Money

- Primary function: a medium of exchange
- We hold money because we expect we can buy things with it
- The value of money depends on confidence
- Confidence in money depends on
  - Scarcity
  - Ease of recognition
  - Difficulty of counterfeiting

Gold and silver as money

- Gold and silver have special qualities that make them useful as money
  - Scarce, durable, malleable, recognizable, etc.
- US money
  - Gold coins and paper money backed by gold, until 1933
  - Silver coins and paper money backed by silver, until 1965
  - Paper money now backed by nothing

The international gold standard ca. 1870-1914

- All major currencies defined in terms of gold
  - US $20.67 = one oz. gold
  - UK £4.253 = one oz. gold
  - Other major currencies also defined by gold
- Conversion rates of these currencies was never in doubt
  - $/£ exchange rate was 20.67/4.253 = $4.86/£
- Inflation was largely unknown
- International trade was greatly facilitated

Gradual erosion of the gold standard

- Governments like to finance war by printing money
- If a gold or silver standard is in effect they have to suspend redemption of paper money into specie (gold/silver)
- 1914: Warring European countries suspended gold redemption
- 1925: UK tried to return to gold at prewar rate
- 1931: UK went off gold
- 1933: Roosevelt seized private gold
- 1944: Gold exchange standard established at Bretton Woods
- 1971: Last link to gold removed

Bretton Woods monetary system

- Bretton Woods conference, 1944 had two goals
  - Reduce tariffs and other trade barriers
  - Establish a stable international monetary system
- Bretton Woods system
  - Foreign central banks could convert US$ into gold at $35/oz.
  - Exchange rates fixed: $4.03/£, 119 Ffr/$, etc.

Decline and fall of the Bretton Woods monetary system

- The Bretton Woods system relied on prudent government fiscal and monetary policy
- Governments that incurred high deficits risked breaking their currency's link to US$.
- When a country's currency got too far out of line with its official exchange rate there were sometimes sudden and jarring devaluations

Devaluations

- British pound
  - 1944: $4.03/£ set at Bretton woods (previously $4.86)
  - 1949: Devalued to $2.80/£
  - 1967: Devalued to $2.40/£
  - 1971: Bretton Woods collapse
- French franc
  - 1944: 119 Ffr/$
  - 1949: 350 Ffr/$
  - 1958: 494 Ffr/$
  - 1958: 4.94 new Ffr/$

Declining U.S. gold reserves

- Foreign governments had been exercising their rights to redeem US$ for gold in spite of the “gentlemen’s agreement” not to
- Led by French who disliked the Bretton Woods system and distrusted the U.S. generally
- U.S. gold reserves had declined from 20,000 tonnes to 8,000 tons.

The Sunday night Nixon shock: Aug. 15, 1971

- Richard Nixon liked dramatic gestures, whether they made sense or not
- Aug 15:
  - Extra 10% tariff on imports
  - Wage and price freeze
  - End of gold convertibility; beginning of the end of fixed exchange rates

Nixon tariff increase

- Intended as a bargaining chip to induce other countries to revalue their currencies upward
- Nixon was warned that other countries might retaliate
- Surcharge ended in December 1971 before too much damage was done

Nixon wage/price freeze

- Popular at first; helped Nixon get re-elected in 1972
- Longer-term: created shortages and other economic distortions
- Abandoned 1973
- Helped create a decade of “stagflation:” inflation plus economic stagnation

Foreign exchange (FX)

- Foreign currencies supplied and demanded by
  - International travelers
  - Business firms
  - Governments
  - Speculators
- We will study S/D for UK£, paid for with US$ (Fig. 10.2)

Current exchange rates (XR)

- Online, e.g. www.xe.com
  - 0.901 €/US$ or 1.110 US$/€
  - 0.808 £/US$ or 1.238 US$/£
  - 103.03 ¥/US$ or 0.00970 US$/¥
  - 0.747 US$/C$ or C$1.339/US$
  - XR alone do not tell us the strength of a currency. The Korean won is strong at 1,150 per US$
  - Underlined forms preferred for convenience
- Fluctuations last 12 months:
  - 99.99 to 103.17 ¥/$
  - 1.251 to 1.523 $/£
  - 1.057 to 1.153 $/€

Exchange rate arbitrage

- Suppose we observe these XR:
  - $1.15/€
  - $1.40/£
- These numbers determine the expected £/€ rate: 1.40/1.15 = 1.22 €/£. If the actual rate is 1.20, someone holding US$ can profit:
  - Exchange $1,000 for €869.56 (1000/1.15)
  - Exchange €869.56 for £724.63 (869.56/1.20)
  - Exchange £724.63 for $1,014.44 (724.63×1.40)
  - 1.4% profit in almost no time – unrealistic

Currency appreciation/depreciation

- If the $/£ XR rises we say
  - It costs more to acquire £ using $
  - The £ has appreciated (strengthened) vs. the $
  - The $ has depreciated (weakened) vs. the £
- If the ¥/$ XR rises we say
  - It less to acquire £ using $
  - The ¥ has depreciated vs. the $
  - The $ has appreciated vs. the ¥

Supply and demand for UK£

- We focus on the market for UK£ paid for with US$
- “Supply” in this market refers to holders of £ who want to exchange them for $
- UK demand for $ implies supply of £
- “Demand” refers to holders of $ who want to exchange them for £
- US supply of $ implies demand for £

Effects of S/D shifts

- Demand increases (shifts right)
  - $/£ XR rises, £ appreciates, $ depreciates
- Demand decreases (shifts left)
  - $/£ XR falls, £ depreciates, $ appreciates
- Supply increases (shifts right)
  - $/£ XR falls, £ depreciates, $ appreciates
- Supply decreases (shifts left)
  - $/£ XR rises, £ appreciates, $ depreciates

Scenario 1: US price level rises more than UK price level

- UK response:
  - UK people demand fewer US goods/services
  - UK people demand fewer $ to pay for them
  - Lower demand for $ means lower supply of £
  - XR ($/£) rises, £ appreciates, $ depreciates
- US response
  - US people demand more UK goods/services
  - US people demand more £ to pay for them
  - XR rises more

Scenario 2: US interest rates rise more than UK interest rates

- US bonds are more attractive to UK savers
  - Demand more $ to pay for US bonds
  - Supply more £ into FX market
  - $/£ XR drops, £ depreciates, $ appreciates
- UK bonds are less attractive to US savers
  - Demand fewer UK bonds (or sell some)
  - Demand fewer UK£
  - $/£ XR drops more

Scenario 3: a socialist is elected in UK, £ depreciation expected

- Market participants will want to get rid of £ before the expected depreciation occurs
- Increased supply into FX market will suppress $/£ XR
- Like all other markets, FX markets try to anticipate ("discount") future events
- If they get it right, speculators provide social benefits by causing adjustments to future changes sooner

Exchange rate risk

- Sometimes people are risk-averse and are willing to pay someone to take on risk
- Sometimes people are risk-takers and are willing to take on risk for a price
- Exchange rates change over time, posing risks
  - A US firm that will be receive £ a year from now, to be converted to $, will lose purchasing power if the $/£ exchange rate drops
  - Risk can be off-loaded to speculators by forward contracts: e.g. $ price for £ to be delivered in one year

Forward (futures) contracts. Agricultural example

- A farmer plants wheat which he will harvest in September. He is willing to pay a fee to avoid the risk of lower September wheat prices.
- A speculator is willing to pay the farmer now for delivery of wheat in September. He hopes the wheat price will be high in September
- The speculator will not take delivery of the wheat, but will sell the contract to someone who wants wheat

Social benefits of speculation

- Speculation shifts risk from risk-averse people to risk-taking people
- When they are right, speculators cause prices to adjust to future conditions sooner than they would otherwise
  - Example: wheat speculator expects bad weather before September, hence poor crop and high price
  - Buys wheat for future delivery, thereby bidding up current prices

Forward currency contracts

- Forward currency contracts are mutually beneficial:
  - One party wants to reduce XR risk and is willing to pay
  - The counter-party is willing to take risk, hoping for profit
- A US person who will need £ in the future (to pay for a purchase, for example) can buy a contract for forward delivery
  - Assured of receiving future £ at a rate agreed to now
  - Avoids risk of £ appreciation
  - Will lose any benefit from £ depreciation

Forward currency contracts

- A US person who will *receive* £ in the future (getting paid for a sale, for example) can *sell* a contract for forward delivery
  - Assured of getting rid of £ in the future at a price agreed to now
  - Avoids risk of £ depreciation
  - Assumes risk of missing out on £ appreciation

Forward currency contracts

- Example 1: I have contracted to buy an apartment in London for £1,000,000 which will be due in 3 months. XR is now $1.40/£
  - I could buy a contract for delivery of £1,000,000 for $1.41/£, total $1,410,000
  - Suppose 3 months go by and the XR is $1.45. Without the contract I would have paid $1,450,000 for the £. I have saved $40,000
  - Suppose 3 months go by and the XR is $1.39. Without the contract I would have paid $1,390,000 for the £. I have lost $20,000

Forward currency contracts

- Example 2: I have contracted to sell a valuable painting in London for £1,000,000 which I will receive in 3 months. XR is now $1.40/£
  - I could sell a contract for delivery of £1,000,000 and receive (say) $1.39/£, total $1,390,000
  - Suppose 3 months go by and the XR is $1.35. Without the contract I would have received $1,350,000 for the £. I am $40,000 better off
  - Suppose 3 months go by and the XR is $1.45. Without the contract I would have received $1,450,000 for the £. I am $60,000 worse off

Purchasing power parity (PPP)

- Exchange rates are sometimes "wrong" according to PPP. Assume $1.40/£:
  - If you can buy more goods/services with $1,400 than you can with 1,000 £ then we conclude:
    - The $ is over-valued relative to the £
    - The £ is under-valued relative to the $
    - An arbitrage opportunity exists: buy stuff for $ and sell it for £
    - Arbitrage should drive the $ down and the £ up. The XR might move to $1.41/£

Persistence of purchasing power disparity

- Currencies are “at parity” when there is no discrepancy between their purchasing powers (PPP)
- Deviations in PPP often cannot be arbitraged away because
  - Some goods and especially services can’t be traded
  - Transaction costs and tariffs/quotas interfere
  - Expectations can drive currencies away from PPP

Price level

- The “price level” in a particular country is an attempt to measure the purchasing power of its currency
- An imaginary “basket” of goods and services is used to attempt price level measurements
- A rise in the price of a basket is called “price inflation” or just “inflation”

Real (inflation-adjusted) exchange rate

- Exchange rates tend to follow changes in the price level in the two countries
- If prices rise more rapidly in the UK than in the US, we would expect the £ to depreciate relative to the $, so that the purchasing powers of each currency remained unchanged
- If the XR does not fall as much as expected, the real exchange rate has risen
- If the XR falls more than expected, the real exchange rate has fallen

Real (inflation-adjusted) interest rates

- Assume there is a single interest rate that characterizes a country's entire loan market
- Assume price inflation can be measured in each of two countries
  - Ex post: calculated from recent price history
  - Ex ante: anticipated future price changes
  - Expressed as % per year
- Interest rates in two countries should reflect anticipated future price inflation in both countries

Real interest rates

- In general, lenders who anticipate price inflation will demand higher interest to compensate for future purchasing power deterioration:
- Subtract expected price inflation rate from nominal interest rate to get real interest rate

  $r = i - \pi$
- Example: inflation rate π=2%, nominal interest rate i=4.2%, real interest rate 4.2-2 = 2.2%, representing change in purchasing power

Real interest rate parity

- XR should reflect anticipated real interest rates in each country
- The expected change in XR over time (% per annum) should roughly equal the interest rate difference in that time
- If not, there is an arbitrage opportunity.

Real interest rate parity

- Example (text)
  - German CD pays 2% per annum, denominated in €
  - US CD pays 3% per annum, denominated in $
  - US investor has two ways to invest $1,000
    - Buy US CD and receive $1,030 after one year
    - Convert $1,000 to €833.33 at current XR=$1.20
    - Get 1.02x833.33 = €850 after one year
    - But how many $ will €850 buy after one year? If interest rate parity prevails the XR would be $1,030/€850 = $1.211/€
    - € appreciation compensates for lower German interest rate

Real interest rate parity

- Stated differently (text p. 220)
- The interest rate parity condition says that the difference in interest rates between two countries should equal the one-year change in XR between those countries, e.g.
  - $i_{UK} - i_{US} = (FXR-XR)/XR$
  - XR = spot $/£ exchange rate
  - FXR = one-year forward $/£ exchange rate
  - i_{UK} = UK interest rate, i_{US} = US interest rate