ECON3102-005
Chapter 8:Two-Period Model: The Consumption-Savings Decision and Credit Markets

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Outline

- Consumer's consumption-savings decision: responses of consumers to changes in income and interest rates.

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- Government budget deficits and the Ricardian Equivalence Theorem.

    - This theorem states that the size of government deficit is irrelevant as it does not affect macro variables of importance to economic welfare.

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  - We start with an exchange economy. This way we can focus on the consumption-savings decision for now, and we will come back with the production side in Chapter 10.
- In a multi-period model, saving-borrowing and the interest rate are key elements. Saving-borrowing allows the consumer to smooth consumption over time.

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- Each consumer leaves after 2 periods.
- Consumers receive an exogenous income (they do not make a work-leisure decision).
- Specifically, consumers receive income y in the first period, and y' in the second period.

Notations

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- BC (budget constraints), IC (indifference curves).

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- A bond issued with face value s yields a return of $(1 + r)s$ in the following period. Note that the unit here is consumption goods.

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- If $s < 0$, then the consumer pays back both interest and principal in the second period.
- If $s > 0$, then the consumer receives the promised return on her savings in the second period.

Consumer's Problem

The consumer's problem is given by

$$\max_{c,c',s} V(c,c') \tag{1}$$

subject to

$$c + s = y - t \tag{2}$$

$$c' = (1+r)s + y' - t' \tag{3}$$

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$$c + \frac{c'}{1+r} = y - t + \frac{y' - t'}{1+r} \qquad \text{(PVBC)}$$

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- This is the consumer's present value budget constraint (PVBC).
- Note that now we have just one PVBC and two variables to solve for the consumer's problem. We can conduct the same graphical analysis as we did for the static problem.

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- That is, $\frac{1}{1+r}$ is the relative price of future consumption in terms of current consumption:
    - One unit of consumption today is equivalent to $1 + r$ units of consumption tomorrow.

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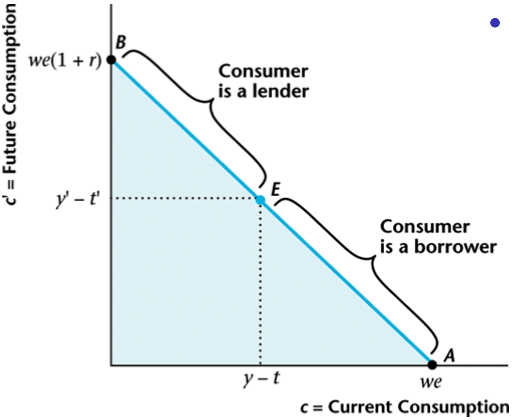
- We can rewrite the PVBC as

$$c + \frac{c'}{1+r} = we$$

$$c' = \underbrace{we(1+r)}_{\text{y-intercept}} - \underbrace{(1+r)}_{\text{slope}} c$$

PVBC (LTBC) on Graph



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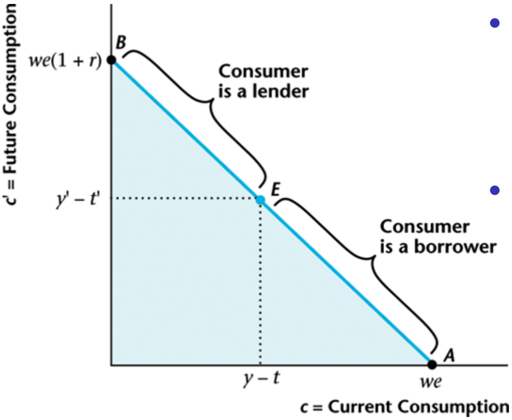

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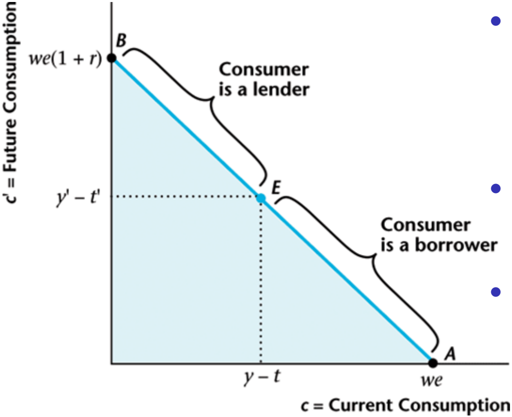

- At point E, the consumer neither borrows or lends ($s = 0$). Note that E is the endowment.
- To the NW of E, the consumer is a lender with positive savings.
- To the SE of E, the consumer is a borrower with negative savings.

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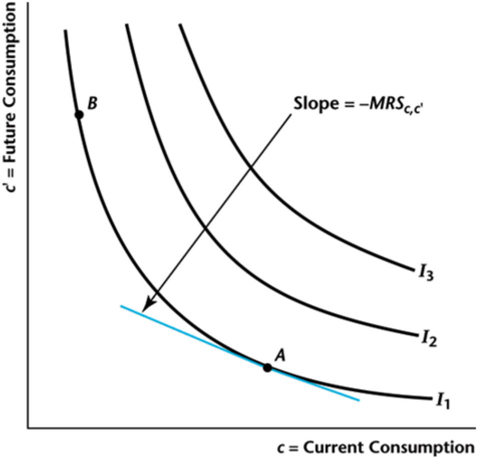
  - This assumption implies that consumers will prefer to smooth their consumption over time. They do not like consume everything today and nothing tomorrow (or everything tomorrow and nothing today).
- (normal goods): current and future consumptions are normal goods. As the LTBC increases, both current and future consumptions will increase.

Indifference Curves



- The slope of the blue line is the $-MRS_{c,c'}$ at point A, which means the consumer is willing to give up a lot of consumption today to get a little consumption tomorrow.

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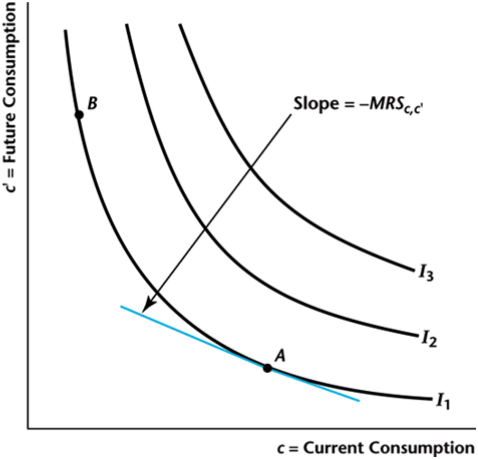

- The slope of the blue line is the $-MRS_{c,c'}$ at point A, which means the consumer is willing to give up a lot of consumption today to get a little consumption tomorrow.
- At point A, the consumer has a lot of consumption today and very little consumption tomorrow.

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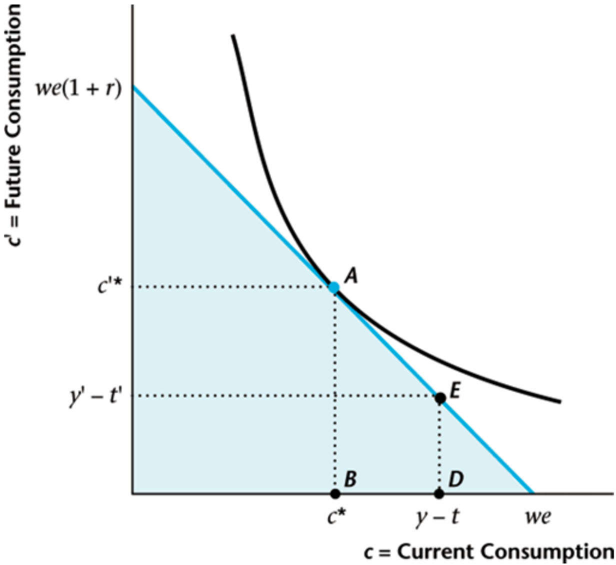
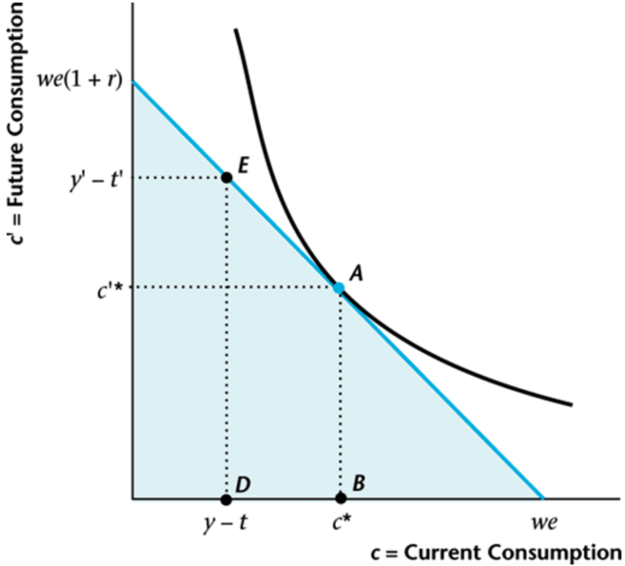
- $1 + r$ is how much future consumption the market would give in exchange for one unit of current consumption.
- If $MRS_{c,c'} < 1 + r$, for one unit of current consumption, the consumer gets more future consumption than she needs to stay on the same indifference curve. So the consumer is better off trading away current consumption.

A Consumer Who is a Lender



Savings is $y - t - c^* =$DB.

A Consumer Who is a Borrower



Savings is $y - t - c^* =$DB.

An Increase in Current Income y

- Holding everything else constant, suppose current income y increases by Δy.
- Then, *we* increases by Δy.

Predictions:

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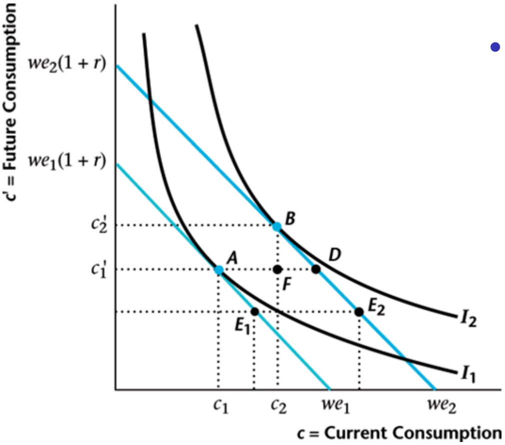

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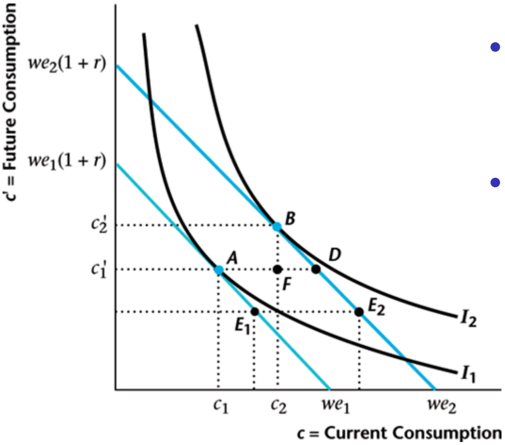

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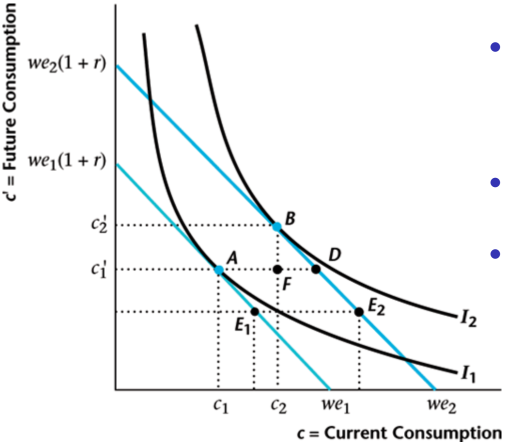

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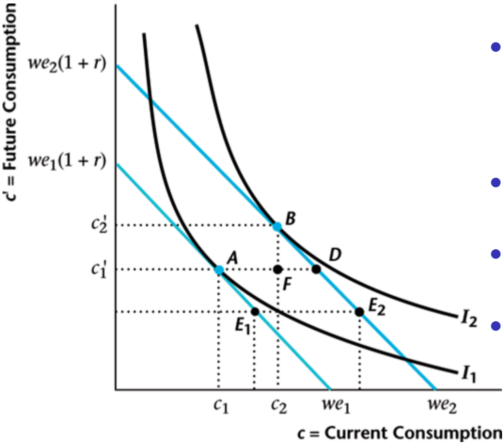

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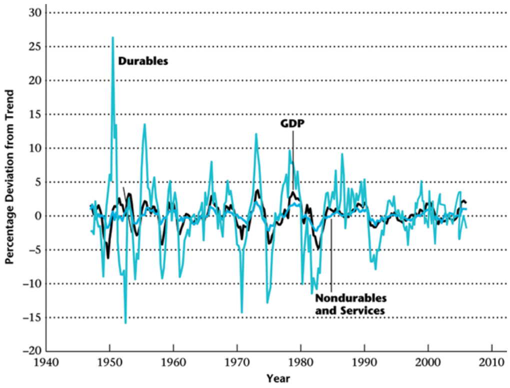
- The observation is evidence that in practice, people do smooth their consumptions.

Durable, Non-durable goods and RGDP



Source: Bureau of Economic Analysis, Department of Commerce.

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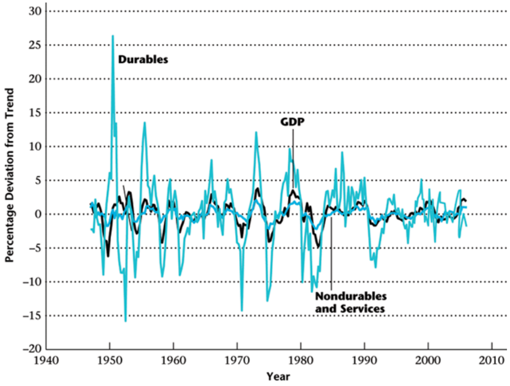

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- Aggregate consumption of non-durable goods is smooth relative to RGDP, but aggregate consumption of durable goods is more volatile than RGDP.
- This is because economically consumption of durable goods are more like investment.

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- Again, these results are explained by consumers' actions to smooth their consumptions over time.

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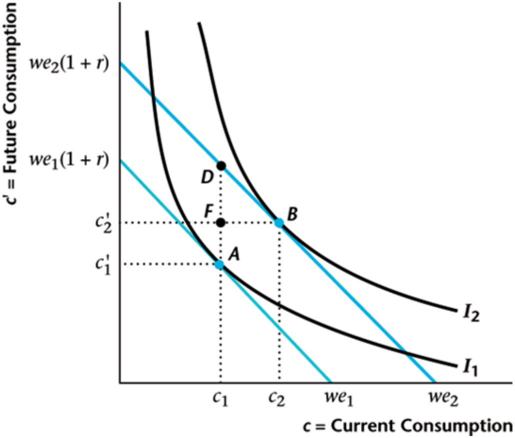

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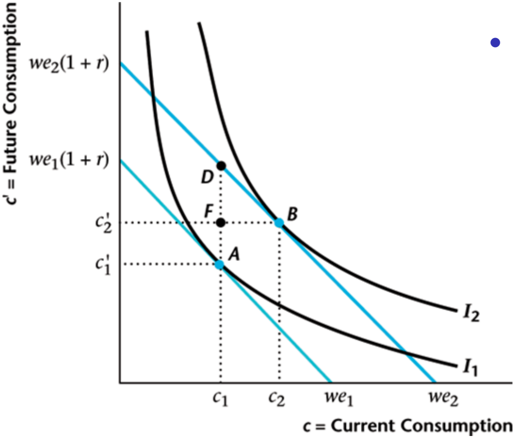

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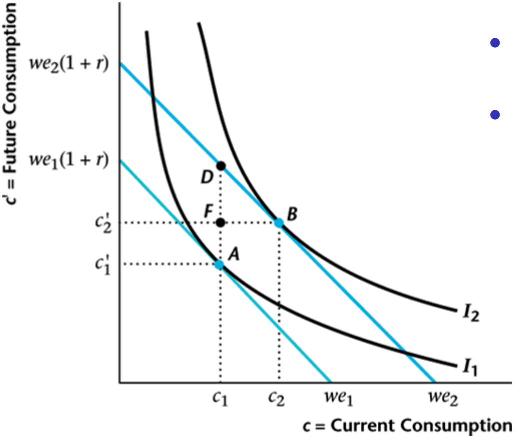

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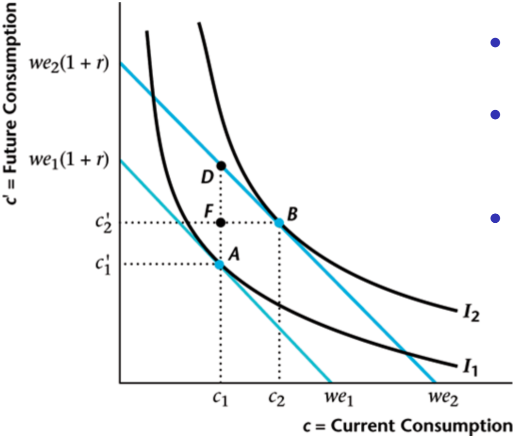

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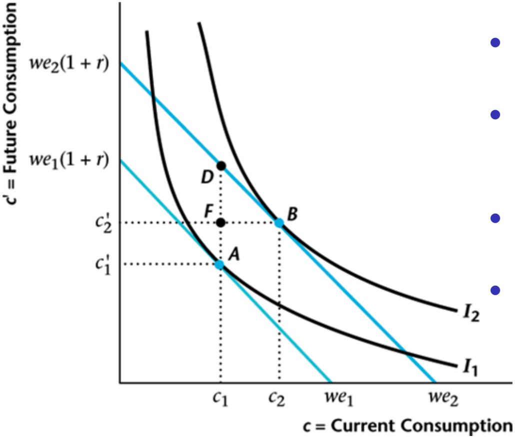

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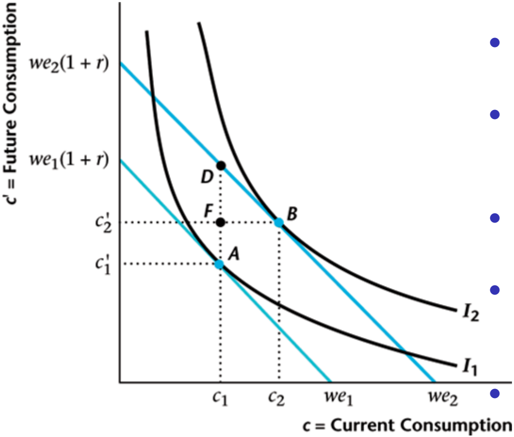

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- With the increase in future income, the consumer wants to smooth consumption by saving less today.

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- Changes in permanent income were studied by Milton Friedman, as the famous "permanent income hypothesis".

The Permanent Income Hypothesis

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- This will in turn create a larger effect on current consumption.
- In other words, the consumer will tend to save most of a purely temporary income increase.

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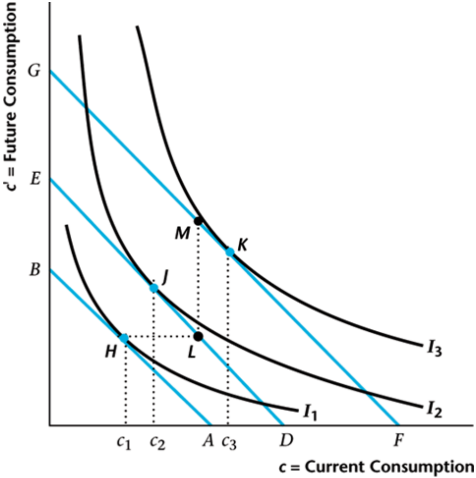

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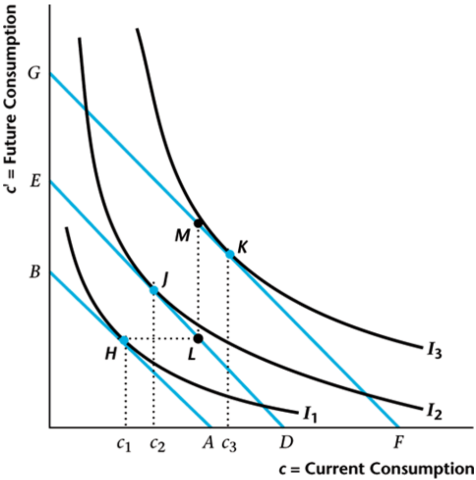

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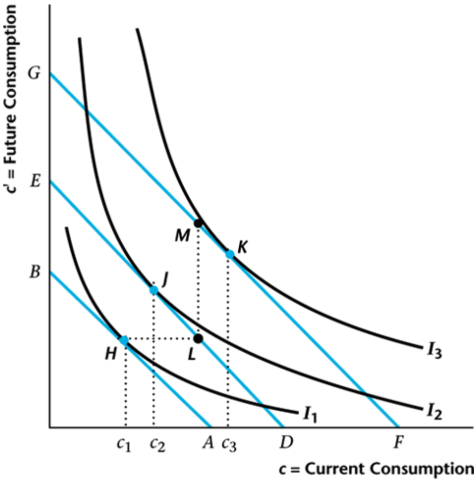

- The initial budget constraint is AB.
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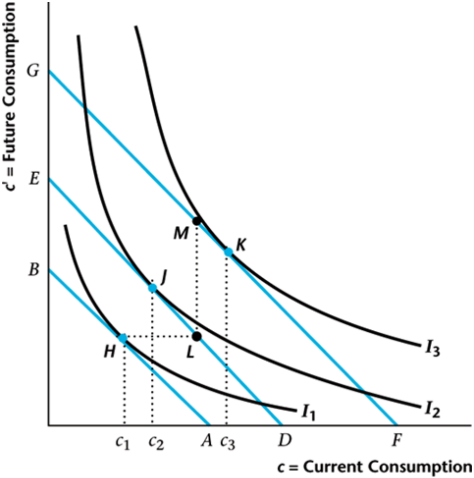
- When both$y$ and y' increase simultaneously, the new budget constraint is GF (OCB moves from H to K.).

An Increase in Permanent Income



- The initial budget constraint is AB.
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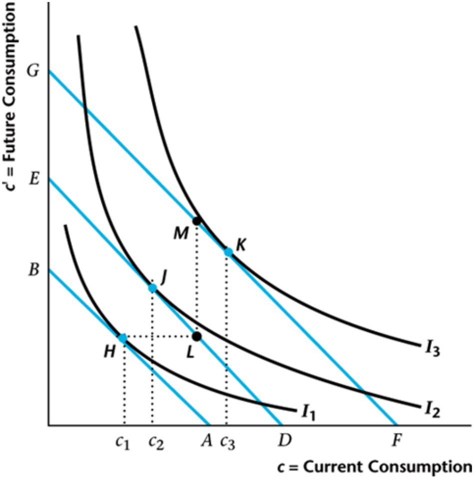

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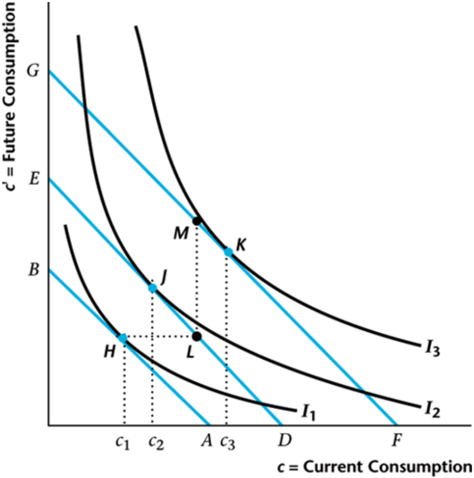

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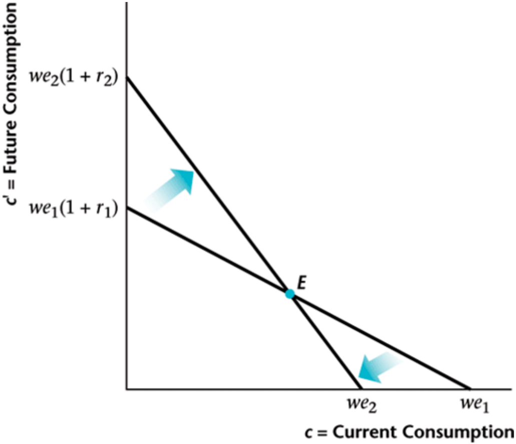
- With the increase in future income, the consumer wants to smooth consumption by saving

An Increase in the Real Interest Rate



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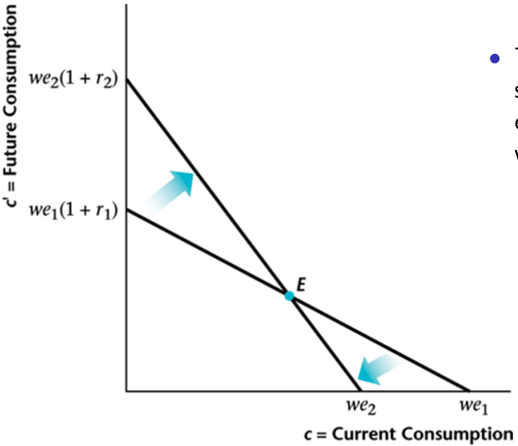

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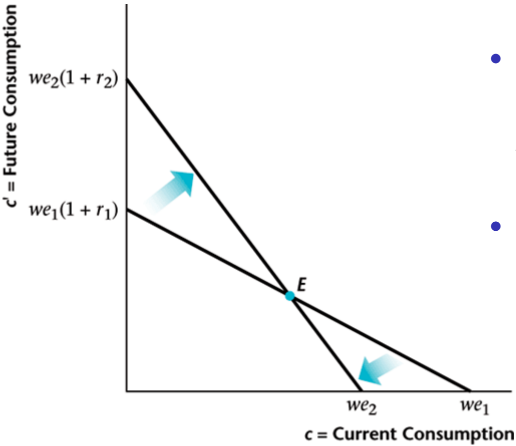

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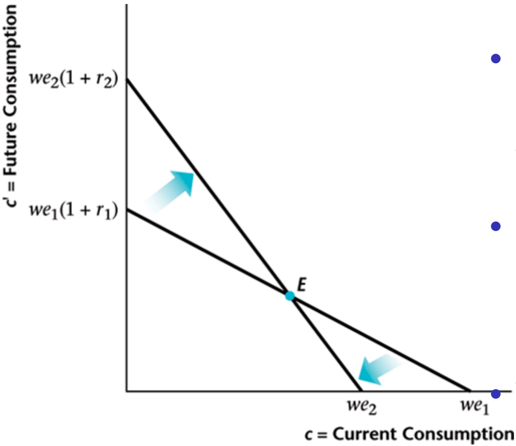

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- This is because the consumer should be able to afford his endowment point, no matter what prices are.
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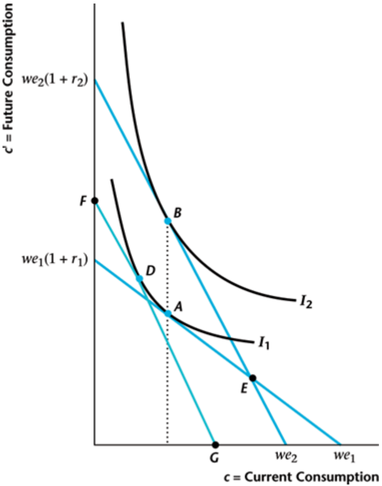
- We will see that the income and substitution effects depend on if the consumer is a borrower or a lender.

An Increase in the Real Interest Rate for a Lender



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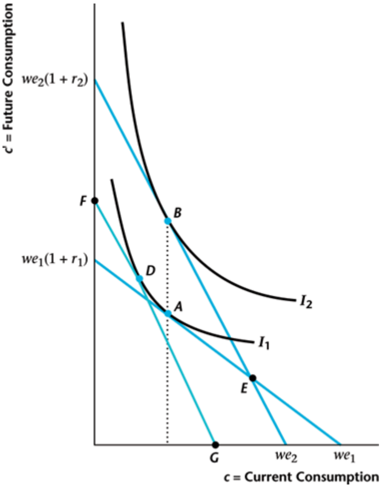

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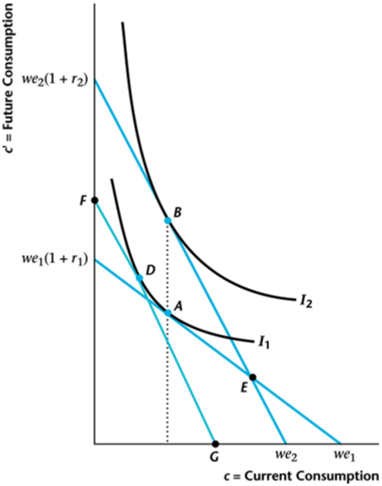

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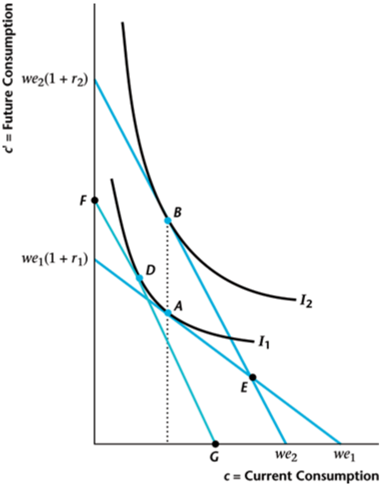

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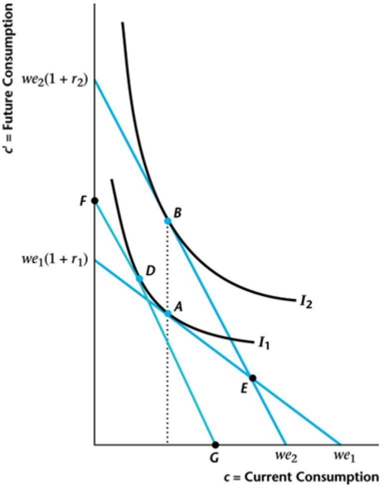

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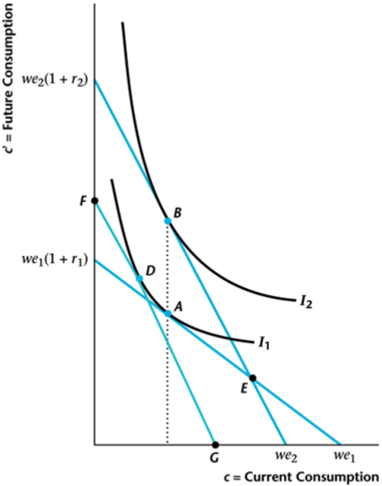

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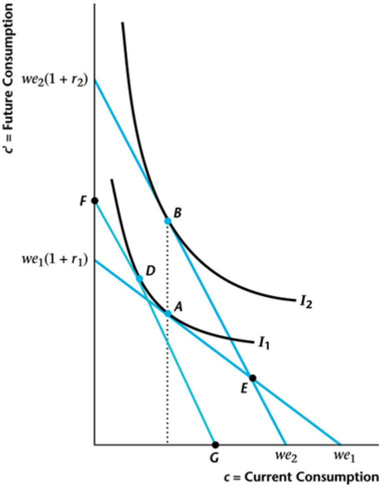

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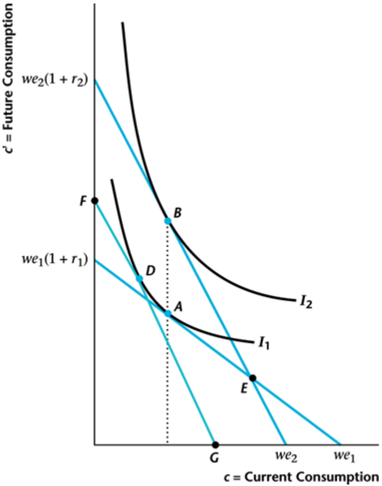

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  - Since both goods are normal, both current and future consumptions increase from D to B.

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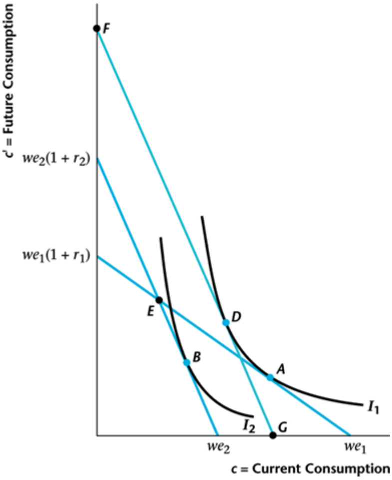

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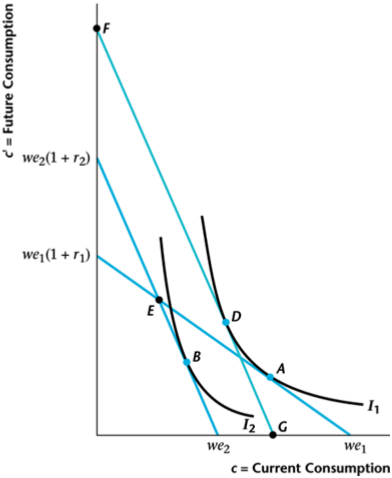

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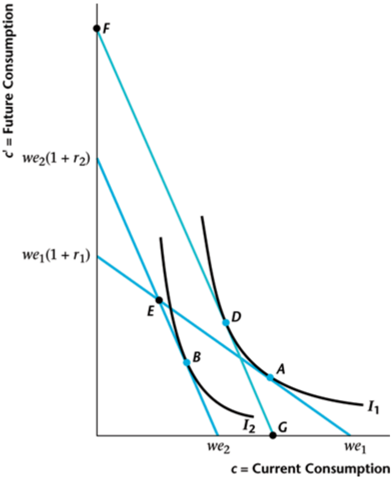

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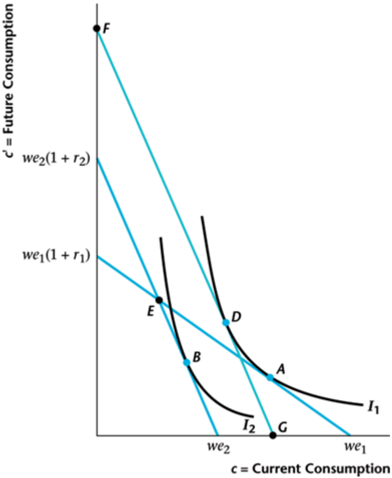

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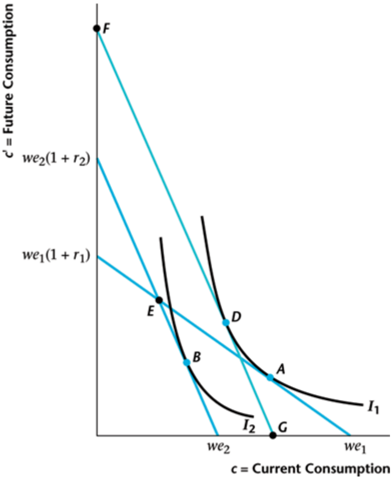

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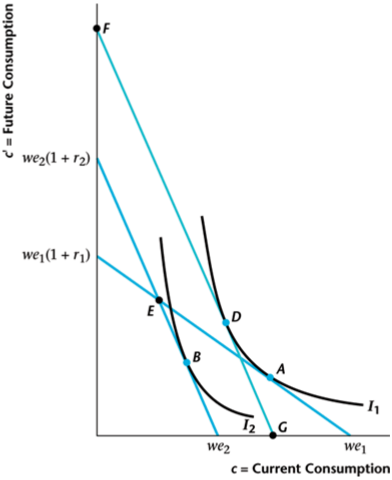

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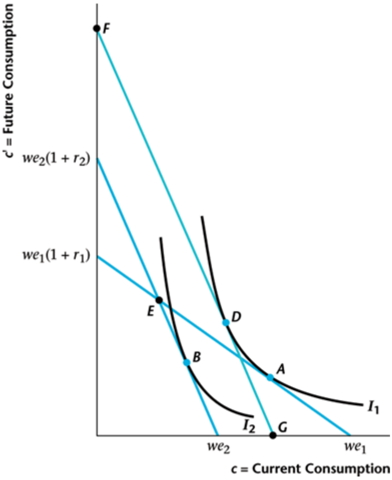

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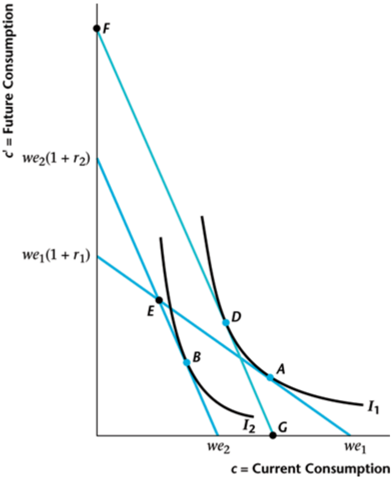

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  - Therefore, for a borrower, the income effect is negative (shift from (FG) to (EB)) and creates in decrease in the consumption of both goods.

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- Let B denote the quantity of government's issued bond. $B < 0 \Rightarrow$ the govn't is lending.

The Governmeng Budget Constraint

$$G = T + B \qquad \text{(period 1)}$$

$$G' + (1 + r)B = T' \qquad \text{(period 2)}$$

- Solving for $B = \frac{T' - G'}{1+r}$ in the second equation and replacing B in the first one yields:

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- This is equivalent to saying all government debt has to be paid with taxes.

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- the credit market clears:

$$S^p = B$$

  That is, private savings = quantity of debt issued by the government.

THEOREM: $S^p = B \Leftrightarrow Y = C + G$

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- This result is important because it makes it simpler to solve for the competitive equilibrium:
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Ricardian Equivalence Theorem

Everything else equal, two scheme of taxes that yield the same present value, but are different in their timings, will affect the economy in an identical fashion: both the interest rate and the path of individual consumption will remain identical.

Proof of the Ricardian Equivalence Theorem

- Substitute $T = Nt$ and $T' = Nt'$ into the govn't PVBC to get:

$$G + \frac{G'}{1+r} = Nt + \frac{Nt'}{1+r}$$

- Rearrange the equation above and it gives:

$$t + \frac{t'}{1+r} = \frac{1}{N}\left[G + \frac{G'}{1+r}\right]$$

- Substitute into the consumer's PVBC:

$$c + \frac{c'}{1+r} = y + \frac{y'}{1+r} - \frac{1}{N}\left[G + \frac{G'}{1+r}\right]$$

- Suppose there is a change in the tax schedule such that

$$\Delta t + \frac{\Delta t'}{1+r} = 0$$

Proof of the Ricardian Equivalence Theorem (cont'd)

- Because there is no change in the *we* and since the consumer takes r as given, The consumer's choices as a function of r will remain the same.
- Now, since $Y = C + G$ still holds, the interest rate r remains the same.
- Hence both the interest rate and the consumer's choices are unchanged as a result of the change in the tax scheme.

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- Perfect Credit Markets.