Foreign Exchange (FX)

UK Pound Sterling (£)

Japan Yen (¥)

Switzerland Franc (SF)

Mexico Peso ($) (¢ ($)?

Argentina Peso ($)

Brazil Real (R)

Euroland Euro (€ "Eurosllyph"

Germany Deutsche Mark (DEM)

France Franc (Fr)

Belgium Franc (Bfr)

Luxembourg

Netherlands Guilder (Guilder)

Italy Lira (Lira)
Euro started at $1.17/€ in 1999, fell to $.86/€ in 2001, then rose to $1.57/€ in 2008, fell back to $1.30/€ in 2009, but has rebounded since. Was $1.41/€ on 5/24/11.

Equivalently, Dollar was €0.85/$ in 1999, rose to €1.16/$ in 2001, fell to €0.64 in 2009, rose back to €0.77/$ in 2009, but has fallen since. Was €0.71/$ on 5/24/11. €0.01 = 1 “cent” or “euro cent”.

(Generally, $X(\text{€}n_1/\text{€}n_2) = \frac{1}{X(\text{€}n_2/\text{€}n_1)}$)
Spot FX Rate
immediate delivery, payment

• \( X (\text{Cur}_2 / \text{Cur}_1) \uparrow \)
  \( \text{Cur}_1 \) "appreciates"

• \( X (\text{Cur}_2 / \text{Cur}_1) \downarrow \)
  \( \text{Cur}_1 \) "depreciates"
  (i.e. \( \text{Cur}_2 \))

\[ \text{€ \& $} \]

\begin{array}{c|c}
11/30/2007 & 11/30/2008 \\
\hline
\text{€ 1.4812} & \text{€ 1.2974} \\
\text{\$ 0.6751} & \text{\$ 0.8017} \\
\end{array}

\[ \Rightarrow \text{€ depreciated} \quad (\text{val to $}), \]
\[ \text{\$ appreciated} \quad (\text{val to €}). \]

\[ X (\text{Cur}_1 / \text{Cur}_2) \]
\[ = \frac{1}{X (\text{Cur}_2 / \text{Cur}_1)} \]
**Forward FX Rates**

*Future delivery, payment.*

<table>
<thead>
<tr>
<th>Date</th>
<th>$/¥</th>
<th>¥/$</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/20/08</td>
<td></td>
<td></td>
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- **Spot**  
  - .010622/¥  
  - ¥94.14/$

- **30 day Fwd**  
  - .010631  
  - 94.06

- **60 day Fwd**  
  - .010666  
  - 93.76

- **90 day Fwd**  
  - .010705  
  - 93.41

⇒ ¥ at Fwd Premium  
  (rel. to $)  

$ at Fwd Discount  
  (rel. to ¥)

*I.e. market is betting that $ will appreciate in near future.*
Hedging vs Speculation in Forward Exchange Market

**Hedging**
- Reduces risk that otherwise exists
- E.g., US Exporter to Europe sells Euros forward to eliminate FX risk on future Euro payments

**Speculation**
- Takes on risk in hope of profit
- E.g., Speculator might buy Euros forward if he/she believes future spot price will exceed current forward price.
FX Markets

Value of \( \$ \)

\((1+i) \times \) \( X(\frac{\$}{\$}) \)

\( X_m \)

\( Q_m \) \( Q \) of \( \$ /yr \)

\( D \) for \( \$ \)

\( S \) of \( \$ \)

FX market for \( \$ \) (vs \( \£ \))

traded in FX market.
Increase in Market D for \$ (Rightward Shift)

\[ \Rightarrow X_m \left( \frac{\$}{\$} \right) \uparrow \] (\$ App.)

FX Markets

Value of \$

\[ \frac{\text{Value of } \$}{\text{Old } X_m} \]

\[ X \left( \frac{\$}{\text{New } X_m} \right) \]

5 of \$

(unchanged)

\[ \text{New D}\$_{\$} \]

\[ \text{D for } \$ \] (old)

Q of \$ / yr

traded in FX market

FX market for \$ (vs €)
Decrease in Market D for $ (leftward shift)
\[ \Rightarrow X_m \left( \frac{e}{s} \right) \downarrow \text{($ Deposits$)} \]

FX Markets

Value of $\frac{e}{s}$

\[ X \left( \frac{e}{s} \right) \]

(old) $X_m$

New $X_m$

New $D$ for $\frac{e}{s}$

(old) $D$ for $s$

\[ Q_m \]

Q of $\frac{s}{yr}$ traded in FX market.

FX market for $\$ (vs \$).
Increase in Market $ of $ (Right)

\[ \frac{1}{m} \left( \frac{\frac{\text{Value of $}}{\text{Old $}}}{\text{New $}} \right) \downarrow \]

FX Markets

Value of $ (Old $)

\[ X \left( \frac{\text{Value of $}}{\text{New $}} \right) \]

Old $ \times m

New $ \times m

\[ Q \text{ of $/yr} \]

Qm

traded in FX market.

FX market for $ (vs $)
Decrease in Market $ of $ (leftward shift)

\[ \Rightarrow X_m \left( \frac{\varepsilon}{\$} \right) \downarrow \]  ($ appreciates)

FX Markets

Value of $ (into ε)

\[ X \left( \frac{\varepsilon}{\$} \right) \]

New $ of $ (old) $ of $ (old) $ of $

\[ \text{D for } \$

\[ Q_m \]

\[ Q \text{ of } \$ /yr \]

Traded in FX market.

FX market for $ (vs ε).
FX D for $ 

1 - 3 = Fundamental

1. Trade D
   = Fn. D. for US goods
   Depends on Relative Price.

2. Investment D
   = Fn. D. for investment in US.
   Depends on Relative $’s.

3. Transfer D
   = Fn. Gifts, Official payments to US
   Interest, Dividends

4. Speculative D
   (pro-$)

5. Official Intervention
   Fed buys $ with "I" → "I US"
   or
   ECB buys $ with new Euros → "I ECB"

(European Central Bank)
\[ FX \ 5 \ of \ \$ \equiv FX\ D \ for \ Fn.\ Cur.\ (us\$) \]

\[ \Rightarrow \ \text{Determinant of } FX\ 5 \ of \ \$ \]
\[ = \ \text{Determinant of } FX\ D \ for \ Fn.\ Cur. \]

1. \text{Trade } 5 \ of \ \$
\[ = \ \text{US D for Fn goods.} \]

2. \text{Investment } 5 \ of \ \$
\[ = \ \text{US D for Inv. abroad} \]

3. \text{Transfer } 5 \ of \ \$
\[ = \ \text{US Gifts, Obligatory puts abroad} \]

4. \text{Speculative } 5 \ of \ \$
\[ (\text{anti- } \$) \]

5. \text{Official } 5 \ of \ \$

Fed trade new \$ for \text{Euro} \rightarrow \text{Euro} ↑

or ECB uses \$ (I ECB) to buy € \rightarrow I ECB ↑
Purchasing Power Parity (PPP)

Strong Assumptions:

- All goods traded
- No trade barriers
  - No tariffs
  - No quotas
  - No exchange controls
- No transportation costs
  - or delays

\[ \Rightarrow \quad X \left( \frac{\text{Cur} 1}{\text{Cur} 2} \right) \leq \frac{P_i}{P_2} \quad \text{PPP} \]

(\(X\) = "Proportional to", \(P_i\) = CPI in country i)
Dynamic Form of PPP

\[ \Pi_1 = \frac{\Delta P_1}{P_1} \]

\[ \Pi_2 = \frac{\Delta P_2}{P_2} \]

PPP \Rightarrow \frac{\Delta X}{X} \left( \frac{\text{Curl1}}{\text{Curl2}} \right) \approx \Pi_1 - \Pi_2 \]

\[ \frac{\Delta X}{X} \left( \frac{\text{Curl1}}{\text{Curl2}} \right) \approx \Pi_1 - \Pi_2 \]

Example

\[ \Pi_{US} = 7.0 \% \text{ / yr} \]

\[ \Pi_{Euro} = 3.2 \% \text{ / yr} \]

PPP \Rightarrow \frac{\Delta X}{X} \left( \frac{\$}{\$} \right) = (7) - (2) = 5.0 \% \text{ / yr}

\[ \frac{\Delta X}{X} \left( \frac{\$}{\$} \right) = (7) - (2) = 5.0 \% \text{ / yr} \]

($\$ \text{ Appreciation})

\[ \text{or} \frac{\Delta X}{X} \left( \frac{\$}{\$} \right) = (2) - (7) = -5.0 \% / yr \]

($\$ \text{ Depreciation})
• PPP explains most of change in Exchange Rate for countries with very different TI
  eg US / Brazil

• But deviations from PPP are very apparent for countries with similar TI
  eg US / Euro area
Can Purchasing Power Parity explain X($/EUR)?

US CPI-U, Euroarea HCPI, both 1/1999 = 100

Price Level, 1/1999 = 100

US CPI-U, All items, FRED series CPIAUCNS, rescaled to 1/1999 = 100
Euroarea Harmonized CPI, all items excluding alcohol & tobacco, from www.ecb.europa.eu

-- Only a little!

P(US)/P(Euro), 1/1999 = 1, X($/EUR)

FRED series EXESEU
Real Exchange Rate:
\[ x(\$/EUR) = X(\$/EUR) \cdot P(\text{Europe}) / P(\text{US}) \]

Real $-Euro exchange rate \ x(\$/EUR), 1999-2009 = 1)

Geometric mean = 1, 1999-2009

Real Exchange Rate should be nearly constant under PPP.

Instead, $ strong relative to PPP before 2004,

Euro strong relative to PPP since 2004.
Deviations from PPP:

Interest rate differentials explain a little, but why was $ so weak in 2005-2007?