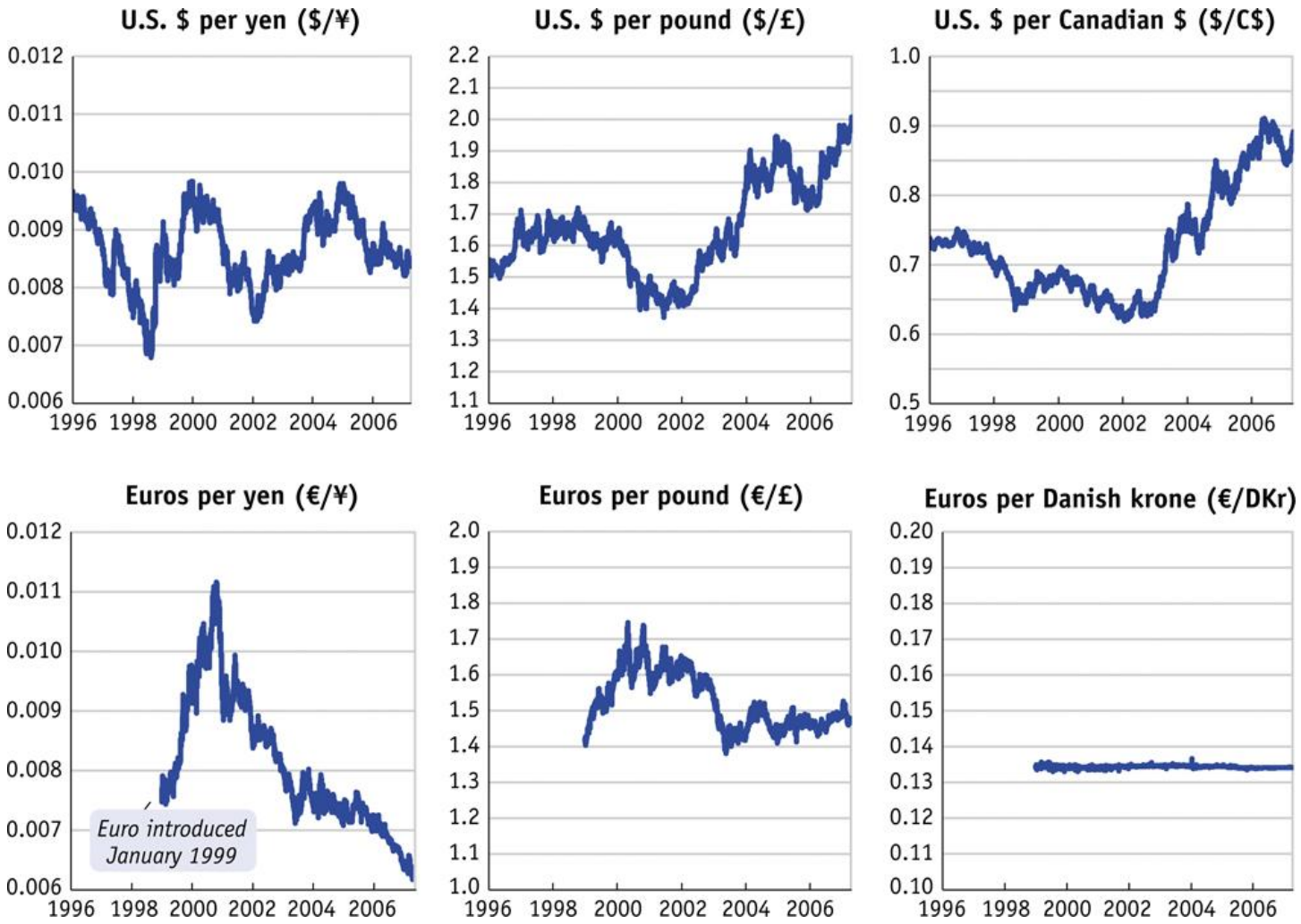
# What Determines Exchange Rates?

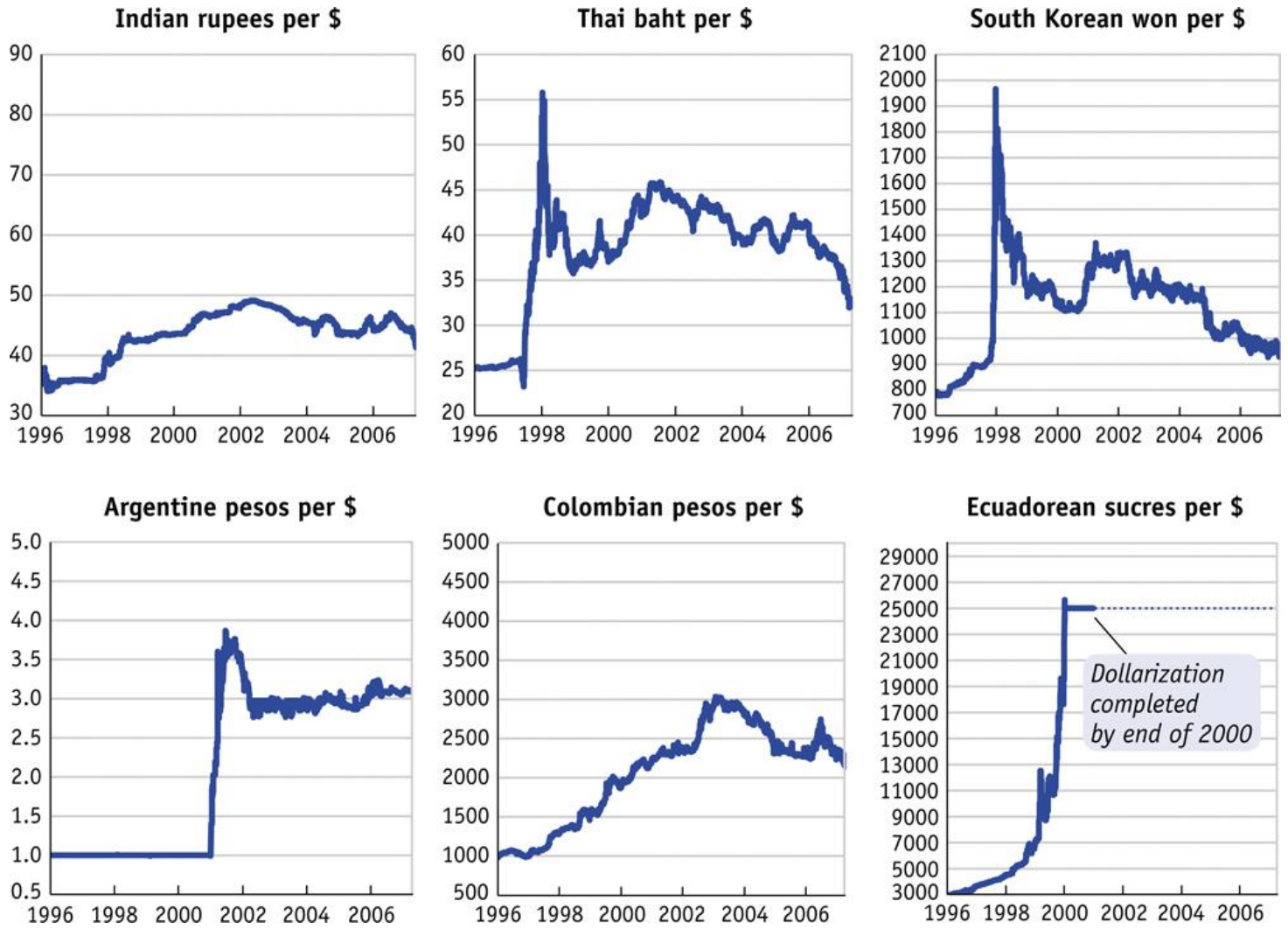
In the Short Run

In the Long Run

# Selected Exchange Rates



# Selected Exchange Rates



# Determinants of the Exchange Rate in the Short Run

- In the short run, movements of currency respond to short run differences in interest rates so that short run rates of return are equalized across borders

# Determinants of the Exchange Rate in the Short Run

| Change in Variable | Direction of International Financial Repositioning | Implications for the Current Spot Exchange Rate ($e$ = Domestic currency/Foreign currency) |
|---|---|---|
| **Domestic Interest Rate ($i$)** | | |
| Increases | Toward domestic-currency assets | $e$ decreases (domestic currency appreciates) |
| Decreases | Toward foreign-currency assets | $e$ increases (domestic currency depreciates) |
| **Foreign Interest Rate ($i_f$)** | | |
| Increases | Toward foreign-currency assets | $e$ increases (domestic currency depreciates) |
| Decreases | Toward domestic-currency assets | $e$ decreases (domestic currency appreciates) |
| **Expected Future Spot Exchange Rate ($e^{ex}$)** | | |
| Increases | Toward foreign-currency assets | $e$ increases (domestic currency depreciates) |
| Decreases | Toward domestic-currency assets | $e$ decreases (domestic currency appreciates) |

The analysis for each change in one of the variables assumes that the other two variables are unchanged.

# Determinants of the Exchange Rate in the Long Run

- In the long run, currency moves in response to price differences so that long run prices for the same goods are the same across borders

# Long Run Exchange Rates
# Law of One Price (LOOP)

LOOP states that if

- There is free trade (no tariffs, quotas, etc)
- Transportation costs are low relative to the value of the product (diamonds, oil, wheat, but not Big Macs)
- Competition

Then identical products sold in different locations will sell for the same price (when expressed in a common currency)

# Law of One Price (LOOP)

If a diamond of high quality sells for

- 1000 € in Amsterdam
- $4000 in New York
- The exchange rate is $1.50/€

Then trader could buy the diamond for $1500 in Amsterdam and sell it for $4000 in New York.

Traders would continue doing this, driving up the price in Amsterdam, and driving down the price in New York until the price is (for example)  2000€ in Amsterdam and $3000 in New York.

# Law of One Price (LOOP)

The Big Mac Index is a (partly tongue in cheek) applications of LOOP. The Big Mac Index has been published for over 20 years by the Economist as an indicator of short term under or over valuations of currencies

Link to July/08 Big Mac Index

# Law of One Price - Big Mac Index

By LOOP, when expressed in a common currency (say US$) the price of a Big Mac should be the same every

In Beijing: Big Mac Price = 12.5 RMB

In New York: Big Mac Price = $3.57

In Zurich: Big Mac Price = 6.50SF

Exchange Rates (Oct. 08): 6.84RMB/$ and 1SF/$

So the Beijing Big Mac is cheap …..12.5/6.83=$1.83.

The Zurich Big Mac is pricey ……..6.50/1.02= $6.37

# Law of One Price (LOOP)
# Ipod Index

By LOOP, when expressed in a common currency (say US$) the price of an Ipod should be the same every location. The Ipod may be a better product to use for this than the Big Mac because Ipods are traded internationally (Big Macs typically don't get imported or exported).

Link to the Ipod Index

# Law of One Price (LOOP)
# Ipod Index (2gb)

| Country | Price |
|---|---|
| Brazil | $327.71 |
| India | $222.27 |
| France | $205.80 |
| UK | $195.04 |
| Italy | $192.86 |
| China | $179.84 |
| Korea | $176.17 |
| Switzerland | $175.59 |
| Taiwan | $164.88 |
| Mexico | $154.46 |
| USA | $149.00 |
| Japan | $147.63 |
| Canada | $144.20 |

# Purchasing Power Parity (PPP)

Purchasing Power Parity is the macroeconomic equivalent of the Law of One Price.

Rather than looking at one good (LOOP), purchasing power parity examines a representative market basket of goods.

Link to OECD PPPs

# Absolute Purchasing Power Parity

With Absolute Purchasing Power Parity any market basket of goods will have the same price when expressed in a common currency.

Let Q be a representative market basket

$P_{US}$ = Prices of market basket goods in the US

$P_E$ = Price of market basket goods in Europe

$P_{US}$ *Q= cost of market basket in US

$P_E$ *Q = cost of market basket in Europe

With Absolute PPP:

Exchange Rate ($/ €) = $P_{US}$*Q / $P_E$ *Q

# Absolute Purchasing Power Parity

In the unhealthy case where the "representative market basket" just included the Big Mac

With Absolute PPP the exchange rate between the Chinese RMB and the US $ would simply be the ratio of Big Mac prices (Beijing/New York)

Exchange Rate (RMB/$) = 11RMB/$3.41=3.22RMB

# Absolute Purchasing Power Parity

While New Yorkers are not likely to Fed Ex cheap Big Macs from Beijing, the violation of purchasing power parity does suggest that the same product may be less expensive in the PRC than in the US (at the current exchange rate). The US will find it attractive to import Chinese goods, and over time we should observe some combination of

- Upward pressure on the prices of PRC exports
- Downward pressure on the price of US substitutes
- Appreciation of the RMB

# Relative Purchasing Power Parity

Chapter 12 uses Relative PPP

Relative PPP

- Changes in Exchange rates are related to differences in the level of prices between two countries
  - Changes in relative national price levels determine changes in exchange rates over the long run
- Given in symbols as: $$S_1 = S_0 \frac{P_{US_1}/P_{US_0}}{P_{S_1}/P_{S_0}}$$
- Application of the concept (Table 12.4)

# Relative Purchasing Power Parity

Application of the concept (Table 12.4)

**TABLE 12.4**

PURCHASING POWER PARITY IN ACTION, 1985–1989

| Year | U.S. Consumer Price Index | Mexican Consumer Price Index | Actual Exchange Rate: Dollars/Peso | Forecasted Exchange Rate: Dollars/Peso |
|---|---|---|---|---|
| 1985 | 100.0 | 100.0 | 0.0039 | — |
| 1987 | 105.7 | 431.7 | 0.0007 | 0.0010 |
| 1989 | 115.2 | 1,109.6 | 0.0004 | 0.0004 |

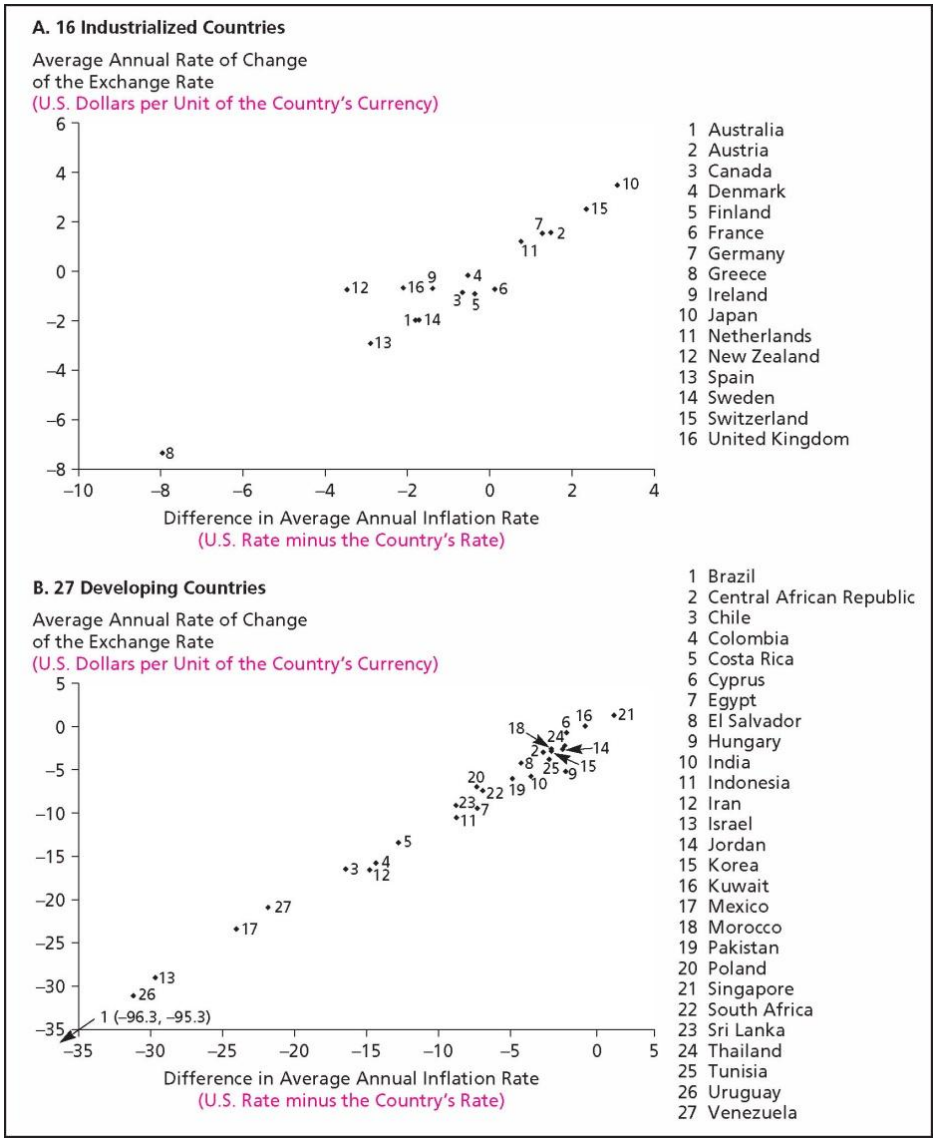
**Source:** From International Monetary Fund, *IMF Financial Statistics*, Washington, DC, May 1990.

Between 1985 and 1987 prices rose by about 400% in Mexico while US prices only rose by 5%. So it makes sense that since the prices of the same Mexican goods rose by a factor of 4, their currency (compared to the US$) would be worth about ¼ of what it was worth in 1985.

# Key Implications of Relative PPP

- A country with a relatively high inflation rate will have a depreciating currency (a declining nominal-exchange-rate value of its currency).
- A country with a relatively low inflation rate will have an appreciating currency (an increasing nominal-exchange-rate value of its currency).
- The rate of appreciation or depreciation will be approximately equal to the percentage-point difference in the inflation rates.

# Relative Purchasing Power Parity: Inflation Rate Differences and Exchange Rate Changes, 1975-2004



# Figure 19.4 – Actual Exchange Rates and Exchange Rates Consistent with PPP, Monthly, 1975-2005

# International Income Comparisons and PPP

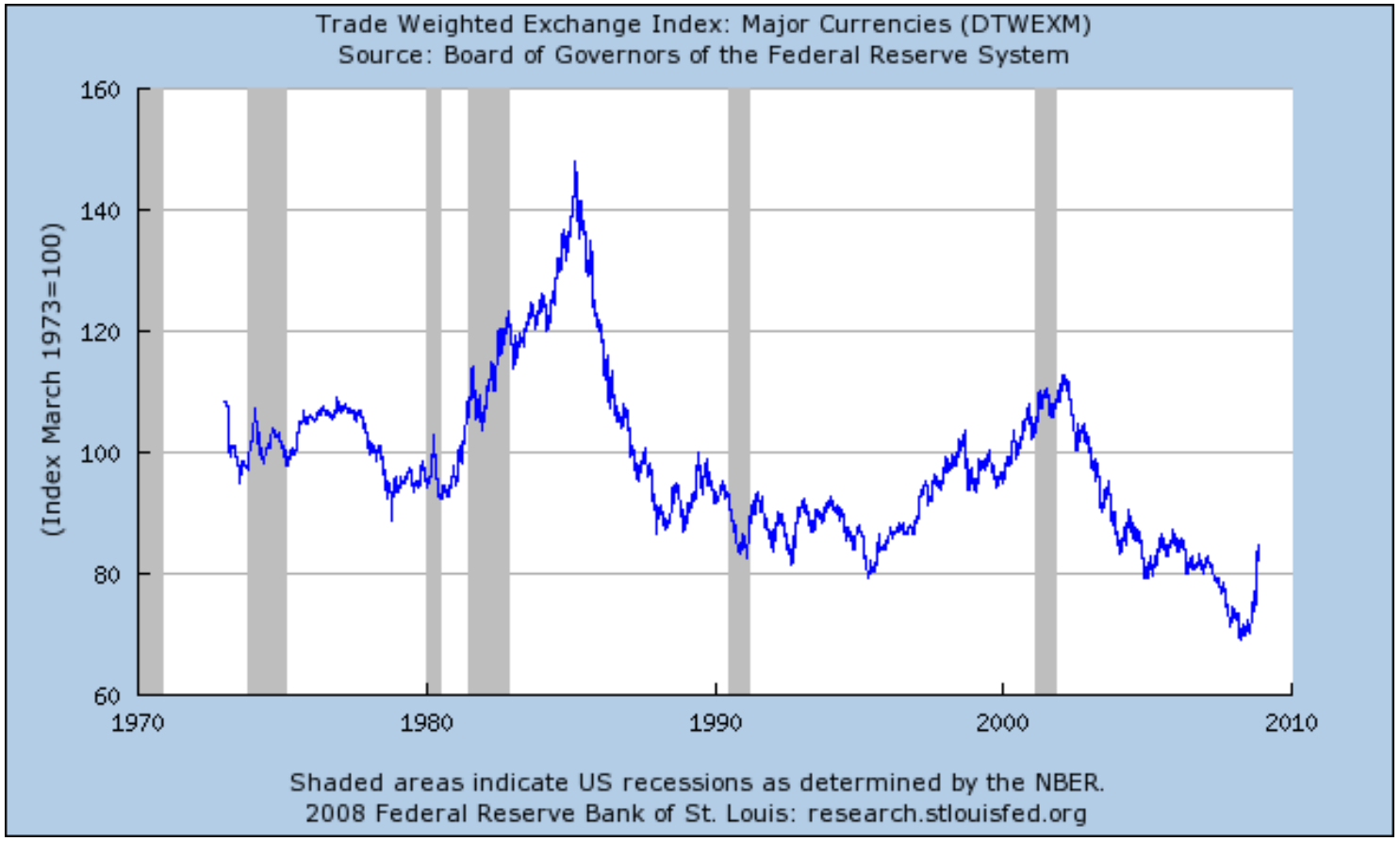
| Country | National Income per Capita, 2004, Relative to the United States = 100: Using the Exchange Rate | National Income per Capita, 2004, Relative to the United States = 100: Using Common Prices | Domestic Price Level (This Country/U.S.) as a Percentage of the Level Predicted by PPP |
|---|---|---|---|
| United States | 100 | 100 | 100% |
| Norway | 126 | 97 | 129 |
| Switzerland | 116 | 89 | 131 |
| Britain | 82 | 79 | 103 |
| Canada | 69 | 77 | 89 |
| Japan | 90 | 76 | 119 |
| Sweden | 86 | 75 | 115 |
| France | 73 | 74 | 98 |
| Australia | 65 | 74 | 88 |
| Germany | 73 | 70 | 103 |
| Italy | 63 | 70 | 90 |
| Singapore | 59 | 67 | 87 |
| Israel | 42 | 59 | 71 |
| South Korea | 34 | 51 | 66 |
| Czech Republic | 22 | 46 | 48 |
| Saudi Arabia | 25 | 35 | 71 |
| Poland | 15 | 32 | 46 |
| South Africa | 9 | 28 | 32 |
| Chile | 12 | 26 | 45 |
| Russia | 8 | 24 | 34 |
| Mexico | 16 | 24 | 68 |
| Brazil | 7 | 20 | 37 |
| Thailand | 6 | 20 | 30 |
| Turkey | 9 | 19 | 47 |
| China | 3 | 14 | 22 |
| Egypt | 3 | 10 | 30 |
| Indonesia | 3 | 9 | 32 |
| India | 1 | 8 | 19 |
| Ghana | 1 | 6 | 16 |
| Pakistan | 1 | 5 | 27 |
| Tajikistan | 1 | 3 | 23 |
| Nigeria | 1 | 2 | 40 |

Source: World Bank, *World Development Report 2006.*

# The Ups and Downs of the Dollar: 1970 to 2008

- The 1980s
  - Path of appreciation and then depreciation
  - Peaked in 1985; 50% above 1979 levels
  - Depreciation in latter half of 1980s
    - Fluctuations significantly caused by policy changes – Monetary expansion at US Fed
- The 1990s
  - Economic weakness; recession in 1991
  - Rapid growth in the mid-1990s
    - Appreciation: 1995-2001

# The Ups and Downs of the Dollar: 1970 to 2008



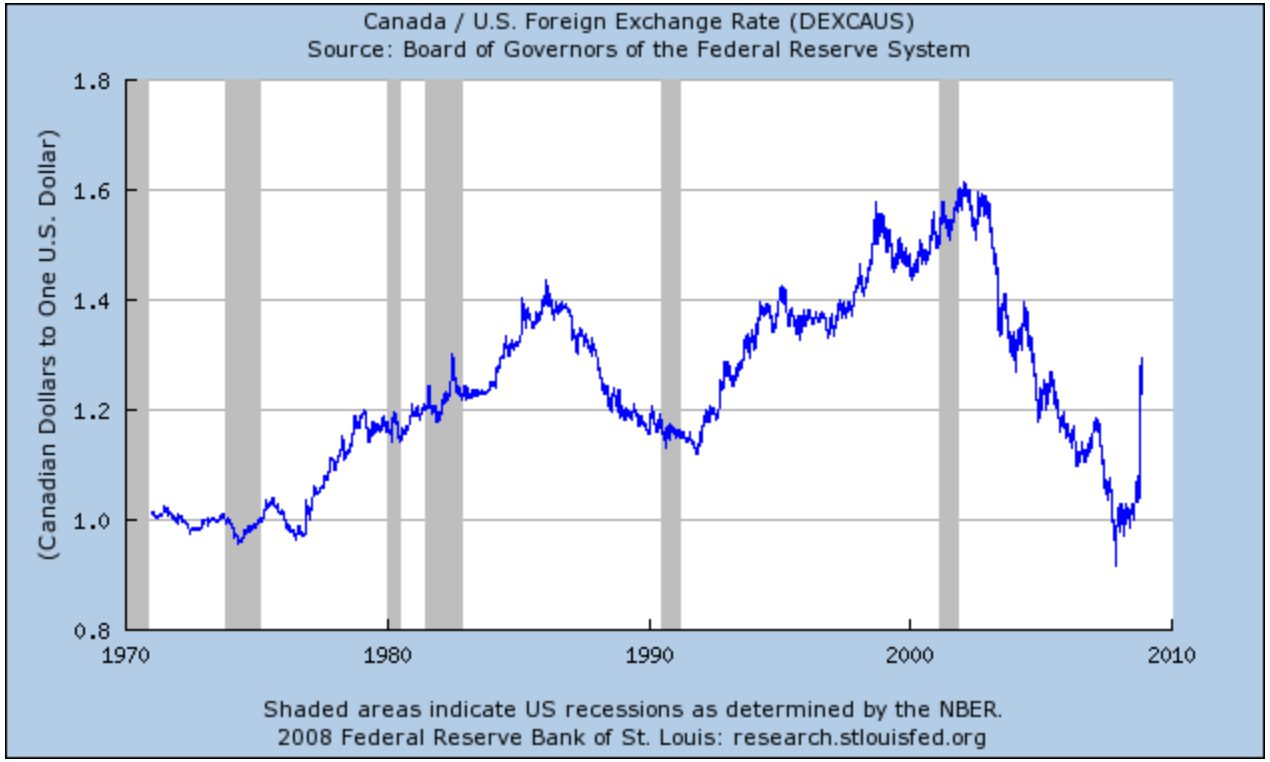
# The Ups and Downs of the Dollar: 2000 to 2008

- The 2001
  - A rising dollar and the large flow of investment into the U.S. that pushes the currency higher than could not be sustained
  - Depreciation in 2002–2007 -Historically low US interest rates
    - Weakening of the demand for dollar-denominated assets on the part of foreign investors.
  - 2008: US $ appreciates as world owners of assets look for a safe haven

# Too Much Volatility? Exchange-Rate Overshooting

- Short-run response to a change in market fundamentals greater than long-run response
  - Helps explain sharp movements
  - Tendency of elasticities to be smaller in the short run than in the long run (Figure 12.5)
  - Exchange rates tend to be more flexible than many other prices

# Too Much Volatility? Exchange-Rate Overshooting




In 1980 the US$ was 1.2 Canadian, by 1985 it was back to 1.2, then rose to 1.6 in 2000, only to fall back to 1.2 in 2005, and fall to less than 1.00 in 2007, only to come back to 1.2 today. Did all this variation reflect changes in the two economies?

# Forecasting Foreign-Exchange Rates

- Most forecasting methods use:
  - Accepted economic relationships to formulate a model that is then refined through statistical analysis of past data
  - Exchange-rate forecasting organizations and their methodologies (Table 12.7)

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**TABLE 12.7**

## EXCHANGE-RATE FORECASTERS

| Forecasting Organization | Methodology | Horizon |
|---|---|---|
| Chase Econometrics | Econometric | 8 quarters |
| Chase Manhattan Bank | Judgmental | Under 12 months |
| Data Resources | Econometric | 6 quarters |
| Exchange Rate Outlook | Judgmental | 12 months ahead |
| Goldman Sachs | Technical | Under 12 months |
| | Econometric | Over 12 months |
| Phillips & Drew | Judgmental, econometric | 6, 12 months ahead |
| Predex Forecast | Econometric | 7 quarters |
| Predex Short-Term Forecast | Technical | 1–3 months ahead |
| Wharton Econometric Forecasting Associates | Econometric | 24 months ahead |

**Source:** *Euromoney,* various issues.

# Forecasting Foreign-Exchange Rates

Continued

- Judgmental forecasts
  - Subjective or common sense models
  - Projections based on a thorough examination of individual nations
    - Use of economic indicators; political factors; technical factors; and psychological factors
- Technical forecasts
  - Involves the use of historical exchange-rate data to estimate future values (Figure 12.6)
  - Useful in explaining short-term movements

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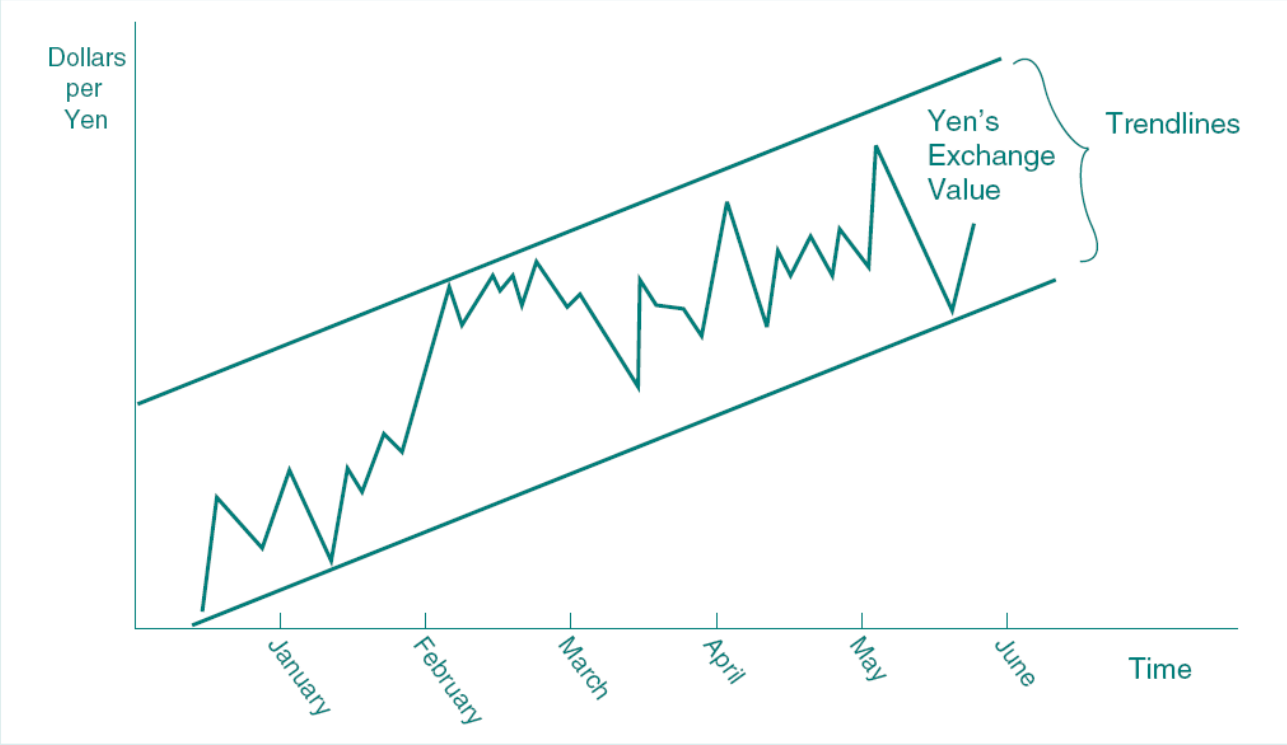
**FIGURE 12.6**

## TECHNICAL ANALYSIS OF THE YEN'S EXCHANGE VALUE




When forecasting exchange rates, technical analysts watch for new highs and lows, broken trendlines, and patterns that are thought to predict price targets and movement.

# Forecasting Foreign-Exchange Rates

Continued

- Fundamental analysis
  - Involves consideration of economic variables that are likely to affect a currency's value
  - Uses computer-based econometric models
  - Best suited for forecasting long-run trends

# Forecast Performance of Advisory Services

- Better information about future exchange rates than is available to the market
- Evaluating the performance of forecasters
  - Predict spot rates better than what is implied by the forward rate

# Figure 19.5 – A Case of Exchange Rate Overshooting