

3543 Fiscal and Financial System in Japan A / KC3002 International Finance

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Lecture 2(Sept 27)

Exchange Rates:

Equilibrium in the FX Market

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Goals of the Course

- After the successful completion, the students are expected to give logical answers to these questions:
 1. What factors determine the exchange rates in different time periods?
 2. How are **exchange rates**, **interest rates**, and **output** are jointly determined?
 3. What kinds of **shocks or events** affect those variables, and how?
 4. What measures can **governments** take to alleviate the negative impacts of those shocks?
 5. Can **institutional arrangements** make any difference to the answers to these questions?

Goals of the Course (cont.)

- Upon successful completion of the course, you'll also be familiar with the economist's analytical tool, "model," and you'll be able to apply some models to find the answers to the questions above.

Exchange Rates

The exchange rate is the “price” of one currency measured in terms of another currency.

The yen/dollar exchange rate is the “price” of a dollar measured in terms of yens.

If the dollar is priced at 95 yen, the yen/dollar exchange rate is quoted as “95 yen per dollar” or “¥95/\$.”

Depreciation (減価), Appreciation (増価)

¥100/\$ → ¥95/\$

The price of the dollar in terms of yens **decreases** from ¥100 to ¥95.

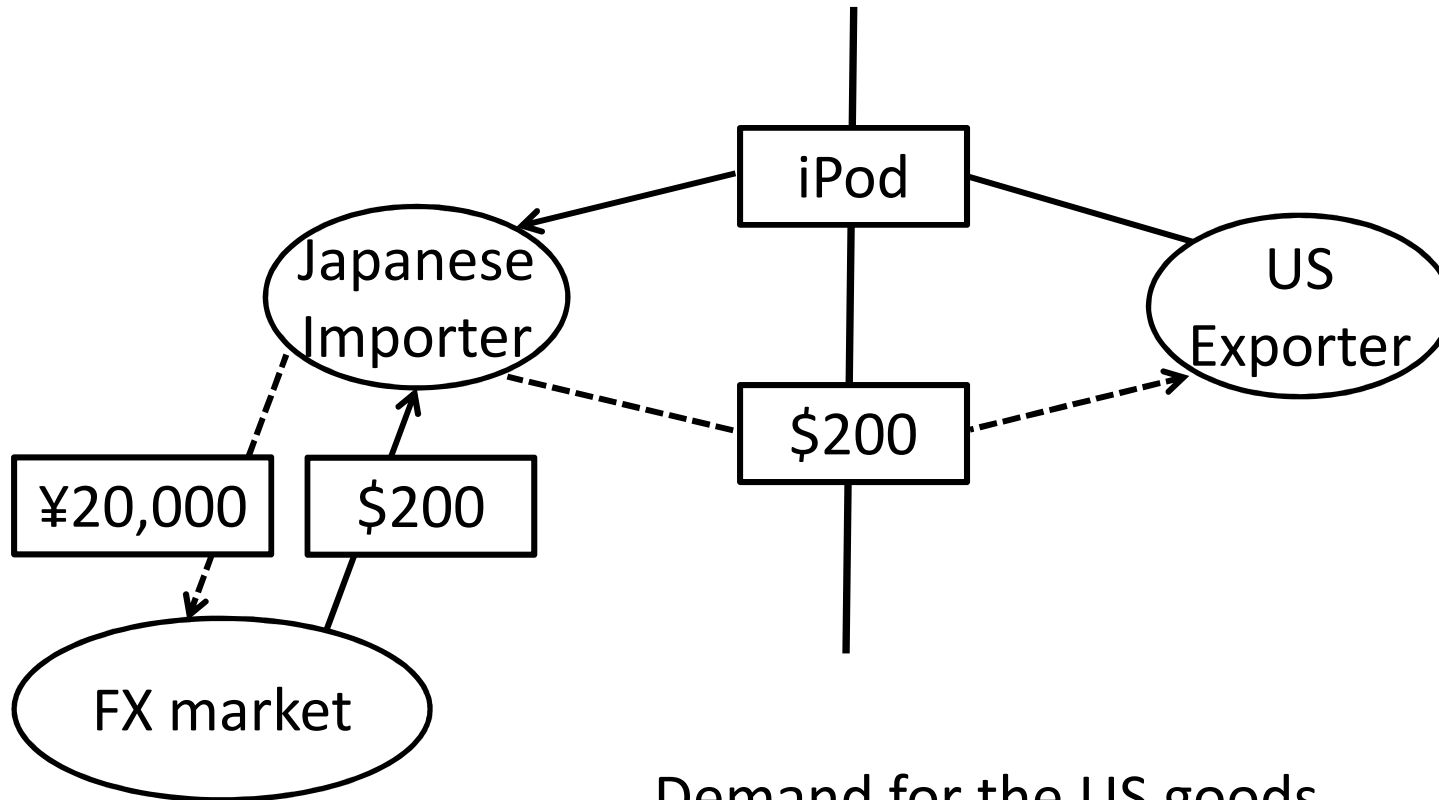
The dollar **depreciates** against the yen.

¥100/\$ → ¥105/\$

The price of the dollar in terms of yens **increases** from ¥100 to ¥105.

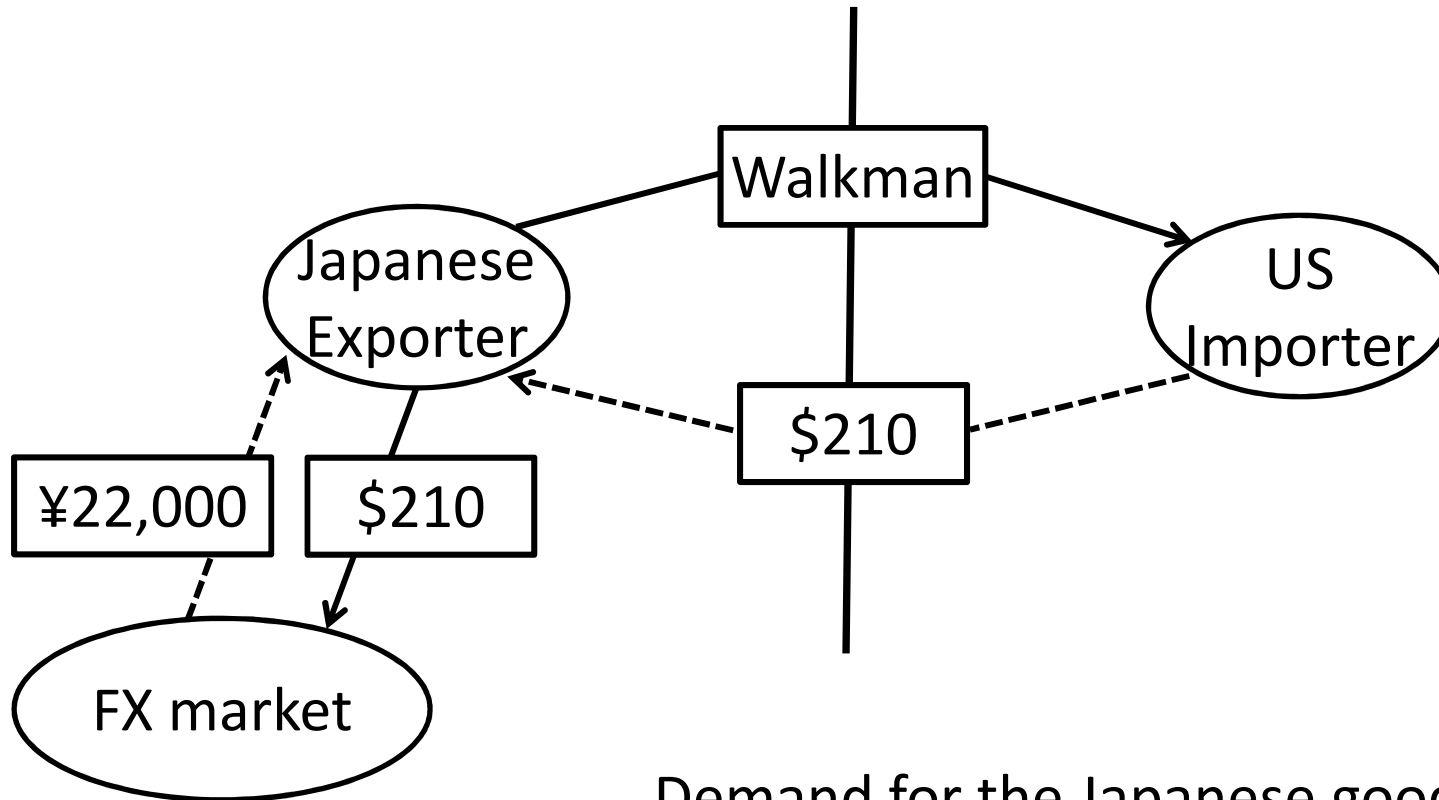
The dollar **appreciates** against the yen.

Imports of Foreign Goods



Demand for the US goods
→ Demand for the dollar

Exports of Domestic Goods



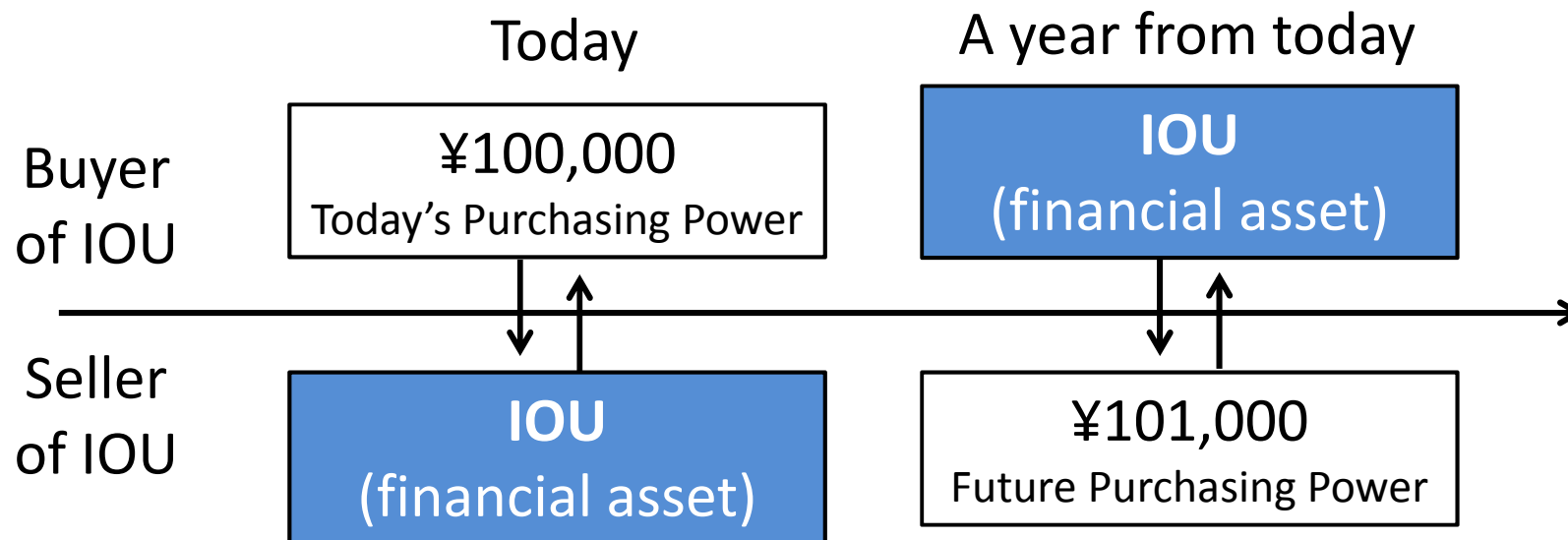
Demand for the Japanese goods
→ Supply of the dollar

Financial assets

Financial assets are “IOUs(借用書).”

For the sellers(borrowers), the financial assets transfer the future purchasing power into the current one.

For the buyers(lenders), the financial assets transfer the current purchasing power into the future one.



Composition of Individual's Wealth

There exist financial assets denominated in different currencies, and you can diversify your portfolio.

Your total wealth and its composition



Dollar-Denominated Asset (ドル建資産):

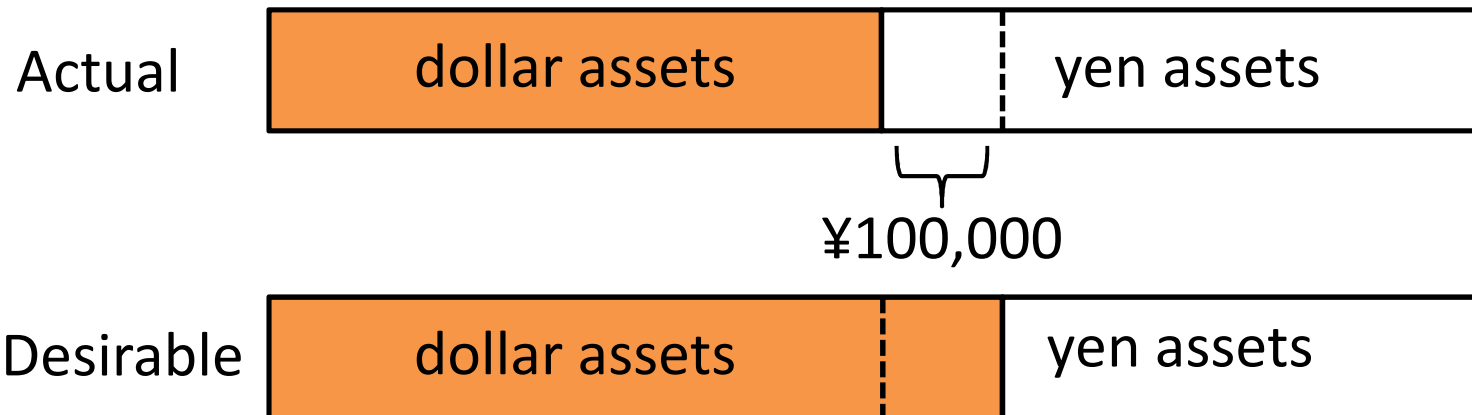
An asset which is bought with dollars, pays out interest in dollars, and is finally redeemed in dollars.

Yen-Denominated Asset (円建資産):

An asset which is bought with yens, pays out interest in yens, and is finally redeemed in yens.

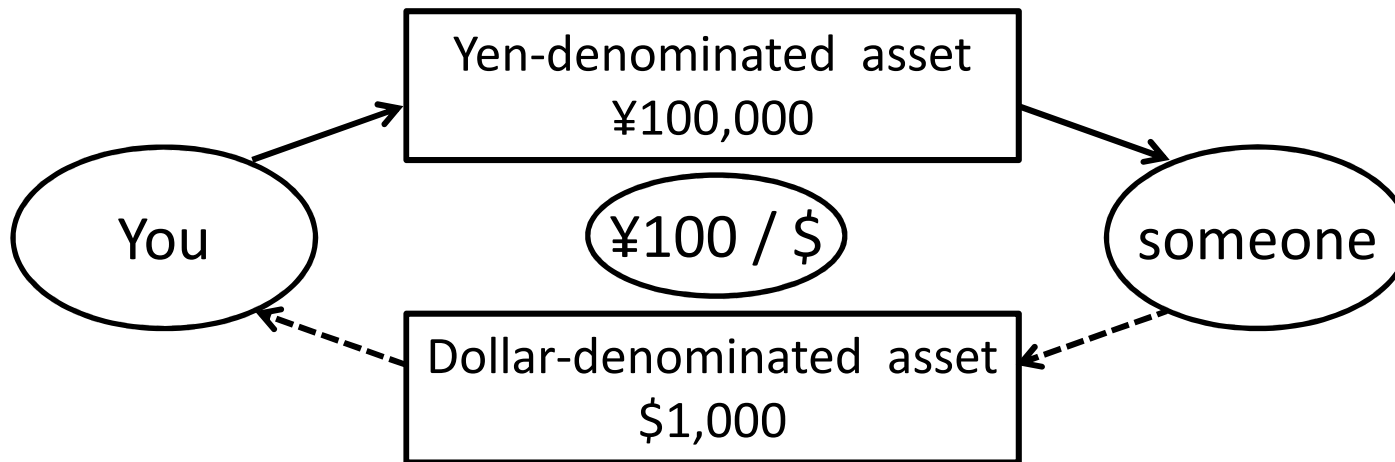
Changes in portfolio

When, for some reason, you want to have more dollar assets, that is, you want to change your portfolio, you need to exchange part of your yen assets for someone else's dollar assets.



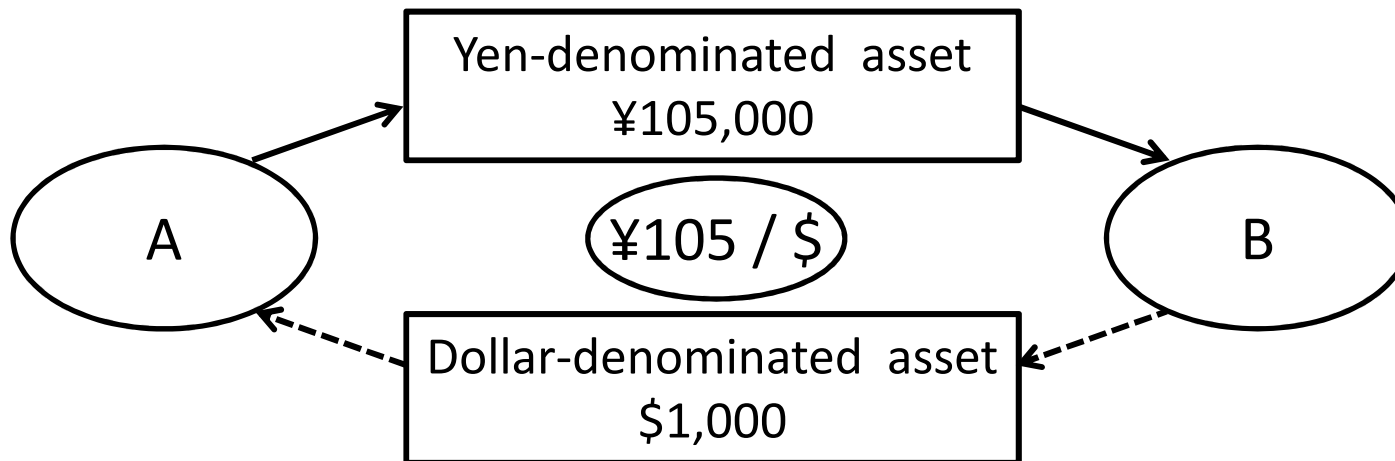
Exchanges of Assets

When your 100,000 yens of yen asset is exchanged for someone else's 1,000 dollars of dollar asset, the dollar is valued at 100 yens.



Demand for dollar assets

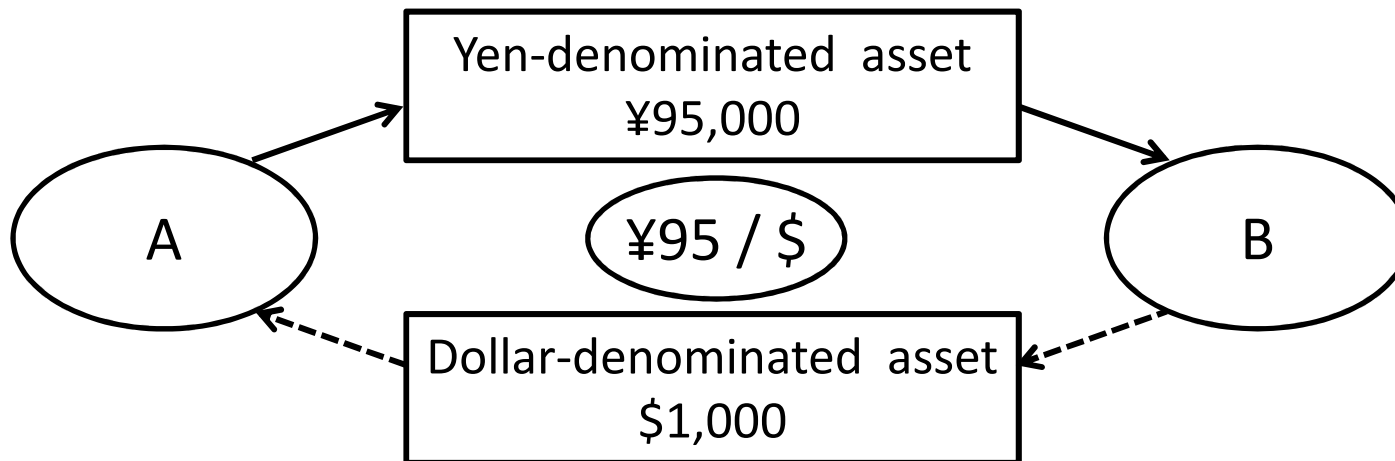
If many of us want to have more dollar assets and try to exchange our yen assets for someone else's dollar assets, a 105,000 yens of yen asset may be exchanged for a 1,000 dollars of dollar asset.



The dollar is valued at 105 yens, higher than before.

Demand for yen assets

Conversely, if many of us want to have more yen assets and try to exchange our dollar assets for someone else's yen assets, a 95,000 yens of yen asset may be exchanged for a 1,000 dollars of dollar asset.



The dollar is valued at 95 yens, lower than before.

As the demand for dollar-denominated assets rises, the dollar is more highly valued, or the dollar appreciates.

As the demand for yen-denominated assets rises, the dollar is less valued, or the dollar depreciates.

The demand for the dollar-denominated and yen-denominated **assets**, as well as the demand for the US and Japanese **goods**, affect the yen/dollar exchange rate.

Asset Approach

“Export and import transactions are small relative to the amount of domestic and foreign assets at any given time. For example, foreign exchange transactions in the United States each year are well over 25 times greater than the amount of U.S. exports and imports. ” (Mishkin, p.511)

In the short run, the price of the dollar is mainly affected by the demand for the dollar and yen **assets**, rather than the demand for the US and Japanese **goods**.

→ *Asset Approach* to the Short-term Exchange Rate Determination

Asset Approach

When dollar assets are more attractive than yen assets, we try to replace part of yen assets with dollar assets.

→ Dollar's appreciation

When dollar assets are less attractive than yen assets, we try to replace part of dollar assets with yen assets.

→ Dollar's depreciation

How do we judge which is more desirable, the dollar and the yen assets?

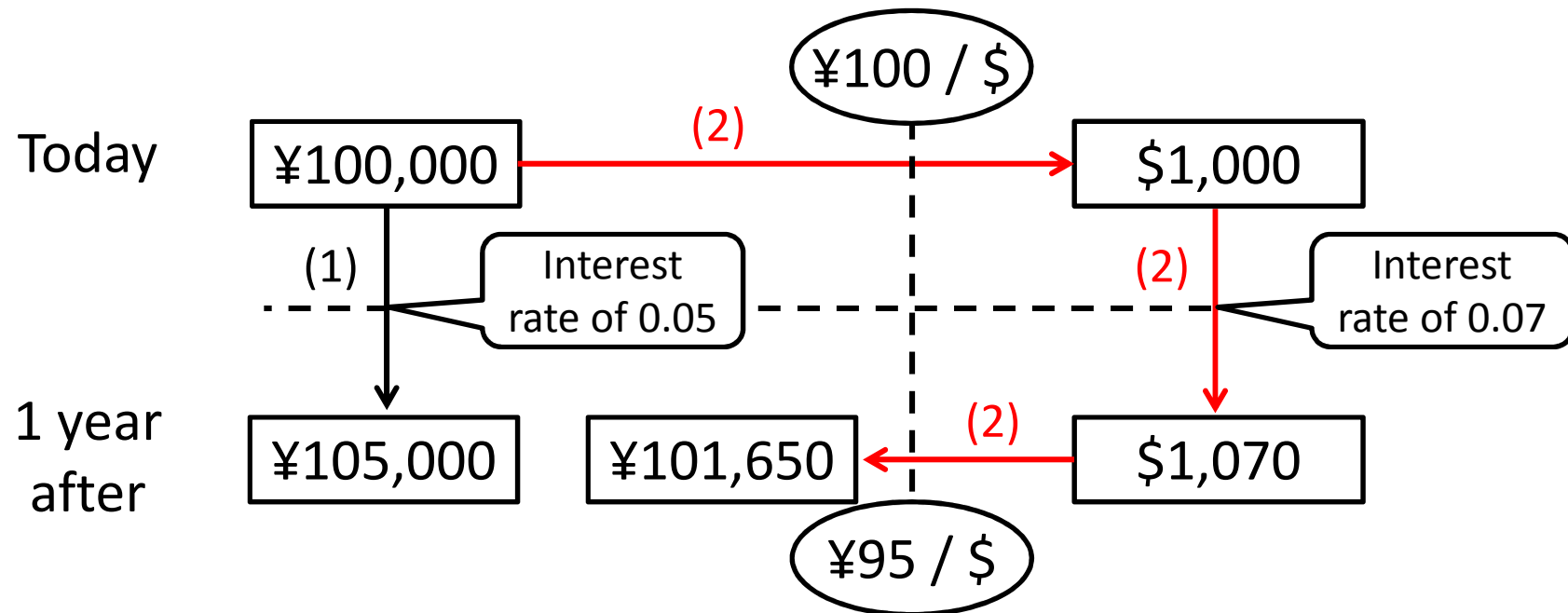
We judge the desirability of an asset on the basis of its **rate of return**, the percentage increase in value of an asset over one year.

Portfolio decision

Two alternatives:

(1) to hold the yen asset with 5% interest or

(2) to exchange it for a dollar asset with 7% interest.



To compare the two alternative assets (investments), the values must be expressed *in the same currency*.

Comparison of rates of return

The rate of return on the dollar asset *in terms of yens*
(*Yen* rate of return on the dollar asset)

$$= \frac{\begin{array}{l} \text{Final value} - \text{Initial value} \\ 101,650 - 100,000 \end{array}}{\begin{array}{l} 100,000 \\ \text{Initial value} \end{array}} = 0.0165 \text{ (1.65\%)}$$

Here, the yen return on the dollar asset is lower than the dollar interest rate.

It's because, while the asset earns *dollar* interest, the dollar itself *loses its value against the yen*.

Generally, the *yen* return on a dollar denominated asset is **not** equal to the interest rate of a dollar denominated asset.

- If the dollar *appreciates* against the yen, the yen return on a dollar asset is *greater than the dollar interest rate*.
- If the dollar *depreciates* against the yen, the yen return on a dollar asset is *smaller than the dollar interest rate*.
- If the exchange rate stays the same, the yen return on a dollar asset is exactly equal to the dollar interest rate.

This implies that the yen rate of return on a dollar denominated asset depends strongly on the yen/dollar exchange rates.

Formula for yen return on dollar asset

Yen return on a dollar asset $\approx i^* + \frac{E_1 - E_0}{E_0}$

Because the future exchange rate is unknown as of today, E_1 must be replaced by an “expected” value E_1^e .

Because the yen rate of return is calculated based on the expectation of future exchange rate, it is strictly called the “expected” yen rate of return.

Expected rate of yen return on a dollar asset

$$\approx i^* + \frac{E_1^e - E_0}{E_0}$$

$$\approx \boxed{\text{Interest rate on a dollar asset}} + \boxed{\text{Expected rate of dollar appreciation}}$$

What affects return on dollar asset?

$$\begin{array}{l} \text{Expected rate of} \\ \text{yen return on} \\ \text{a dollar asset} \end{array} \approx \begin{array}{c} (1) \\ i^* \end{array} + \frac{\begin{array}{c} (3) \quad (2) \\ E_1^e - E_0 \end{array}}{E_0}$$

All else equal;

1. an increase in the interest paid on dollar-denominated assets raises the expected rate of yen return;
2. a depreciation of the “current” dollar raises the expected rate of yen return;
3. a depreciation of the “future” dollar lowers the expected rate of yen return.

Depreciation of the Current Dollar

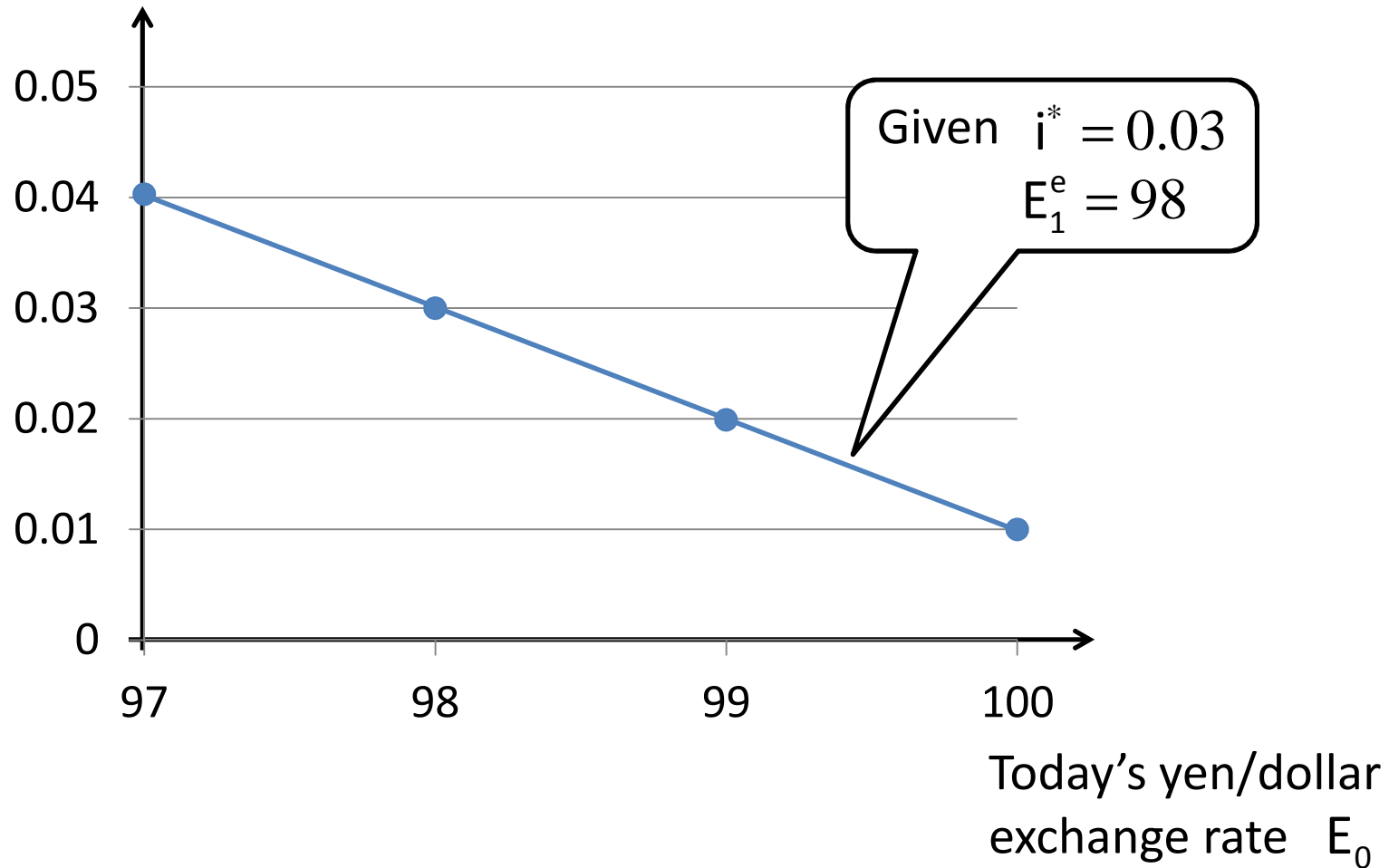
How do changes in the current exchange rate affect the expected yen return on dollar assets, holding the dollar interest rate and the future exchange rate constant, $i = 0.03$, $E_1^e = 98$?

$$\text{Expected yen return on a dollar asset} \approx 0.03 + \frac{98 - E_0}{E_0}$$

Today's yen/dollar exchange rate	Expected yen/dollar exchange rate	Expected yen return on dollar assets
100	98	0.01
99	98	0.02
98	98	0.03
97	98	0.04

As the today's dollar depreciates,
the expected yen return increases.

Expected yen return
on dollar assets



Depreciation of the Future Dollar

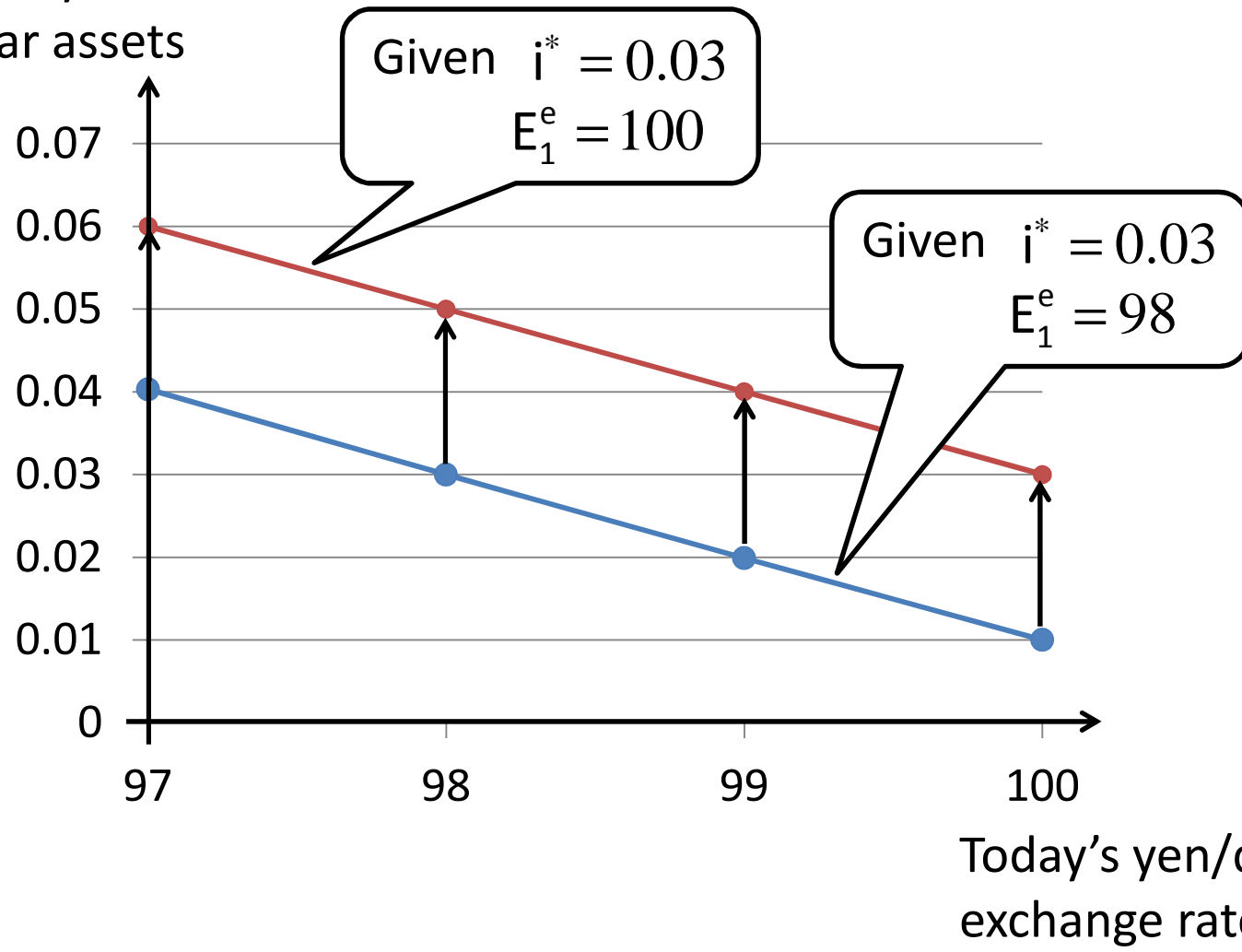
How do changes in the expected future exchange rate affect the expected yen return on dollar assets, holding the interest rate and the today's exchange rate constant, $i = 0.03, E_0 = 100$?

$$\text{Expected yen return on a dollar asset} \approx 0.03 + \frac{E_1^e - 100}{100}$$

Today's yen/dollar exchange rate	Expected yen/dollar exchange rate	Expected yen return on dollar assets
100	100	0.03
100	99	0.02
100	98	0.01
100	97	0

As the future dollar appreciates,
the expected yen return increases.

Expected yen return
on dollar assets



Today's yen/dollar
exchange rate E_0

Assumptions on Investors' Behavior

Assumption 1: Perfect Substitutes

Investors view the dollar and yen denominated assets as equally desirable, if the returns are equal.

Investors do not prefer assets denominated by one particular currency to those denominated by another currency.

Assumption 2: Risk Neutrality

Investors care only about the expected returns, though uncertain.

A1 and A2 jointly imply that if the expected return on dollar assets is higher than that on yen assets, both US and Japanese investors want to hold only dollar assets and are never willing to hold yen assets.