

## Lecture 5

### Expectations, Consumption, and Investment

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I Semestre 2018

Last updated: April 17, 2018

Universidad de Costa Rica

EC3201 - Teoría Macroeconómica 2

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# Introduction

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# Expectations, Consumption, and Investment

- In this lecture, we look at the role expectations play in determining the two main components of GDP: consumption and investment.
- This description of consumption and investment will be the main building block of the expanded IS-LM model we develop in next lecture.

# Consumption and expectations

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# Permanent income and life cycle

- How do people decide how much to consume and how much to save?
- The modern theory of consumption was developed independently in the 1950s by **Milton Friedman** the permanent income theory, and **Franco Modigliani** the life cycle theory.
- The behavior of aggregate consumption has remained a hot area of research ever since, for two reasons:
  - the sheer size of consumption as a component of GDP, and
  - the increasing availability of large surveys of individual consumers

# A foresighted consumer: consumption as function of wealth

Consumption for a very foresighted consumer depends on:

1. **Human wealth:** After-tax labor income over working life
2. **Nonhuman wealth:** The sum of...
  - 2.1 **Financial wealth:** The value of checking and saving accounts
  - 2.2 **Housing wealth:** The value of the house owned minus the mortgage due

Consumption decision:

$$C_t = C(\text{total wealth}_t)$$

# Consumption smoothing vs frictions

- If you want to consume the same amount every year, the constant level of consumption that you can afford equals your total wealth divided by your expected remaining life.
- However, you might:
  - not want to plan for constant consumption over your lifetime
  - make consumption decisions in a less forward-looking fashion
  - become unemployed or sick
  - not be able to get a loan from a bank when you need to borrow



## Consumption and current disposable income

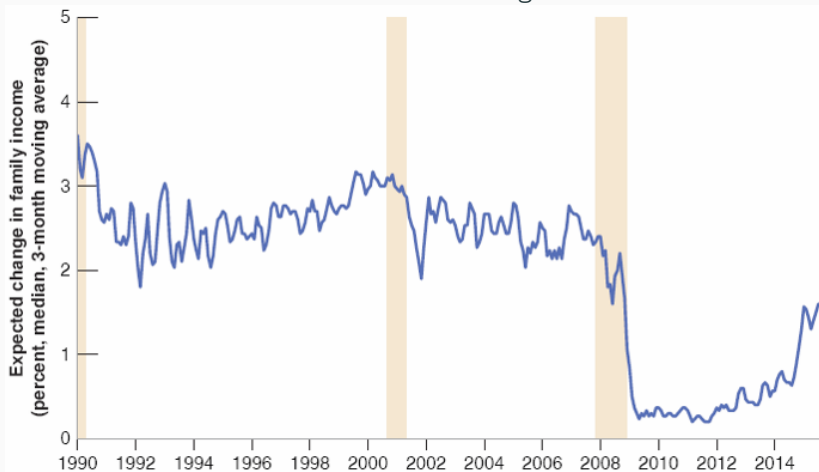
- Consumption function with after-tax labor income:

$$C_t = C \left( \underset{+}{\text{total wealth}_t}, \underset{+}{Y_{Lt} - T_t} \right)$$

- Expectations affect consumption:
  - Directly through human wealth
  - Indirectly through nonhuman wealth
- Implications of expectations of the relation between consumption and income:
  - Consumption is likely to respond less than one-for-one in current income.
  - Consumption may move even if current income does not change.

## Expected Change in Family Income since 1990

After falling sharply in 2008, expectations of income growth remained low for a long time.



# Investment and expectations

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## Investment: is it worth it to buy an extra machine

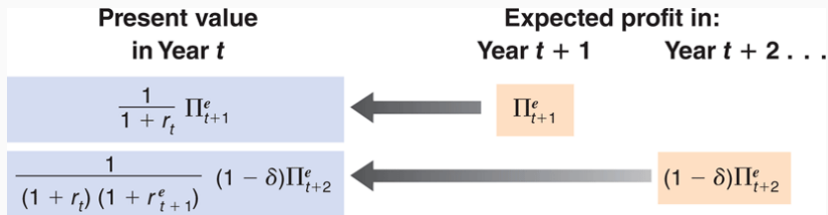
- To compute the present value of expected profits the firm must first estimate how long the machine will last or the depreciation rate  $\delta$ .
- The present value of expected profits from buying the machine in year  $t$  is:

$$V(\Pi_t^e) = \frac{\Pi_{t+1}^e}{1+r_t} + \frac{(1-\delta)\Pi_{t+2}^e}{(1+r_t)(1+r_{t+1}^e)} + \dots \quad (1)$$

- The investment function becomes:

$$I_t = I\left(V(\Pi_t^e)\right) \quad (2)$$

# Computing the Present Value of Expected Profits



## Investment with static expectations

- If firms expect both future profits and future interest rates to remain at the same level as today:

$$\begin{aligned}\Pi_{t+1}^e &= \Pi_{t+2}^e = \dots = \Pi_t \\ r_{t+1}^e &= r_{t+2}^e = \dots = r_t\end{aligned}$$

- then equation (1) becomes:

$$V(\Pi_t^e) = \frac{\Pi_t}{1+r_t} + \frac{(1-\delta)\Pi_t}{(1+r_t)^2} + \dots = \frac{\Pi_t}{1+r_t} \left( 1 + \frac{1-\delta}{1+r_t} + \dots \right)$$

- which can be reduced to:

$$V(\Pi_t^e) = \frac{(1+r_t)\Pi_t}{(1+r_t)(r_t+\delta)} = \frac{\Pi_t}{(r_t+\delta)} \quad (3)$$

- Replacing equation (3) in equation (2) gives:

$$I_t = I \left( \frac{\Pi_t}{r_t + \delta} \right) \quad (4)$$

- where  $r_t + \delta$  is rental cost or shadow cost of capital.

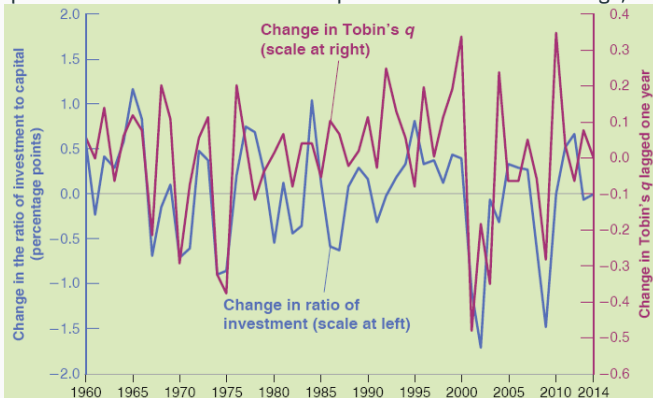
# Factors affecting investment

- According to the investment function of equation (4):
  - Investment depends on the ratio of profit to the user cost.
  - The higher the profit, the higher the level of investment.
  - The higher the user cost, the lower the level of investment.
- If a firm's current profit is low:
  - it can get the funds it needs only by borrowing if it wants to buy new machines.
  - it might have difficulty borrowing even if it wants to invest.

# FOCUS: Investment and the Stock Market

Tobin's  $q$  is the ratio of the value of capital relative to its current purchase price, and a higher  $q$  leads to higher investment.

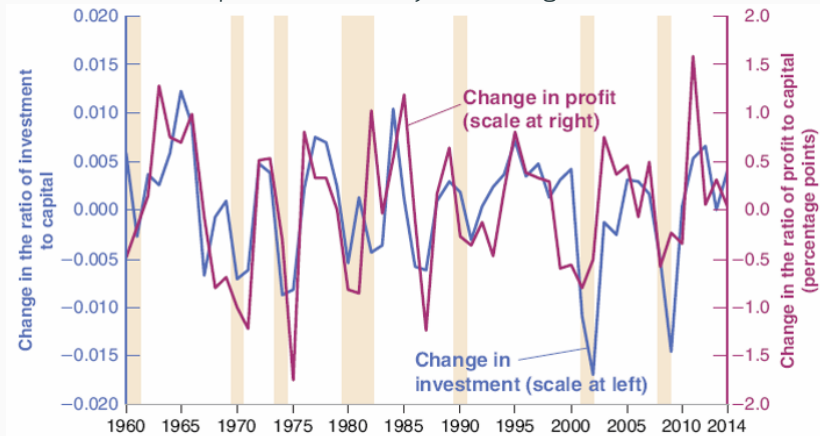
Tobin's  $q$  vs. the Ratio of Investment to Capital. Annual Rates of Change, since 1960





# Changes in Investment and Changes in Profit in the United States, since 1960

Investment and profit move very much together.



## FOCUS: Profitability versus Cash Flow

- Profitability is the expected present discount value of future profits.
- Cash flow is net flow of cash the firm receives now (current profit).
- An economist found that in 1986 when the declines in the oil price led to large losses in oil-related activities, investment spending in nonoil activities also reduced. This suggests that current cash flow matters in investment.

## Investment vs output to capital ratio

- Investment depends both on the expected present value of future profits and on the current level of profit:

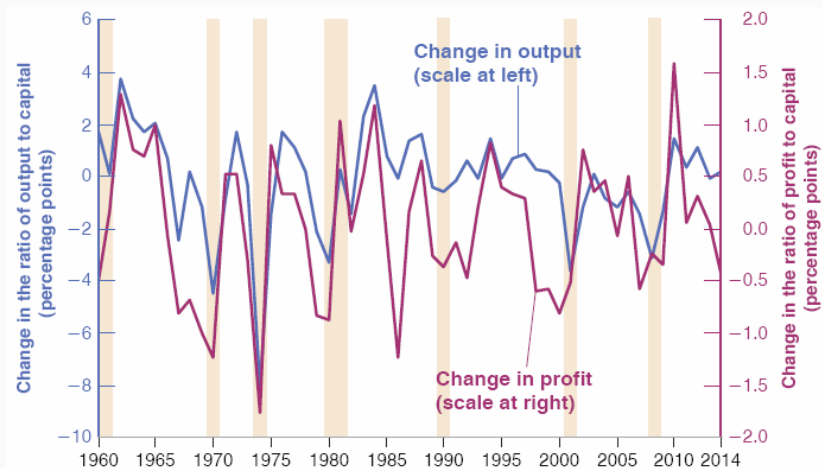
$$I_t = I \left( V \underset{+}{\left( \Pi_t^e \right)}, \underset{+}{\Pi_t} \right)$$

- Profit per unit of capital is an increasing function of the ratio of sales or output (Y) to the capital stock (K):

$$\Pi_t = \Pi \left( \underset{+}{\frac{Y_t}{K_t}} \right)$$

# Changes in Profit per Unit of Capital versus Changes in the Ratio of Output to Capital in the United States since 1960

Profit per unit of capital and the ratio of output to capital move largely together.



# The Volatility of Consumption and Investment

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# The Volatility of Consumption and Investment

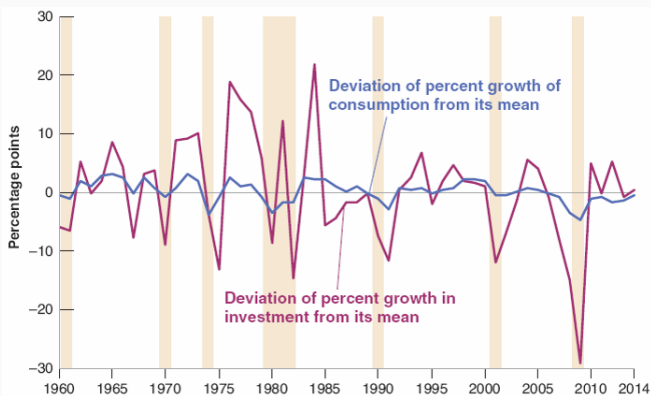
- Similarities between consumption and investment behavior:
  - The more transitory consumers expect a current increase in income to be, the less they will increase their consumption.
  - The more transitory firms expect a current increase in sales to be, the less they revise their assessment of the present value of profits, and thus the less likely they are to buy new machines or build new factories.

## The Volatility of Consumption and Investment 2

- Differences between consumption and investment decisions:
  - The permanent nature of the change in income implies that consumers can afford to change consumption now and in the future by the same amount as the change in income.
  - However, the change in investment spending may exceed the change in sales.

# Rates of Change of Consumption and Investment, in the United States, since 1960

- Consumption and investment usually move together.
- Investment is much more volatile than consumption.
- Both components contribute roughly equal to output fluctuations.





## Summary: about consumption

- Consumption depends on both wealth and current income. Wealth is the sum of nonhuman wealth (financial wealth and housing wealth) and human wealth (the present value of expected after-tax labor income).
- The response of consumption to changes in income depends on whether consumers perceive these changes as transitory or permanent.
- Consumption is likely to respond less than one-for-one to movements in income. Consumption might move even if current income does not change.

## Summary: about investment

- Investment depends on both current profit and the present value of expected future profits.
- If firms expect profits and interest rates to be constant, we can think of investment as depending on the ratio of profit to the user cost of capital (= real interest rate + the depreciation rate).

## Summary: about investment (2)

- Profit is very correlated to output. Hence, we can think of investment as depending indirectly on current and expected future output movements. Firms that anticipate a long output expansion (high profits) will invest. Movements in output that are not expected to last will have a small effect on investment.
- Investment is much more volatile than consumption. But because investment accounts only for 15% of GDP and consumption accounts for 70%, movements in investment and consumption are of roughly equal importance in accounting for movements in aggregate output.

This presentation is mostly based on Blanchard, Amighini, and Giavazzi ([2012](#), chapter 16).

## References

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Blanchard, Olivier, Alessia Amighini, and Francesco Giavazzi (2012). *Macroeconomía*.