

Principles of Macroeconomics

ECO 1019 Lecture 5

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In this Lecture:

- Consumer's consumption/savings decision – responses of consumer to changes in income and interest rates.
- Government budget deficits and the Ricardian Equivalence Theorem.

Intertemporal decisions

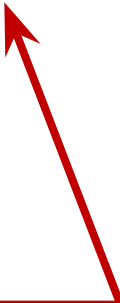
- They involve a **trade off across periods of time**: between current and future consumption, between current and future taxes, etc.
- In Solow model: arbitrary intertemporal decision rule, constant saving rate
- We use microeconomic principles to have a more detailed analysis

Our model

- Two period model: today and tomorrow
- For simplicity: income is exogenous (no work/leisure decision). This helps us focus on the consumption-savings decision
- Lump sum taxes

Budget Constraints

The consumer's current-period budget constraint:

$$c + s = y - t$$


We assume a credit market in which we trade a bond issued either by the consumers or the government

$s > 0$: consumer is a **lender** on the credit market

$s < 0$: consumer is a **borrower** on the credit market

Budget Constraints

The consumer's future-period budget constraint:

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

Interest rate



Simplify

Solve the future-period budget constraint for s :

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

Next,

Substitute in the current-period budget constraint
obtaining lifetime budget constraint:

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

Consumer's Lifetime Budget Constraint

Substitute in the current-period budget constraint
obtaining lifetime budget constraint:

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

$we =$ **lifetime wealth**, i.e.
quantity of resources that the
consumer has available (in
present value) to spend on
consumption over his life time

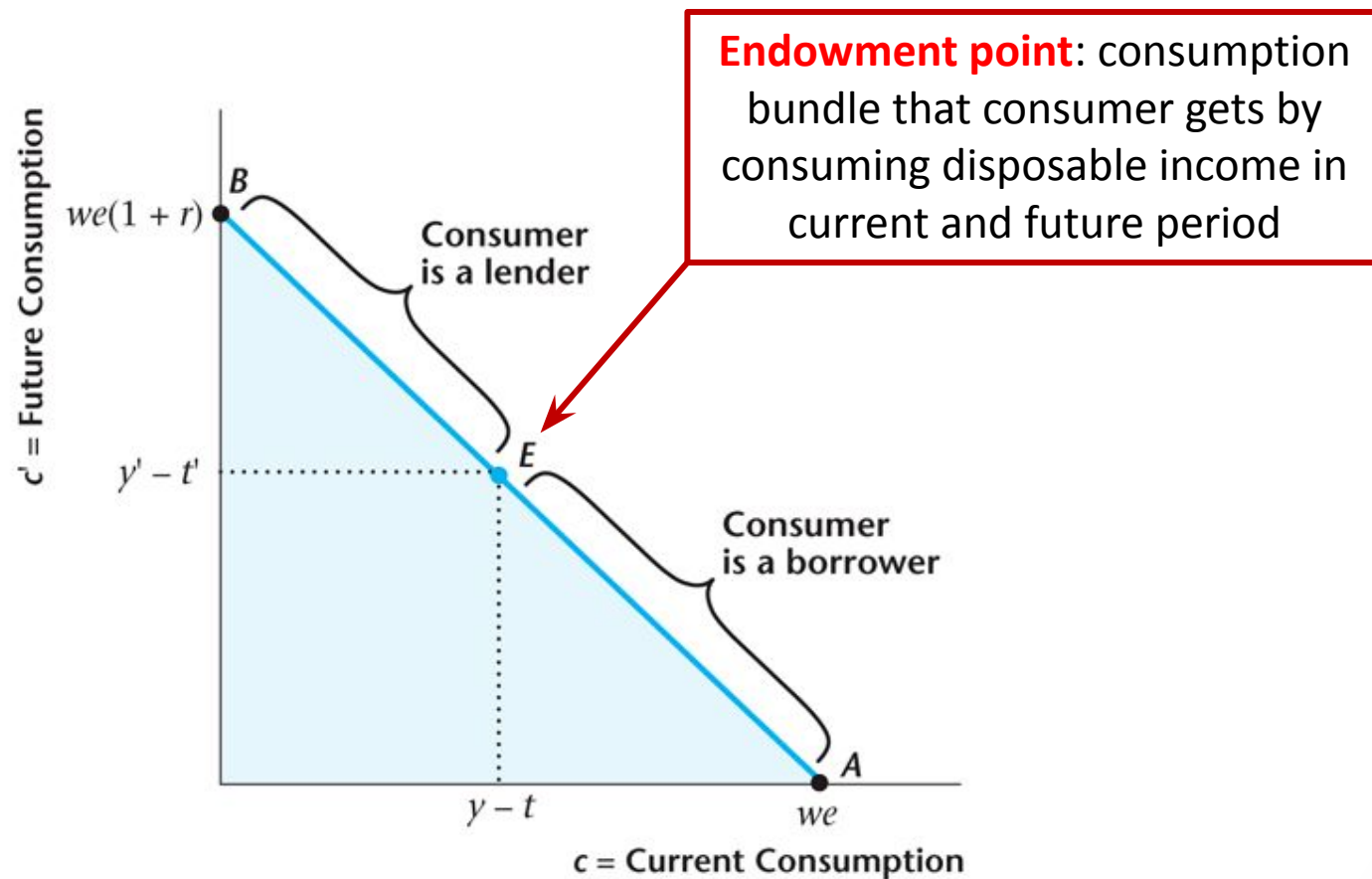
Simplified Lifetime Budget Constraint

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

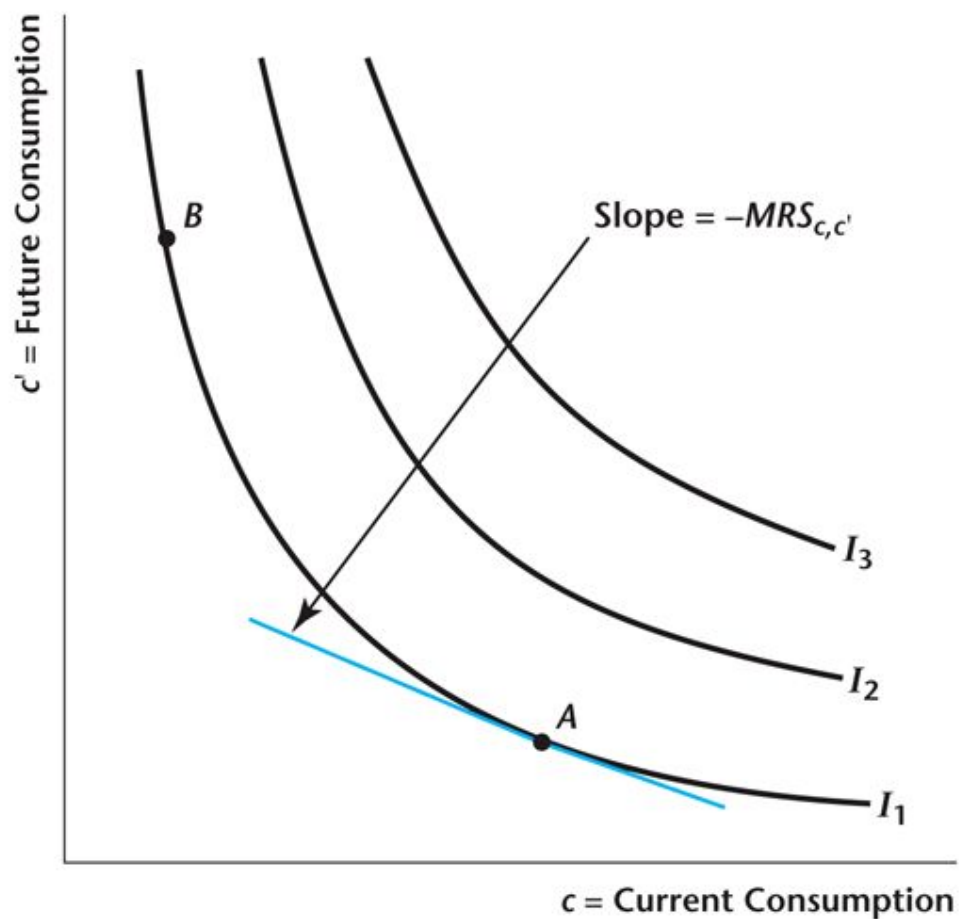
Simplified Lifetime Budget Constraint: Slope-Intercept

$$c' = -(1+r)c + we(1+r)$$

Consumer's Lifetime Budget Constraint



A Consumer's Indifference Curves



Sara's Desire for Consumption Smoothing

Table 8.1 Sara's Desire for Consumption Smoothing

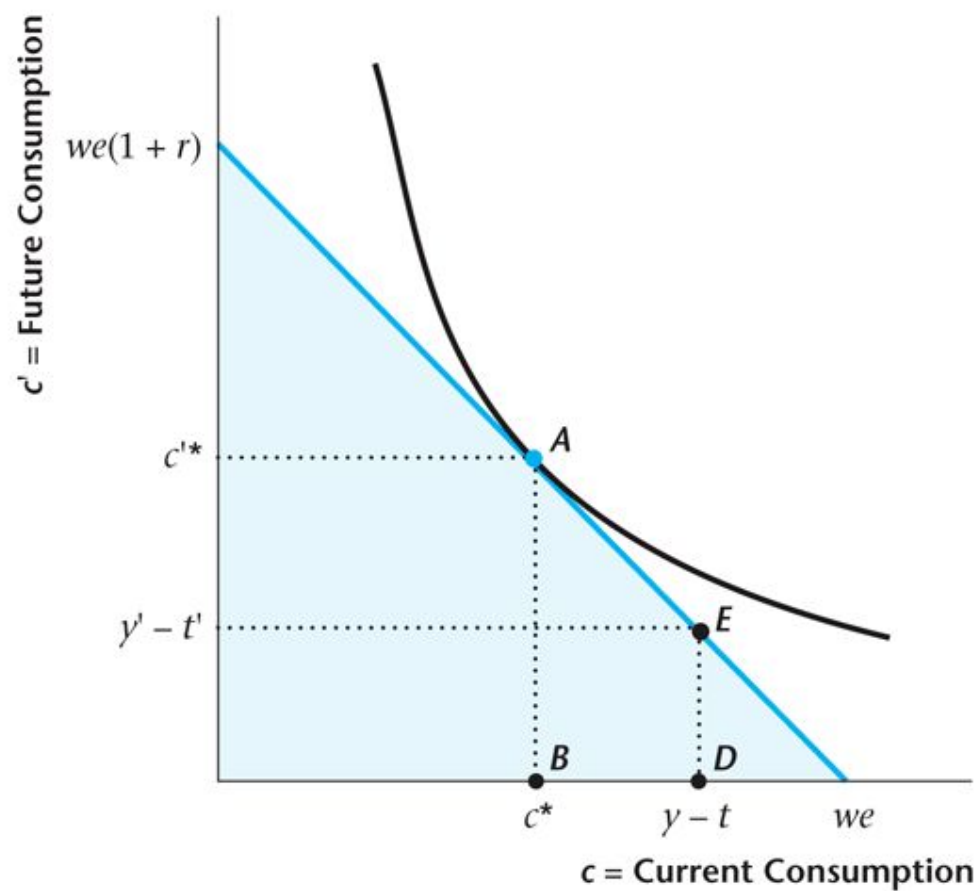
	Week 1 Coconuts	Week 2 Coconuts	Total Consumption
Bundle 1	5	15	20
Bundle 2	17	3	20
Preferred Bundle	11	9	20

Optimization

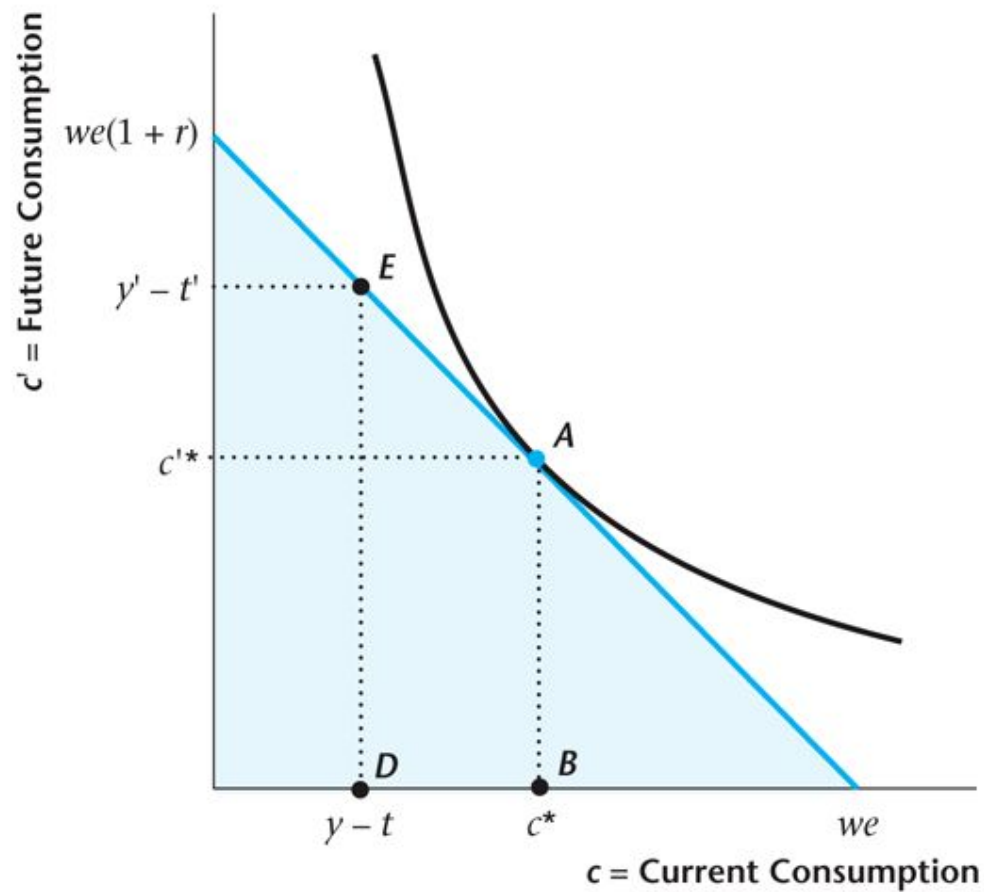
Marginal condition that holds when the consumer is optimizing:

$$MRS_{c,c'} = 1 + r$$

A Consumer Who Is a Lender



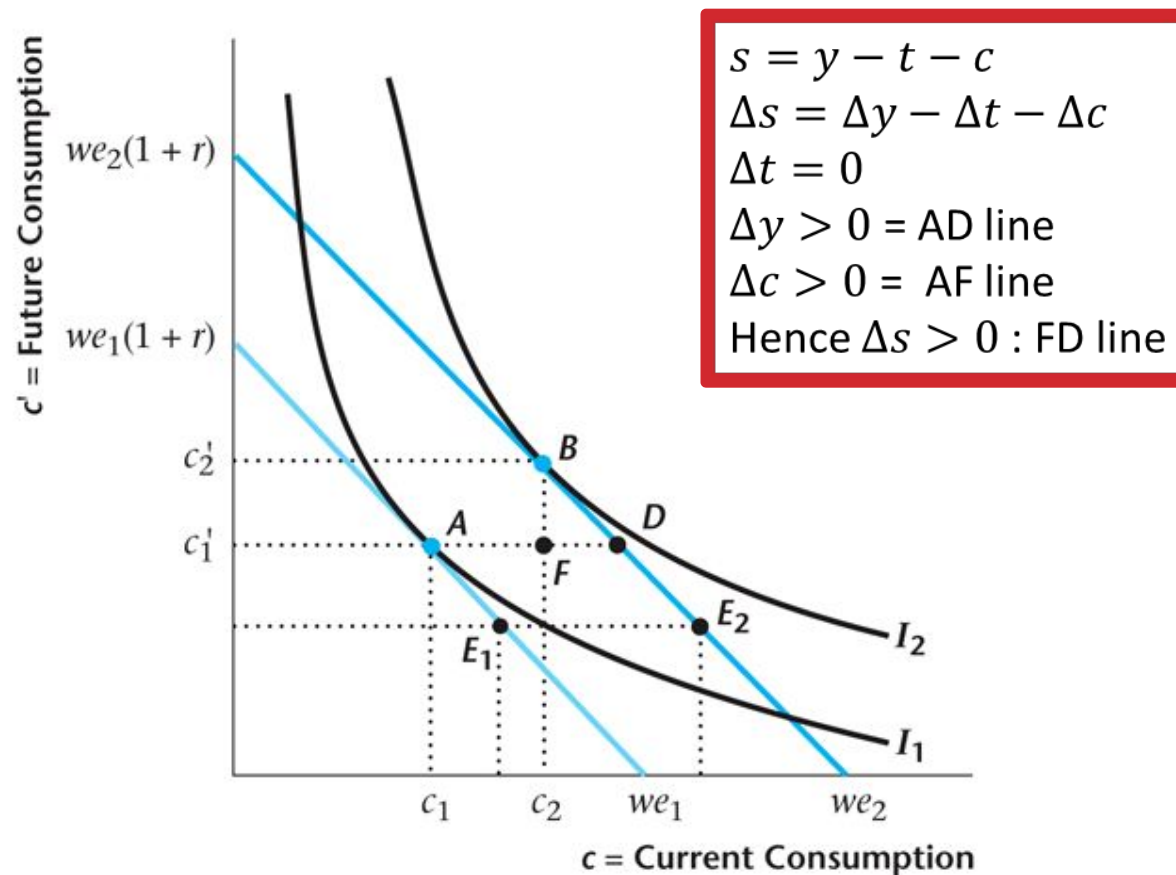
A Consumer Who Is a Borrower



An Increase in Current Income for the Consumer

- Current and future consumption increase.
- Saving increases.
- The consumer acts to smooth consumption over time.

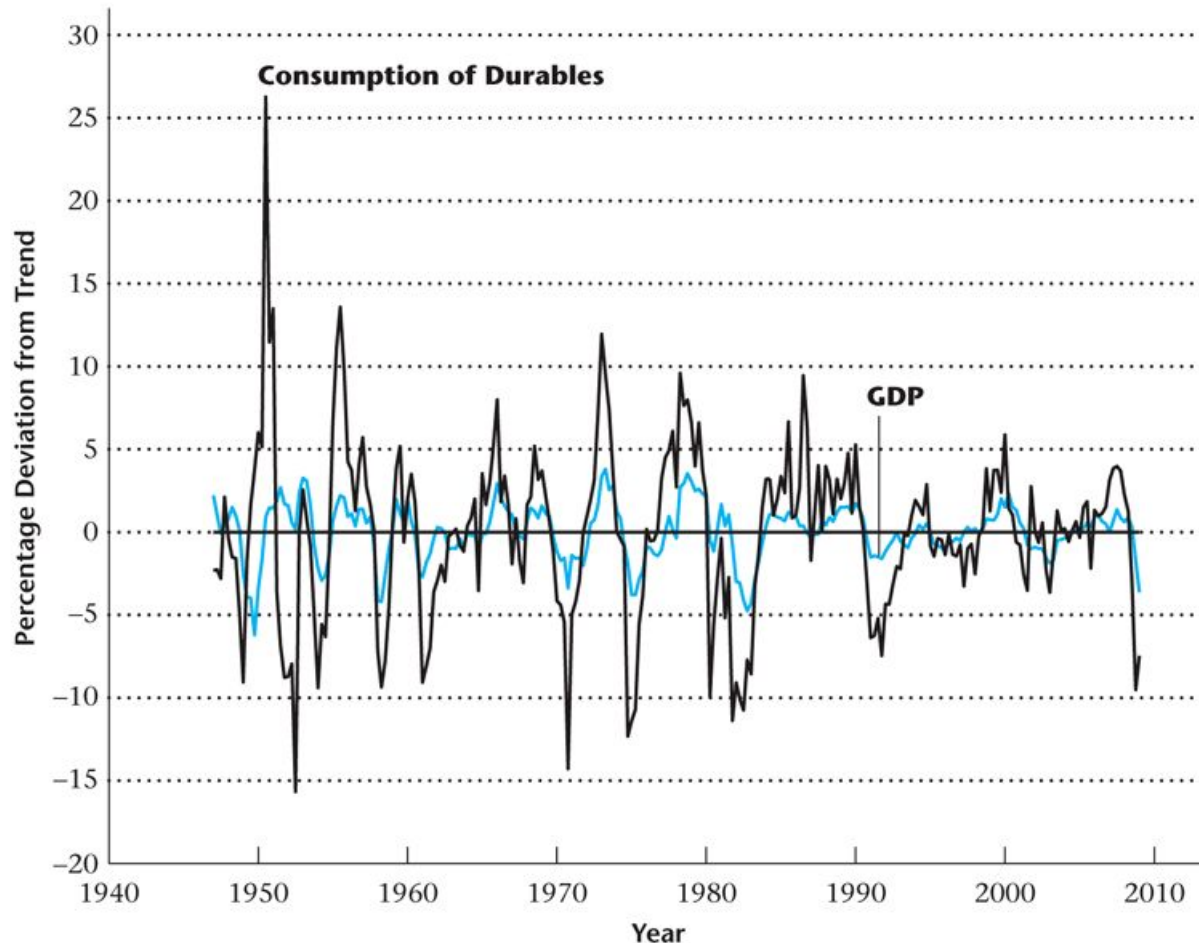
The Effects of an Increase in Current Income for a Lender



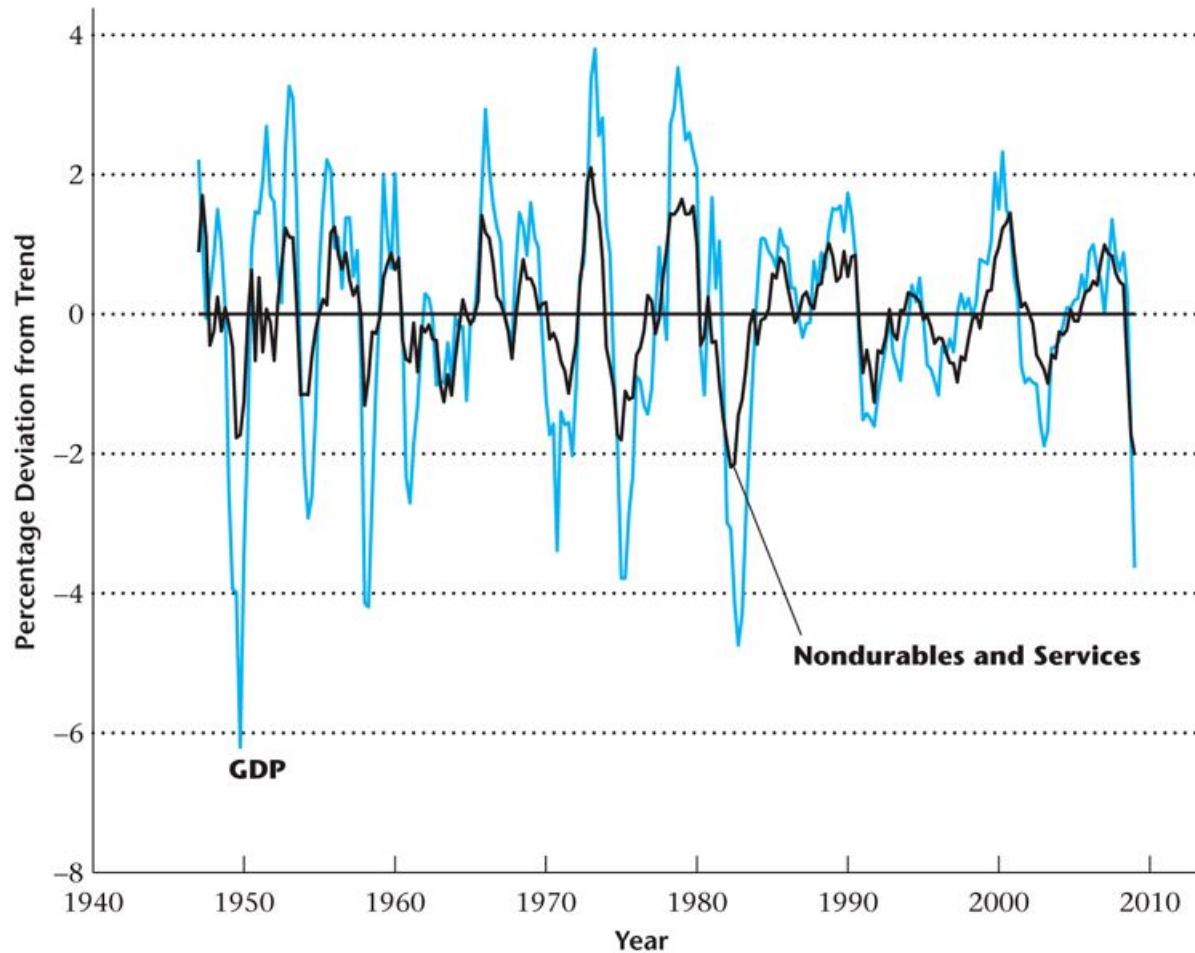
Observed Consumption-Smoothing Behavior

- If all consumers try to smooth consumption overtime, we should observe that aggregate consumption is smoother than aggregate income
- Aggregate consumption of non-durables and services is smooth relative to aggregate income, but the consumption of durables is more volatile than income.
- This is because durables consumption is economically more like investment than consumption.

Percentage Deviations from Trend in Consumption of Durables and Real GDP



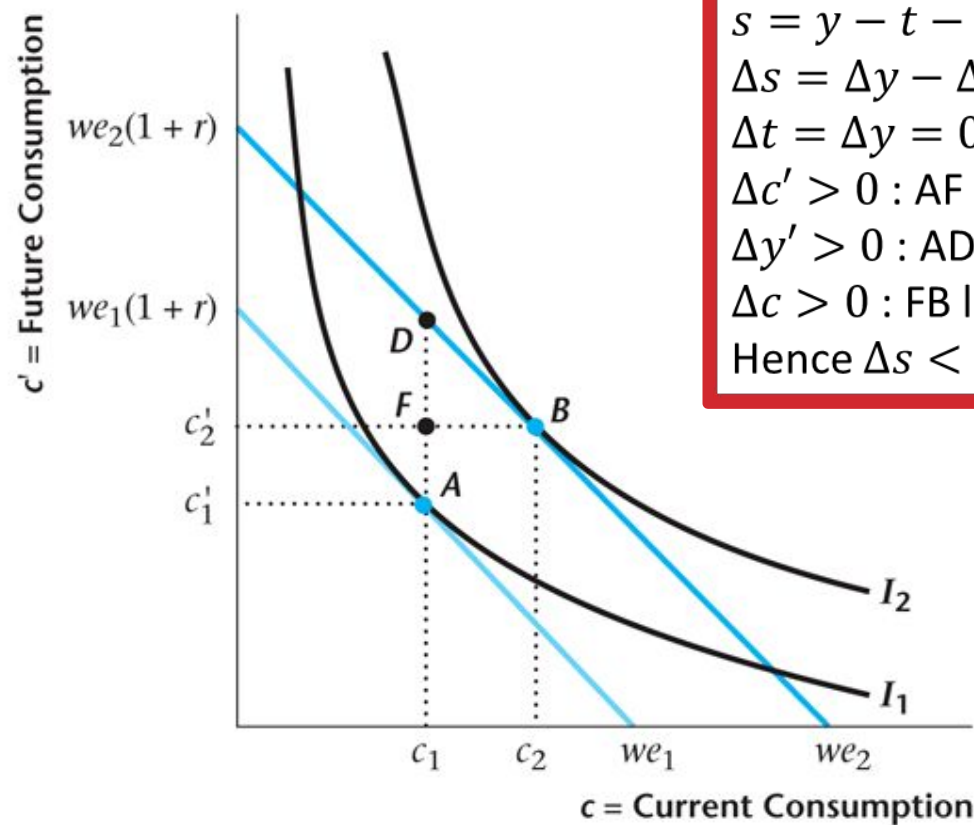
Percentage Deviations from Trend in Consumption of Nondurables and Services and Real GDP



An Increase in Future Income for the Consumer

- Current and future consumption increase.
- Saving decreases.
- The consumer acts to smooth consumption over time.

An Increase in Future Income



$$s = y - t - c$$

$$\Delta s = \Delta y - \Delta t - \Delta c$$

$$\Delta t = \Delta y = 0$$

$$\Delta c' > 0 : \text{AF line}$$

$$\Delta y' > 0 : \text{AD line}$$

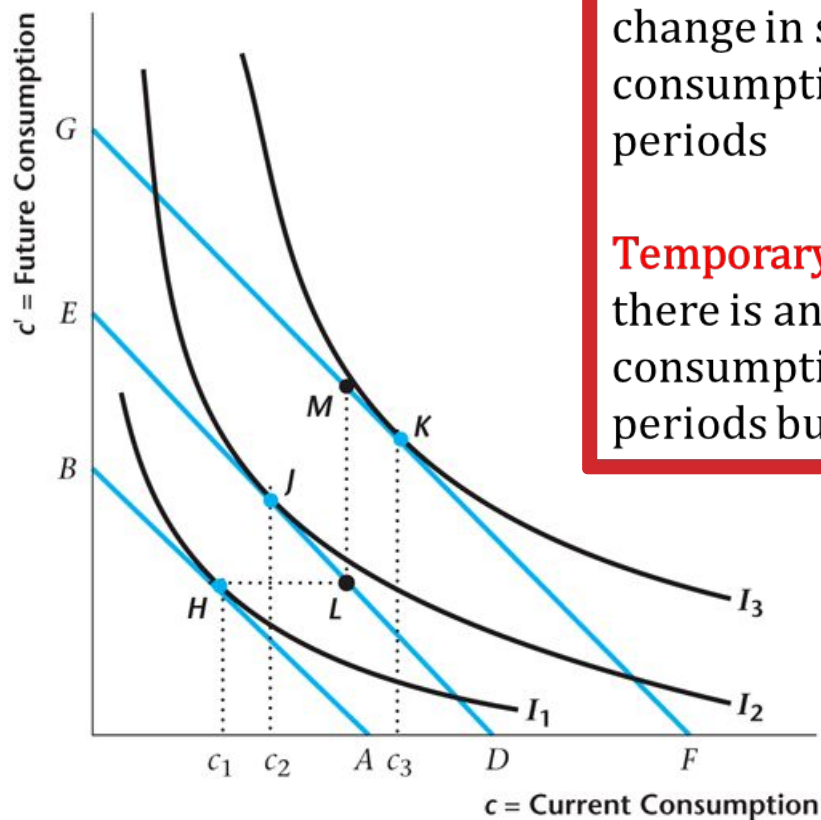
$$\Delta c > 0 : \text{FB line}$$

$$\text{Hence } \Delta s < 0$$

Temporary and Permanent Increases in Income

- As a permanent increase in income will have a larger effect on lifetime wealth than a temporary increase, there will be a larger effect on current consumption.
- A consumer will tend to save most of a purely temporary income increase.
- This is the **permanent income hypothesis** by Milton Friedman

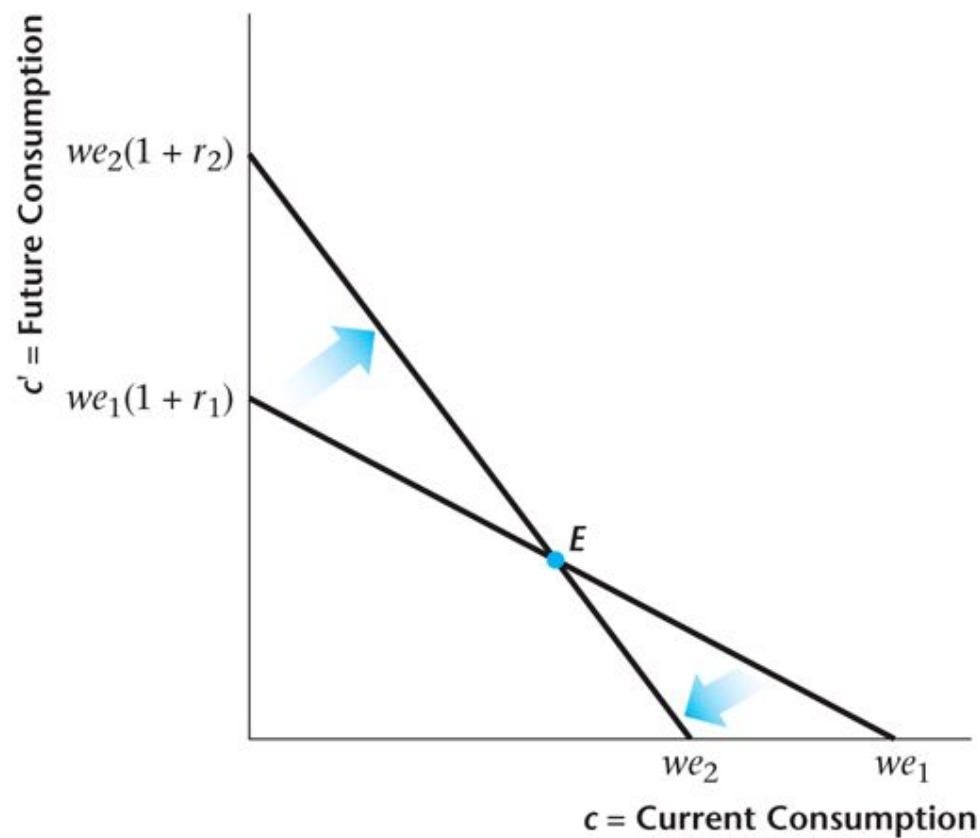
Temporary Versus Permanent Increases in Income



Permanent: $\Delta y' = \Delta y > 0$, *no* change in savings, consumption goes up in both periods

Temporary: $\Delta y' = 0, \Delta y > 0$, there is an increase in savings, consumption goes up in both periods but less

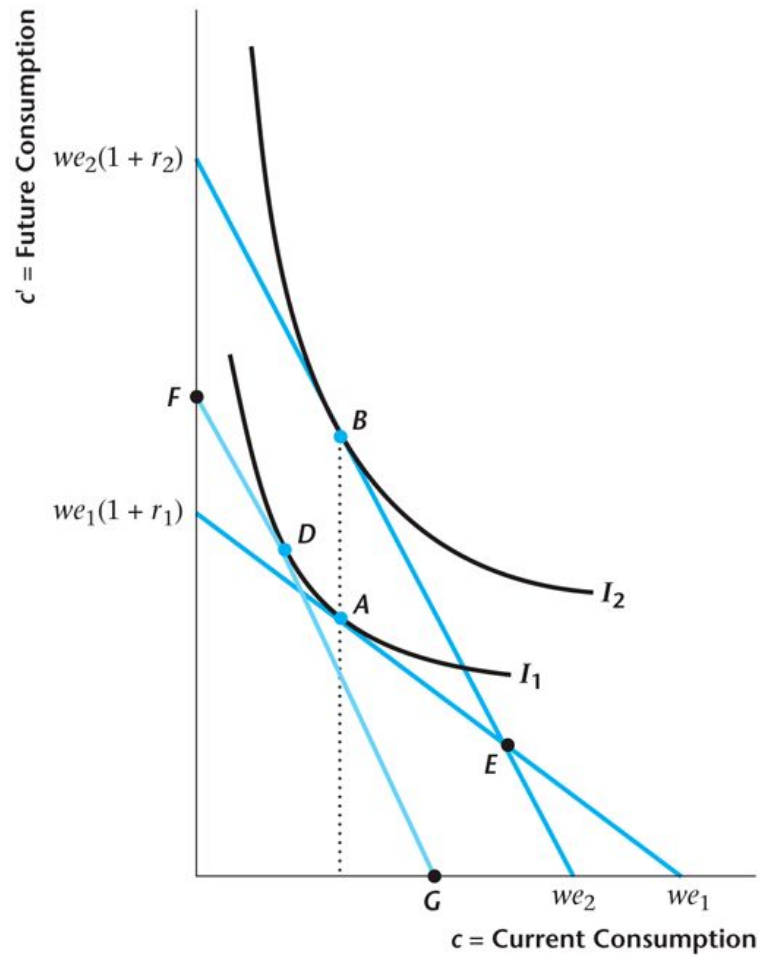
An Increase in the Real Interest Rate



An Increase in the Market Real Interest Rate

An increase in the market real interest rate decreases the relative price of future consumption goods in terms of current consumption goods – this has income and substitution effects for the consumer.

An Increase in the Real Interest Rate for a Lender

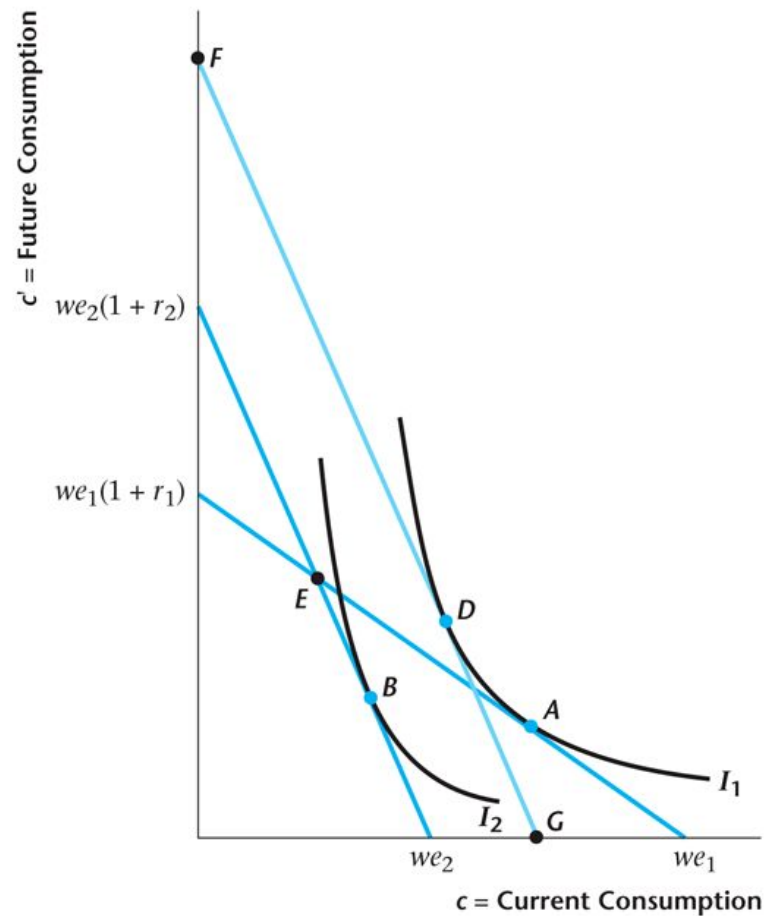


Effects of an Increase in the Real Interest Rate for a Lender

Table 8.2 Effects of an Increase in the Real Interest Rate for a Lender

Current consumption	?
Future consumption	Increases
Current savings	?

An Increase in the Real Interest Rate for a Borrower



Effects of an Increase in the Real Interest Rate for a Borrower

Table 8.3 Effects of an Increase in the Real Interest Rate for a Borrower

Current consumption	Decreases
Future consumption	?
Current savings	Increases

Introducing the government

- Government buys G , financed either with taxes or debt.
- $T=Nt$, $T'=Nt'$
- Private and government bonds are indistinguishable, have same interest rate r

Government Budget Constraints

The government's current-period budget constraint:

$$G = T + B$$

Government Budget Constraints

The government's future-period budget constraint:

$$G' + (1 + r)B = T'$$

Government Budget Constraints

The government's *present-value budget constraint*:

$$G + \frac{G'}{1+r} = T + \frac{T'}{1+r}$$

Competitive equilibrium

- Each consumer chooses current and future consumption and savings optimally given interest rate r
- The government present-value budget constraint holds
- The credit market clears

Credit Market Equilibrium Condition

Total private savings is equal to the quantity of government bonds issued in the current period.

$$S^p = B$$

Credit Market Equilibrium: Implications

Remember: $S = S^p + S^g = I + CA$

Here $I=0$, $CA=0$, and $S^g = -B$

$$S^p = Y - C - T$$

$$B = G - T$$

Therefore, $S^p = B \Leftrightarrow Y - C - T = G - T$

Or rearranging $Y = C + G$

Income-Expenditure Identity

Credit market equilibrium implies that the income-expenditure identity holds.

$$Y = C + G$$

Ricardian Equivalence

- The **Ricardian Equivalence Theorem** states that , under some conditions, a change in the timing of taxes is neutral, i.e. has no effect on the interest rate and on current and future consumption

Ricardian Equivalence

Key equation: The consumer's lifetime tax burden is equal to the consumer's share of the present value of government spending – the timing of taxation does not matter for the consumer.

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

implies

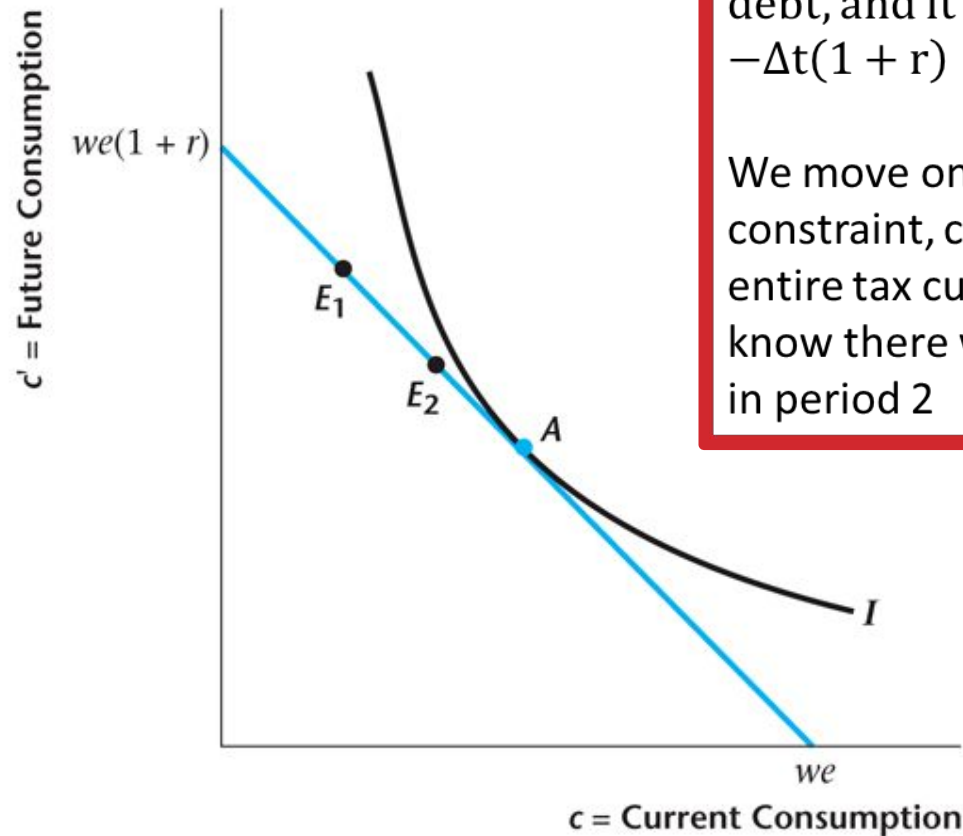
$$t + \frac{t'}{1+r} = \frac{1}{N} \left(G + \frac{G'}{1+r} \right)$$

Ricardian Equivalence

Then, substitute in the consumer's budget constraint – taxes do not matter in equilibrium for the consumer's lifetime wealth, just the present value of government spending.

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

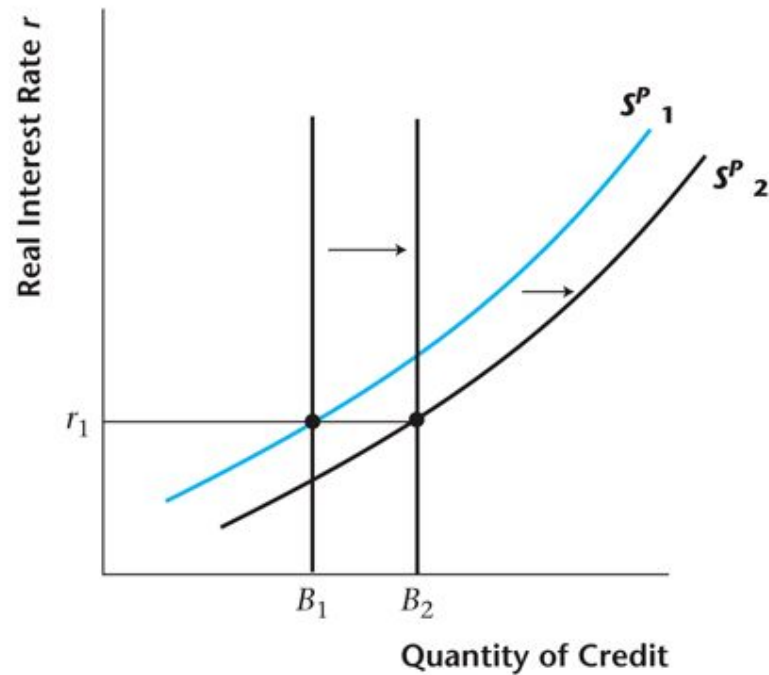
Ricardian Equivalence with a Cut in Current Taxes for a Borrower



$\Delta t < 0$ is tax cut, financed with debt, and it implies $-\Delta t(1+r) > 0$ tomorrow

We move on the budget constraint, consumers save the entire tax cut because they know there will be a tax increase in period 2

Ricardian Equivalence and Credit Market Equilibrium



Discussion of the assumptions

- Ricardian equivalence theorems says government debt represents our future liabilities as a nation, must be paid by taxing citizens in the future.
- It's a good benchmark to start thinking about government debt, however some of the assumptions are very strong!
- Situations in which it might not hold:
 - Heterogeneity: different taxes for different people
 - Finite lifetimes
 - Distortionary taxes
 - Imperfections in the credit markets

Readings

- Savings are generally a good idea
http://www.youtube.com/watch?v=C_8TGTKdrIY
- The cost of repair
http://www.economist.com/node/17173933?story_id=17173933
- Economists show “Cash-for-clunkers” was a clunker
<http://www.theatlantic.com/business/archive/2010/10/economists-show-cash-for-clunkers-was-a-clunker/65356/>