ECON 421: Business Fluctuations

Spring 2015
Tu 6:00PM–9:00PM
Section 102

Created by
Richard Schwinn

Based on
Macroeconomics, Blanchard and Johnson [2011]

Terminology

Goods flows:

- **Exports** are sales of goods and services to foreign consumers, firms, and governments. (e.g. US sales of soybeans to China)
- **Imports** are purchase of foreign goods and services by domestic consumers, firms, and governments. (e.g. LV bags from France)
- In both cases currency flows in the opposite direction of the goods.

Financial flows:

- **Domestic holdings of foreign assets** increase due to **Capital Outflows**. (e.g. You purchase Nokia stock)
- **Foreign holdings of domestic assets** increase due to **Capital Inflows**. (e.g. A German businessman purchases Chipotle stock)

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Two equivalent methods to express a currency's values:

- The **exchange rate (E)** is the cost of the domestic currency in terms of the foreign currency. (e.g. If one dollar costs 120 yen then E = 120 ¥/$)
- The **spot rate (S)** is the cost of the foreign currency in terms of the domestic currency.[1] (e.g. If one British pound costs 1.46 dollars then S = 1.46 $/£)
- ¥ spot rate? £ exchange rate?

Interest rates:

- Nominal interest rate on *foreign* bonds is denoted i^*.
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[1] These definitions are often conflated. We will only utilize the exchange rate (E) terminology.

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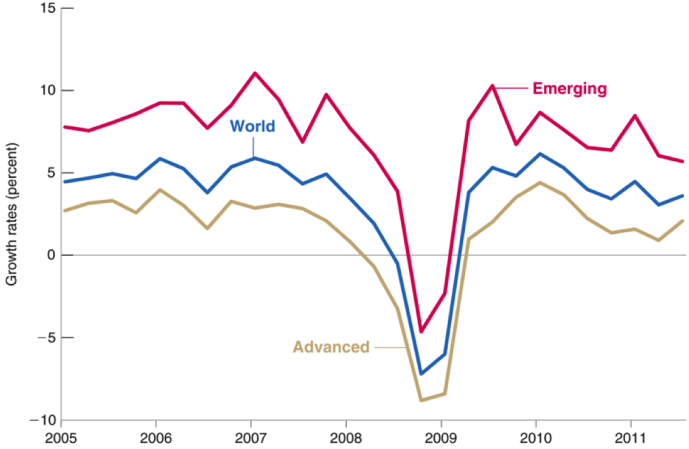
The Crisis Was International

- This graph shows growth in Advanced and Emerging Economies since 2005.
- Crisis started in the US, but affected nearly all countries in the world.
- If all countries were isolated, this would not be the case.
- What forces allow economic conditions to be transmitted across borders?



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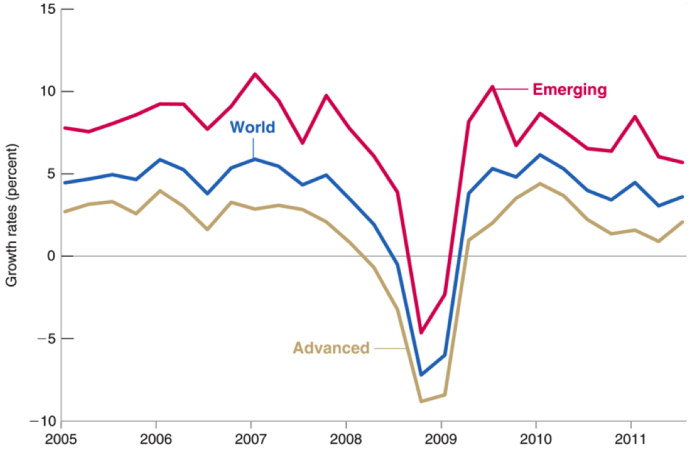

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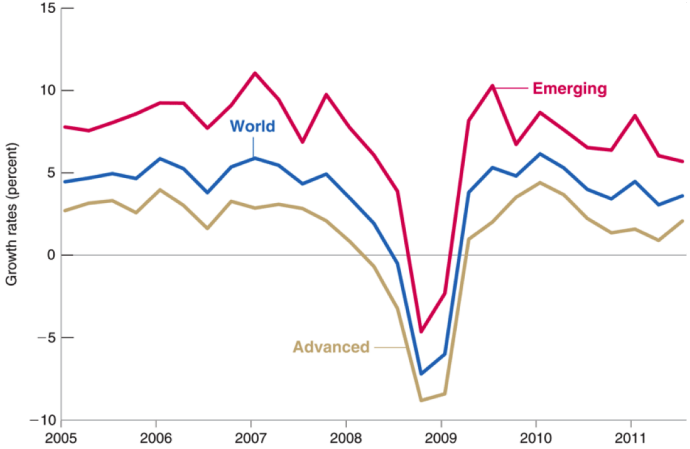

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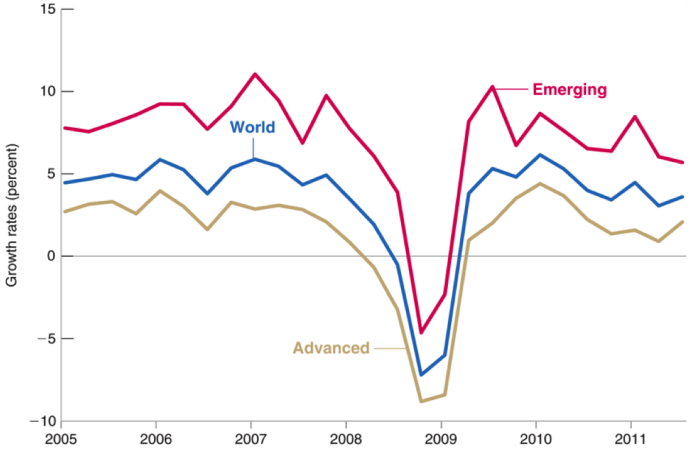

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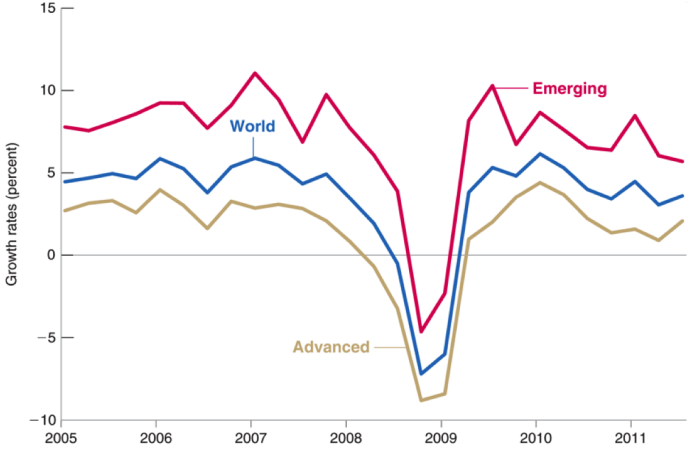

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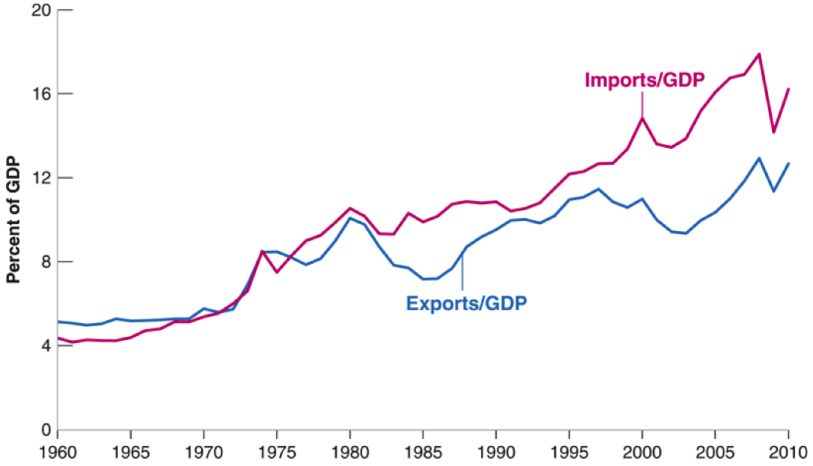
Exports and Imports

The graph shows U.S. Exports and Imports as Ratios of GDP since 1960.

- Since 1960, exports and imports have more than doubled in relation to GDP.
- The United States has become a much more open economy.
- Although it remains far less open/interdependent than many other economies.



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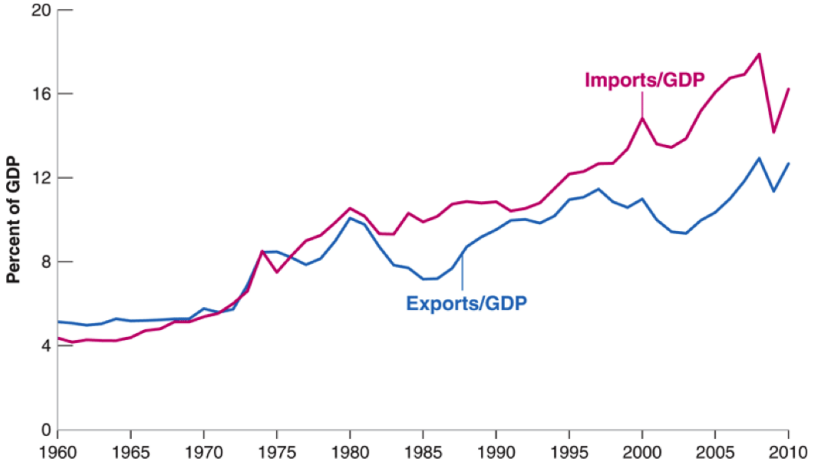

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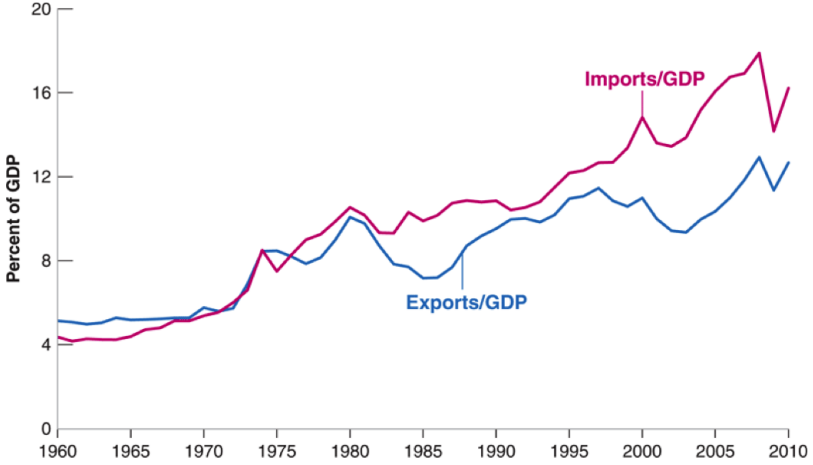

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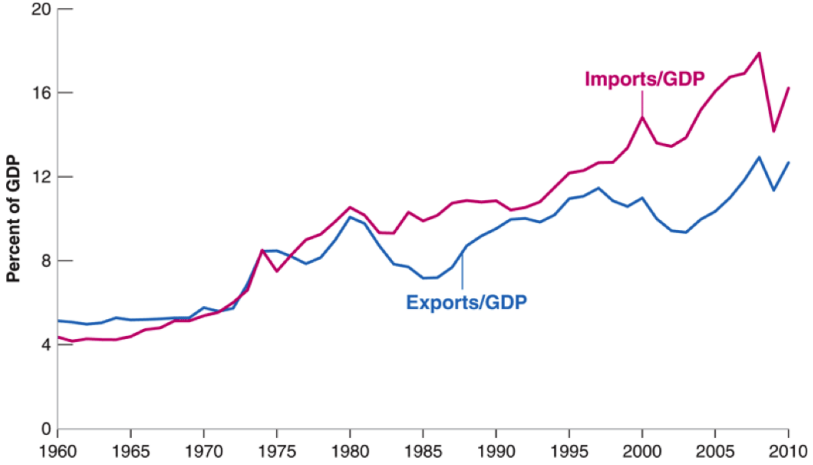

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Export Ratios

For countries other than the United States, open economy considerations have substantial effects on economic performance.

Country	Export Ratio	Country	Export Ratio
United States	13%	Switzerland	54%
Japan	15%	Austria	55%
United Kingdom	30%	Netherlands	78%
Germany	46%	Belgium	81%

Source: OECD Economic Outlook Database

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Openness in the goods markets means that domestic residents are able to buy foreign goods and sell domestic goods abroad.

- In closed economy models people face one decision: Save or Buy.
- In an economy open to imports, people have three choices:
  - Save
  - Buy domestic
  - Buy foreign
- The latter decisions depend on the nominal exchange rate and the prices[2] in each country.
- The decision to import is only available for tradable goods (e.g. electronics, cars) and not for non-tradable goods (e.g. haircuts, most medical services).
- 60% of aggregate output in the United States is estimated to be tradable goods.

[2] Plus transport costs.

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- In January 2015, one dollar purchased 120 ¥, therefore E=120 was the nominal exchange rate.
- Obviously this does not mean that one could purchase 120 times more goods and services in Japan than in the US. This is because prices in quoted in ¥ are greater than when quoted in dollars.
- What if Japanese prices are not 120 times greater than US prices?

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What if Japanese prices are not 120 times greater than US prices?

- The average for the US was \$4.79 (denote domestic prices with P).
- This implies that the price in Yen should be 575¥(denote domestic prices with P^*).
- But the average price of a Big Mac in Japan in January 2015 was 370¥. (And thus implying a dollar price of \$3.08)
- This relative price is based on the **real exchange rate (ϵ)**.

$$\epsilon = E\frac{P}{P^*} = (120)\frac{4.79}{370} = 1.55$$

This example suggests that the dollar can be used to purchases 55% more goods in the Japan than it does in US.

- Typically ϵ is thought of in terms of price *levels* (i.e. averages across all goods in the economy.)
- Thus the *real* exchange rate is the relative price of foreign goods in terms of domestic goods.

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$$\epsilon = E\frac{P}{P^*} = (120)\frac{4.79}{370} = 1.55$$

This example suggests that the dollar can be used to purchases 55% more goods in the Japan than it does in US.

- Typically ϵ is thought of in terms of price *levels* (i.e. averages across all goods in the economy.)
- Thus the *real* exchange rate is the relative price of foreign goods in terms of domestic goods.

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Real Exchange Rates

What if Japanese prices are not 120 times greater than US prices?

- The average for the US was \$4.79 (denote domestic prices with P).
- This implies that the price in Yen should be 575¥(denote domestic prices with P^*).
- But the average price of a Big Mac in Japan in January 2015 was 370¥. (And thus implying a dollar price of \$3.08)
- This relative price is based on the **real exchange rate (ϵ)**.

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Fixed vs. Flexible Rates

- **Fixed exchange rates** refer to a system in which two or more countries maintain a constant exchange rate between their currencies.
  - Under such a system, increases in the exchange rate, which are infrequent by definition, are called **revaluations** (rather than appreciations).
  - Decreases in the exchange rate are called **devaluations**.
- In **flexible**[3] **exchange rate systems**, a currency's price freely fluctuate according to the supply and demand for that currency.
  - An increase in the nominal exchange rate, that is, an increase in the price of dollars with respect to a foreign currency, is called an **appreciation**.
  - A decrease in the real exchange rate, that is, a decrease in the relative price of domestic goods in terms of foreign goods, is called a **real depreciation**.

Can there be a real appreciation with no nominal appreciation?

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[3] Also known as floating

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Nominal Exchange Rate between the $ and the £ since 1971

Although the dollar has appreciated relative to the pound over the past four decades, this appreciation has come with large swings in the nominal exchange rate between the two currencies.

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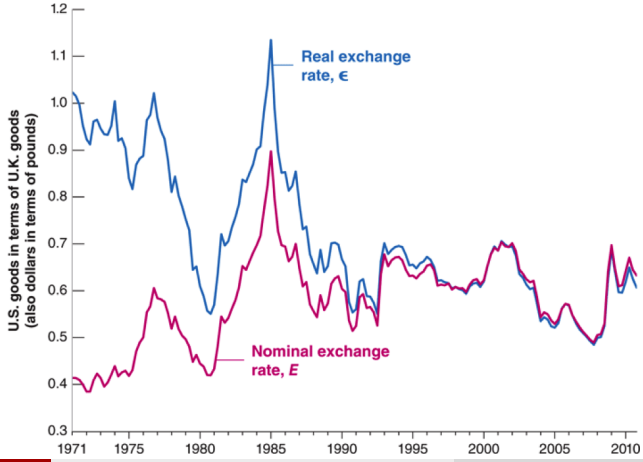
Real Exchange Rate between the $ and the £ since 1971

- In 1971, the price of British goods in terms of US goods was close to 1.
- The real value of the dollar fell steadily into the 1990s.
- Since the early 1990s, the nominal and the real exchange rates have moved largely together and remained relatively constant.



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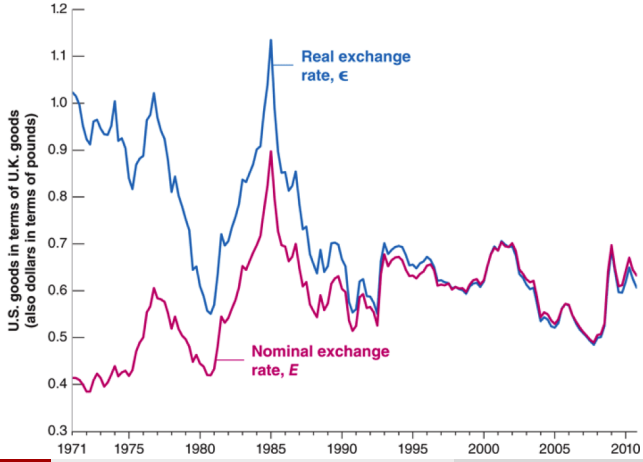

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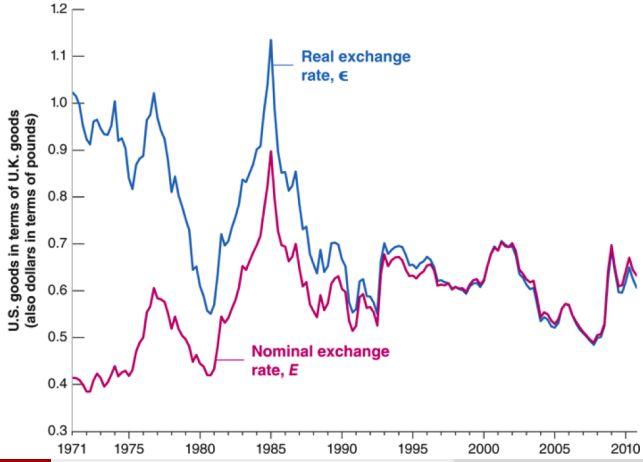

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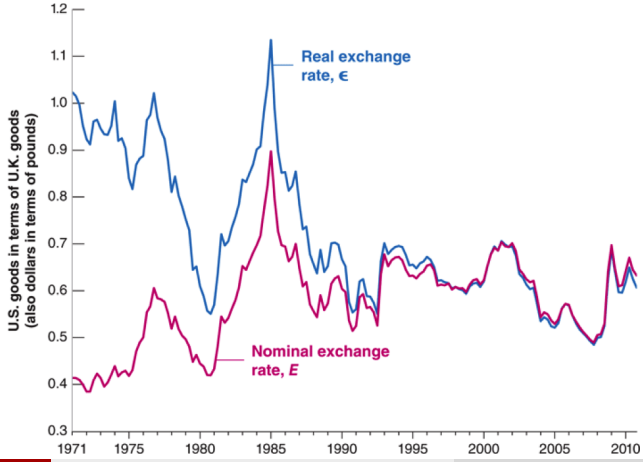

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Multilateral Exchange Rates

- Economists are often interested in the real exchange rate measured against all other countries, rather than against just one country.
- The bilateral real exchange rate as defined above is often replaced by a multilateral real exchange rate, which is a weighted average of the real exchange rate against all other countries.
- The weights are based on the composition of trade among trading partners (shown in the table for the US) as well as on how the US competes with other countries in foreign markets.

	Percent of Exports to	Percent of Imports from
Canada	16	13
Mexico	10	11
European Union	23	20
China	7	17
Japan	6	7
Rest of Asia and Pacific	16	14
Others	22	18

Source: Survey of Current Business, August 2011, Tables F2 and F3

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Source: Price-Adjusted Broad Dollar Index—Monthly Index, Federal Reserve Board. www.federalreserve.gov/releases/h10/summary/

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Openness in Financial Market

- Money flows between countries in exchange for goods and services.
- Why else does money flow between countries?
  - Foreign aid
  - Remittances (i.e. gifts for family members, etc.)
  - For the purchase and sale of foreign assets.
  - Income from ownership of foreign assets.
- Openness in financial markets means that domestic residents are able to exchange assets (stocks, bonds, and money) with residents of other countries.

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The Balance of Payments

- The balance of payments formally records a country's transactions with the rest of the world for all of the above categories over a given period of time.
- Countries that run trade deficits (like the US) can finance them by borrowing from countries that run trade surpluses.

Current Account		
Exports	1838	
Imports	2338	
Trade balance (deficit = −) (1)		−500
Income received	663	
Income paid	498	
Net income (2)		165
Net transfers received (3)		−136
Current account balance (deficit = −) (1) + (2) + (3)		−471
Capital Account		
Increase in foreign holdings of U.S. assets (4)	1260	
Increase in U.S. holdings of foreign assets (5)	1005	
Capital account balance (deficit = −) (4) − (5)		255
Statistical discrepancy		216

Source: Survey of Current Business, August 2011, Table F2

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Exports	1838	
Imports	2338	
Trade balance (deficit = −) (1)		−500
Income received	663	
Income paid	498	
Net income (2)		165
Net transfers received (3)		−136
Current account balance (deficit = −) (1) + (2) + (3)		−471
Capital Account		
Increase in foreign holdings of U.S. assets (4)	1260	
Increase in U.S. holdings of foreign assets (5)	1005	
Capital account balance (deficit = −) (4) − (5)		255
Statistical discrepancy		216

Source: Survey of Current Business, August 2011, Table F2

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Purchases of Foreign Assets

Purchases of foreign assets include

- Purchases and the direct creation of productive capital and other productive capacity in foreign countries.
- Purchases of foreign bonds represents a transfer of ownership.

In both cases, the decision to buy foreign versus assets is a function of the exp. returns (i^* and i)... If exchange rates were constant, then i and i^* would be all we would need to know to understand the flow of currency.

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Purchases of Foreign Assets

$$\begin{pmatrix} Return \\ at \\ Home \end{pmatrix} = \begin{pmatrix} Return\ if \\ Invested \\ Abroad \end{pmatrix}$$

$$\begin{pmatrix} Domestic \\ Currency \end{pmatrix} * \begin{pmatrix} Home \\ Bond \\ Return \end{pmatrix} = \begin{pmatrix} Foreign\ Currency \\ from\ Trading \\ Domestic \\ Currency\ Today \end{pmatrix} * \begin{pmatrix} Foreign \\ Bond \\ Return \end{pmatrix} / \begin{pmatrix} Expected \\ Future \\ Exchange \\ Rate \end{pmatrix}$$

$$(1)(1+i) = (E_t) * (1+i^*)/(E_{t+1}^{expected})$$

$$1+i = \frac{(E_t) * (1+i^*)}{E_{t+1}^{exp.}}$$

verify:

$$(1+i)(E_{t+1}^{exp.}) = (E_t) * (1+i^*)$$

$$\begin{pmatrix} Return\ in\ Foreign \\ Currency\ if\ Invested \\ at\ Home \end{pmatrix} = \begin{pmatrix} Return\ in\ Foreign \\ Currency\ if\ Invested \\ Abroad \end{pmatrix}$$

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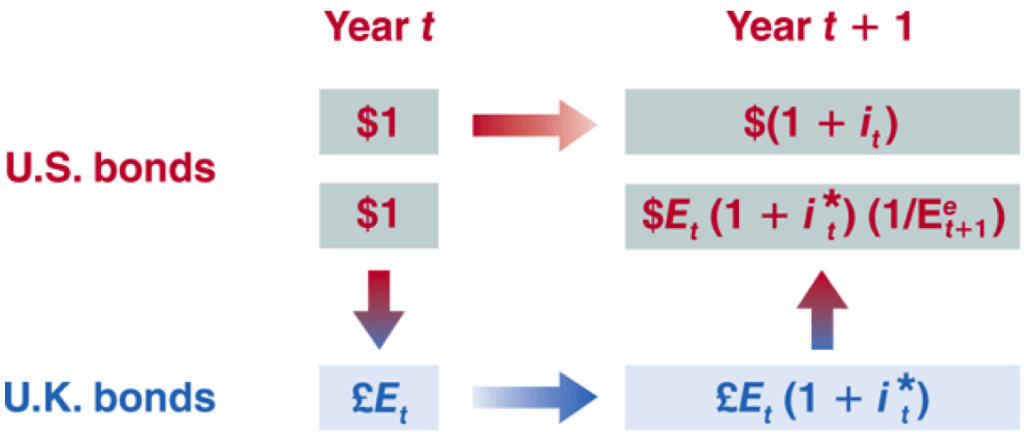
One Dollar Invested Domestically and One Abroad



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$$\begin{pmatrix} Return\ in\ Domestic \\ Currency\ if\ Invested \\ at\ Home \end{pmatrix} = \begin{pmatrix} Return\ in\ Domestic \\ Currency\ if\ Invested \\ Abroad \end{pmatrix}$$

$$1+i = \frac{E_t(1+i^*)}{E_{t+1}^{exp.}}$$

$1+i = \frac{E_t(1+i^*)}{E_{t+1}^{exp.}}$ is called the **uncovered interest parity (UIP)** condition. It can be used to demonstrate that expected changes in the exchange rate can be estimated from differences in interest rates:

$$E_{t+1}^{exp.} = \frac{E_t(1+i^*)}{1+i}$$

Notice that everything on the RHS is known at time t.

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Uncovered Interest Rate Parity

Next take logs of both sides of $1+i=\frac{(1+i^*)E_t}{E_{t+1}^{exp.}}$ to obtain:

$$\ln(1+i) = \ln\left(\frac{(1+i^*)E_t}{E_{t+1}^{exp.}}\right)$$
$$\ln(1+i) = \ln(1+i^*) + \ln E_t - \ln E_{t+1}^{exp.}$$
$$\ln(1+i) = \ln(1+i^*) - (\ln E_{t+1}^{exp.} - \ln E_t)$$

Note that $\ln(1+i) \approx i$ and that $\ln E_{t+1}^{exp.} - \ln E_t = \%\Delta E^{exp}$.

$$i = i^* - \%\Delta E^{exp}$$

$$\begin{pmatrix} Domestic \\ Interest \\ Rate \end{pmatrix} = \begin{pmatrix} Foreign \\ Interest \\ Rate \end{pmatrix} - \begin{pmatrix} Expacted\ Change \\ in \\ Exchange\ Rate \end{pmatrix}$$

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Interest Rates and Appreciation

Recall that $i = i^* - \%\Delta E^{exp}$. Which currencies are expected to appreciate against the dollar?

Country	Interest Rate
Denmark	-0.75
Germany	0.05
Greece	0.05
United States	0.25
Mexico	3
Philippines	4
China	5.35
India	7.5
Russia	14
Argentina	20.52

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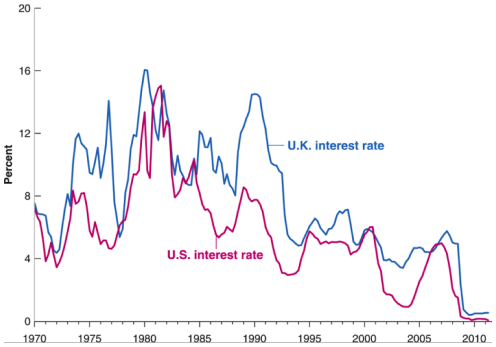
Did UIP in the late 70s for the US and UK? Early 90s? 00s?

$$i = i^* - \%\Delta E^{exp}$$



Practice 1

Label each of the following statements true, false, or uncertain. Explain briefly.

1. If there are no statistical discrepancies,countries with current account deficits must receive net capital inflows.
2. While the export ratio can be larger than one, as it is in Singapore, the same cannot be true of the ratio of imports to GDP.
3. That a rich country like Japan has such a small ratio of imports to GDP is clear evidence of an unfair playing field for U.S. exporters to Japan.
4. Uncovered interest parity implies that interest rates must be the same across countries.
5. If the dollar is expected to appreciate against the yen, uncovered interest parity implies that the U.S. nominal interest rate will be greater than the Japanese nominal interest rate.
6. Given the definition of the exchange rate adopted in this chapter, if the dollar is the domestic currency and the euro the foreign currency, a nominal exchange rate of 0.75 means that 0.75 dollars is worth 0.75 euros.
7. A real appreciation means that domestic goods become less expensive relative to foreign goods.

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Comments, questions, or concerns?

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Olivier Jean Blanchard and David Johnson. *Macroeconomics*. Prentice Hall, 6th edition, 2011. ISBN 9780133061635.