Exchange Rates in the Short Run

What determines exchange rates in the short-run?
» Exchange rates are priced like financial assets
» Asset prices change quickly, often by more than contemporaneous changes in underlying determinants
» Markets are forward looking, react to what is expected

The asset market approach to exchange rates
» The role of interest rates
» The role of the expected future spot rate

Exchange rate dynamics and “overshooting”
» What happens when asset prices are very flexible while consumer goods prices are “sticky”?
» Is “overshooting” bad? Is “overshooting” avoidable?

Forecasting exchange rates - Is it possible?
The Asset Market Approach

✧ What determines the current price of an equity share?
   » P(t) = Net present value of all future cash flows
   » P(t) = Net present value of future equity share price
     ◆ P(t) = P(t+1) / (1 + i(risk-free) + i(risk-premium))
   » Current share price reflects markets’ expectation of important underlying variables
   » Current share price responds to news about these variables

✧ What determines the current price of foreign exchange?
   » S(t) = Net present value of all future driving variables
   » S(t) = Net present value of future exchange rate  *(More details, p. 3)*
   » Current exchange rate reflects markets’ expectation of important underlying variables
   » Current exchange rate responds to news about these variables
The Asset Market Approach to Exchange Rates


emies


Recall Uncovered International Investment (Chap 17, p. 14)
» When uncovered interest parity holds, then
\[ 0 = \text{EUD} = \left( \frac{S_{t+3}^*}{S_t} \right) \times (1+i_{\text{UK}}) - (1+i_{\text{US}}) \]
where \(S_{t+3}^*\) is your expectation of the future spot rate 3-months from today.
» Rearranging terms we have:
\[ S_t = S_{t+3}^* \times \frac{1+i_{\text{UK}}}{1+i_{\text{US}}} \quad [1] \]
» The above equation is approximately the same as:
\[ S_t = S_{t+3}^* \times \frac{1}{1+i_{\text{US}} - i_{\text{UK}}} \quad [2] \]

Equation (2) \(\Rightarrow\) current exchange rate is present value of future exchange rate, where \(i_{\text{US}} - i_{\text{UK}}\) is discount factor.
» Discount factor does not reflect currency, liquidity or country risk.
Determinants of the Exchange Rate in the Short Run

<table>
<thead>
<tr>
<th>Variable</th>
<th>Direction</th>
<th>Impact on $/(£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>US interest rate</td>
<td>↑</td>
<td>$S_t \downarrow$ (US$ appreciates)</td>
</tr>
<tr>
<td>UK interest rate</td>
<td>↑</td>
<td>$S_t \uparrow$ (US$ depreciates)</td>
</tr>
<tr>
<td>Expected future spot rate</td>
<td>↑</td>
<td>$S_t \uparrow$ (US$ depreciates)</td>
</tr>
</tbody>
</table>

Caution: Impact on current spot rate assumes change in one variable **only**. Other variables assumed unchanged.
### Numerical Examples (1 of 3)

Holding S(expected) constant

- An increase in i($) leads to an appreciation in the $.
- An increase in i(£) leads to an appreciation in the £.

\[
S_t = S_{t+1 \text{ year}} \times \frac{1+i_{UK}}{1+i_{US}}
\]

<table>
<thead>
<tr>
<th></th>
<th>Base case</th>
<th>i($) up</th>
<th>i(£) up</th>
</tr>
</thead>
<tbody>
<tr>
<td>(S \text{ ($/£)})</td>
<td>1.5425</td>
<td>1.5280</td>
<td>1.5566</td>
</tr>
<tr>
<td>(S \text{ (expected)})</td>
<td>1.5000</td>
<td>1.5000</td>
<td>1.5000</td>
</tr>
<tr>
<td>(i \text{ (£)} 1 \text{ year})</td>
<td>9.00%</td>
<td>9.00%</td>
<td>10.00%</td>
</tr>
<tr>
<td>(i \text{ ($) 1 year})</td>
<td>6.00%</td>
<td>7.00%</td>
<td>6.00%</td>
</tr>
</tbody>
</table>
Numerical Examples (2 of 3)

\[ S_t = S_{t+3 \text{months}}^* \times \frac{1+i_{DM}/4}{1+i_{US$}/4} \]

Holding S(expected) constant:
- An increase in i($) leads to an appreciation in the $.
- An increase in i(DM) leads to an appreciation in the DM.

<table>
<thead>
<tr>
<th></th>
<th>Base case</th>
<th>i($) up</th>
<th>i(DM) up</th>
</tr>
</thead>
<tbody>
<tr>
<td>( S ($/DM) )</td>
<td>0.5001</td>
<td>0.4976</td>
<td>0.5025</td>
</tr>
<tr>
<td>( S ) (expected)</td>
<td>0.5050</td>
<td>0.5050</td>
<td>0.5050</td>
</tr>
<tr>
<td>( i ) (DM) 90 days</td>
<td>5.00%</td>
<td>5.00%</td>
<td>7.00%</td>
</tr>
<tr>
<td>( i ) ($) 90 days</td>
<td>9.00%</td>
<td>11.00%</td>
<td>9.00%</td>
</tr>
</tbody>
</table>

Textbook examples, p. 383
Numerical Examples (3 of 3)

\[ S_t = S_{t+1 \text{ year}} \times \frac{1 + i_{UK}}{1 + i_{US}} \]

Holding interest rates constant
• An increase in \( S(\text{expected}) \) leads to an depreciation in the $.
• A decrease in \( S(\text{expected}) \) leads to an appreciation in the $.

<table>
<thead>
<tr>
<th></th>
<th>Base case</th>
<th>( S^* ) up</th>
<th>( S^* ) down</th>
</tr>
</thead>
<tbody>
<tr>
<td>( S ) ($/£)</td>
<td>1.5425</td>
<td>1.5939</td>
<td>1.4910</td>
</tr>
<tr>
<td>( S ) (expected)</td>
<td>1.5000</td>
<td>1.5500</td>
<td>1.4500</td>
</tr>
<tr>
<td>( i ) (£) 1 year</td>
<td>9.00%</td>
<td>9.00%</td>
<td>9.00%</td>
</tr>
<tr>
<td>( i ) ($) 1 year</td>
<td>6.00%</td>
<td>6.00%</td>
<td>6.00%</td>
</tr>
</tbody>
</table>
The result that a rise in the home interest rate leads to an appreciation in home currency assumes that the future expected spot rate is unchanged.

Suppose interest rates rise in the home country because people have raised their expectation of expected future inflation. Then what?

- Then, based on the PPP theory, $S^*_{t}$ ↑
- It is still true that $S_t$ is the present value of $S^*$. But if $S^*$ has risen sharply because of inflationary fears, then the analyst may observe that $S_t$ ↑ when $i(\text{home})$ ↑

An easy way to remember - *hyperinflationary economies*

- High interest rates need not attract capital when inflation is high
- Investors are attracted by high real interest rates
Price Dynamics and “Overshooting”

“Overshooting” defined - prices move by “too much” in the short-run relative to some benchmark
  » Relative to the movement if markets had full information
  » Relative to the movement needed to establish PPP
  » Our def’n: Relative to the movement required in the long-run

You have encountered overshooting before in the market for goods that are in limited supply when there is a sudden demand shock (see next page)
  » “Overshooting” of this sort is not bad, an equilibrium result caused by rigidities of some sort
    ◆ Typical microeconomics example: Rigidities in supply
    ◆ International finance example: Stickiness in goods prices
Initial equilibrium at “A”, then sudden shift in demand from D to D’
In the short-run prices “overshoot” to $12,000 and gradually adjust to their long-term equilibrium at $11,000
As an empirical regularity, we find that prices of goods are less variable in the short-run than exchange rates. Domestic prices of goods are described as “sticky” or “rigid” but in the long-run, goods prices become more flexible.
Consider the following “experiment”
Assume i(\$) = i(£) and exchange rate is flat and not expected to change.

NOW, let the US money supply rise unexpectedly by 1% at time T(1), while conditions in the rest of the world stay unchanged.

The surplus of money leads $ interest rates to fall, but goods prices are sticky.

As a result, capital flows out of US, and toward foreign investments, and $ depreciates.
Exchange Rate Overshooting

$ has two strikes against it:
1. Low interest rates
2. Excess money supply likely to cause inflation in the long run

Puzzle: How to get investors to willingly hold US$ assets?

Answer: Let the US$ depreciate immediately by “too much”, to overshoot.

Then in the medium run, the US$ can appreciate, and compensate investors for the low $ interest rate.
Lessons of Exchange Rate Overshooting

 почему происходит “overshooting”? 
 » товарные цены статичны в краткосрочном периоде. Если бы товарные цены были полностью гибкими, то M(US)↑ на x%, P(US)↑ на x%, и S($/£)↑ на x% в момент. (Монетарный подход + PPP)
 » капитал мобильен, и цены активов быстро адаптируются.
 » мир шумел. Неожиданные макроэкономические шоки.

 почему overshooting это что-то плохое? В нашем контексте, “нет”
 » это естественный процесс для равновесия возвратов в активы США и иностранные активы, и удаление арбитражных прибылей
 » отражает полную информацию, а не путаницу
 » было бы лучше иметь меньше макроэкономических сюрпризов (менее волатильности обменных курсов), но сюрпризы случаются.

 независимо от overshooting, PPP держится в долгосрочной перспективе
Predicting Exchange Rate Changes

✦ Should be very difficult to predict changes
  » Asset markets tend to be efficient, prices reflect information
  » Short-run price changes caused by “news” - unpredictable

✦ Short-run prediction
  » Many analysts use technical, trend-following models to predict the direction (but not magnitude) of changes
  » No traditional economic foundation for these models, but studies find that they are often useful and profitable.

✦ Medium to Long-run prediction
  » Some evidence that exchange rates gravitate toward the values indicated by structural, monetary models
  » Short-run deviations are temporary, in the medium to longer run, fundamentals matter for exchange rates
Summary on Exchange Rates in the Short-Run

- Exchange rates are priced like financial assets
  - Market participants are forward looking
  - Current price reflects the present value of the future price
  - Prices change quickly in response to changes in home interest rate, foreign interest rates, and expectations

- In the short-run exchange rate volatility may exceed volatility in fundamentals
  - Some of this volatility is due to “overshooting”
  - Overshooting can result from sticky good prices and high capital mobility, not the result of market confusion

- Exchange rate forecasting is difficult
  - As is forecasting other financial assets like stocks and bonds
  - Some possibilities of forecasting in medium- to long-run