Lectures 15 and 16

The Foreign Exchange Market
Foreign Exchange Rates

Canadian dollar

British pound

Japanese yen

Euro
The Foreign Exchange Market

Definitions:
1. Spot exchange rate
2. Forward exchange rate
3. Appreciation
4. Depreciation

Currency appreciates, country’s goods prices ↑ abroad and foreign goods prices ↓ in that country
The Foreign Exchange Market

1. Makes domestic businesses less competitive
2. Benefits domestic consumers

FX traded in over-the-counter market

1. Trade is in bank deposits denominated in different currencies
Law of One Price

Example: American steel $100 per ton, Japanese steel 10,000 yen per ton

If $E = 50$ yen/$ then prices are:

<table>
<thead>
<tr>
<th></th>
<th>American Steel</th>
<th>Japanese Steel</th>
</tr>
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<tbody>
<tr>
<td>In U.S.</td>
<td>$100</td>
<td>$200</td>
</tr>
<tr>
<td>In Japan</td>
<td>5000 yen</td>
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Law of One Price

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Law of one price $\Rightarrow E = 100$ yen/$
Purchasing Power Parity (PPP)

PPP $\Rightarrow$ Domestic price level $\uparrow$ 10%, domestic currency $\downarrow$ 10%

1. Application of law of one price to price levels
2. Works in long run, not short run

Problems with PPP
1. All goods not identical in both countries: Toyota vs Chevy
2. Many goods and services are not traded: e.g. haircuts
## Factors Affecting $E$ in Long Run

**Basic Principle:** If factor increases demand for domestic goods relative to foreign goods, $E \uparrow$

### Summary

<table>
<thead>
<tr>
<th>Factor</th>
<th>Change in Factor</th>
<th>Response of the Exchange Rate, $E^*$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic price level†</td>
<td>↑</td>
<td>↓</td>
</tr>
<tr>
<td>Trade barriers†</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Import demand</td>
<td>↑</td>
<td>↓</td>
</tr>
<tr>
<td>Export demand</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Productivity†</td>
<td>↑</td>
<td>↑</td>
</tr>
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</table>

*Units of foreign currency per dollar: ↑ indicates domestic currency appreciation; ↓, depreciation. †Relative to other countries.  

**Note:** Only increases (↑) in the factors are shown; the effects of decreases in the variables on the exchange rate are the opposite of those indicated in the “Response” column.
Expected Returns and Interest Parity

<table>
<thead>
<tr>
<th></th>
<th>Francois</th>
<th>AI</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ Deposits</td>
<td>( i^D + \frac{(E^e_{t+1} - E_t)}{E_t} )</td>
<td>( i^D )</td>
</tr>
<tr>
<td>Euro Deposits</td>
<td>( i^F )</td>
<td>( i^F - \frac{(E^e_{t+1} - E_t)}{E_t} )</td>
</tr>
<tr>
<td>Relative ( R^e )</td>
<td>( i^D - i^F + \frac{(E^e_{t+1} - E_t)}{E_t} )</td>
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**Interest Parity Condition:**

$ and Euro deposits perfect substitutes

\[ i^D = i^F - \frac{(E^e_{t+1} - E_t)}{E_t} \]

**Example:** if \( i^D = 10\% \) and expected appreciation of $,
\( \frac{(E^e_{t+1} - E_t)}{E_t}, = 5\% \) \( \Rightarrow i^F = 15\% \)
Deriving $R^F$ Curve

Assume $i^F = 10\%$, $E^e_{t+1} = 1$ euro/$

Point

A: $E_t = 0.95$, $R^F = .10 - (1 - 0.95)/0.95 = .048 = 4.8\%$

B: $E_t = 1.00$, $R^F = .10 - (1 - 1.0)/1.0 = .100 = 10.0\%$

C: $E_t = 1.05$, $R^F = .10 - (1 - 1.05)/1.05 = .148 = 14.8\%$

$R^F$ curve connects these points and is upward sloping because when $E_t$ is higher, expected appreciation of $F$ higher, $R^F \uparrow$

Deriving $R^D$ Curve

Points B, D, E, $R^D = 10\%$: so curve is vertical

Equilibrium

\[ R^D = R^F \text{ at } E^* \]

If $E_t > E^*$, $R^F > R^D$, sell $\$, $E_t \downarrow$

If $E_t < E^*$, $R^F < R^D$, buy $\$, $E_t \uparrow$
Equilibrium in the Foreign Exchange Market

![Diagram showing the equilibrium exchange rate (Et) in the foreign exchange market. The diagram includes points A, B, C, and D, and lines R^D and R^F representing demand and supply. The exchange rate is measured in euros per dollar (euros/$) on the vertical axis, and the expected return in $ terms on the horizontal axis. The equilibrium exchange rate, Et^*, is marked at 1.00.]
Shifts in $R^F$

$R^F$ curve shifts right when

1. $i^F \uparrow$: because $R^F \uparrow$ at each $E_t$
2. $E^{e}_{t+1} \downarrow$: because expected appreciation of $F \uparrow$ at each $E_t$ and $R^F \uparrow$

Occurs $E^{e}_{t+1} \downarrow$ $i^F$:
1) Domestic $P \uparrow$,
2) Trade Barriers $\downarrow$
3) Imports $\uparrow$,
4) Exports $\downarrow$,
5) Productivity $\downarrow$
$R^D$ shifts right when

1. $i^D \uparrow$; because $R^D \uparrow$

   at each $E_t$

Assumes that domestic $\pi^e$ unchanged, so domestic real rate $\uparrow$
Factors that Shift $R^F$ and $R^D$
Response to \( i \uparrow \) Because \( \pi^e \uparrow \)

1. \( \pi^e \uparrow, E_{t+1}^e \downarrow \), expected appreciation of \( F \uparrow \), 
   \( R^F \) shifts out to right
2. \( i^D \uparrow, R^D \) shifts to right

However because \( \pi^e \uparrow > i^D \uparrow \), real rate \( \downarrow \), \( E_{t+1}^e \downarrow \) more than \( i^D \uparrow \) ⇒ 
\( R^F \) out > \( R^D \) out and \( E_t \downarrow \)
Response to $M^s \uparrow$

1. $M^s \uparrow$, $P \uparrow$, $E^e_{t+1} \downarrow$, expected appreciation of $F \uparrow$, $R^F$ shifts right
2. $M^s \uparrow$, $i^D \downarrow$, $R^D$ shifts left
   Go to point 2 and $E_t \downarrow$
3. In the long run, $i^D$ returns to old level, $R^D$ shifts back, go to point 3 and get Exchange Rate Overshooting

![Graph showing exchange rate dynamics](image)
Why Exchange Rate Volatility?

1. Expectations of $Ee_{t+1}$ fluctuate
2. Exchange rate overshooting
The Dollar and Interest Rates

1. Value of $ and real rates rise and fall together, as theory predicts

2. No association between $ and nominal rates: $ falls in late 70s as nominal rate rises