Principles of Economics

Savings and Investment

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This version: Fall 2018

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Closed Economy

- A closed economy has no interactions in trade or finance with other countries.
- In a closed economy:

$$Y = C + I + G$$

  - Y : GNI $\overset{\text{closed}}{=}$ GDP

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Closed Economy

- Private saving[1]:

$$S_{pvt} = Y - T - C$$

  - T : taxes

- Public saving:

$$S_{gov} = T - G$$

- National saving:

$$S = S_{pvt} + S_{gov} = Y - C - G = I$$

[1] For simplicity, we ignore government transfer and interest payments to the public here.

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Open Economy

- Open economies interact by trading goods and services and by making investments in each other's economies.
- **Balance of payments**: a record of a country's international transactions
  - Transactions that involves a flow of funds *into* the country is a credit item (+) on the balance of payments.
  - Transactions that involves a flow of funds *out of* the country is a debit item (-) on the balance of payments.

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Balance of Payments

Current Account (CA):

$$CA = NX + NFP$$

Financial Account (FA):

$$FA = CI - CO$$

- The financial account records international purchases of assets, including financial assets (cash, stocks, bonds), and real assets (land, housing, factories).
- Capital inflow (CI): increase in foreign holding of domestic assets
- Capital outflow (CO): increase in domestic holding of foreign assets.

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Capital Flow

- **Foreign Direct Investment** (FDI)
  - e.g., Microsoft opening a research center in Beijing
    - ★ Capital inflow for China. Capital outflow for the U.S.
- **Foreign portfolio investment** (FPI)
  - e.g., a Chinese citizen buying an Apple stock
    - ★ Capital outflow for China. Capital inflow for the U.S.

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Balance of Payments

Accounting Identity

$$CA + FA = 0 \tag{1}$$

[a]

[a] In reality, there is also a "capital account," which records things like government debt forgiveness, migrants' capital transfer, etc. Because the capital account is typically small relative to the current account and the financial account, we ignore it in our discussion here. More rigorously, the balance of payments accounting identity is: Current account + Financial account + Capital account = 0

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Balance of Payments

- When a country has a current account surplus ($CA > 0$) due to, for example, a trade surplus[2], it must be using the foreign currency to purchase foreign assets. Thus, capital is flowing out of the country ($FA < 0$).
- When a country has a current account deficit ($CA < 0$) due to, for example, a trade deficit, it must be financing the net purchase of these goods and services by selling assets abroad. Thus, capital is flowing into the country ($FA > 0$).

[2] For most countries, trade balance is the most important part of the current account balance.

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Balance of Payments

Example

- Assume that U.S. residents do not want to buy any foreign assets, but foreign residents want to purchase some stock in a U.S. firm (such as Microsoft). How are the foreigners going to get the dollars to purchase the stock?
- They would do it the same way U.S. residents would purchase the stock—they would have to earn more than they spend. In other words, foreigners must sell the United States more goods and services than they purchase from the United States.
- This leads to negative net exports for the United States. The extra dollars spent by U.S. residents on foreign-produced goods and services would be used to purchase the stock in Microsoft.

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Balance of Payments

Example (Domestic-currency Invoicing)

You (a Chinese citizen) write a software and sell it to a Japanese consumer. You are paid 100 Yuan. From China's perspective:

- The sale of software is an export of China: $NX + 100 \Rightarrow CA + 100$.
- The 100 Yuan you have acquired represents a decrease in Japan's holding of Chinese assets: $CI - 100 \Rightarrow FA - 100$.

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Balance of Payments

Example (Foreign-currency Invoicing)

You (a Chinese citizen) write a software and sell it to a Japanese consumer. You are paid 1,685 Yen ($\approx$ 100 Yuan). From China's perspective:

- The sale of software is an export of China: $NX + 100 \Rightarrow CA + 100$.
- The 1,685 Yen are Japanese assets that you have acquired: $CO + 100 \Rightarrow FA - 100$.

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Balance of Payments

Example (Foreign-currency Invoicing)

After receiving 1,685 Yen, you can

1. keep the cash
2. buy Japanese stocks and bonds
3. buy Japanese goods and services
4. exchange Yen for Yuan

- If you do (2), you exchange one Japanese asset for another Japanese asset. FA is unchanged as a result.
  - The combined result of selling the software to Japan and using the received Japanese currency to buy Japanese stocks and bonds is that $CA + 100, FA - 100$.

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Balance of Payments

Example (Foreign-currency Invoicing)

After receiving 1,685 Yen, you can

1. keep the cash
2. buy Japanese stocks and bonds
3. buy Japanese goods and services
4. exchange Yen for Yuan

- If you do (3), $CO - 100, IM + 100 \Rightarrow CA - 100, FA + 100$.
  - The combined result of selling the software to Japan and using the received Japanese currency to buy Japanese goods and services is that CA and FA are unchanged.

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Balance of Payments

Example (Foreign-currency Invoicing)

After receiving 1,685 Yen, you can

1. keep the cash
2. buy Japanese stocks and bonds
3. buy Japanese goods and services
4. exchange Yen for Yuan

- If you do (4), suppose you exchange Yen for Yuan with another Chinese citizen or a Chinese bank, then nothing changes from China's balance of payments perspective. If you exchange Yen for Yuan with a foreign citizen, then $CI - 100, CO - 100 \Rightarrow FA$ is unchanged.
  - The combined result of selling the software to Japan and exchanging the received Japanese currency for domestic currency is that $CA + 100, FA - 100$.

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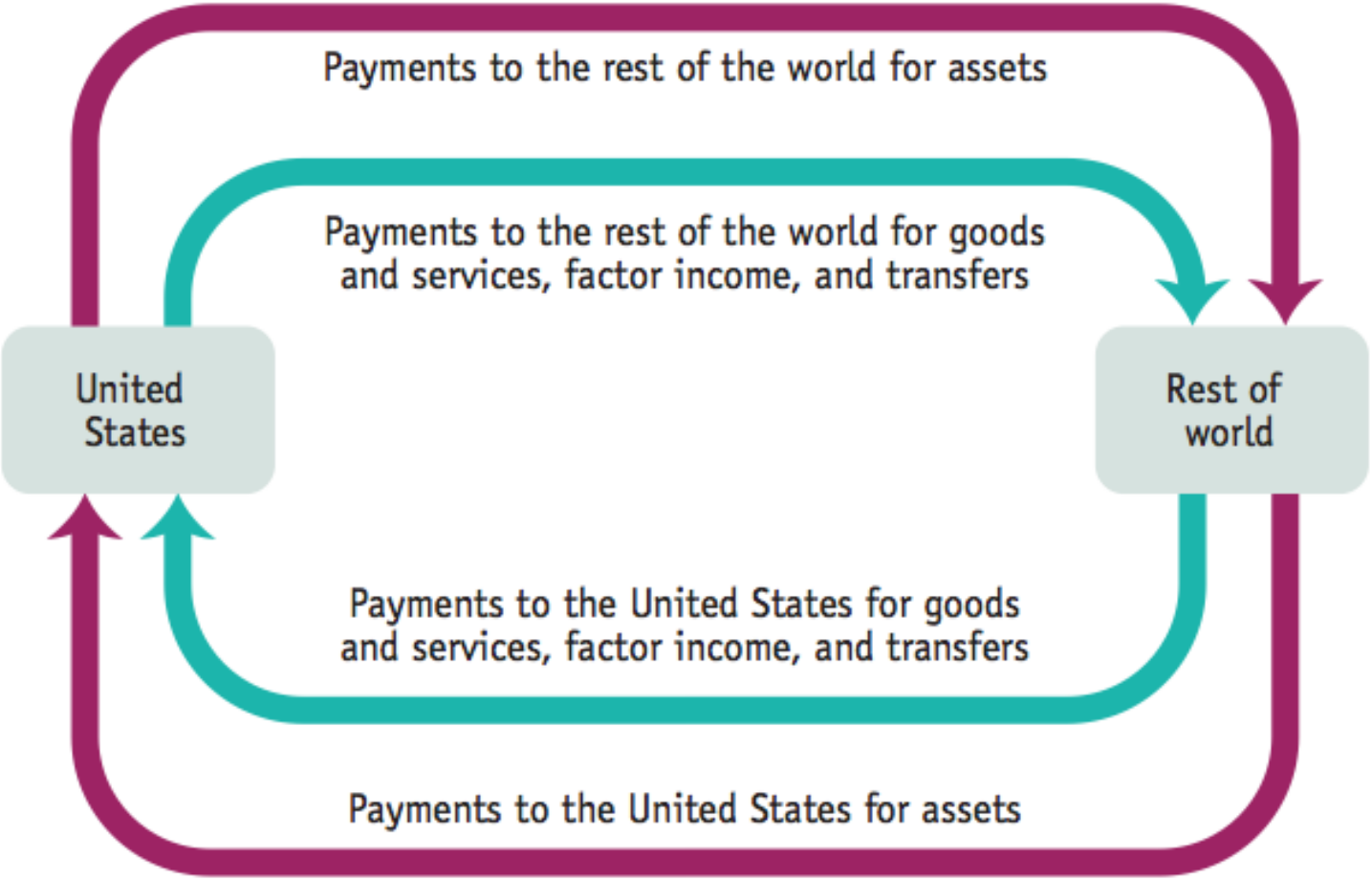
Balance of Payments



Balance of Payments (U.S. perspective). Green arrows represent payments that are counted in CA. Red arrows represent payments that are counted in FA.

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Balance of Payments

Current Account	
1. Merchandise exports	+1023.1
2. Merchandise imports	–1,861.4
3. Merchandise trade balance (1 + 2)	–838.3
4. Service exports	+422.6
5. Service imports	–342.8
6. Goods and services balance (3 + 4 + 5)	–758.5
7. Net investment income from abroad	+36.6
8. Net unilateral transfers	–89.6
9. Current account balance (6 + 7 + 8)	–811.5
Financial Account	
10. Change in U.S. owned assets abroad	–1,059.1
11. Change in foreign-owned assets in U.S.	+1,888.4
12. Financial account balance (10 + 11)	+829.3
13. Statistical discrepancy	–17.8
TOTAL (9 + 12 + 13)	**0.0**

U.S. Balance of Payments (2006, Billions of dollars)

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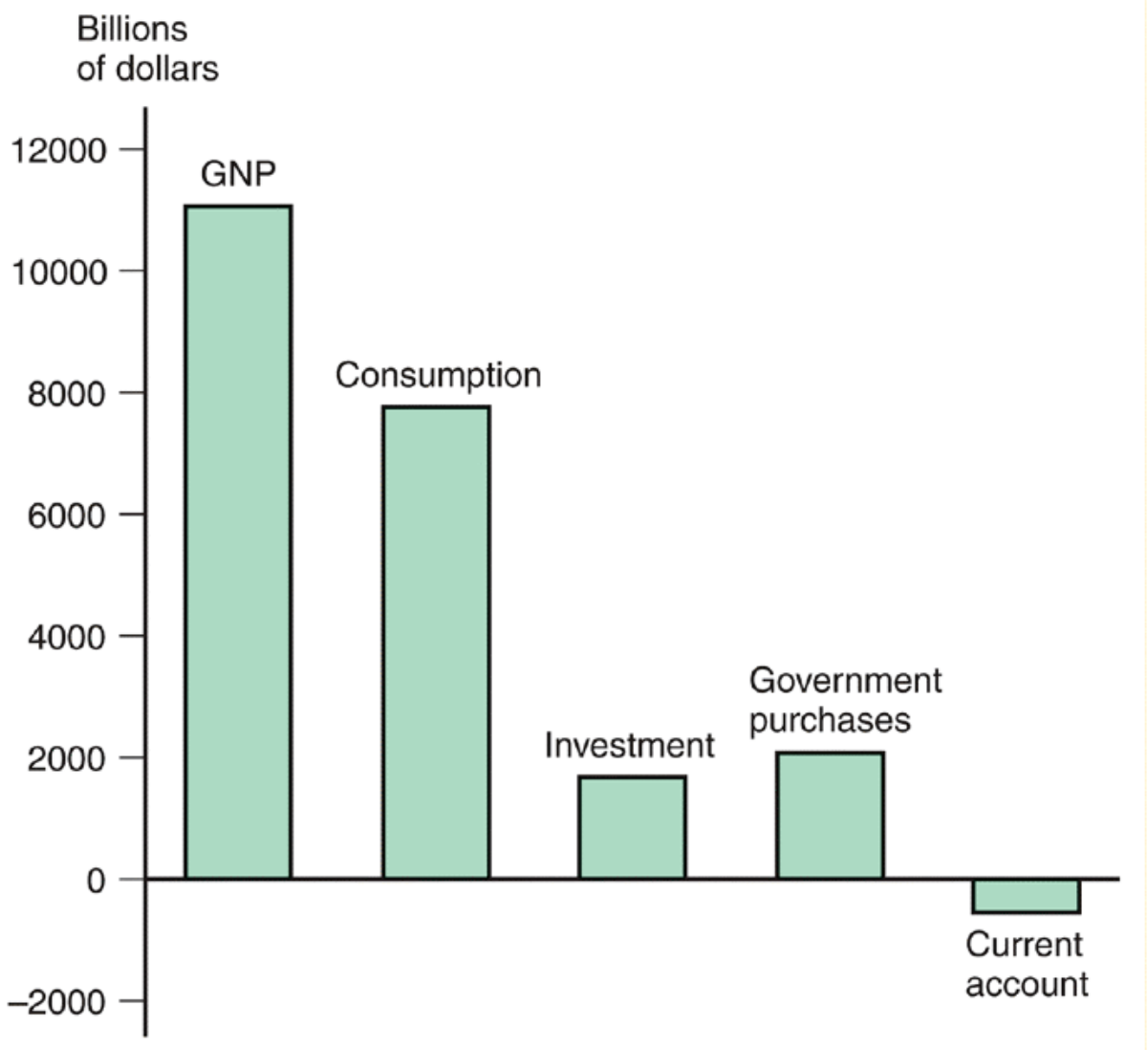
GNP



U.S. GNP and Its Components (2003)

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Open Economy

- GNI:

$$Y = GDP + NFP = C + I + G + NX + NFP$$

- National saving:

$$S = S_{pvt} + S_{gov} = Y - C - G = I + NX + NFP \tag{2}$$

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Open Economy

(2) can be alternatively written as

$$
\begin{aligned}
S &= I + CA \\
S + FA &= I \\
S + CI &= I + CO \\
S + NCI &= I && (3) \\
S &= I + NCO && (4)
\end{aligned}
$$

- Net Capital inflow $(NCI) \equiv CI - CO = FA$.
- Net Capital outflow $(NCO) \equiv CO - CI = -FA$.

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Open Economy

(3) and (4) can be expressed as:

$$\underbrace{S}_{\text{domestic saving}} + \underbrace{NCI}_{\text{foreign saving}} = I$$

$$S = \underbrace{I}_{\text{domestic investment}} + \underbrace{NCO}_{\text{foreign investment}}$$

- When a nation's saving exceeds its domestic investment ($S > I$), its net capital outflow is positive ($NCO > 0$), indicating that the nation is using some of its saving to buy assets abroad.
- When a nation's domestic investment exceeds its saving ($S < I$), its net capital inflow is negative ($NCI > 0$), indicating that foreigners are financing some of this investment by purchasing domestic assets.

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Open Economy

- Countries that run trade deficits ($NX < 0$) can also be thought of as attracting foreign investment or borrowing from abroad ($NCI > 0$)[3].
- Countries that run trade surplus ($NX > 0$) can also be thought of as investing some of their domestic savings abroad ($NCO > 0$).

[3] For most countries, $NX \gg NFP$. Hence,

$$
\begin{aligned}
CA &\approx NX \\
S &\approx I + NX \\
NX &\approx NCO = -NCI
\end{aligned}
$$

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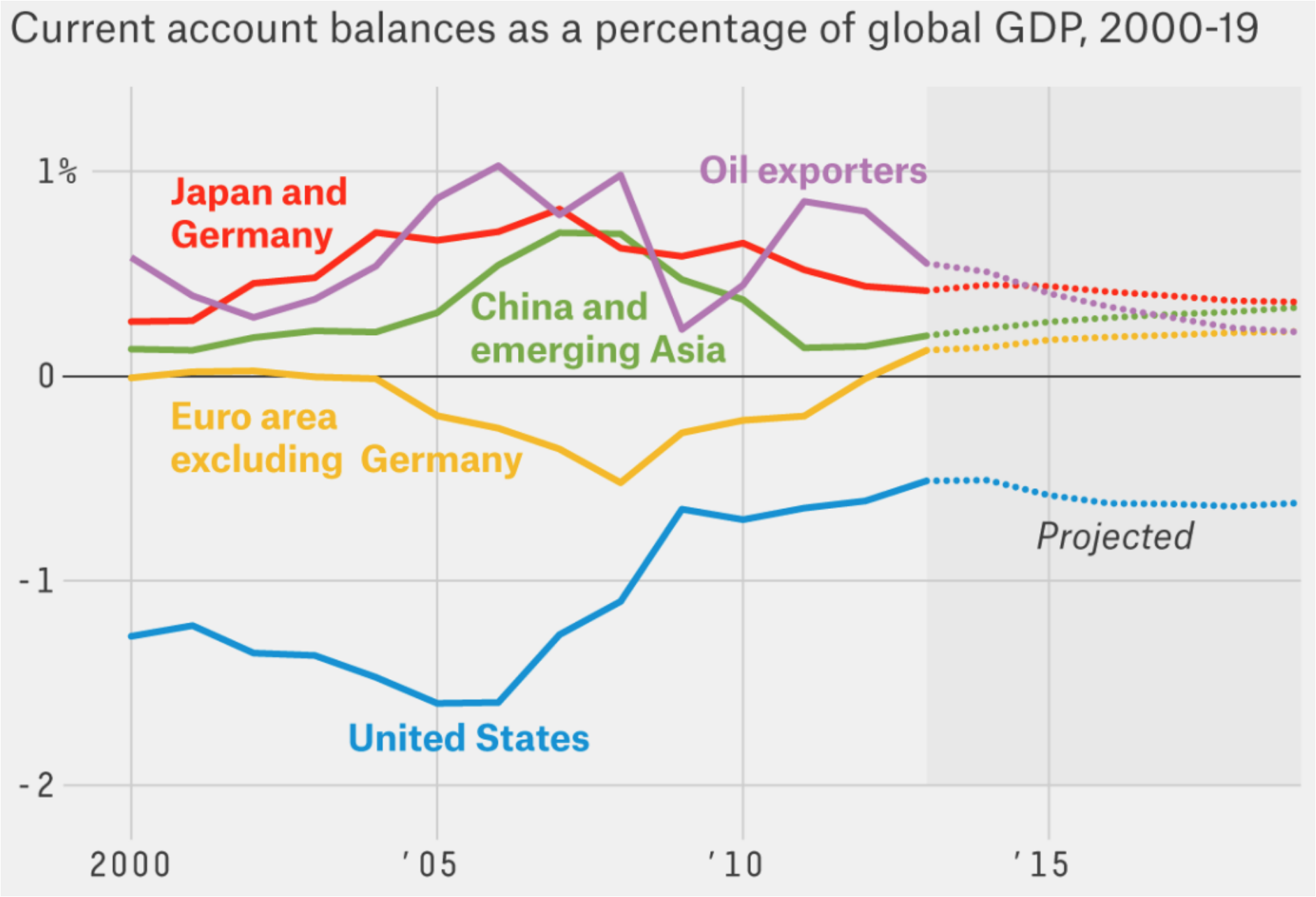
Current account balances as a percentage of global GDP, 2000-19
1%
0
-1
-2
2000
'05
'10
'15
Japan and Germany
Oil exporters
China and emerging Asia
Euro area excluding Germany
United States
Projected

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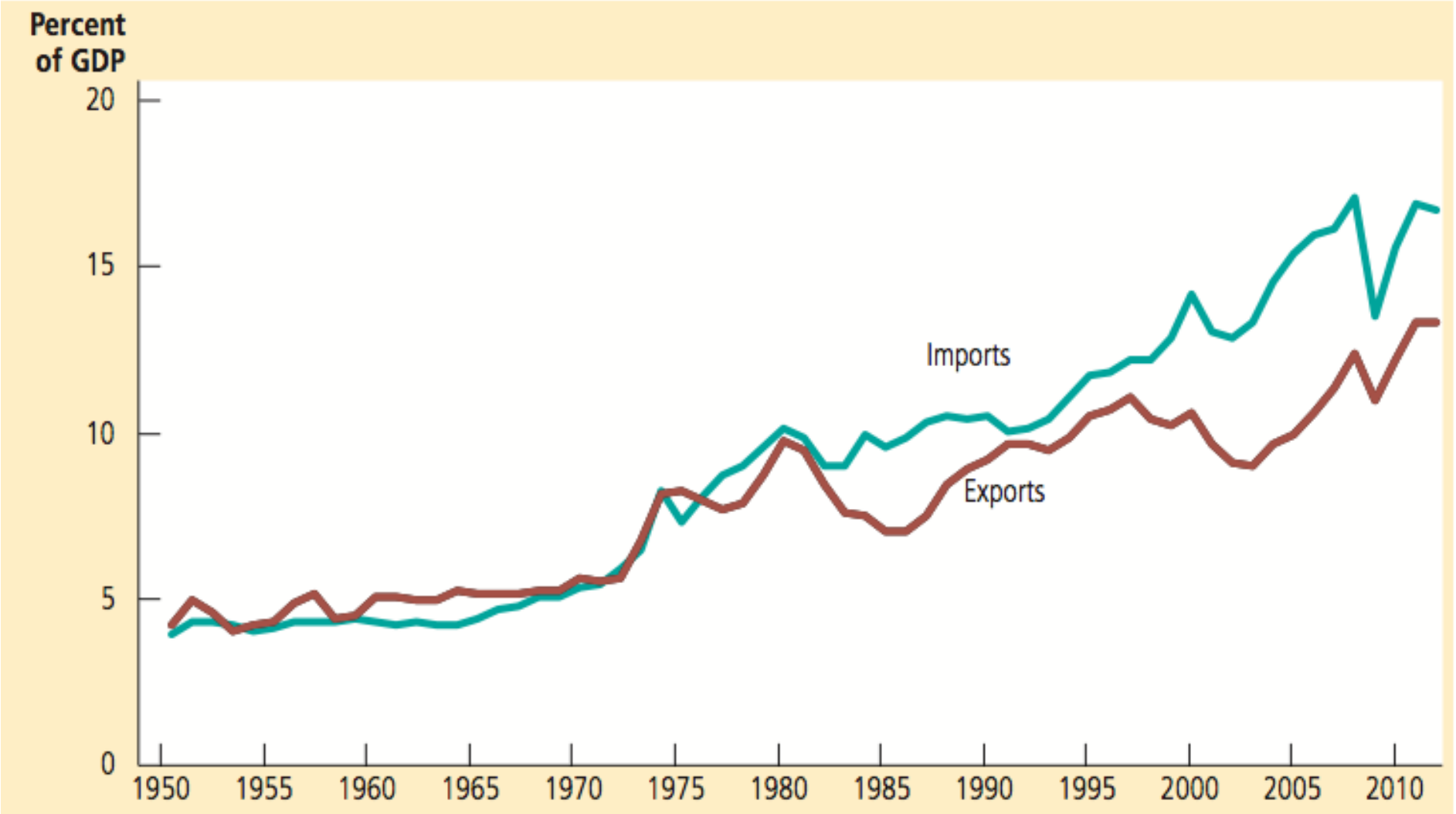

U.S. Trade Balance (as a percentage of GDP)

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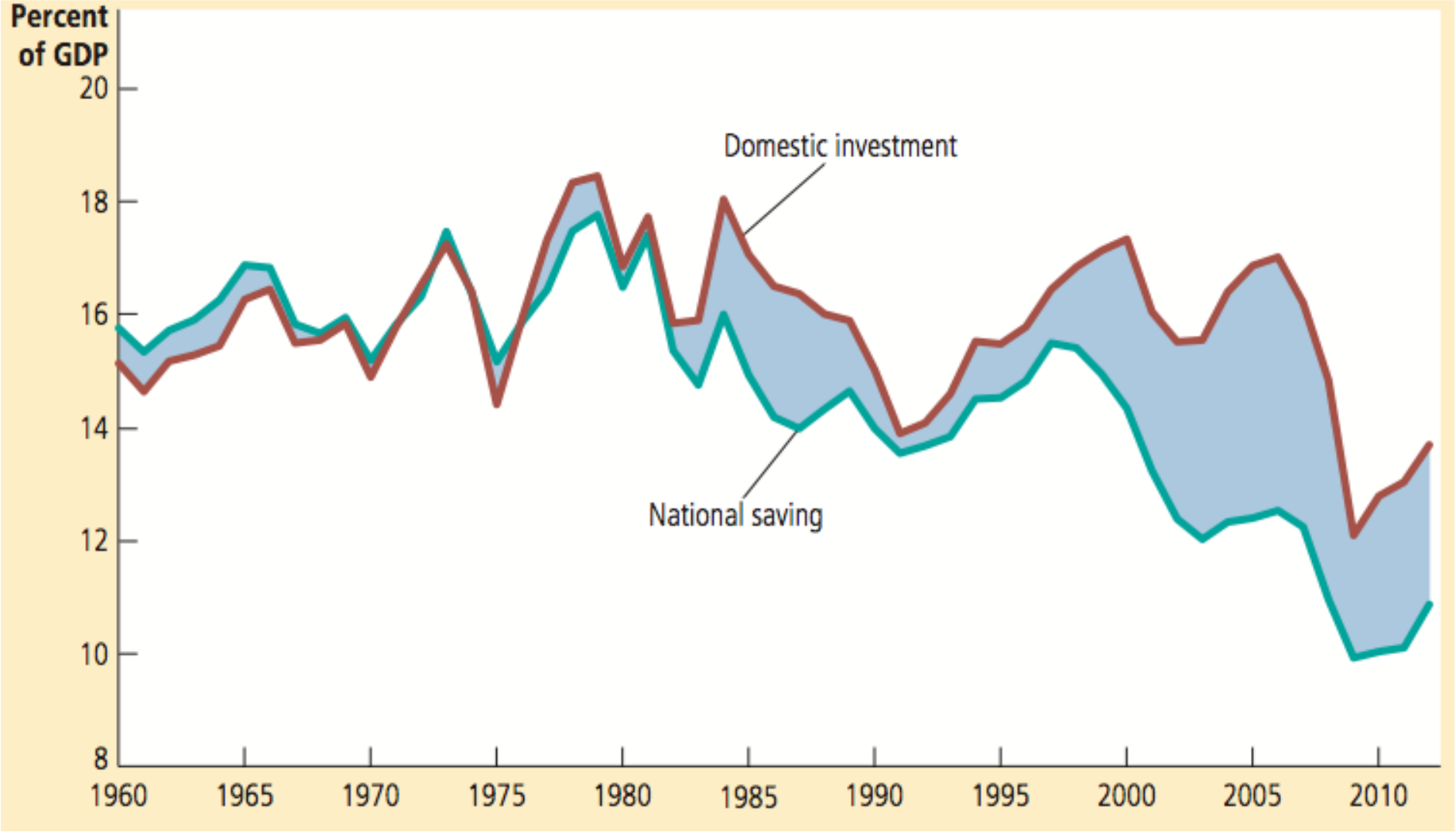

U.S. National Saving and Domestic Investment (as a percentage of GDP)

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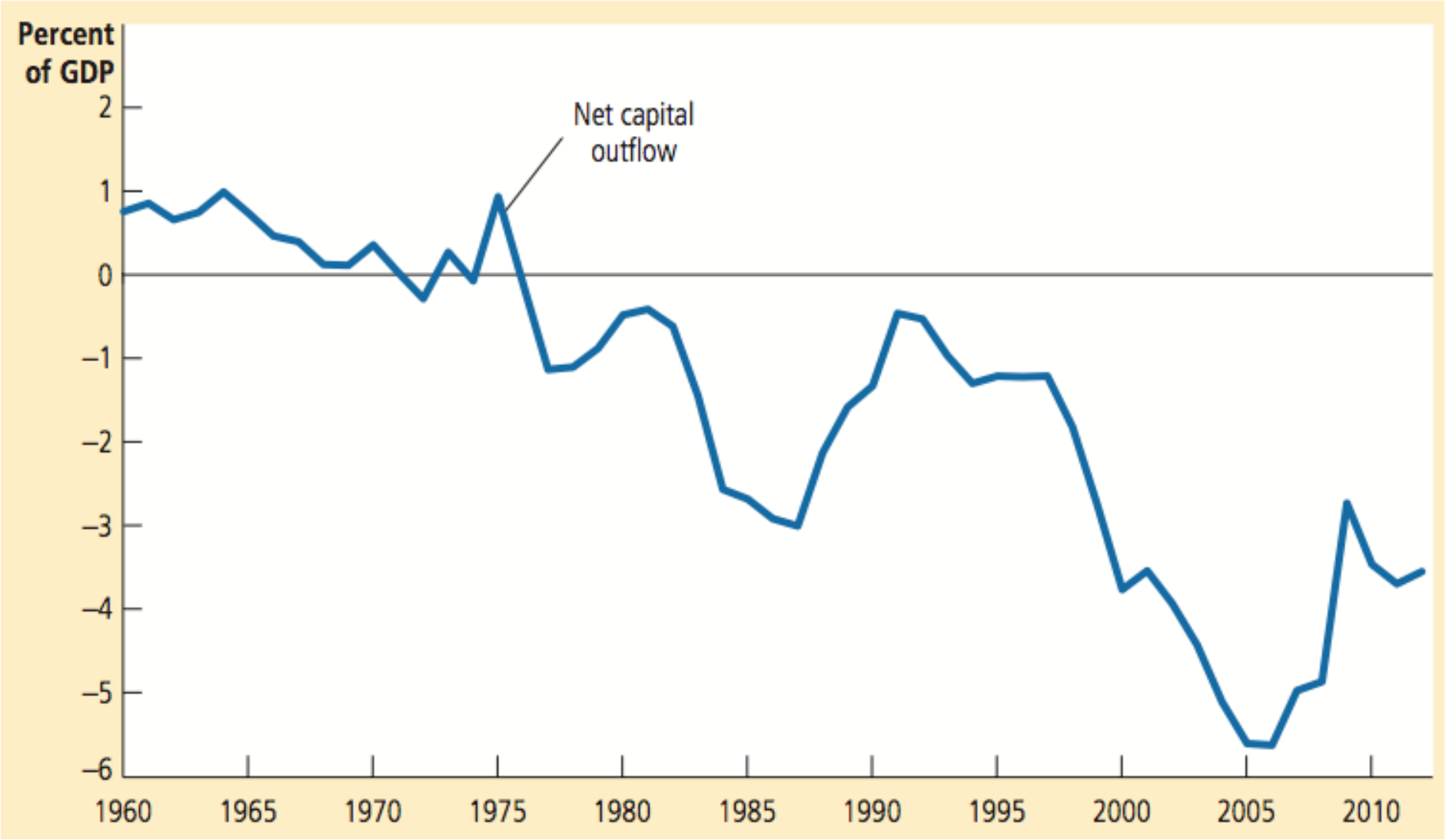

U.S. Net Capital Outflow (as a percentage of GDP)

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The Loanable Funds Theory

- Demand for funds $= I$
- Supply of funds $= S + NCI$[4]
- The supply and demand for funds determine the equilibrium *ex ante* real interest rate (r) in the economy.
  - *Ex ante* real interest rate is the real interest rate that borrowers and lenders agree to before knowing the actual inflation level.
- Other things being equal, $r \uparrow \Rightarrow I \downarrow, S \uparrow, CI \uparrow, CO \downarrow$

[4] Alternatively, one can also write:

- Demand for funds $= I + NCO$
- Supply of funds $= S$

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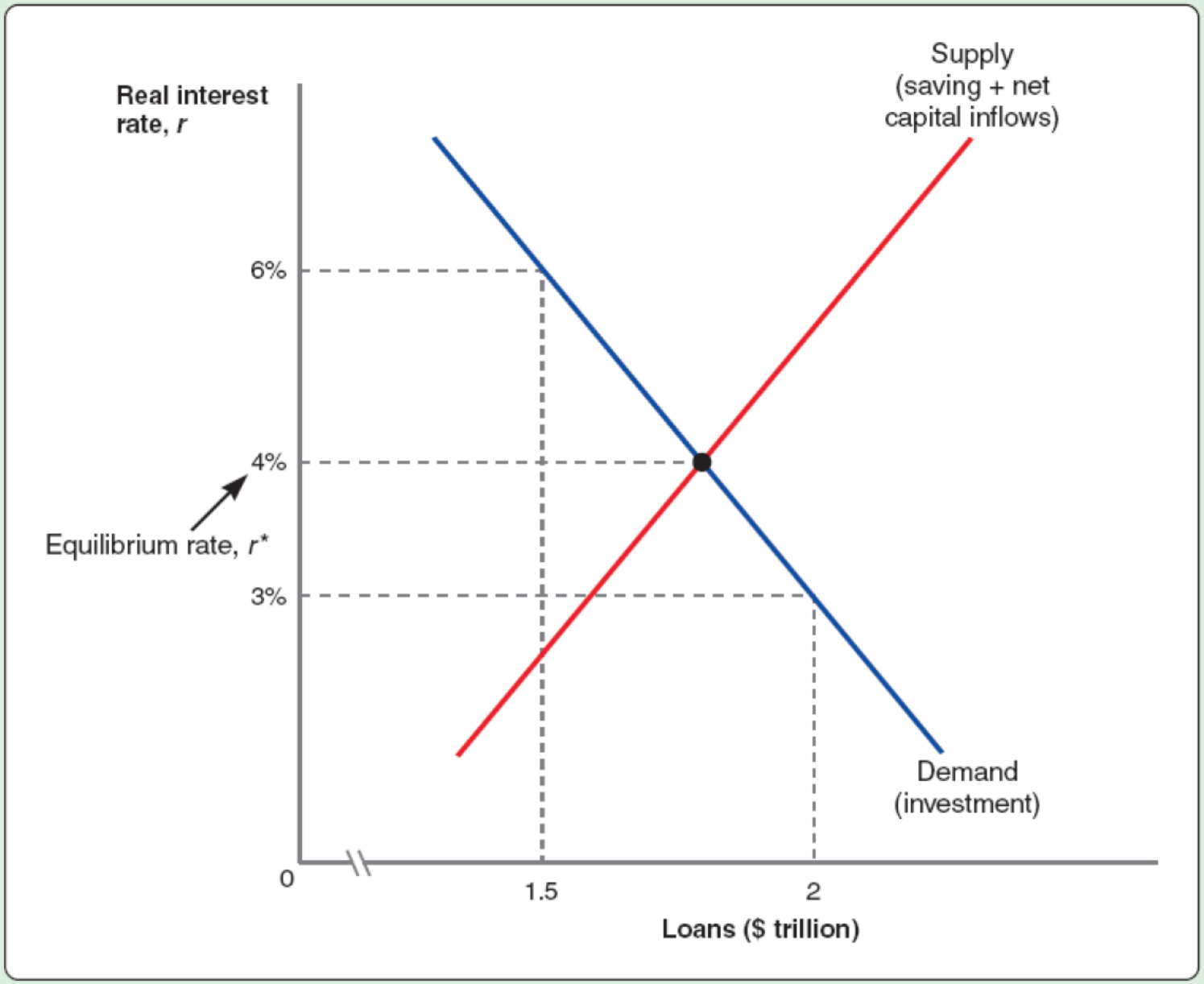
Real interest rate, r
Supply (saving + net capital inflows)
6%
4%
3%
Equilibrium rate, r*
Demand (investment)
0
1.5
2
Loans ($ trillion)

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Loanable Funds Theory: factors that change the real interest rate

Shifts in Investment	Shifts in Saving	Shifts in Net Capital Inflows
New technologies Changes in investors' confidence	Changes in private saving Changes in government budget deficits	Changes in foreign savers' confidence Changes in foreign interest rates

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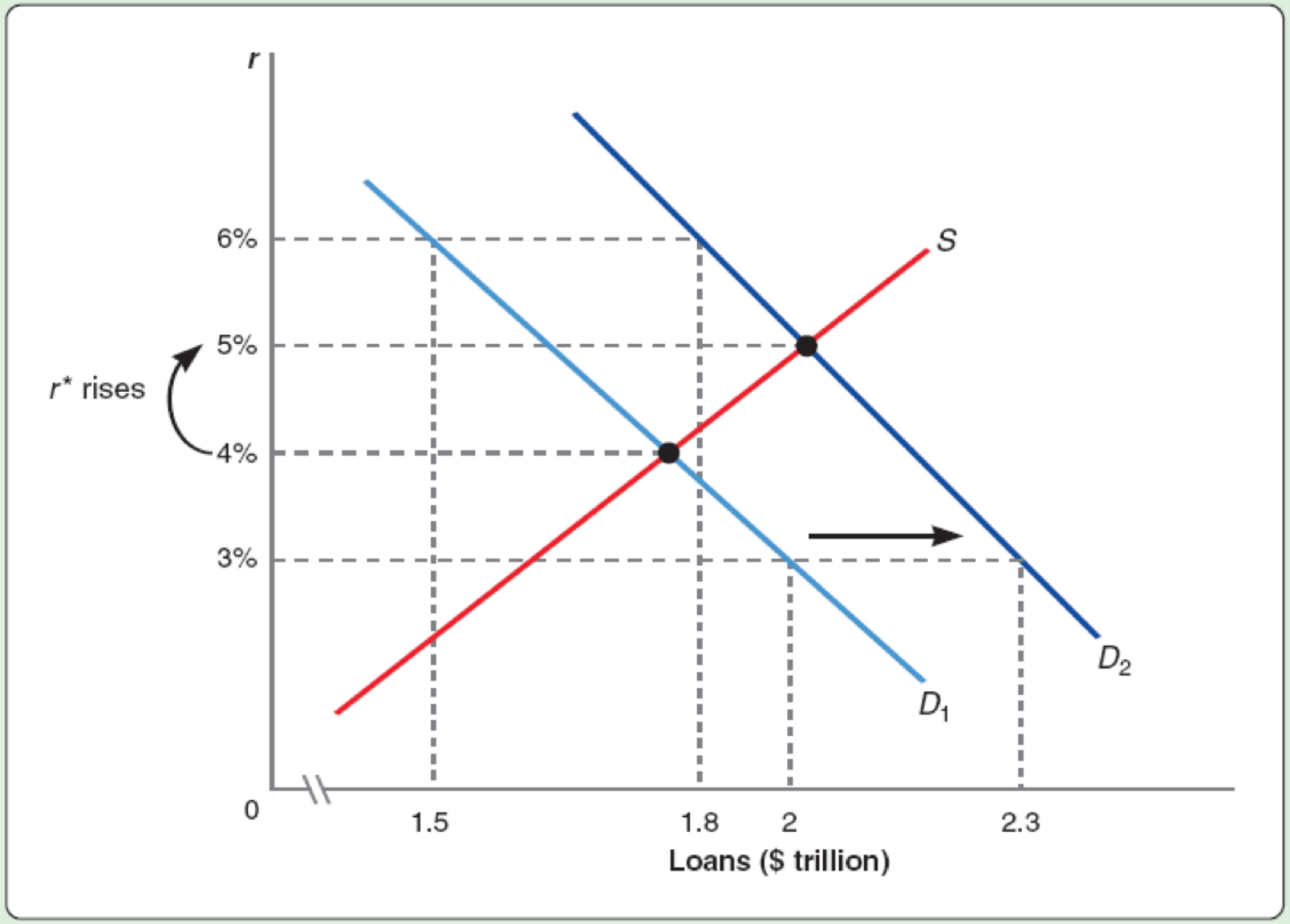
Loanable Funds Theory: an increase in investment



Here a new technology raises the level of investment at each real interest rate. A rise in investment shifts the demand for loans from D_1 to D_2, and r^* rises from 4 percent to 5 percent.

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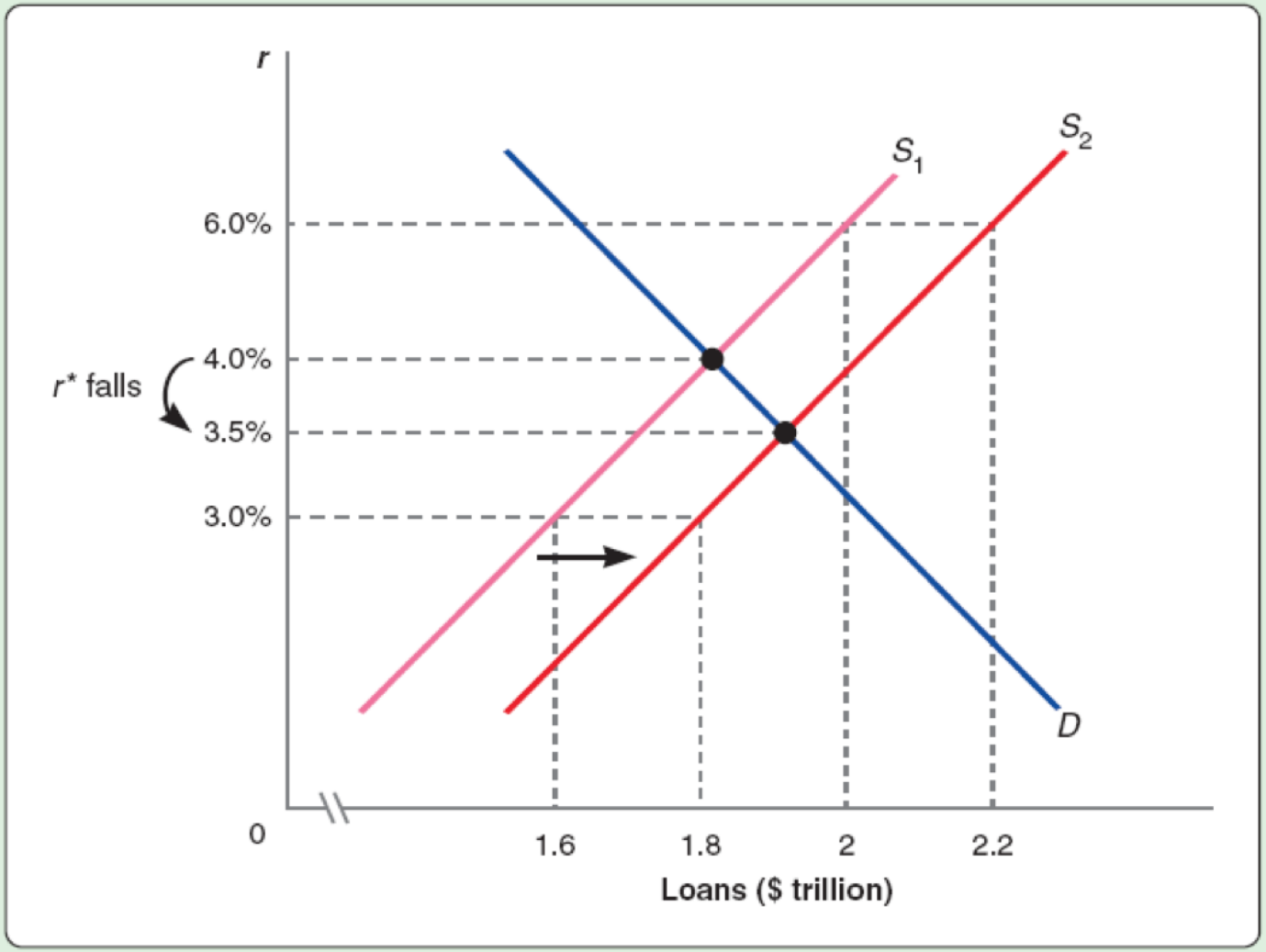
Loanable Funds Theory: an increase in saving



When people become more thrifty, they save more at each real interest rate, increasing the supply of loans. In this example, the supply curve for loans shifts from S_1 to S_2, and r^* falls from 4 percent to 3.5 percent.

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Loanable Funds Theory: a rise in government budget deficit

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Government Budget Deficit and the Crowding Out Effect

- The loanable funds model predicts that *other things being equal*[5], an increase in government budget deficit causes real interest rate to rise and investment to fall.
- This is called the **crowding out effect**.
- Since investment is important for long-run economic growth, budget deficits could reduce the economy's growth rate.

[5] i.e. private saving is unchanged. Investment demand is unchanged. Capital flows are unchanged.

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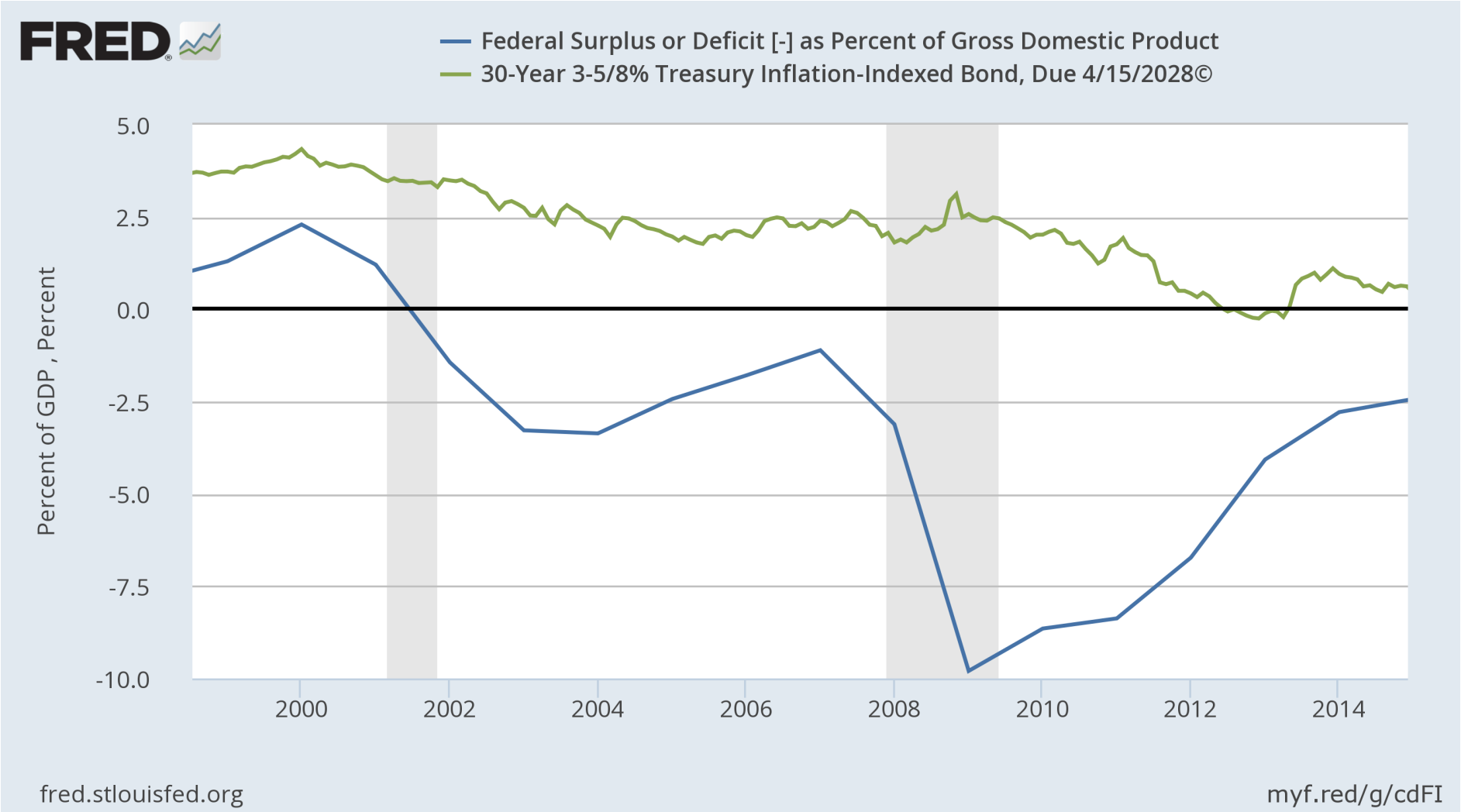
Government Budget Deficit and Real Interest Rate



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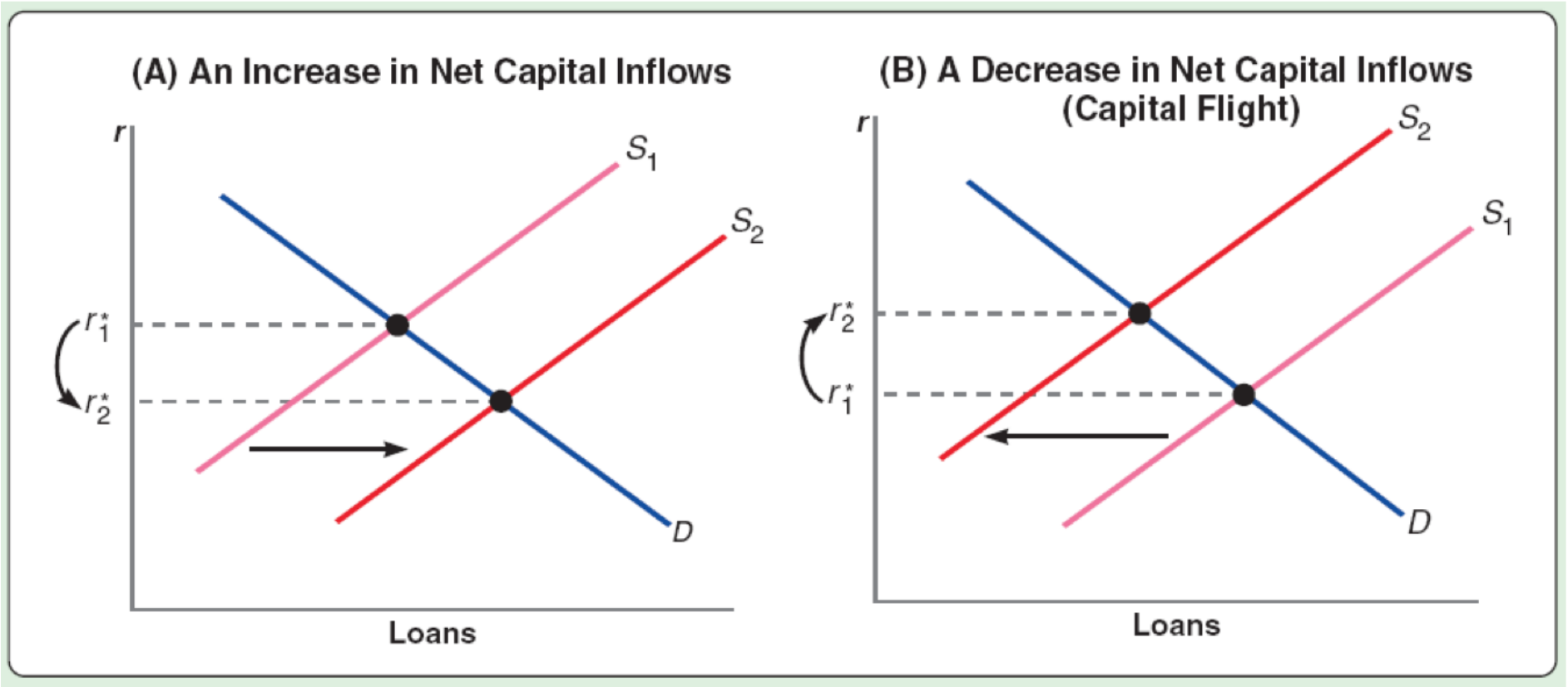
Loanable Funds Theory: shifts in capital flows



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Capital Flight

- Capital flight is a sudden decrease in net capital inflows that occurs when foreign investors lose confidence in an economy. Capital flight increases real interest rates, often sharply.

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The Fisher Equation

The Fisher equation:

$$i = r + \pi^e$$

- Nominal interest rates adjust to anticipated inflation. The predicted full adjustment of the nominal interest rate to anticipated inflation is called the **Fisher effect**.

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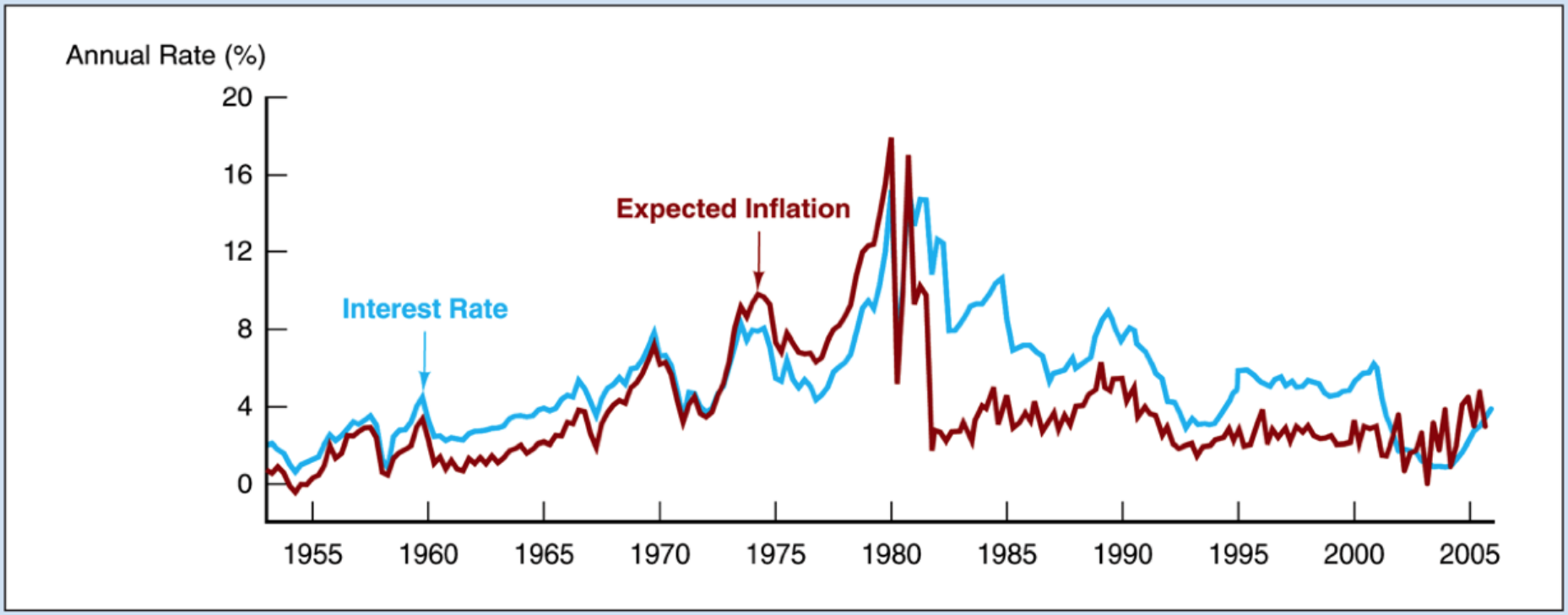

FIGURE 5 **Expected Inflation and Interest Rates (Three-Month Treasury Bills), 1953–2005**

Source: Expected inflation calculated using procedures outlined in Frederic S. Mishkin, "The Real Interest Rate: An Empirical Investigation," *Carnegie-Rochester Conference Series on Public Policy* 15 (1981): 151–200. These procedures involve estimating expected inflation as a function of past interest rates, inflation, and time trends.

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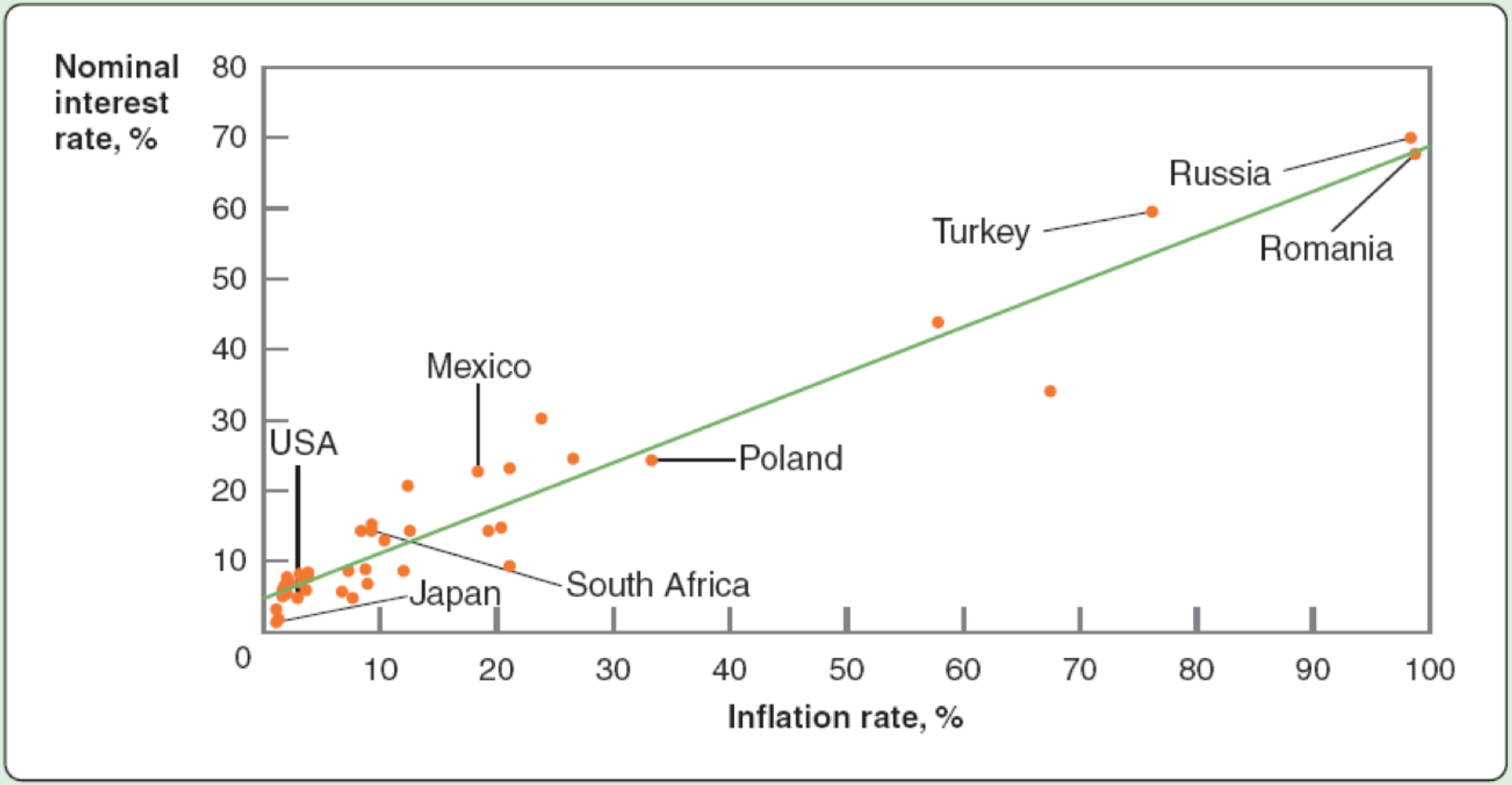
FIGURE 4.9 Inflation and Nominal Interest Rates Across Countries



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Global Imbalances

- Financial crises in the 1990s prompted an important change in the macroeconomic position of a number of developing countries, especially in Asia.
- A common feature of these crises has been capital flight: the sudden reversal of short-term funding ("hot money") from previously flowing into the developing countries to being suddenly withdrawn from them ("sudden stop").
- Since borrowings were mostly denominated in dollar, a borrowing country without enough dollar reserves and unable to sell its long-term investments would be forced into a crisis.

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Global Imbalances

- After the crises, these countries accumulated foreign exchange reserves, reduced their foreign borrowing, and increased their savings substantially, becoming large lenders to the rest of the world — especially to the United States.
- At the same time, China began to accelerate its accumulation of foreign reserves as its export growth accelerated[6], while rising oil prices helped create huge CA surpluses for oil-producing countries.
- As a result, significant global imbalances emerged in the early 2000s.
  - Developing countries on net borrowed $88 billion in 1996 from the rest of the world, by 2003 they were lending a net $205 billion to the rest of the world.

[6] There are arguments that China accelerated its accumulation of foreign reserves *in order to* keep exchange rate low and pursue export-led growth.

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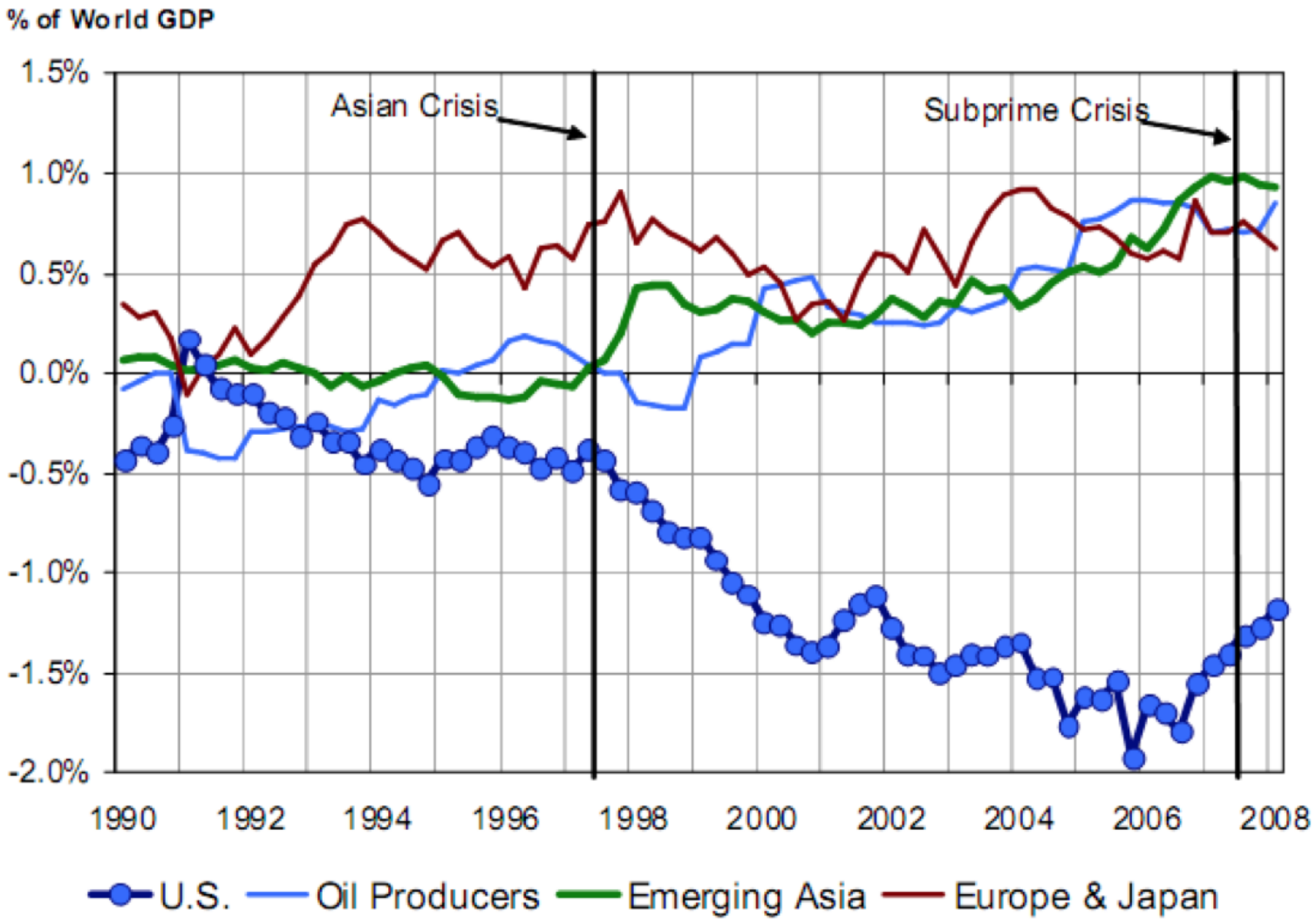
Global Imbalances



CA Balance

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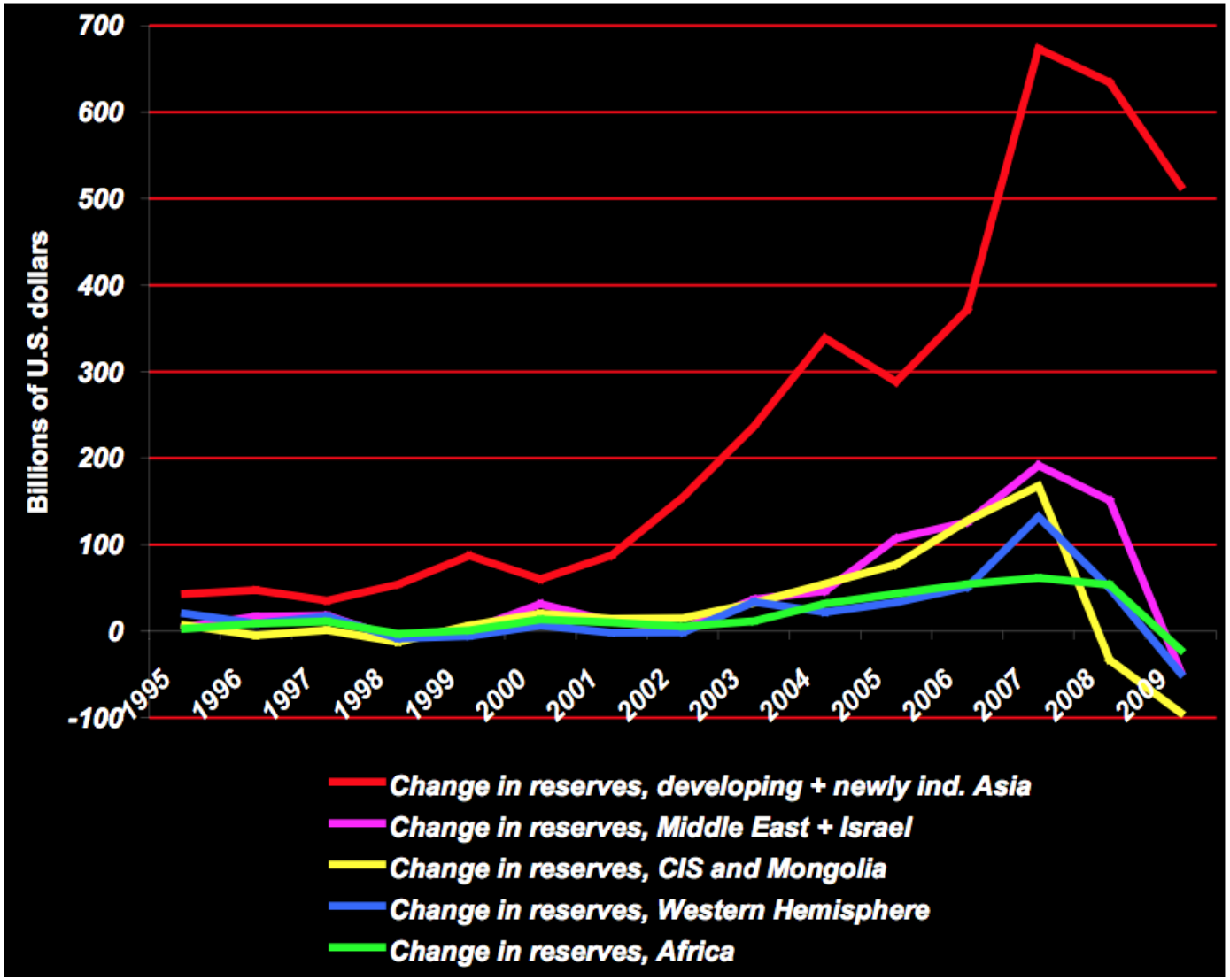
Global Imbalances



Emerging Market Growth of International Reserves

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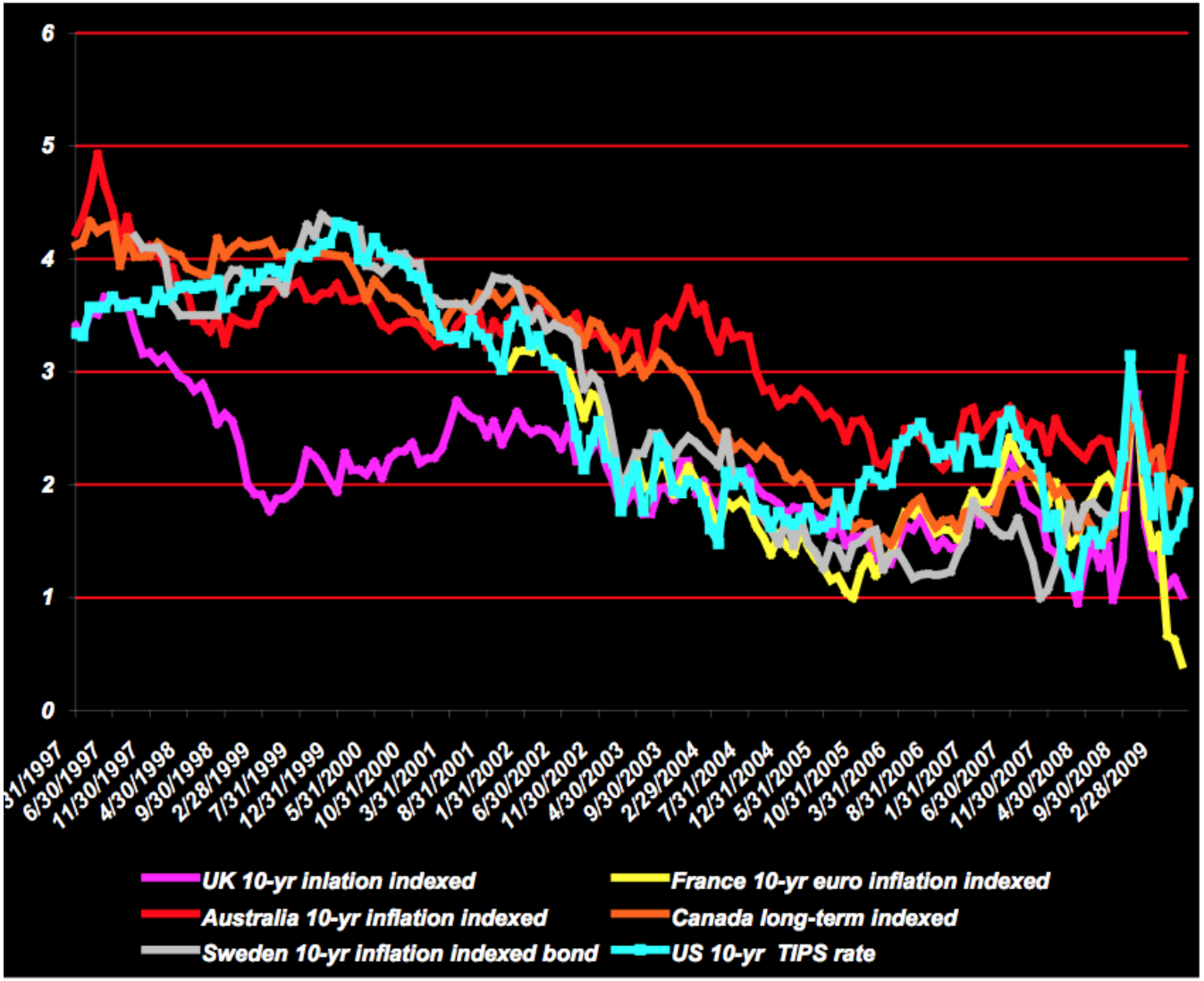
Global Imbalances



Long-term real interest rates

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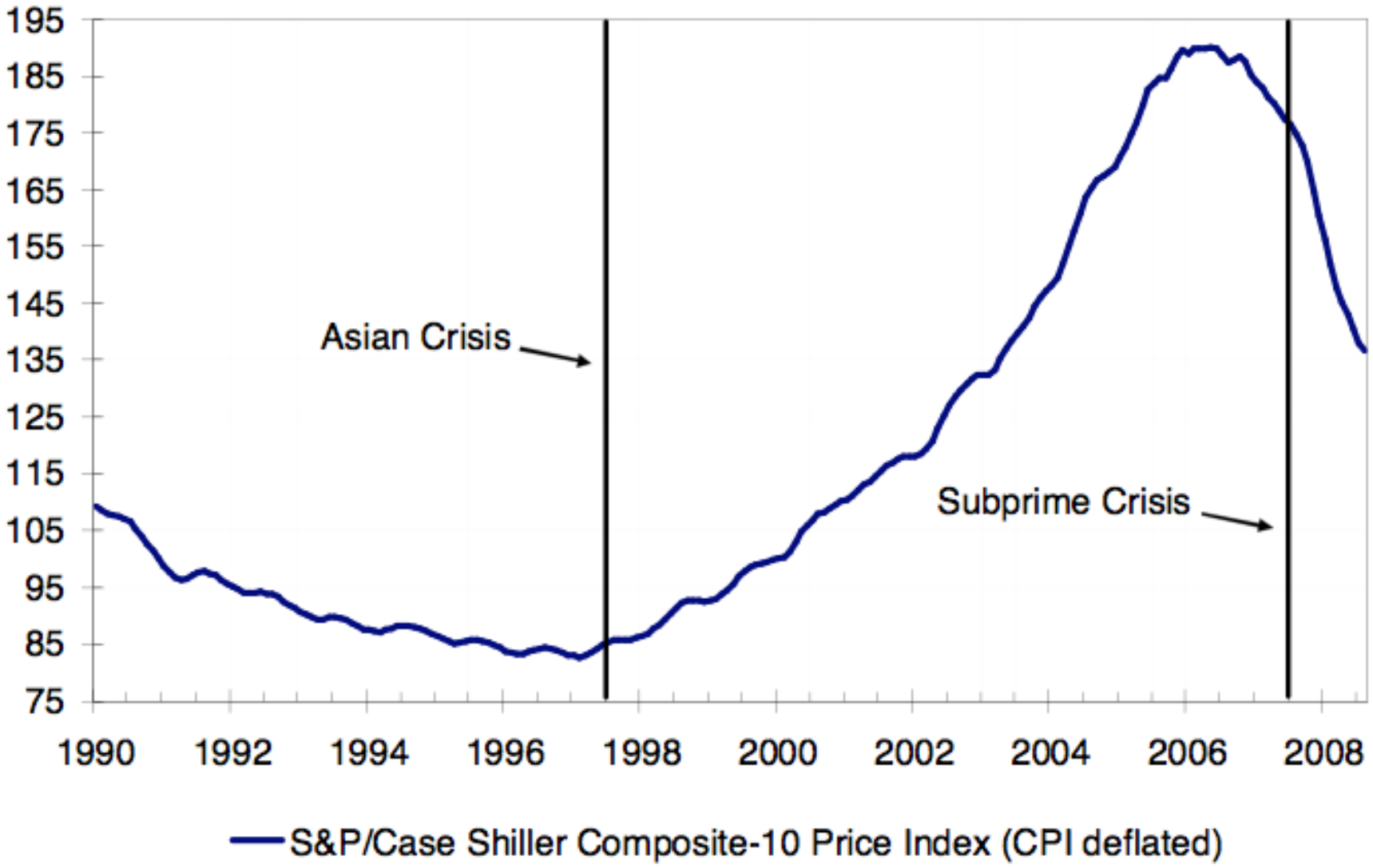
The Global Savings Glut Theory



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The Global Savings Glut Theory

Bernanke:

> *"Over the past decade a combination of diverse forces has created a significant increase in the global supply of saving – a global saving glut – which helps to explain both the increase in the U.S. current account deficit and the relatively low level of long-term real interest rates in the world today."*

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The Global Savings Glut Theory

Bernanke:

> *"It is impossible to understand this crisis without reference to the global imbalances in trade and capital flows that began in the latter half of the 1990s ... Like water seeking its level, saving flowed from where it was abundant to where it was deficient, with the result that the United States and some other advanced countries experienced large capital inflows for more than a decade ... the risk management systems of the private sector and government oversight of the financial sector in the United States and some other industrial countries failed to ensure that the inrush of capital was prudently invested, a failure that has led to a powerful reversal in investor sentiment and a seizing up of credit markets."*

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Acknowledgement

Part of this lecture is adapted from the following sources:

- Ball, L. (2011). *Money, Banking and Financial Markets* (2nd ed.). Worth Publishers.

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