ECON4033 Money and Finance in China

Week 3: Investment[1]

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[1] These lecture notes are largely based on the materials prepared by Prof. Siu Kee Wong for the same topic.

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I. Definition of Investment in GDP Accounting

- Investment, consumption, and government and export spending are defined by their use, rather than their source. For instance

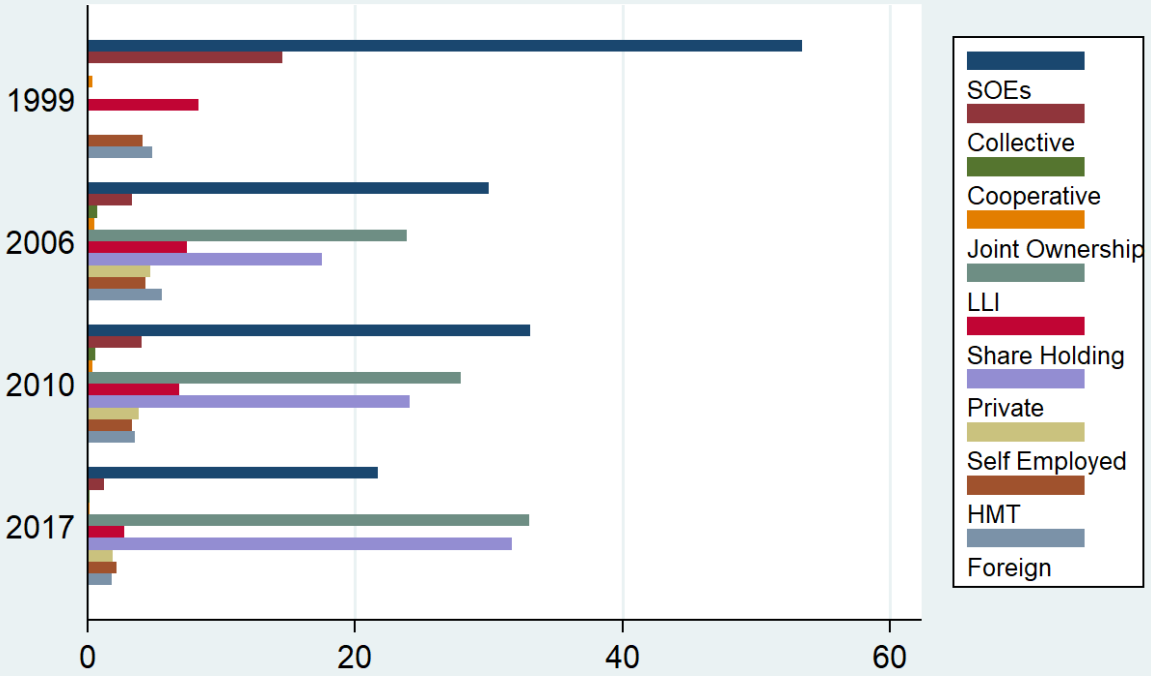
  1) A washing machine purchased by a consumer is defined as consumption whereas had it been purchased by a commercial launderer, it would be classified as investment.

  2) Residential housing is treated as an investment good (even though a consumer is "using" the house) and the homeowner is classified as an investor.

II. The Source of Investment by Ownership in China

- As of 2017, more than 20 percent of total investment in China is still undertaken by SOEs. This share was close to 55 percent in 1999. It has been in continuous decline.
- Other investment categories include: private companies followed by foreign firms, government, individuals, and collective enterprises, etc. Firms rely heavily on internal funds (retained earnings) to finance investment.
- The very profitable production sector has been a substantial lender. Chinese firms have been net issuers of equity and borrowers of bank loans despite strong cash flow from operations. This shows the arbitrage opportunity that SOEs enjoy through borrowing from state-owned banks at low rates, then investing in outside opportunities.

Figure: Total Investment in Fixed Assets by Ownership in China (%)



Notes:
1. Data remains largely incomplete in 1999.
2. Source: https://data.stats.gov.cn.

III. The Use of Investment in China

- Fixed investment includes both business fixed investment and residential fixed investment (housing). Business fixed investment includes new plant or property and equipment (but excludes land) as well as software development. Another type of investment that is not considered "fixed" is the flow of new inventory (stock-building). In summary, investment includes gross new plants, property (including residential housing) and equipment, business software development, and inventory accumulation (Schramm, 2015). The following table from Schramm (2015) compares and contrasts the use of investment in the U.S. and China:

	United States 2012 (US$ billions)	*Percent of GDP*	*China 2011 (RMB 100 million)*	*Percent of GDP*
Gross investment total	3,094.2	19.0%	225,007	47.6%
Non-government, fixed gross investment	2,409.2	14.8%	167,411	35.4%
Non-residential	1,970	12.1%	134,198	28.4%
Residential	439.2	2.7%	33,213	7.0%
Government gross investment	618.9	3.8%	45,631.8	9.6%
Change in inventories	66.1	0.4%	11,964	2.5%
GDP	16,244.6		472,881.6	

- As a share of GDP, China's gross investment is two to three times larger than that of the United States. Across all major categories, investment is higher by similar orders of magnitude.
- In both countries, non-residential investment makes up the lion's share, and this was also true before the 2008 global financial crisis. Non-residential investment includes investment in plant, property, and equipment – mostly on the part of companies, but also includes some infrastructure investment.
- Residential, government, and inventory investment categories are all disproportionately larger in China than the United States. Even in the pre-financial crisis, residential investment in the United States never reached the share of GDP that it currently holds in China.

IV. Models of Investment Behavior

A. Neoclassical model of investment behavior

- At the firm level (micro perspective), greater anticipated profits (π) can be associated with increased investment, while higher opportunity costs (r, often defined as the "cost of capital") are associated with lower levels of investment. This relationship is summarized in the following equation assuming a finite investment period:

$$\text{Net Present Value} = -I_0 + \frac{\pi_1}{1+r} + \frac{\pi_2}{(1+r)^2} + \frac{\pi_3}{(1+r)^3} + \frac{\pi_4}{(1+r)^4} + \cdots$$

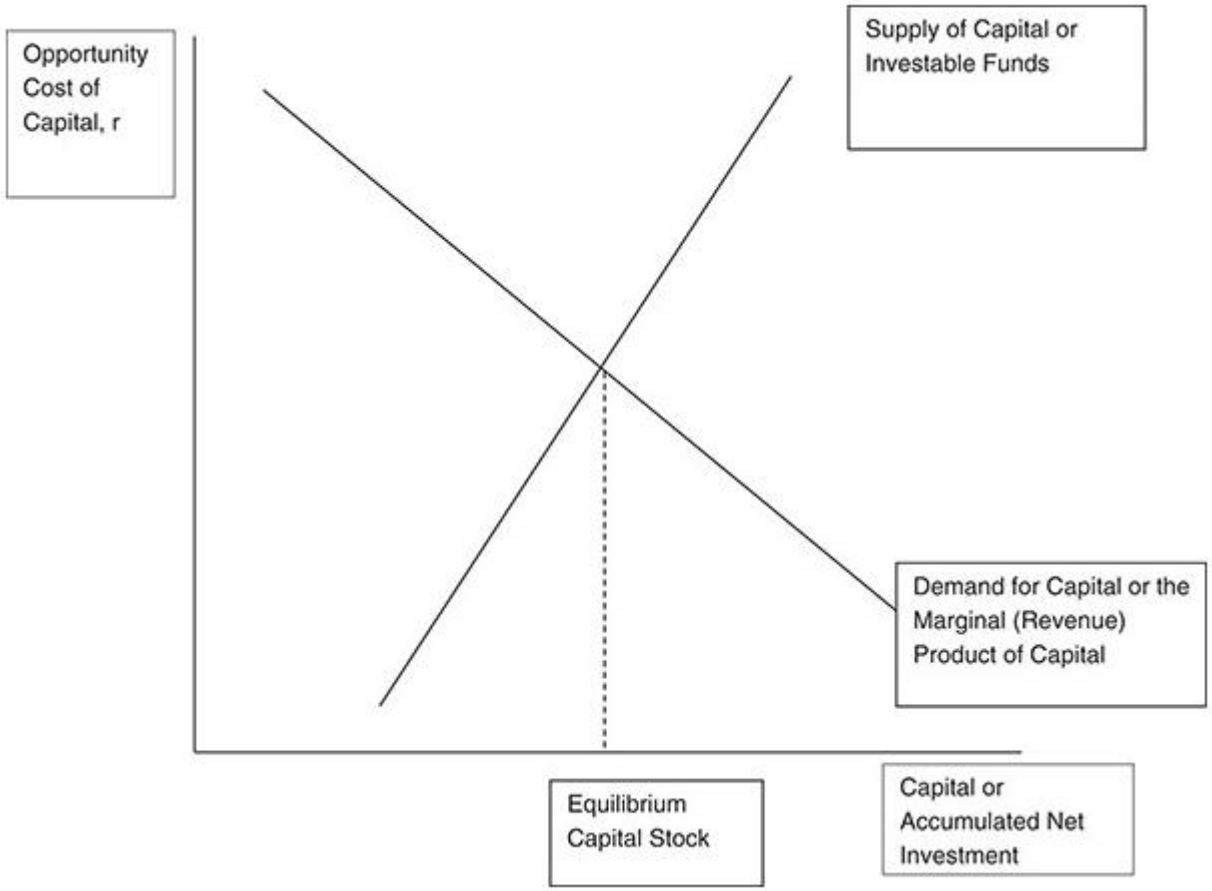
  where I_0 represents the initial outlay for investment. Net present value (NPV) measures the difference between the increased profits and increased cost of undertaking the project. A positive value of NPV suggests that the investment should be undertaken.

- Note that a basic microeconomics equilibrium condition in a competitive economy is:

$$P \times MPK = r$$

  (i.e., value of marginal product = rental cost or capital), where P is the price a firm receives when selling its output, *MPK* is the marginal product of capital (or the extra output derived by adding one unit of capital), and *r*, the rental cost of capital is an all-inclusive measure of the opportunity cost of using one more unit of capital. This implies that a firm should add more capital, up to the point at which the extra benefit just equals the extra cost.

- In a neoclassical framework, the supply of loanable funds and the demand for capital (based on capital's marginal product) will determine an equilibrium level of capital and its price (i.e., opportunity cost of capital).



Source: Schramm (2015).

B. Tobin's *Q*

- Because it is difficult to observe marginal values, James Tobin proposed an alternative theory that makes it easier for empirical exercises. Tobin's *Q* is defined as the ratio of the firm's market value (the sum of debt and equity) to the replacement cost of the firm's capital:

$$\text{Tobin's Q} = \frac{\text{Market Value of a Firm}}{\text{Replacement Cost of a Firm}}.$$

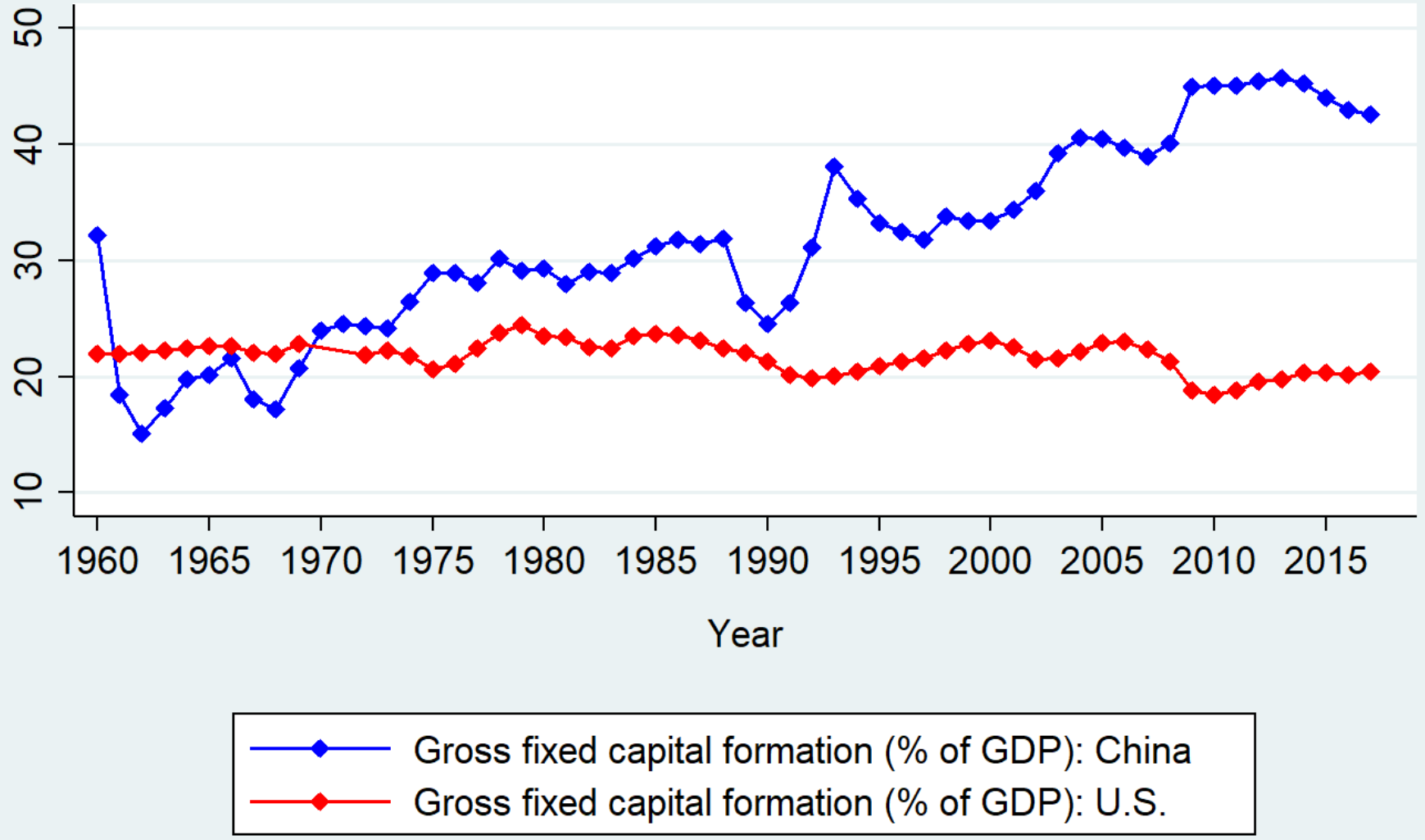
  In other words, this is a means of estimating whether a given business or a market is overvalued or undervalued

- *Q* theory:
  - An undervalued company, one with a Tobin's *Q* ratio less than one, would be attractive to corporate raiders or potential purchasers, as they may want to purchase the firm instead of creating a similar company. This would likely result in increased interest in the company, which would increase its stock price, which would, in turn, increase its Tobin's *Q* ratio.
  - As for overvalued companies, those with a Tobin's *Q* ratio higher than one, they may see increased competition. A ratio higher than one indicates that an existing firm is earning a rate higher than its replacement cost, which would cause individuals or other companies to create similar types of businesses (i.e., investment increases) to capture some of the profits. This would lower the existing firm's market shares, reduce its market price and cause its Tobin's *Q* ratio to fall.

V. Policy Implications and Empirical Evidence

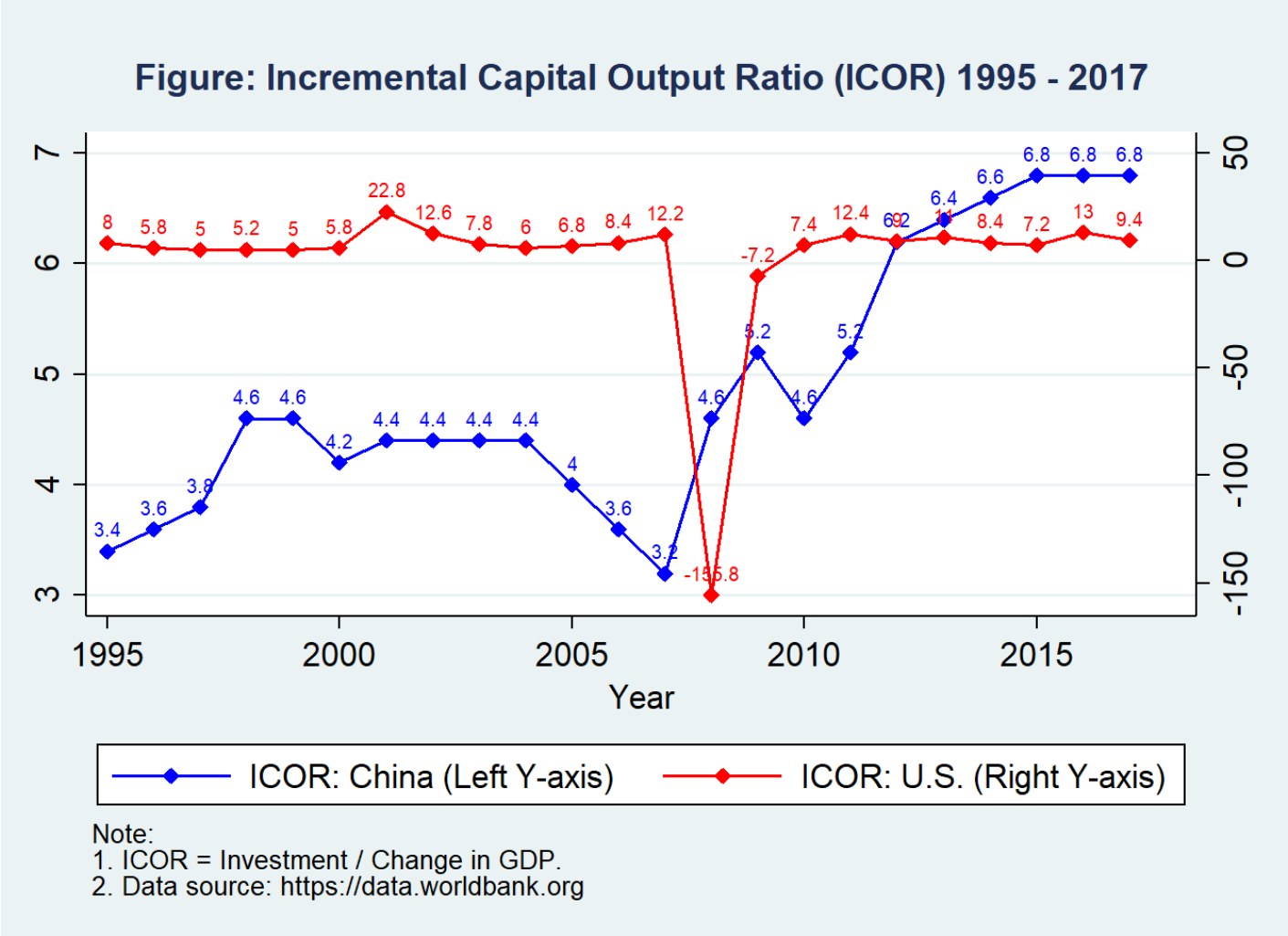
- Emerging economies naturally have high levels of investment. That is because the marginal productivity of capital is much greater than that of advanced economies.
- China's high level of investment as a share of GDP raises the question of whether or not it is too high. Economists have broken this question into different parts, logically looking at the marginal product of capital in China (its return), then comparing that to the opportunity cost of capital (its cost).
- Ding et al. (2010) examine more than 100,000 firms in China and find that one-third of China's firms overinvest. Private firms overinvest because of the presence of excessive cash flow and an absence of outside monitor such as private bondholders. SOEs tend to overinvest because of easy access to credit from the banking system (soft budget constraint).
- Using a model of dynamic optimization, Lee et al. (2012) find that, in China, actual investment as compared to optimal investment has been consistently too high and may now be 10 percentage points too high (i.e, as a share of GDP, investment-GDP ratio should be closer to 40 % rather than recently 50%). See a Figure on the next page.

Figure: Gross Fixed Capital Formation as % of GDP (1960 - 2017)



Data source: https://data.worldbank.org

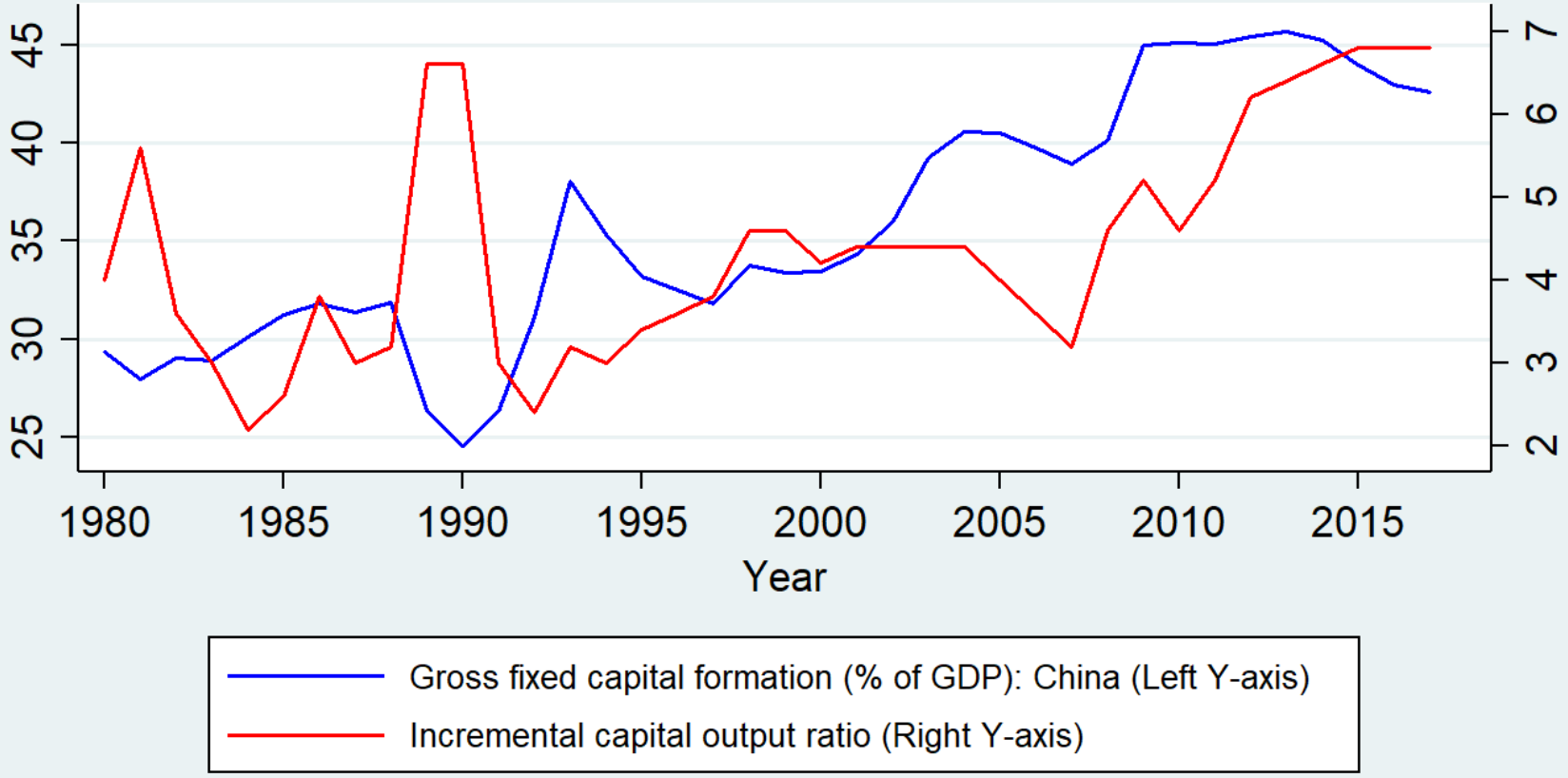
- China's ICOR (incremental capital output ratio) has trended upward over the past two decades — one indication of diminishing returns to investment.[2]



[2] ICOR indicates the additional unit of capital or investment needed to produce an additional unit of output.

Figure: Chinese Investment and Growth

Returns on Investment Have Tumbled



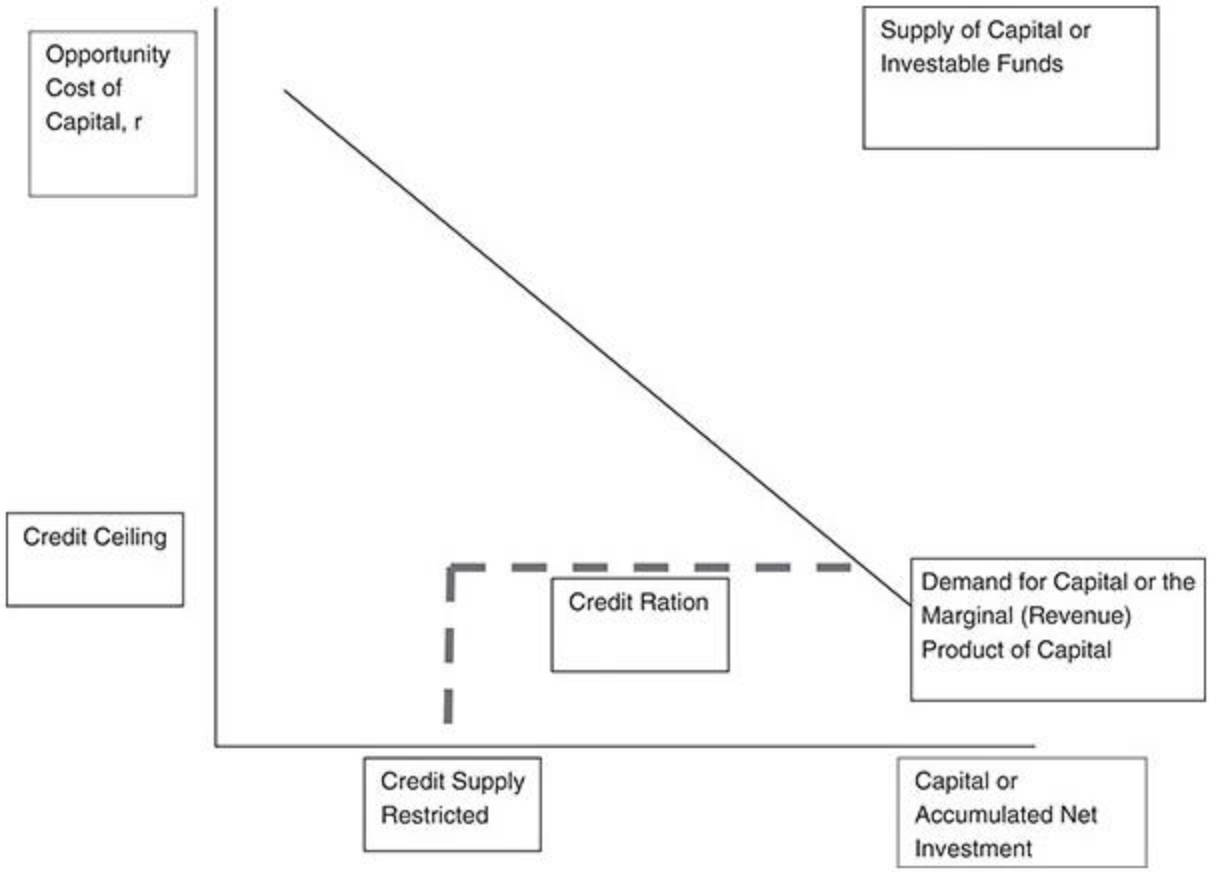
Note:
1. ICOR = Gross fixed capital formation share in GDP / Real GDP growth.
2. Data source: https://data.worldbank.org

- A significant share of investment in China is determined by the government. Through its control of virtually all financial intermediation, especially its control of lending decisions by the four major banks, the government has been the ultimate decision maker in the level, patterns, and types of investments.

- We can still describe China's financial system as "financially repressed". Profitability is not the main objective of financial institutions. There is an absence of competition among financial institutions. Lending and borrowing rates are not determined by market conditions, but rather by other criteria, e.g., a social objective.

- The fact that investment has been determined by lending policies (which in turn reflect government decision making) is only half of the story. The other half is control over the real economy and investment at the firm and industry level. China's central government has, at times, felt the need to directly control investment spending in the aggregate and, at other times, in specific industries in which a perceived overinvestment (bubble) is occurring. The government accomplishes this by restricting specific industries to specific levels of investment. Thus, the government can and has directly controlled investment both at the financing (lending) end and at the industry (decision- making) end.

- Under a financially repressed system, one does not see the usual supply curve of loanable funds. Rather we see, for example, interest rate ceilings below the equilibrium level and rationing of credit (investable funds) to select borrowers.



Source: Schramm (2015).

Reference:

Il Houng Lee, Murtaza Syed and Liu Xueyan "Is China Over-investing and Does it Matter?" IMF Working Paper WP/12/277 (Washington DC: International Monetary Fund).

Ronald M. Schramm (2015), *The Chinese Macroeconomy and Financial System: A U.S. Perspective*, Taylor and Francis, London.

Sai Ding, John Knight & Xiao Zhang (2019) "Does China overinvest? Evidence from a panel of Chinese firms", The European Journal of Finance, 25:6, 489-507.