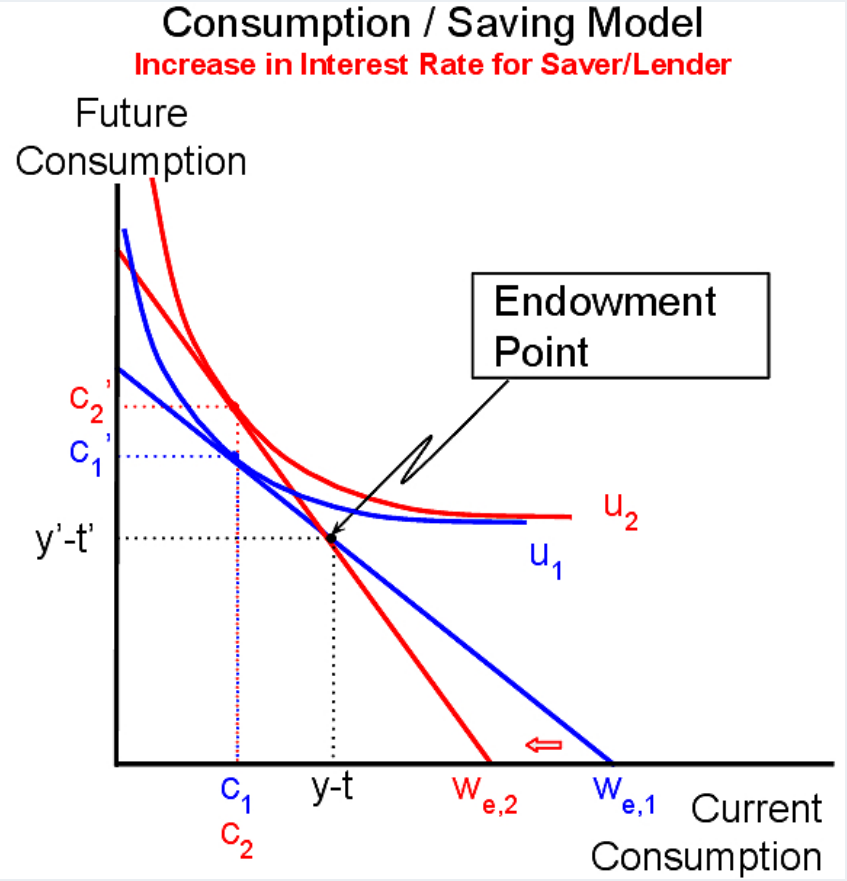

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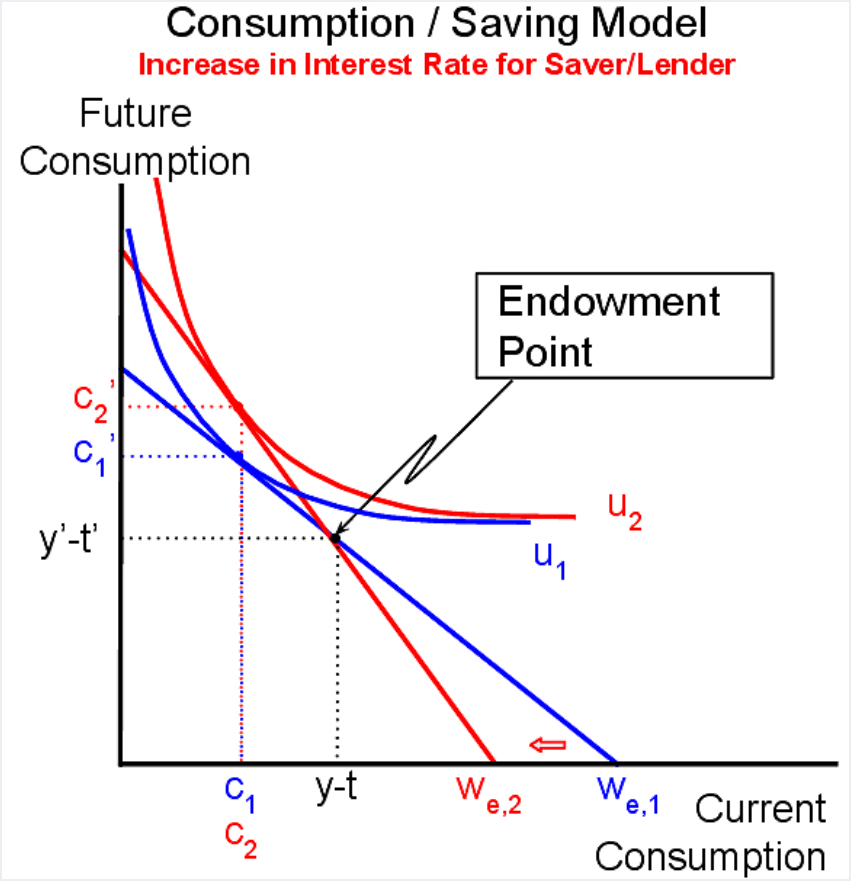

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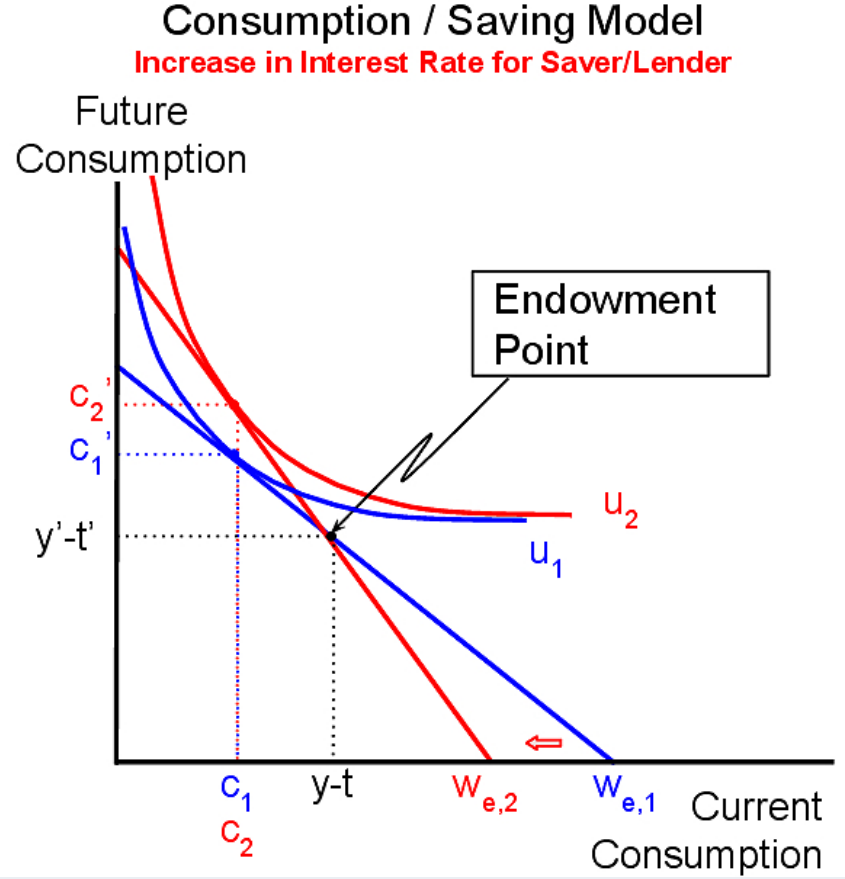

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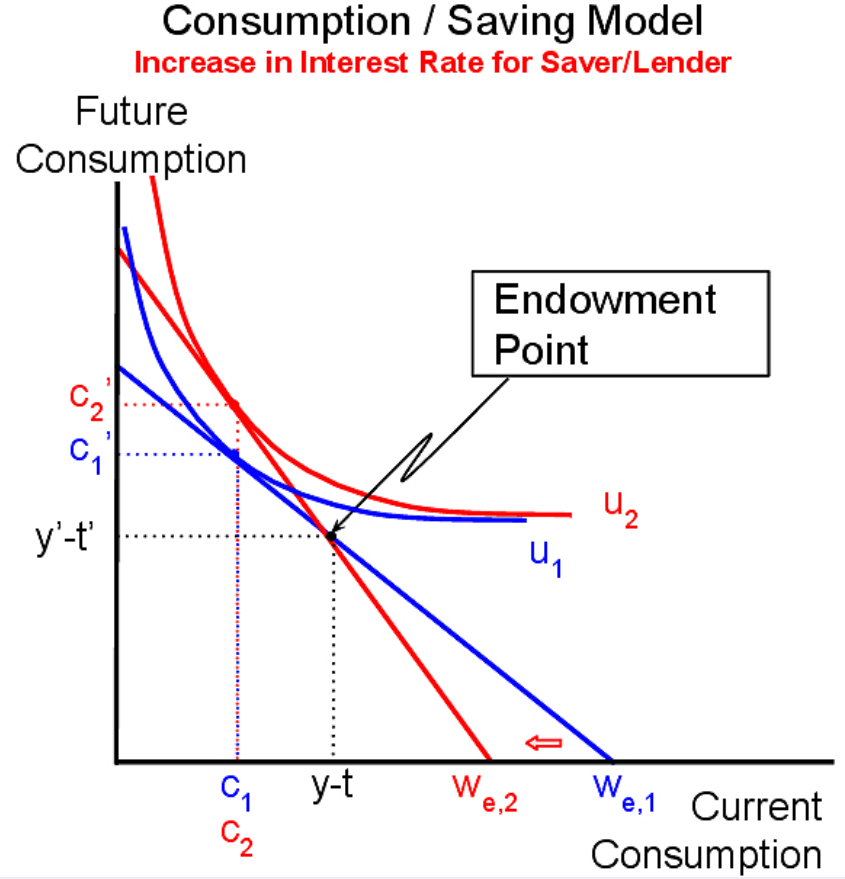

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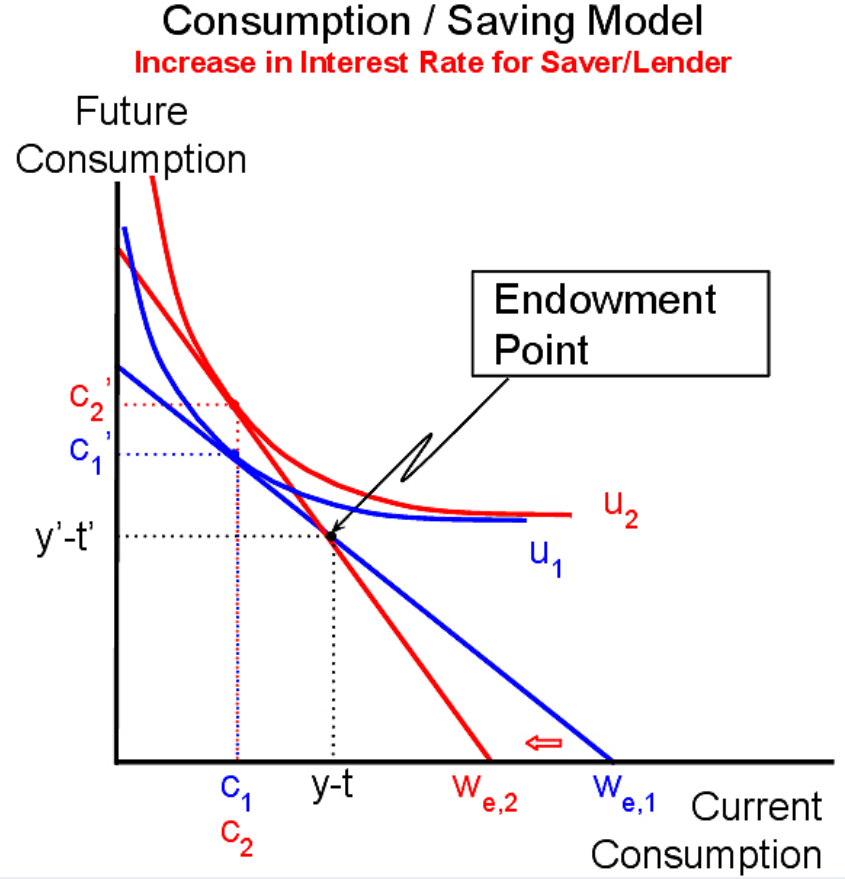

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- Suppose government increases spending, with no change in taxes
- Without a credible announcement on change in future spending, people may assume financed with increase in future taxes
- Budget shifts inward, horizontal distance $= \Delta g$
- Consumption smoothing: Both c and c' decrease
- Increase in real GDP, since $\Delta g > -\Delta c$

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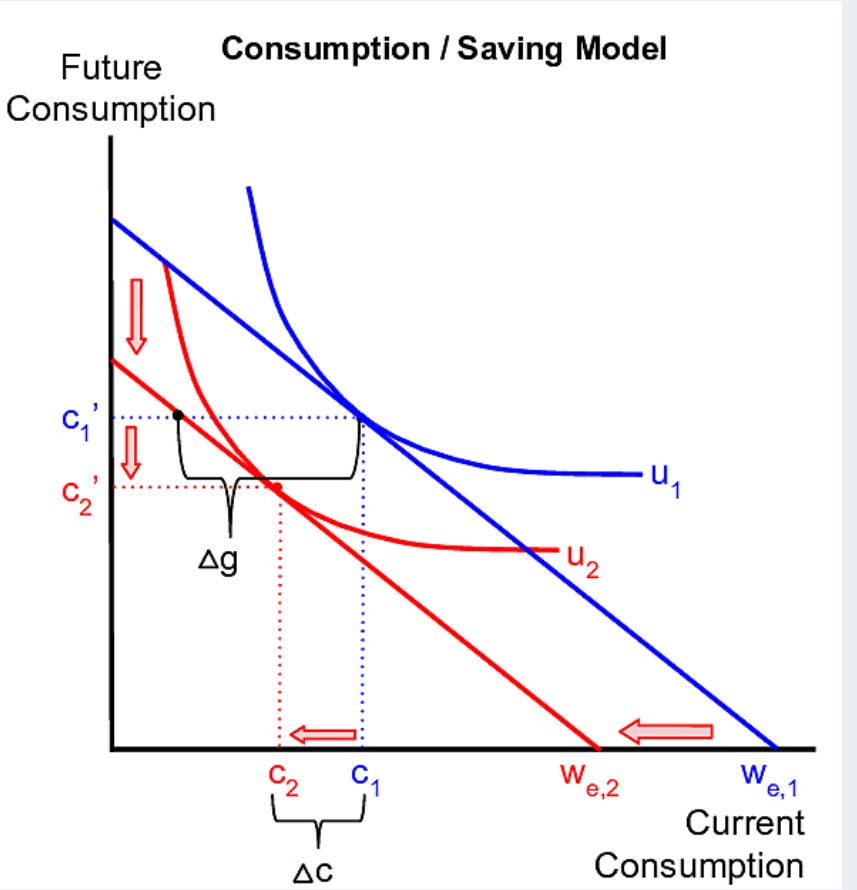

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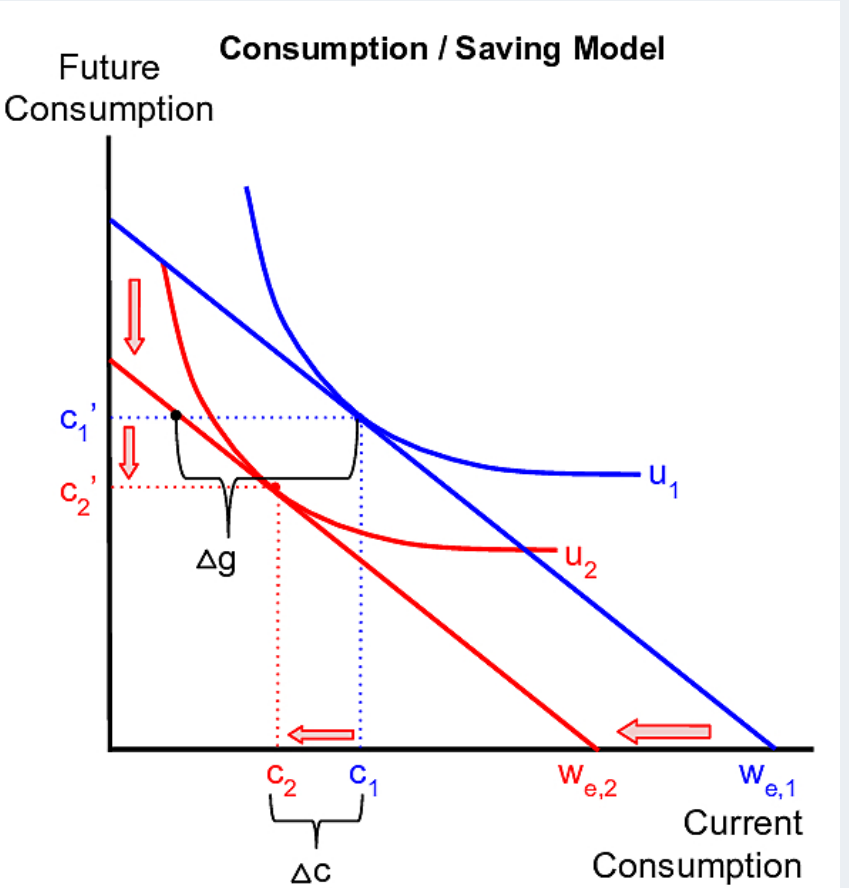

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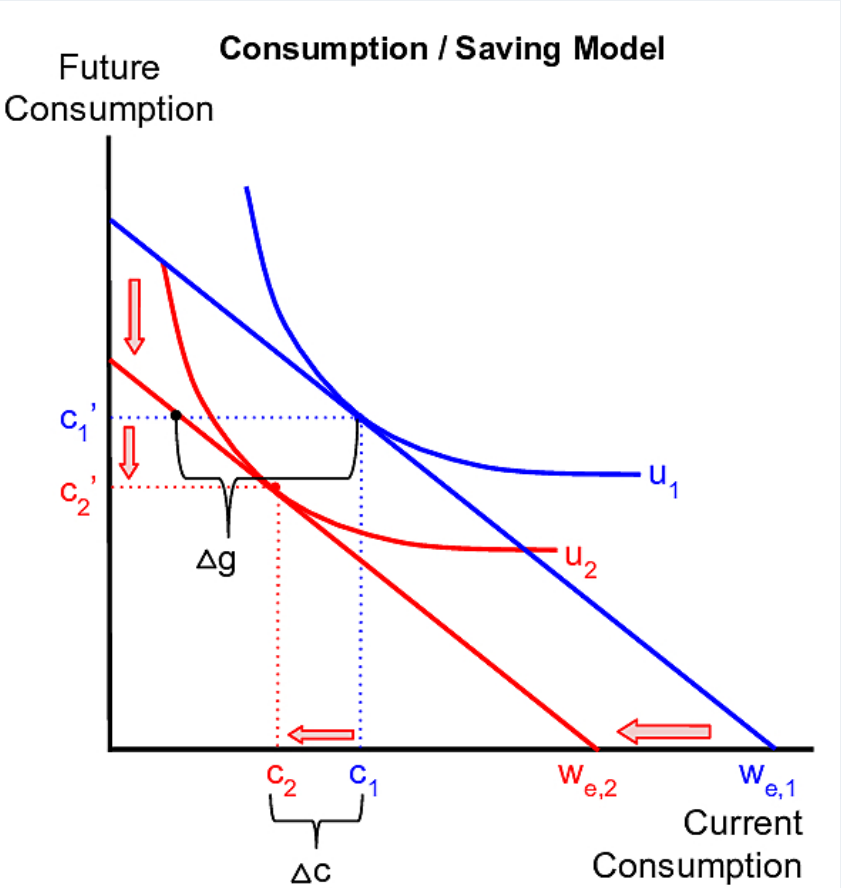

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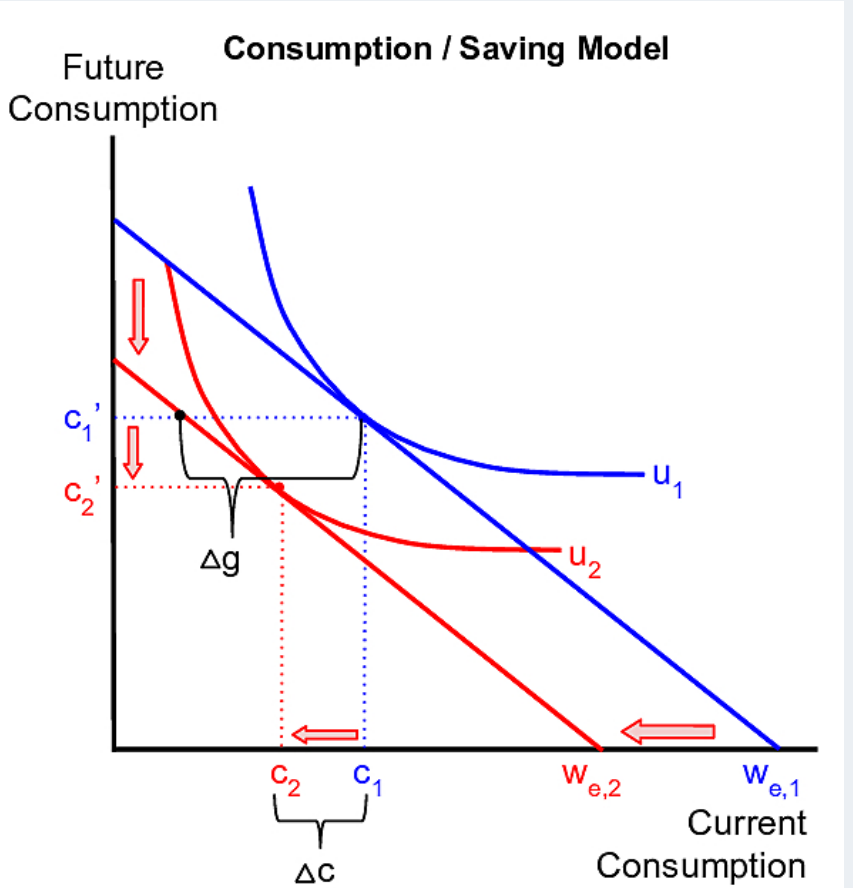

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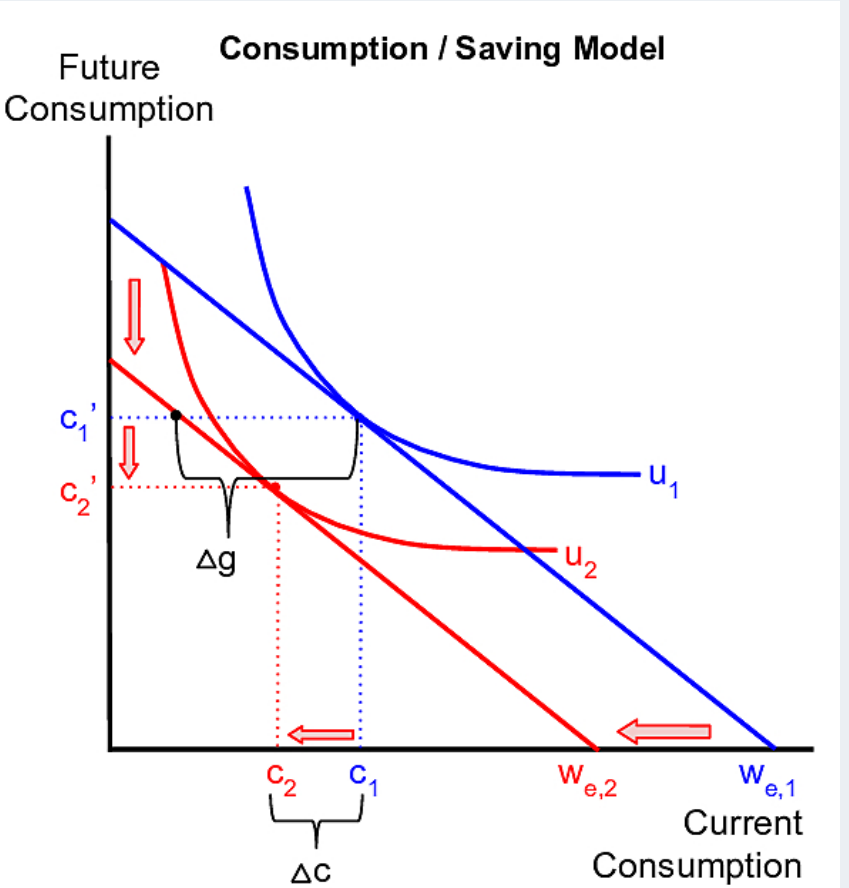

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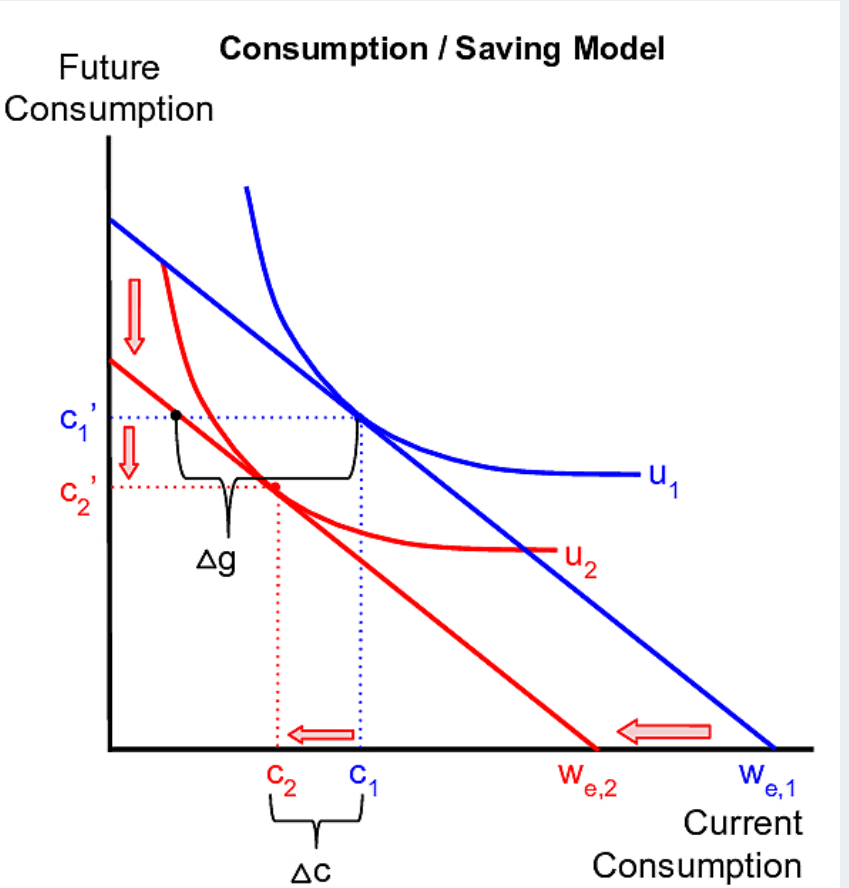

Permanent Increase in Government Expenditures

Scenario

- Suppose government increases spending now and in the future
- Net present value of taxes increases by same amount
- Budget shifts inward, horizontal distance $= \Delta g$, vertical distance $= \Delta g'$
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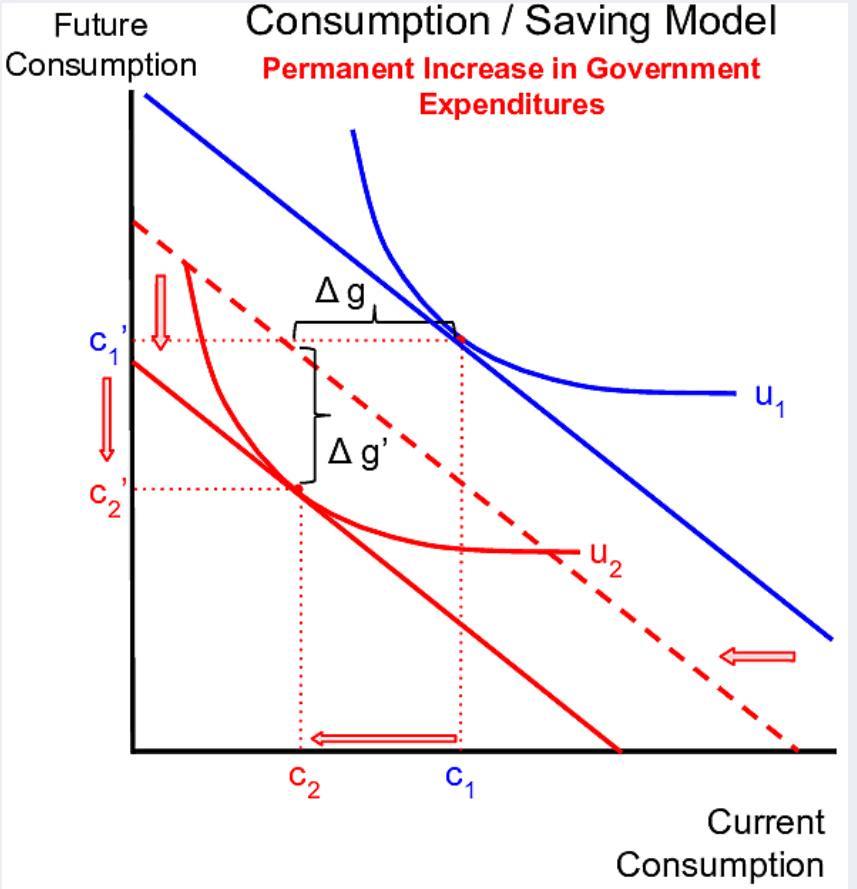

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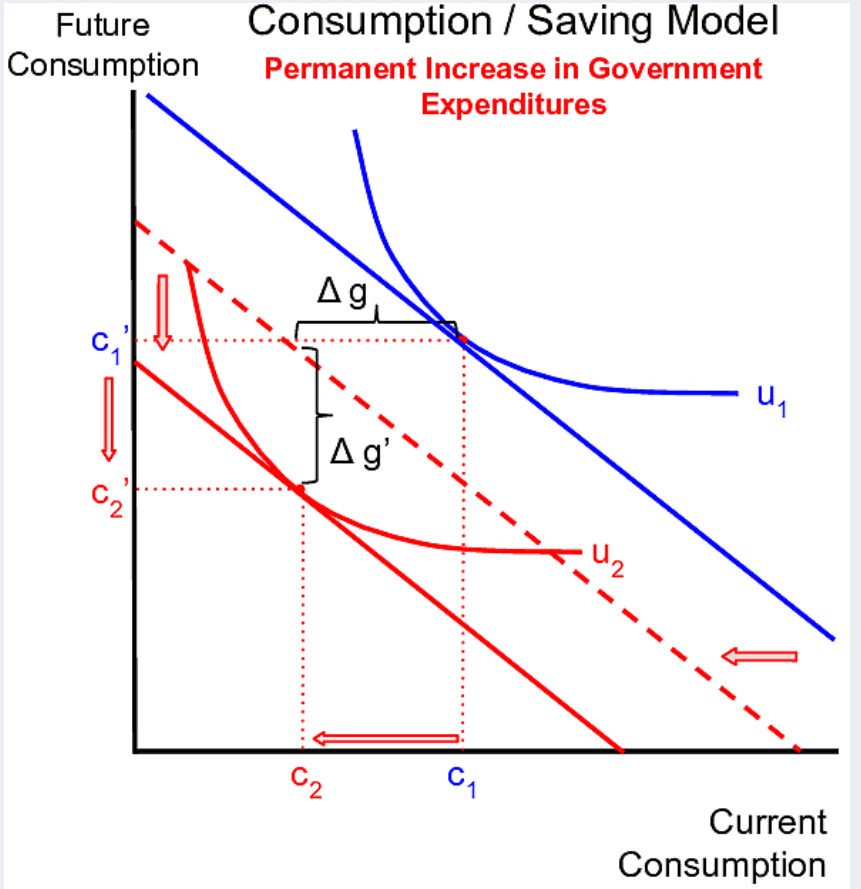

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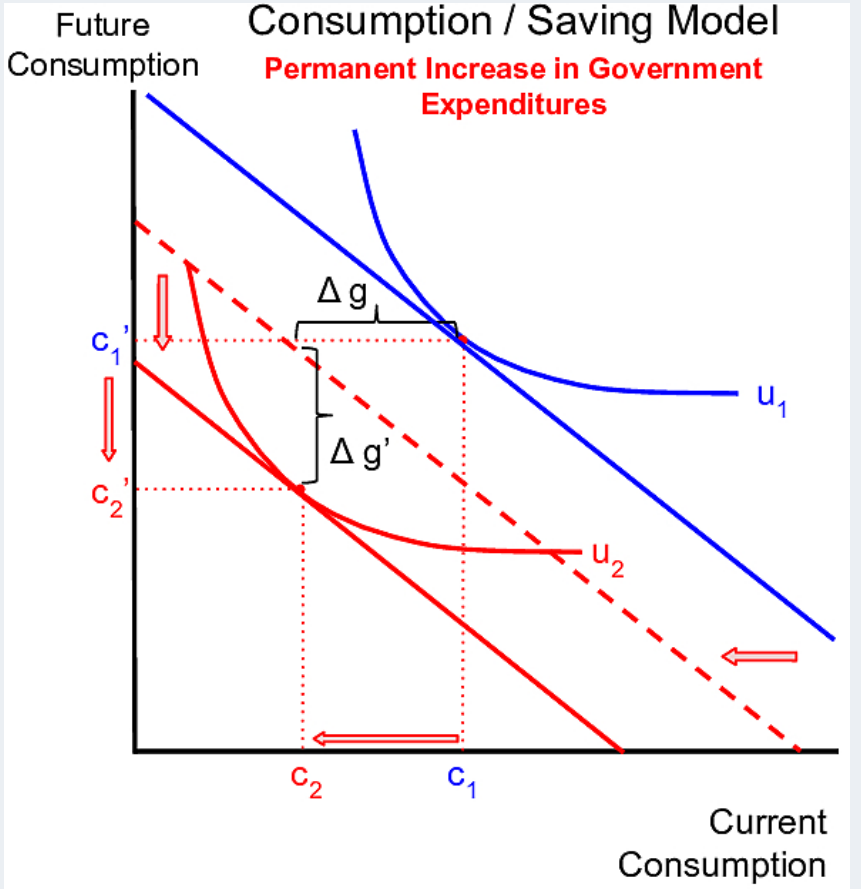

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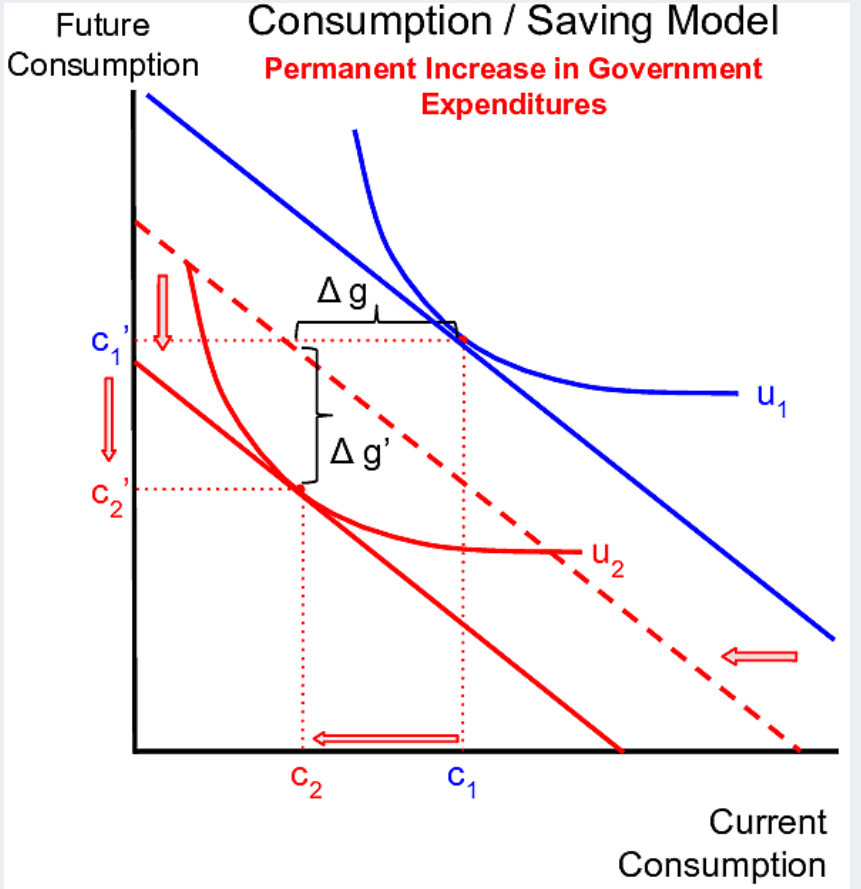

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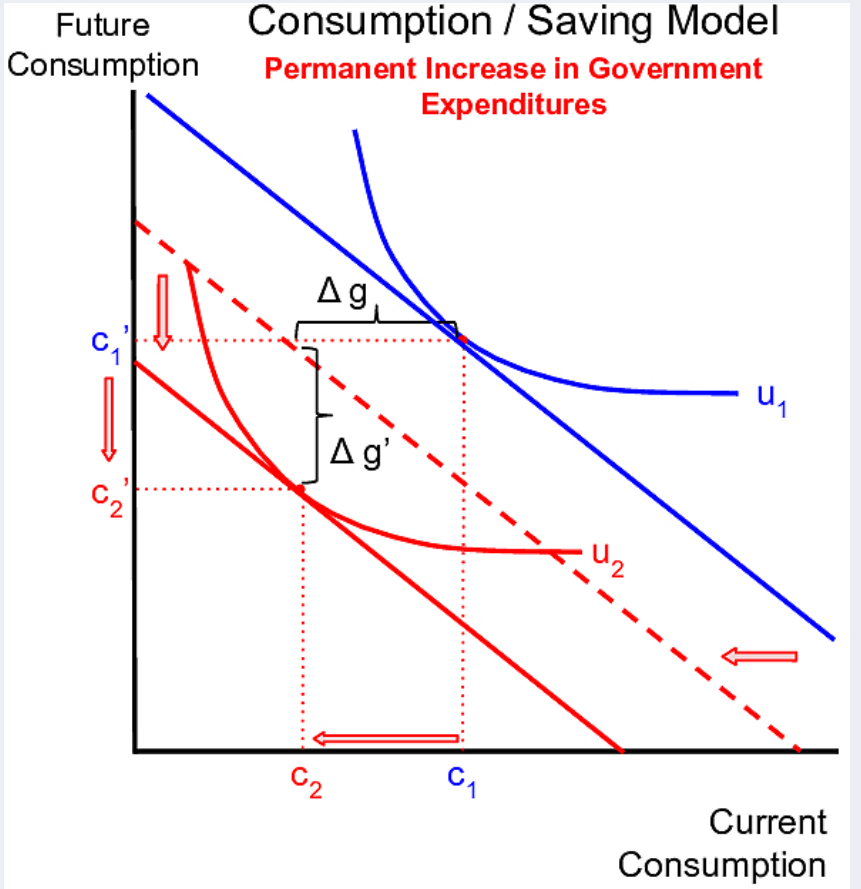

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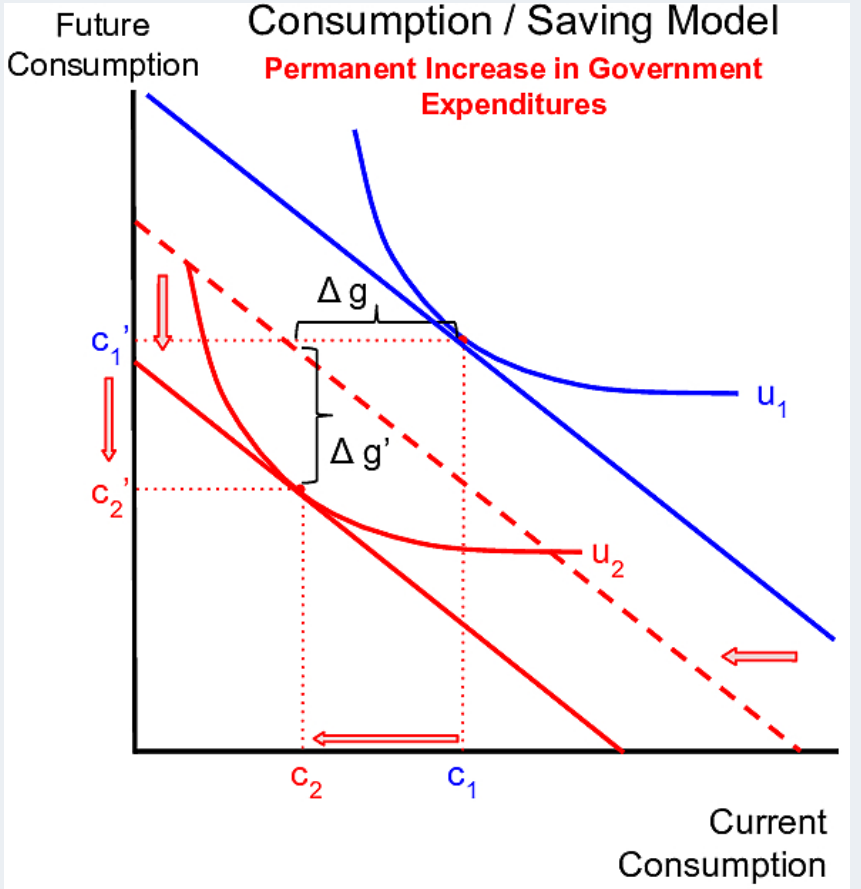

Tax Cut: Ricardian Equivalence

- Suppose the government gives a tax rebate
- But with no change in current or planned government spending
- Gov't budget: $g + \frac{g'}{1+r} = t + \frac{t'}{1+r}$
- If there is no change in right-side of equation, no change in left-side
- No change in net present-value of taxes, $t + \frac{t'}{1+r}$, implies no change in consumer budget constraint, no change in c or c'
- Current period: $c + s = y - t$. With tax cut, no change in c, consumer saves all of the tax cut
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- Current period: $c + s = y - t$. With tax cut, no change in c, consumer saves all of the tax cut
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- Assumes government and consumer had same r
  - In reality, governments often enjoy lower interest rate on debt
- Assumes the *same* consumer pays higher taxes in the future.
  - In reality, complicated tax policies may direct future taxes to different subpopulations
- Assumes the consumer lives long enough under the same tax bracket to pay future taxes
  - Future increase in taxes may be decades away
- Not explicitly modeled: Assumes conditions for socially optimal equilibrium
  - Slowly adjusting wages and prices, distorting tax policies, can create different predictions
- Why is this useful? Still explains realistic limitations of government policy, and how to address it. Define fiscal policies in terms of *current taxes / government expenditures* and *future tax plans*.

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