

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

Fall 2012

Lecture 5(Nov 6)

Exchange Rates:

Equilibrium in the FX Markets

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## 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 dollar measured in terms of yen.

It is expressed as “80 yen per dollar” or “¥80/\$.”

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## Depreciation and Appreciation

**Depreciation** is a decrease in the value of currency relative to another currency.

Dollar's depreciation:  $\text{¥}80/\text{\$} \rightarrow \text{¥}79/\text{\$}$

Depreciated currency is less valuable and therefore can buy smaller amount of another currency.

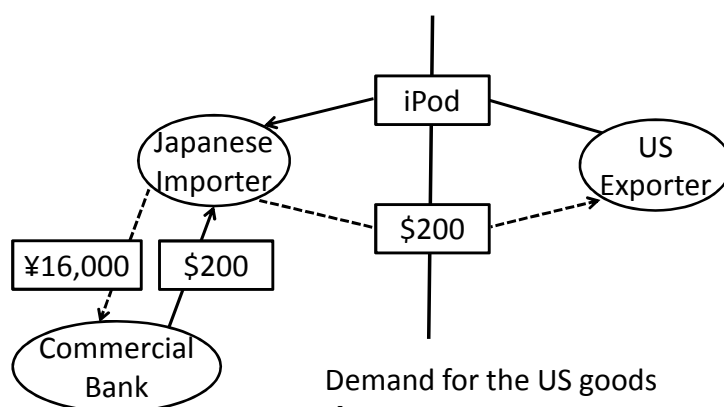
**Appreciation** is an increase in the value of currency relative to another currency.

Dollar's appreciation:  $\text{¥}80/\text{\$} \rightarrow \text{¥}81/\text{\$}$

Appreciated currency is more valuable and therefore can buy larger amount of another currency.

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## Imports/Exports of Goods

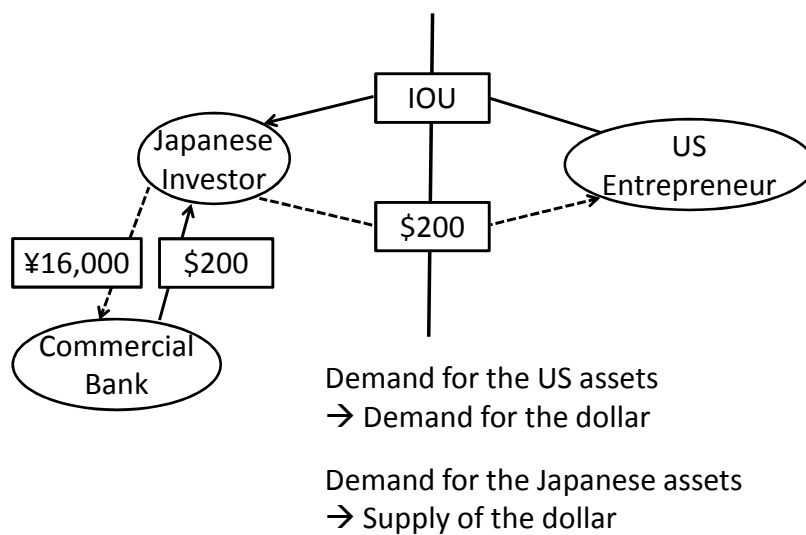


Demand for the US goods  
→ Demand for the dollar

Demand for the Japanese goods  
→ Supply of the dollar

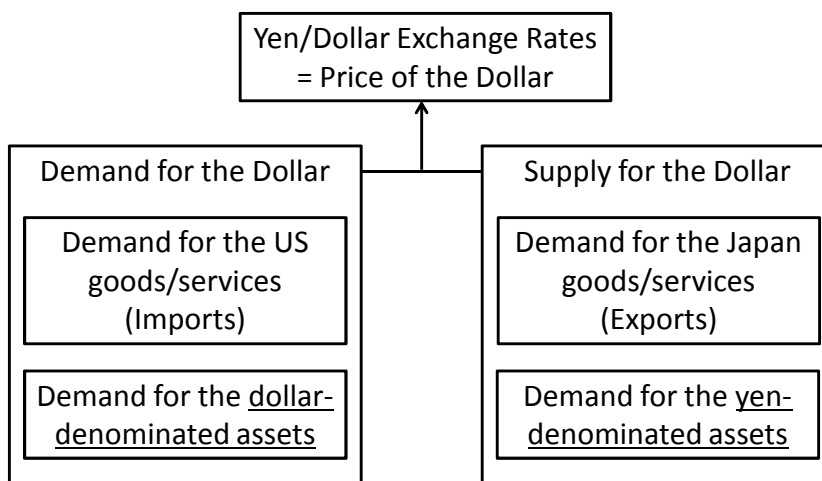
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## Imports/Exports of IOUs



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## Demand and Supply of Dollar



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## Composition of an Individual's Wealth

Total Wealth ¥500,000



Suppose you want to have more dollar assets.



For a short period, you can't add dollar assets to your total wealth.

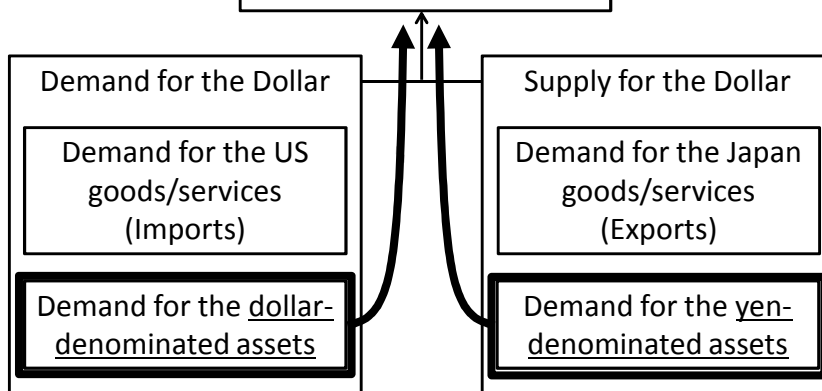


You can only *replace* part of your yen assets with dollar assets, by selling yen assets and buying dollar assets.

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## Asset Approach

Yen/Dollar Exchange Rates  
= Price of the Dollar



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## 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)

For a short period of time, the demand and supply of the dollar mainly reflect the demand for the dollar/yen **assets**, rather than the demand for the US/Japan **goods**.

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

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## Asset Approach

When dollar assets are more attractive than yen assets, investors try to replace part of yen assets with dollar assets: demand for the dollar.

When dollar assets are less attractive than yen assets, investors try to replace part of dollar assets with yen assets: supply of the dollar.

What factors make dollar assets more/less attractive than yen assets ?

What factors affect the demand and supply of the dollar?

→ Asset returns

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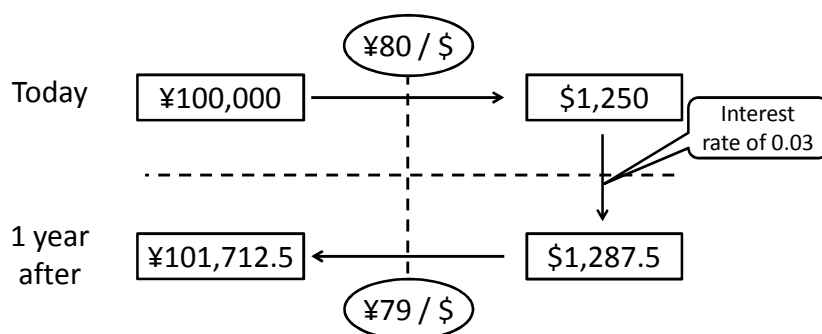
## Interest Rates and Asset Returns

**Asset returns:** the percentage increase in value an asset offers over some time period.

**A currency's interest rate:** the amount of a currency an individual earn by lending a unit of the currency for a year.

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## Interest Rates and Asset Returns



*Dollar* return of dollar denominated asset  
= interest rate of that asset (= 0.03)

*Yen* return of dollar denominated asset

$$= \frac{101,712.5 - 100,000}{100,000} = 0.017125$$

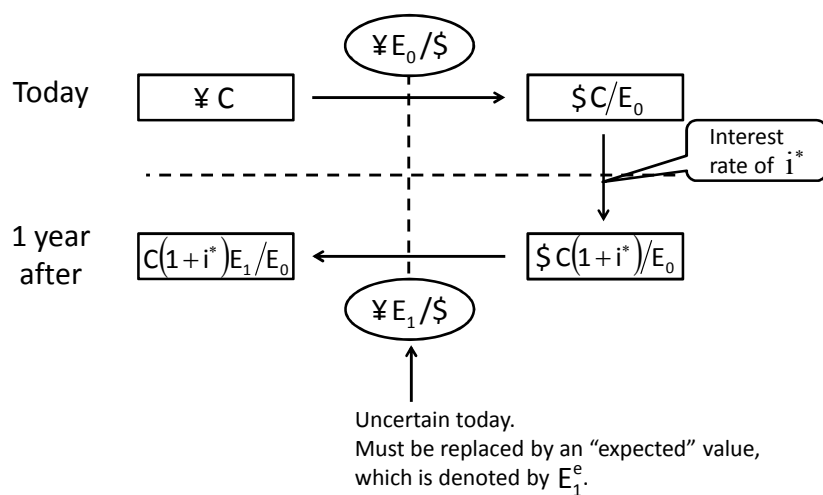
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Generally, the *Yen* return on dollar denominated assets is **not** equal to the interest rate of dollar denominated assets.

- If the dollar appreciates against the yen, the yen return on dollar assets is greater than the interest rate.
- If the dollar depreciates against the yen, the yen return on dollar assets is smaller than the interest rate.

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## Simple Rules for Returns on Foreign Assets



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## Simple Rules for Returns on Foreign Assets

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

Expected rate of  
yen return of  
a dollar asset

$\cong$

Interest rate of  
a dollar asset

+

Expected rate  
of dollar  
appreciation

All else equal,

- An increase in the interest paid on dollar-denominated assets raises the expected rate of yen return of the assets
- A depreciation of the “current” dollar raises the expected rate of yen return of the assets
- A depreciation of the “future” dollar lowers the expected rate of yen return of the assets

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## Depreciation of the Current Dollar

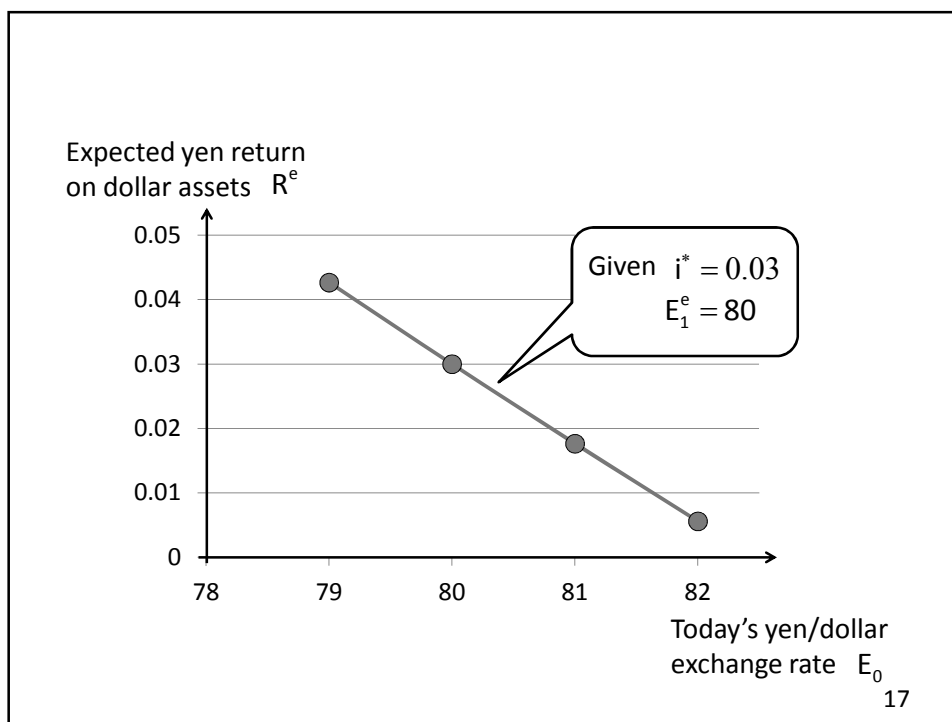
How changes in the current exchange rate affect the expected yen return on dollar assets when  $E_1^e = 80$

$$R^e \cong 0.03 + \frac{80 - E_0}{E_0}$$

Today's yen/dollar exchange rate	Expected yen/dollar exchange rate	Expected yen return on dollar assets
81	80	0.01765
80	80	0.03
79	80	0.04265
78	80	0.05564

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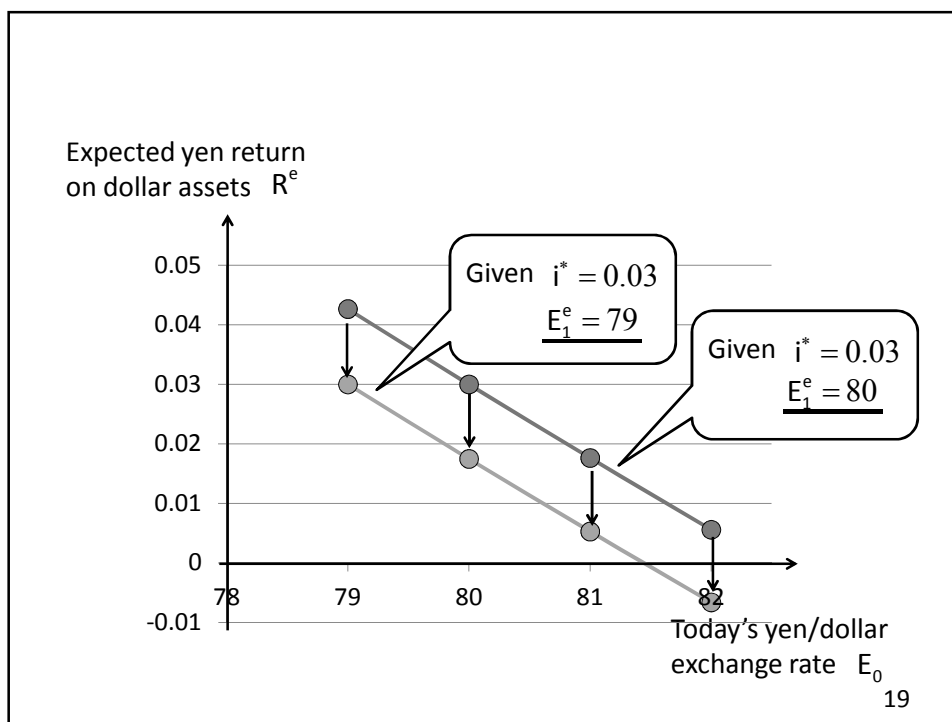


## Depreciation of the Future Dollar

How changes in the future exchange rate affect the expected yen return on dollar assets when  $E_0 = 80$

$$R^e \cong 0.03 + \frac{E_1^e - 80}{80}$$

Today's yen/dollar exchange rate	Expected yen/dollar exchange rate	Expected yen return on dollar assets
80	81	0.0425
80	80	0.03
80	79	0.0175
80	78	0.005



## Assumptions on the 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 for the expected returns, whatever the possible variations are.

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

## Equilibrium in the FX Markets

$$E_1^e = 80 \quad i = 0.02$$

$$E_0 = 78 \quad i^* = 0.03$$

$$R^e \cong 0.03 + \frac{80 - 78}{78} \cong 0.056 > i = 0.02$$

1. Investors try to replace all the yen assets with the dollar assets.
2. An upsurge in demand for the dollar.
3. The dollar begins to appreciate against the yen.

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## Equilibrium in the FX Markets

$$E_1^e = 80 \quad i = 0.02$$

$$E_0 = 82 \quad i^* = 0.03$$

$$R^e \cong 0.03 + \frac{80 - 82}{82} \cong 0.0056 < i = 0.02$$

1. Investors try to replace all the dollar assets with the yen assets.
2. An upsurge in supply of the dollar.
3. The dollar begins to depreciate against the yen.

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## Equilibrium in the FX Markets

$$E_1^e = 80 \quad i = 0.02$$

$$E_0 = 80.8 \quad i^* = 0.03$$

$$R^e \cong 0.03 + \frac{80 - 80.8}{80.8} \cong 0.02 = i = 0.02$$

1. The dollar and yen assets are equivalent for investors.
2. Investors are willing to hold both assets.
3. No more pressure on the exchange rates to change.

¥80.8/\$ Equilibrium exchange rate

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## Interest Parity Condition

Given  $E_1^e$ ,  $i$ ,  $i^*$

if the current exchange rate satisfies the interest parity condition,

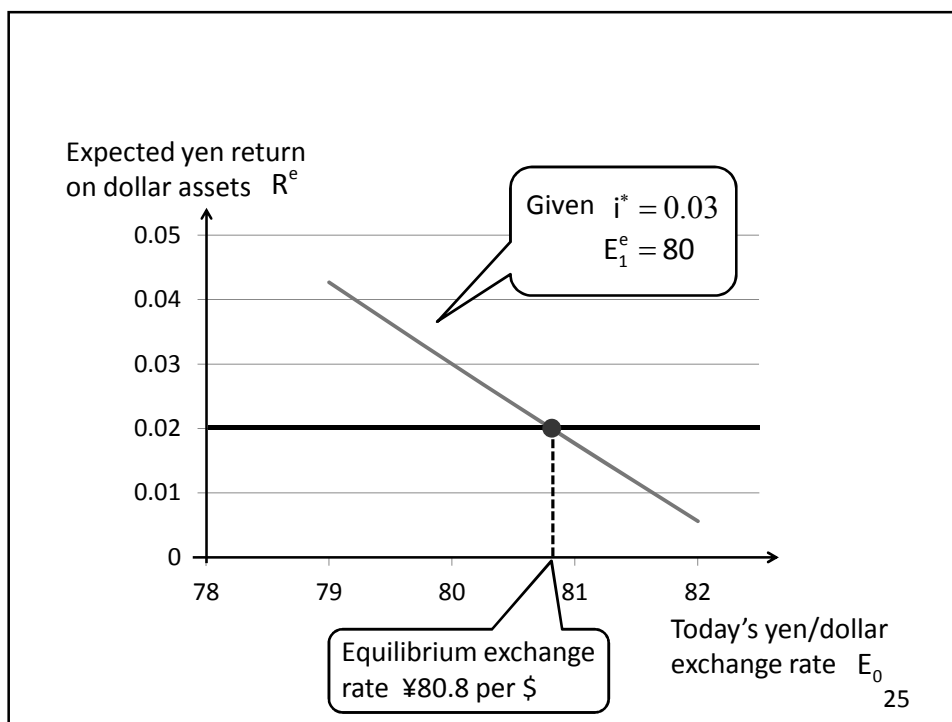
$$i = i^* + \frac{E_1^e - E_0}{E_0}$$

assets of both currencies offer the same expected rate of return measured in one currency, no one has the incentive to replace assets of one currency with another, and the exchange rate stays.

Given  $E_1^e$ ,  $i$ ,  $i^*$

the interest parity condition, determines the equilibrium yen/dollar exchange rate.

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## Changes in yen interest rates

$$E_1^e = 80 \quad i = 0.02 \rightarrow 0.03$$

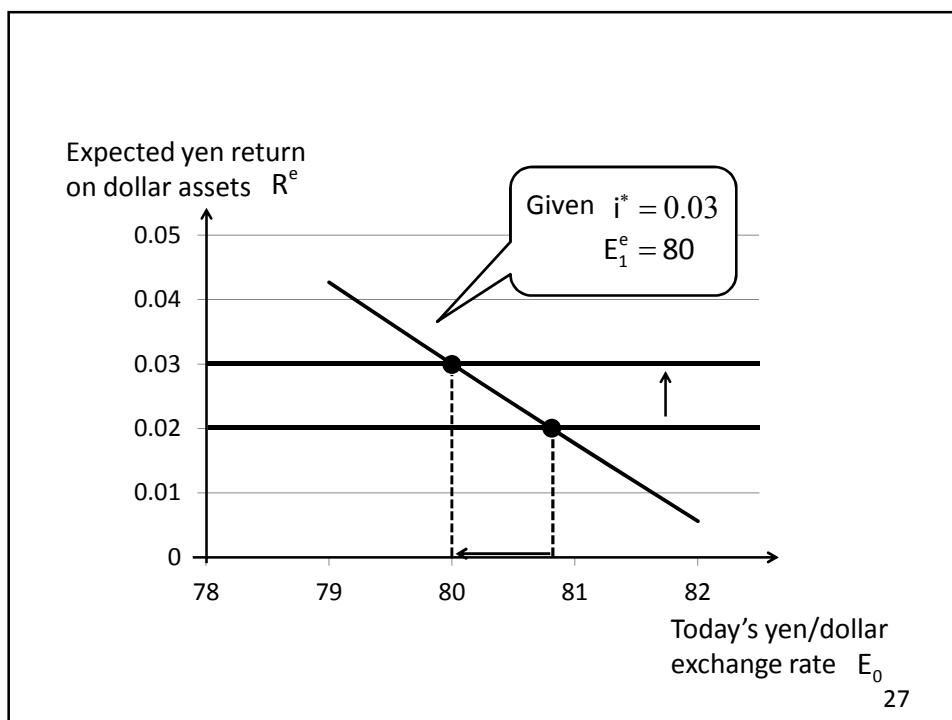
$$E_0 = 80.8 \quad i^* = 0.03$$

1. The higher expected return on the yen assets.

$$R^e \cong 0.03 + \frac{80 - 80.8}{80.8} \cong 0.02 < i = 0.03$$

2. Investors try to replace all the dollar assets with yen, and the dollar begins to depreciate against the yen.
3. At ¥80 per dollar, both assets have the same expected return measured in one currency, and the exchange rate stays.

$$E_0 = 80.8 \rightarrow 80$$



## Changes in dollar interest rates

$$E_1^e = 80 \quad i = 0.02$$

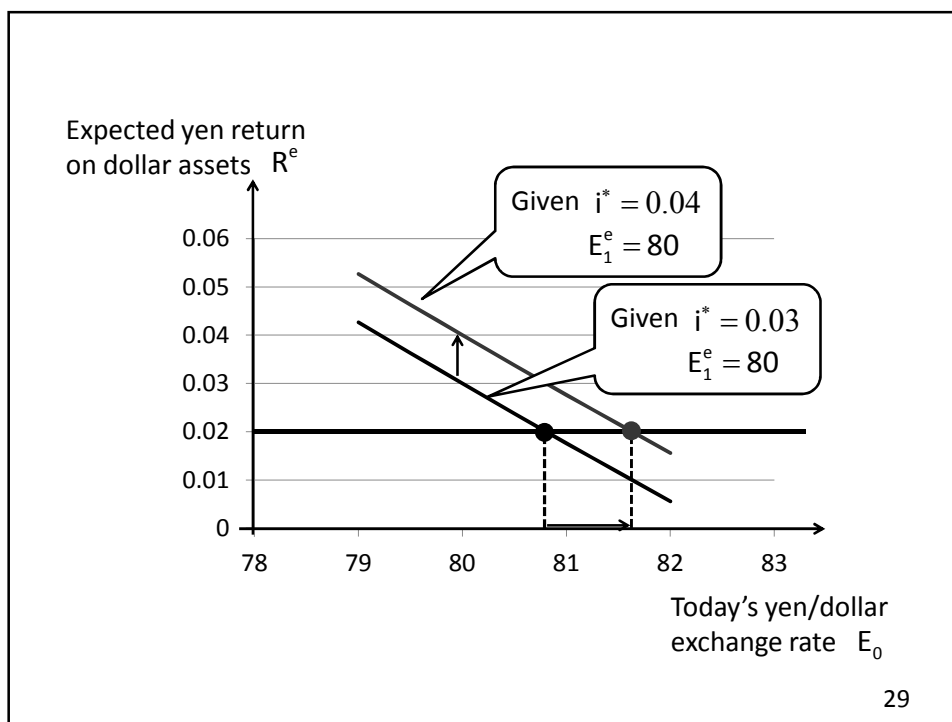
$$E_0 = 80.8 \quad i^* = 0.03 \rightarrow 0.04$$

1. The higher expected return on the dollar assets.

$$R^e \cong 0.04 + \frac{80 - 80.8}{80.8} \cong 0.03 > i = 0.02$$

2. Investors try to replace all the yen assets with dollar, and the dollar begins to appreciate against the yen.
3. At ¥81.6 per dollar, both assets have the same expected return measured in one currency, and the exchange rate stays.

$$E_0 = 80.8 \rightarrow 81.6$$



## Changes in the future exchange rates

$$E_1^e = 80 \rightarrow 79 \quad i = 0.02$$

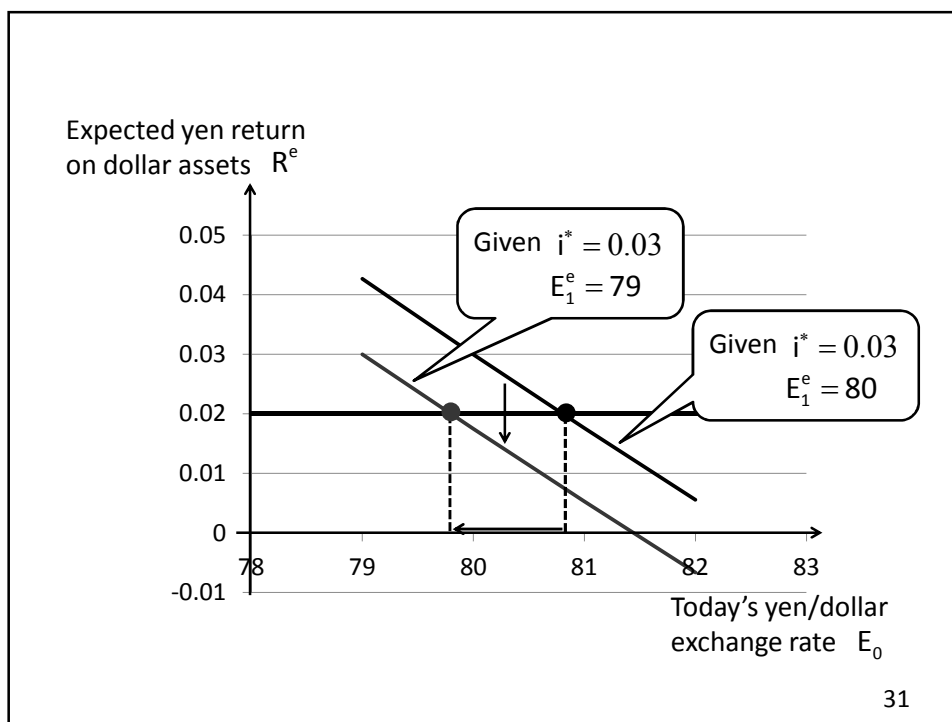
$$E_0 = 80.8 \quad i^* = 0.03$$

1. The higher expected return on the yen assets.

$$R^e \cong 0.03 + \frac{79 - 80.8}{80.8} \cong 0.0077 < i = 0.02$$

2. Investors try to replace all the dollar assets with yen, and the dollar begins to depreciate against the yen.
3. At ¥79.8 per dollar, both assets have the same expected return measured in one currency, and the exchange rate stays.

$$E_0 = 80.8 \rightarrow 79.8$$



## Midterm Exam on Nov 13

- Held at 13:30 – 14:30 on November 13.
- Includes some multiple-choice questions and 3 essay questions.
- Requires basic arithmetic operation for some questions.
- Covers “National Income Accounting,” “Balance of Payments,” and “Exchange Rates.”
- No textbooks, handouts, or notes are allowed.
- No make-up exam will be held.
- Accounts for 30 % of the total evaluation.