Chapter 3: Foreign Exchange Rate Determination

Exchange Rate Movements are complex

We examine their determinants one piece at a time.

Balance of Payments

Purchasing Power Parity

Interest Rates

Suggested Problems

1-6, W2

Supply and Demand

Recall: The Exchange Rate is "The Price of Foreign Exchange"

Like any other price, we understand its movements via supply and demand.

- supply and demand *relative* to that of the other currency
- most of the factors we'll see influence demand for one of the currencies

Demand Example: Suppose Canadian productivity improves.

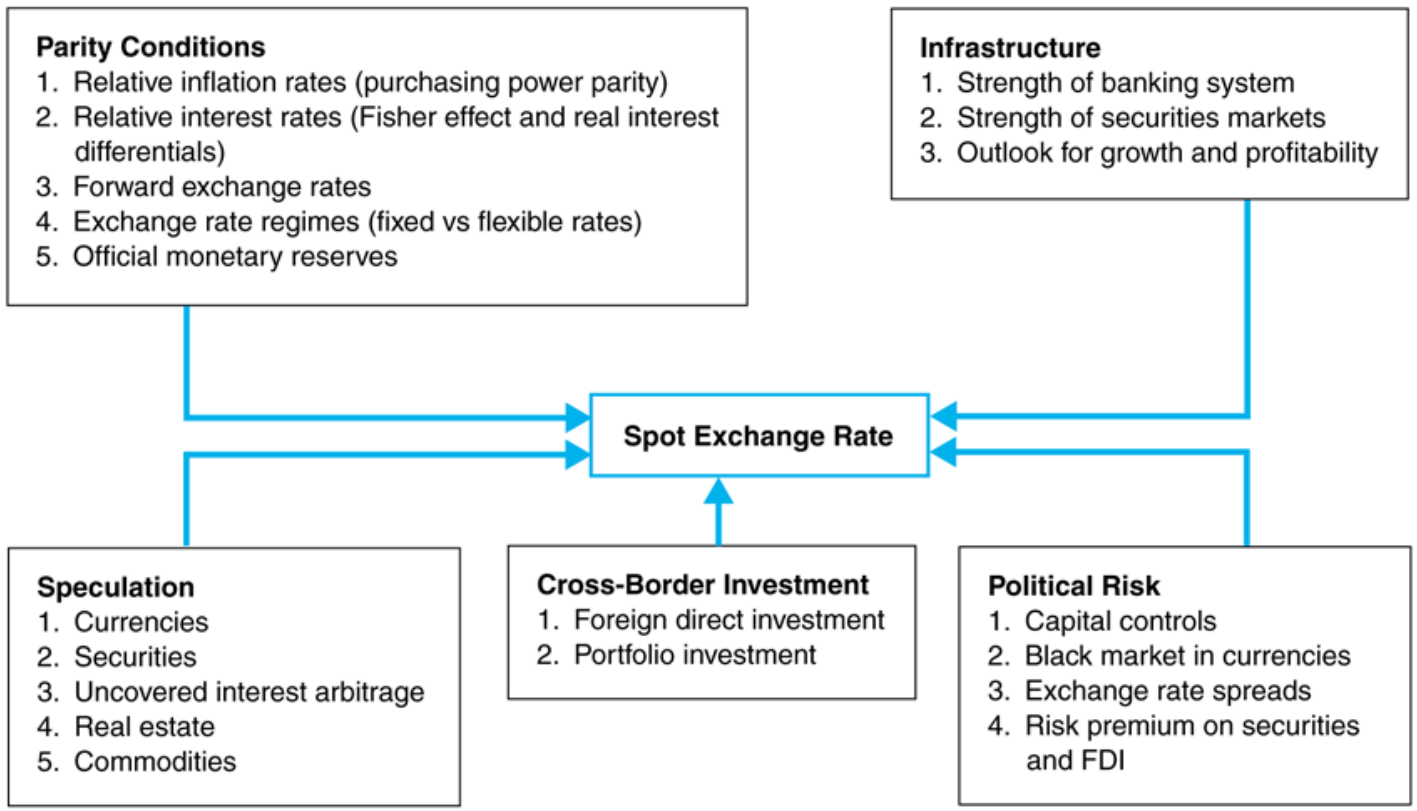
- Canadian goods are now cheaper to make.
- Because their prices are now more competitive, foreign demand for our goods increases.
- This increases demand for CAD,
- *S (CAD/XXX)* goes down (appreciation).

Supply Example: Suppose the Russian government prints more money.

- More available, so price of ruble falls (depreciates)

Exhibit 3.1

Potential Foreign Exchange Rate Determinants



Supply and Demand (cont.)

Exhibit 3.1: Many, many different factors

No one factor works well for most of the currencies and most of the time.

FACT: The volume of foreign exchange traded in a single day is typically enough to finance international trade for a year.

- trade is one factor affecting demand, but investment demand often bigger

Investors care about the return on their investment (relative to domestic)

This has 2 components:

1. difference in expected rates of return in host currencies.
2. capital gains/losses on exchange rate movements.

Investors also care about risk

Exhibit 3.13: Eiteman et al. give their preferred mix of approaches.

"Opinions, however, are subject to change without notice!"

The Balance of Payments

The Balance of Payments is an accounting system that tries to capture a country's transactions with the rest of the world.

Exhibit 3.2

Note that "Financial Account" is often included as part of "Capital Account"

$$BoP = (X - M) + (CI - CO) + (FI - FO) + FXB + errors = 0$$

where

$X - M$ = net exports of Goods and Services

$CI - CO$ = net capital inflows (Fixed Assets)

$FI - FO$ = net capital inflows (Financial Assets)

FXB = changes in official reserves

No one cares about BoP; they care about its components.

Exhibit 3.2

Generic Balance of Payments

A. Current Account

1. Net exports/imports of goods (trade balance)
2. Net exports/imports of services
3. Net income (investment income from direct and portfolio investment plus employee compensation)
4. Net transfers (sums sent home by migrants and permanent workers abroad, gifts, grants, and pensions)

A (1 through 4) = *Current account balance*

B. Capital Account (capital transfers related to the purchase and sale of fixed assets such as real estate)

C. Financial Account

1. Net foreign direct investment
2. Net portfolio investment
3. Other financial items

$A + B + C$ = *Basic balance*

D. Net Errors and Omissions (missing data such as illegal transfers)

$A + B + C + D$ = *Overall balance*

E. Reserves and Related Items (changes in official monetary reserves including gold, foreign exchange, and IMF position)

Impact of BoP

Fixed Exchange Rates

Trade flows (current account) and Capital flows (two capital accounts) determine the net demand for your currency.
Central bank offsets any remainder via changes in official reserves.

- must buy/sell own currency against others to fix exchange rate.
- capital outflows broke pegs in Asia, Russia
- Current Account deficits broke US peg in Bretton Woods

Floating Exchange Rates

Trade flows (current account) and Capital flows (two capital accounts) again determine the net demand for your currency.
Central Bank does nothing: self-equilibrating system.

- excess demand for currency (surplus position) leads to appreciation, appreciation reduces surplus via current account.
- reverse true for excess supply: deficit automatically eliminated over time.

The Law of One Price

LOOP: Arbitrage should ensure that the price of any good or service is the same everywhere.

Applied to exchange rates, LOOP implies that things should cost the same, regardless of the currency we use to quote prices.

Example: If Gold costs \$300/oz. in USD, and CAD/USD = 1.5000, then Gold should cost \$450/oz. in CAD.

$$S = P/P^*$$

Exceptions: Transport costs, barriers to trade, legal restrictions, etc.

LOOP is violated more often than it is respected.

Exhibit 3.4: The Big Mac™ Standard

This is an example of LOOP.

Exhibit 3.7

Exchange Rate Pass-Through

Pass-through is the measure of response of imported and exported product prices to exchange rate changes. Assume the price in dollars and euros of a BMW automobile produced in Germany and sold in the United States at the spot exchange rate is:

$$P_{\text{BMW}} = 35{,}000 \quad \times \quad S = \$1.0000 \quad = \quad P^{\$}_{\text{BMW}} = \$35{,}000$$

If the euro were to appreciate 20% versus the U.S. dollar, from \$1.0000 to \$1.2000, the price of the BMW in the U.S. market should theoretically be \$42,000. But if the price of the BMW in the U.S. does not rise by 20%—for example, to only \$40,000—then the degree of pass-through is only *partial*:

$$\frac{P^{\$}_{\text{BMW},2}}{P^{\$}_{BMW,1}} = \frac{\$40{,}000}{\$35{,}000} = 1.1429, \text{ or a } 14.29\% \text{ increase}$$

The degree of pass-through is measured by the proportion of the exchange rate change reflected in dollar prices. In this example, the dollar price of the BMW rose only 14.29%, while the euro appreciated 20.0% against the U.S. dollar. The degree of pass-through is partial, 14.29% ÷ 20.00%, or approximately 0.71. Only 71% of the exchange rate change was passed-through to the U.S. dollar price. The remaining 29% of the exchange rate change has been absorbed by BMW.

Exchange Rate Pass-Through

Definition: The degree to which import (export) prices change when *S* changes.

Less than 100% pass-through implies a violation of LOOP.

Example: Exhibit 3.7

BMW makes cars in Europe for 35,000 EUR.
Suppose USD/EUR = 1 and they sell the cars in the US for 35,000 USD.

Now suppose EUR appreciates to 1.2 USD/EUR (20% apprec.)

- New USD price should be $42,000.
- To protect US sales, BMW increase US price to only $40,000. (+14.29%)

Passthrough = Price Change / Appreciation = 14.29 / 20 = 71%.

Why no arbitrage?

Transport costs, dealer licensing, warranties, tariffs, certification, etc.

Purchasing Power Parity

PPP: The average Purchasing Power of different currencies should be the same.

- i.e. the cost of living should the same after converting currencies.
- LOOP applies to *one* good or service, PPP applies to bundles.

PPP can be violated even if LOOP holds.

1. In Japan, people eat lots of fish, little beef.
   In Argentina, people eat lots of beef, little fish.
2. Suppose beef and fish cost the same in both countries (LOOP).
3. Now increase the price of beef relative to fish.
   This will violate PPP.

Fact: Everyone agrees that LOOP rarely holds.

Fact: Lots of people think PPP should hold, esp. in long run.

The Balassa-Samuelson Effect: The cost of living is lower in poor countries.

- This is a systematic violation of PPP

Purchasing Power Parity (cont.)

Real Exchange Rates: Inflation-adjusted exchange rates.

$$R = S \cdot \frac{CPI^{\text{Foreign}}}{CPI^{\text{Domestic}}}$$

Effective Exchange Rates: Weighted average of bilateral exchange rates.

- Weights are designed to reflect importance of different trade partners.

Relative PPP: Changes in exchange rates should offset inflation differentials.

This implies constant R; "Absolute" PPP (previous slide) predicts $R = 1$

Tests of relative PPP

In general, relative PPP does a bad job of predicting exchange rate changes.

It does better if relative prices move a lot (e.g. hyperinflation, long periods.)

Covered Interest Parity

Covered Interest Parity (CIP, Covered Interest Arbitrage) is an example of LOOP applied to financial markets.

$$\frac{F-S}{S} = \frac{i-i^*}{1+i^*} \text{ or } \frac{1+i}{1+i^*} = \frac{F}{S}$$

The textbook also refers to this as Interest Rate Parity

See Exhibit 3.9 and 3.10

Can apply this for various maturities, as in Exhibit 3.8.

CIP is very strictly enforced in euromoney markets.
Elsewhere, some exceptions to CIP are observed, such as when

1. The interest rates are on assets with differing degrees of risk.
2. The countries impose capital controls, so you can't access that interest rate.

Exhibit 3.8

Yield Curves by Currency and the Forward Premium

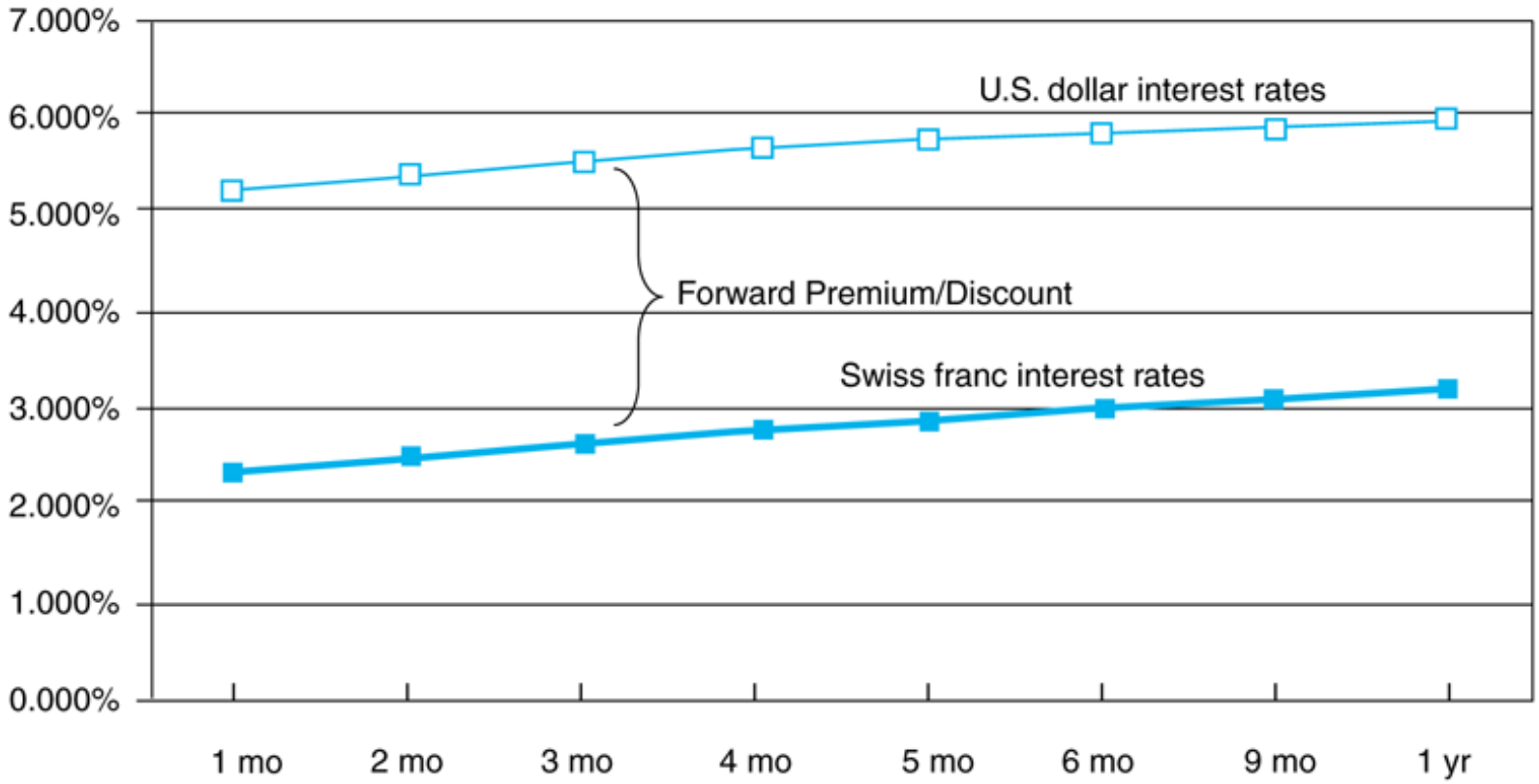
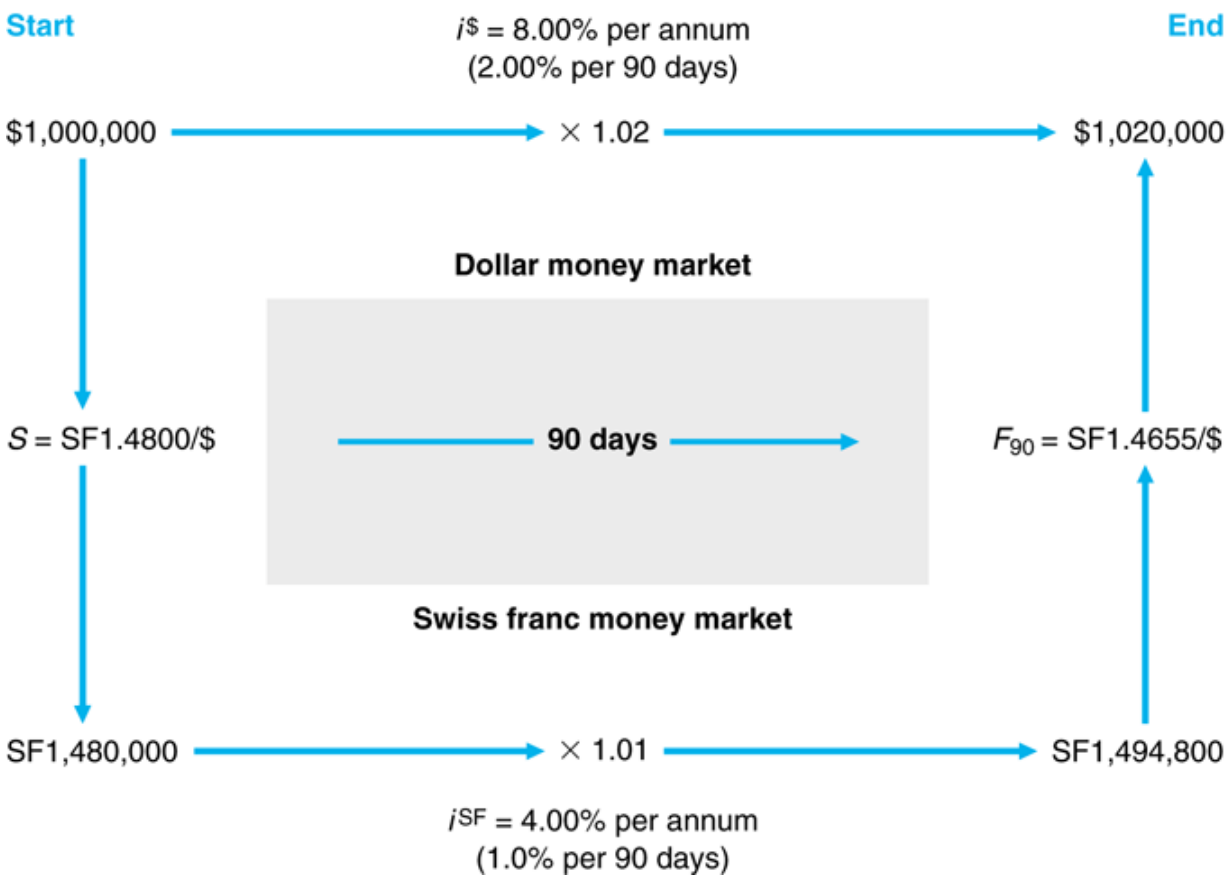


Exhibit 3.9

Interest Rate Parity (IRP)



The Fisher Effects

Irving Fisher argued that the real interest rate ***r*** was constant and universal.

The Fisher Effect: $1 + i = (1 + r) \cdot (1 + \pi)$, so $i \approx r + \pi$

- This relies on *expected* inflation, so it is difficult to test.
- True that high levels of inflation tend to accompany high interest rates.

If ***r*** is the same across countries, this implies $i - i^* = \pi - \pi^*$

The International Fisher Effect
(a.k.a. Fisher Open, Uncovered Interest Parity, UIP)

$$\frac{S_1 - S_2}{S_2} = \frac{i^* - i}{1 + i} \text{ or } \frac{S_1}{S_2} = \frac{1 + i^*}{1 + i}$$

Compare to Covered Interest Rate Parity: just replace S_2 with F.

Some rationalize this as PPP + Fisher Effect.
Better to think of it as a risky CIP: S_2 is expected, not known with certainty.

Applications of Uncovered Interest Rate Parity

Yen Carry Trade

0.4% Interest rate in JPY vs 5.0% in USD.

- This has generated big investment flows out of Japan in recent years.

Investing in USD will be more profitable *if and only if* JPY appreciates < 4.6%.

- exchange rates can move 12% in a month, so this is risky.
- becomes more popular as fx markets less turbulent.

Forecasting Exchange Rates

UIP simply says that $F - S$ should be an unbiased predictor of $S_2 - S_1$.
(See Exhibit 3.12)

- Rationales given in the text (market efficiency) are rationales for UIP.
- Tests consistently reject this = > risk premia are important in fx markets.
  (Deposits in different currencies are *not* perfect substitutes for one another.)

Summing Up the Parity Conditions: Exhibit 3.3

Exhibit 3.3

International Parity Relations in Equilibrium (Approximate Form) (Part 1 of 2)

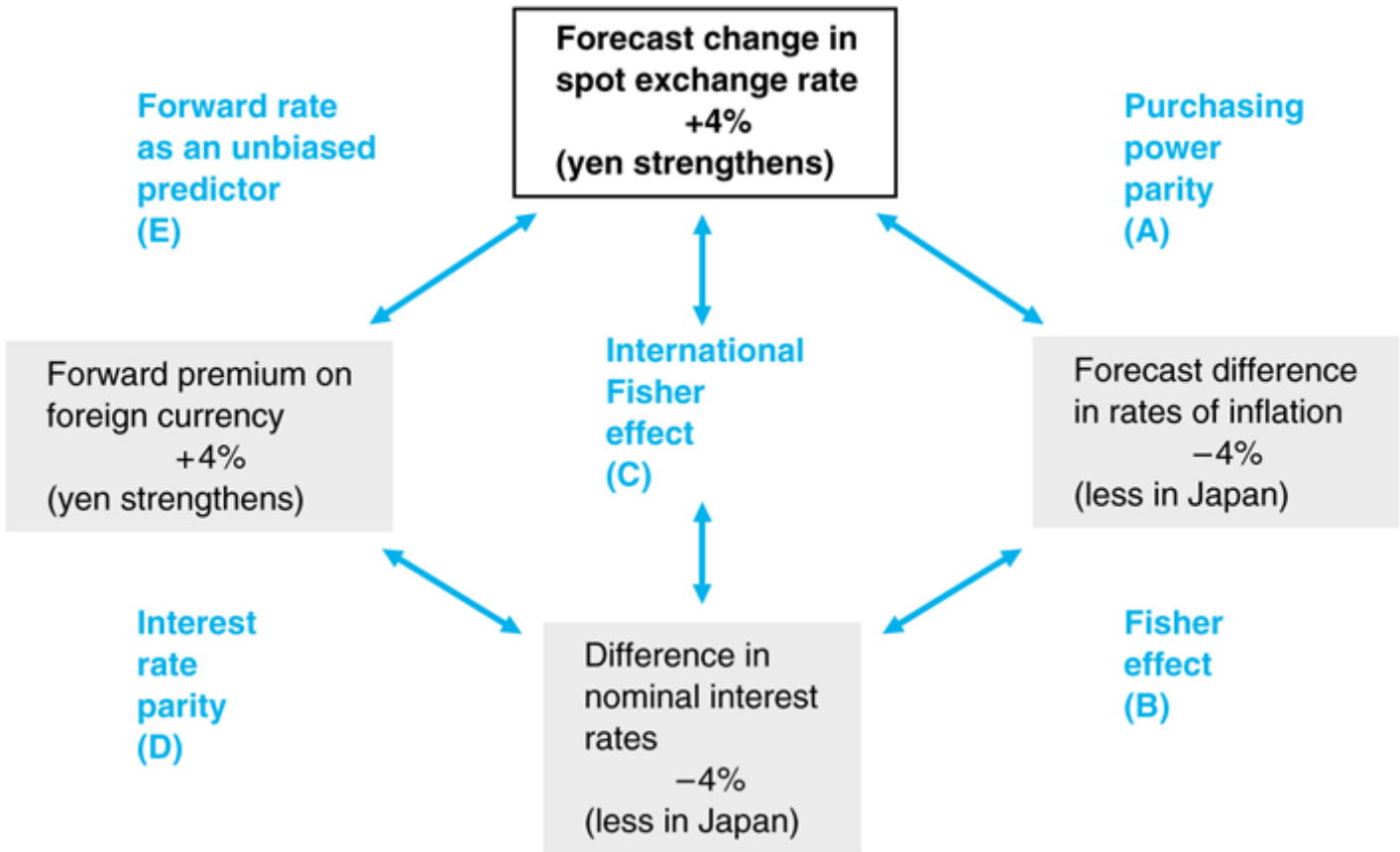
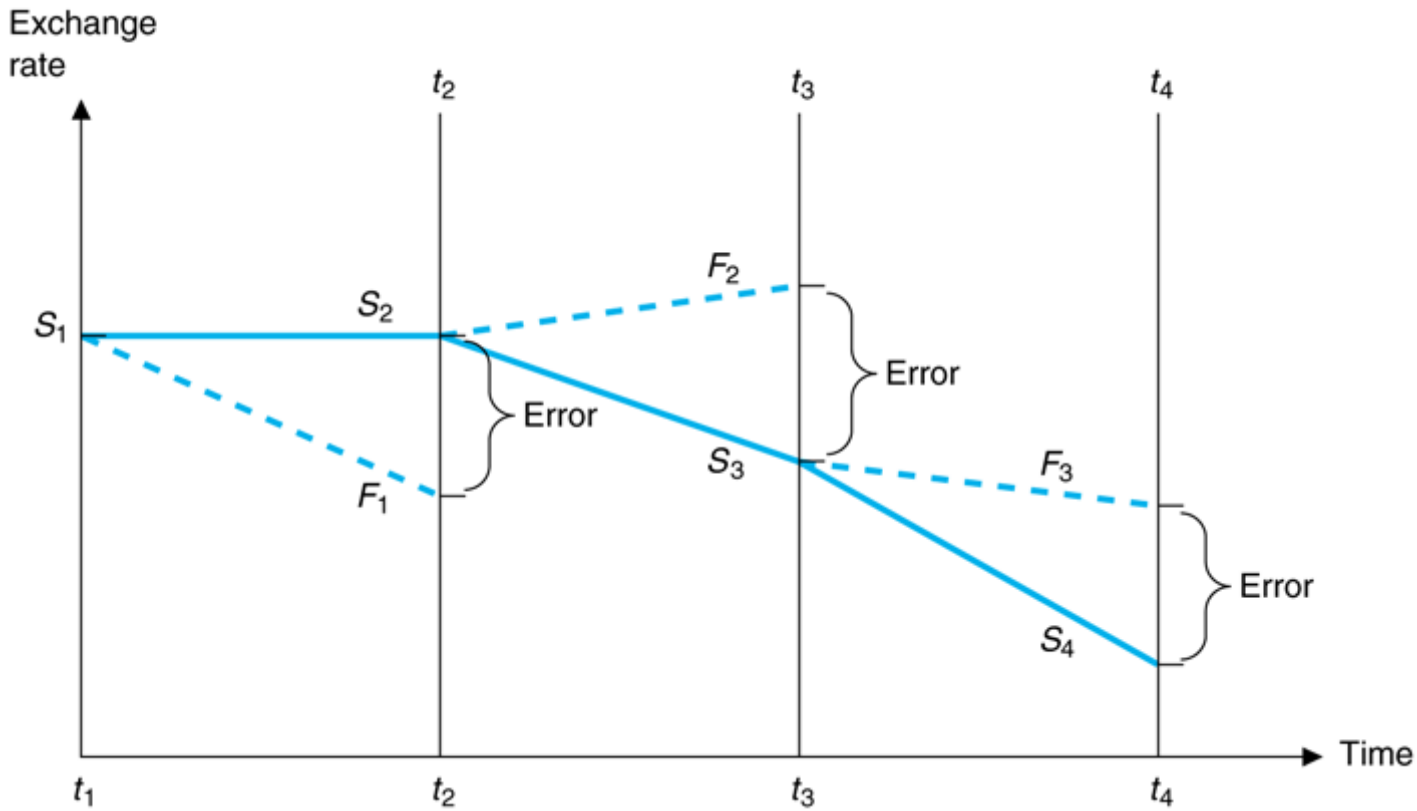


Exhibit 3.12

Forward Rate as an Unbiased Predictor for Future Spot Rate



Asset Markets and Expectations

Real economies don't change by 10% in a few hours, but exchange rates sometimes do. (See discussion of FX crises in Lecture 2.)

Investment factors (risk, capital gains and appreciation/depreciation) are subjective and forward looking.

- That can change fast, which in turn can make exchange rates volatile. (Like any other asset market.)

Financial Markets react on the *news* of the event more than the event itself.

Example (from Sept. 2001): The attack on the WTC has had little economic impact yet, despite its big impact on financial markets. However, we *expect* air travel to be lower for quite some time, so airline stocks are taking a beating.

- Market currently appears to pricing in a war in Iraqi.

Exchange rates appear to be much more volatile than real economic factors.

Market psychology? Bubbles? Time-varying risk aversion? Wrong factors

Forecasting Exchange Rates

Technical Analysis (a.k.a. Chartism)

Forecasting asset prices using just past price and volume.

- Based on belief in recognisable patterns in the data
- Controversial: some think it voodoo, some pay $$$ for it.

Exhibit 3.13 gives a list of commonly-used forecasting methods

Various because nothing works very well.

Forecasters tend to use economic models (PPP, BoP, etc.) for long-run forecasts, asset markets and technical models for short-run forecasts.

- no high-frequency data on economic fundamentals
- blind belief that economic influences must dominate "eventually"