Chapter 2. Exchange Rate Determination

- Balance of Payments (BOP) Approach
- Managerial Significance of BOP Imbalances
- International Parity Conditions
- Interest Rates and Exchange Rates
Exchange Rate Determination

**Exhibit 3.1** Potential Foreign Exchange Rate Determinants

**Parity Conditions**
1. Relative inflation rates (purchasing power parity)
2. Relative interest rates (Fisher effect and real interest differentials)
3. Forward exchange rates
4. Exchange rate regimes (fixed vs flexible rates)
5. Official monetary reserves

**Infrastructure**
1. Strength of banking system
2. Strength of securities markets
3. Outlook for growth and profitability

**Spot Exchange Rate**

**Speculation**
1. Currencies
2. Securities
3. Uncovered interest arbitrage
4. Real estate
5. Commodities

**Cross-Border Investment**
1. Foreign direct investment
2. Portfolio investment

**Political Risk**
1. Capital controls
2. Black market in currencies
3. Exchange rate spreads
4. Risk premium on securities and FDI


Generic BOP

Exhibit 5.2  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

\[ A + B + C = \text{Basic balance} \]

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

\[ A + B + C + D = \text{Overall balance} \]

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

\[
\begin{align*}
\text{Balance of Payments} & = \text{Current Account Balance} + \text{Capital Account Balance} + \text{Financial Account Balance}^2 + \text{Reserve Balance} \\
\text{BOP} & = (X - M) + (CI - CO) + (FI - FO) + FXB
\end{align*}
\]

where:  
\( X \) is exports of goods and services,  
\( M \) is imports of goods and services,  
\( CI \) is capital inflows,  
\( CO \) is capital outflows,  
\( FI \) is financial inflows,  
\( FO \) is financial outflows,  
\( FXB \) is official monetary reserves such as foreign exchange and gold.
CURRENT ACCOUNT BALANCE WITH IMF STANDARD

1. BALANCE ON GOODS
   Trade Balance = Exports – Imports

2. BALANCE ON SERVICES
   • Selling Services = (Credits, +)
   • Purchasing Services = (Debits, -)

3. BALANCE ON INCOME
   • Investment Income = (Credits, +)
     • Compensation of Employees = (Debits, -)

4. BALANCE ON GOODS, SERVICES AND INCOME
   Trade Balance – Services balance – Income Balance

5. BALANCE ON CURRENT TRANSFER
   Payments for home migrants, workers abroad, fees payments to students abroad

6. CURRENT ACCOUNT BALANCE
   • Trade Balance – Services Balance – Income Balance – Transfer Balance
### Exhibit 3.1
United States Balance of Payments Statistics, Analytic Presentation:

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*Excludes components that have been classified in the categories of Group E.

**Tablo 12.8**
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(Milyon Dolar)

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(*) Net hatta ve noksan kalemi içinde, karşılık kalemleri ve ödemeler dengesi finansmanı ile ilgili işlemler yer almaktadır.

### BOP of TRNC (m. US $)

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**II. CAPITAL MOVEMENTS**

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</table>

*Source: State Planning Organization, TRNC.*
United States Balance of Payments (billions of U.S. dollars)

Japanese Balance of Payments (billions of U.S. dollars)

GERMANY

Exhibit 3.6

German Balance of Payments (billions of U.S. dollars)

World Trade Profile: Imports and Exports of Goods Between Major World Segments in 1995 (billions of dollars)

**United States**
- Exports: +577.8
- Imports: -749.8
- Balance: -172.0

**Canada**
- Exports: +189.9
- Imports: -136.4
- Balance: +53.5

**Developed Europe**
- Exports: +2,136.5
- Imports: -1,991.3
- Balance: +145.2

**Developing Europe**
- Exports: +238.2
- Imports: -251.5
- Balance: -12.9

**Western Hemisphere (excl. U.S. & Canada)**
- Exports: +232.6
- Imports: -234.1
- Balance: -1.5

**Japan**
- Exports: +429.3
- Imports: -279.2
- Balance: -131.1

**Africa**
- Exports: +96.0
- Imports: -95.3
- Balance: +0.7

**Middle East**
- Exports: +157.1
- Imports: -139.4
- Balance: +17.7

**Australia/New Zealand**
- Exports: +66.6
- Imports: -69.7
- Balance: -3.1

**Asia (excl. Japan)**
- Exports: +911.6
- Imports: -925.2
- Balance: -13.6

**Total World Trade**
- Exports: +5,035.8
- Imports: -4,921.1
- Balance: +114.7

---

**Developed Europe**: Austria, Belgium, Netherlands, Luxembourg, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

**Developing Europe**: Albania, Armenia, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Moldova, Poland, Romania, Russia, Slovak Republic, Slovenia, Turkey, Ukraine.

LATEST WORLD TRADE PROFILE FOR 1999-2000

http://www.worldbank.org
http://www.imf.org
Approaches in Balancing BOP

- Exchange Rate Adjustments and Elasticity Approach
- National Income Approach
- Total Consumption (Absorption) Approach
- Monetary Approach
Exchange Rate Adjustments and Elasticity Approach

- Mostly related with Current Account Balance
- When deficit in CA, excess supply of the domestic currency, so domestic currency is likely to depreciate

- When surplus in CA, excess demand for domestic currency, so domestic currency is likely to appreciate

- IF $E_x + E_m \geq 1$, then devaluation is BENEFICIAL
- IF NOT, IT IS HARMFUL
National Income Approach

\[ Y = C + I + G + (X - M) \quad \ldots \quad \text{(Keynesian Theory)} \]

Net Exports = Trade Balance

\[ M = m(Y) \quad \ldots \quad m = \text{MPI} \]

M depends on Y

So which policy is to be adopted in case of a Deficit and a Surplus in BOP and when?
Fiscal Policy

In case of a Deficit:

G ↓  Taxes ↑  So;  C,I ↓  and  Y ↓  and  M ↓

So net exports adjusts toward equilibrium, Deficit ↓

In case of a Surplus, the reverse will happen!!!
Monetary Policy

In case of a Deficit:

Government follows Restrictive Monetary Policy:

\[ MS \downarrow \quad i \uparrow \quad I \downarrow \quad Y \downarrow \quad \text{and} \quad M \downarrow \]

Monetary policy is related with Capital Account Balance of BOP, not CA Balance

In case of Restrictive Monetary and Fiscal Policy, Unemployment will be SPEEDING UP, why?
Absorption Approach

\[ Y = C + I + G + (X-M) \]

\[ Y = A + (X-M) \]

where \( A \) means total domestic expenditures

and,

\[ Y - A = X - M \]

If \( Y > A \), excess production and a surplus trade balance

If \( Y < A \), excess demand and a deficit in trade balance

When \( Y \) is increased, \( A \) will also increase but if \( \Delta Y > \Delta A \) (and MPS is positive), then devaluation will be beneficial in an underemployed economy.
Monetary Approach

- Real Demand for money: \( M_d / P \)
- \( M_d / P = f(y, i) \)
- Money supply: \( M_s = A(D + R) \)

When D is driven to the economy:

1. Money supply increases
2. Consumption and investment-savings increase
3. Part of the investment goes to the foreign portfolios
4. There will be an outflow in capital account of balance of payments (BOP)
5. So, an increase in \( M_s \) will damage BOP.
6. An increase in \( M_s \) will have a negative effect on trade and capital balance of BOP, there will be a deficit.
Balance Of Payments

MANAGERIAL SIGNIFICANCE OF BOP IMBALANCES

Exchange Rate Impacts
1. In Fixed Exchange Rate Countries
2. In Floating Exchange Rate Countries
3. In Managed Floats

Economic Development Impacts
1. From National Viewpoint
2. From Program Viewpoint
3. From Liquidity Viewpoint
BOP IMBALANCES

A. FIXED EXCHANGE RATE COUNTRIES

**Surplus:**
- Excess Demand for Domestic Currency
- Intervention: Sell Domestic Currency, \( S \uparrow, D \downarrow, P \uparrow \)
- Exports \( \downarrow \), Imports \( \uparrow \)

**Deficit:**
- Excess Supply of Domestic Currency
- Intervention: Buy Domestic Currency from Market by Reserves
- If No Reserves, then DEVALUATION
- \( P \downarrow, \text{Exports } \uparrow, \text{Imports } \downarrow \)
Imbalances in Fixed Rate Countries

In the case of surplus in BOP:
- Excess demand
- Equilibrium at E
- Prices: $P_E$, $P_1$

In the case of deficit in BOP:
- Excess supply
- Equilibrium at E
- Prices: $P_E$, $P_1$
Relations in Parity Conditions

**Exhibit 3.3**

*International Parity Relations in Equilibrium (Approximate Form)*

- **Forward rate as an unbiased predictor (E)**
- **Forward premium on foreign currency +4% (yen strengthens)**
- **Interest rate parity (D)**
- **Difference in nominal interest rates -4% (less in Japan)**
- **Forecast change in spot exchange rate +4% (yen strengthens)**
- **Purchasing power parity (A)**
- **Forecast difference in rates of inflation -4% (less in Japan)**
- **International Fisher effect (C)**
- **Fisher effect (B)**
PPP

PURCHASING POWER PARITY (PPP)

Absolute PPP

\[ P_Y = S \times P_\$ \]

Relative PPP

\[ \frac{E_1 - E_0}{E_0} = P_D - P_F \]
Relative PPP

\[ P_{\text{Turkey}} = 50\% \]

\[ P_{\text{USA}} = 10\% \]
Relative PPP

\[ P_{\text{USA}} > P_{\text{Japan}} \text{ by } 4\% \]
### Exhibit 3.6

**International Monetary Fund’s Nominal and Real Effective Exchange Rate Indices**

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<th>Year</th>
<th>United States Nominal</th>
<th>United States Real</th>
<th>Germany Nominal</th>
<th>Germany Real</th>
<th>Japan Nominal</th>
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*Nominal effective exchange rate indices are derived from trade in manufactured goods with that country’s major trading partners. The weights are based on relative proportions of trade for the base year of 1995, 1995=100.0.

*Real effective exchange rate indices are compiled from the nominal effective exchange rate index and a cost indicator of relative normalized unit labor costs in manufacturing. The reference base is 1995=100.

Exchange Rate Pass-Through

\[ P_{BMW}^S = P_{BMW}^{DM} \times \frac{1}{S} \]

Complete Pass-Through
Both exchange rates and prices change proportionally (100%)

Partial Pass-Through
If the changes are not proportional, then it is Partial (<100%)
Example

Assume:

\[ P_{DM}^{BMW} = DM59,500 \quad S_1 = DM1.70/$ \quad P_{BMW}^S = $35,000 \]

- If DM appreciate 20%, \( S_2 = DM1.4167/$ \), then \( P_{BMW}^S \) theoretically should be $41,999 (DM59,500 \div DM1.4167). But \( P_{BMW}^S \) is only $40,000.

- Then the degree of Pass-Through is only partial. \( P_{BMW}^S \) rose only 14.29% while \( S_{DM/$} \) decreased by 20%.

- Degree of pass through = 14.29% \div 20.00% = 0.71 = 71%

- The remaining 5.71% (20.00 – 14.29) of the exchange rate change has been absorbed by BMW.
Price Elasticity vs Pass-Through

\[ E_p = \frac{\Delta\% \text{ in } Q_D}{\Delta\% \text{ in } P} \]

- **When BMW is Price Inelastic,**
  
  High degree of Pass-Through. When \( P \uparrow \), then little effect on \( Q \), so \( TR \) will \( \uparrow \)

- **When BMW is Price Elastic,**
  
  Consumers would reduce the number of BMWs purchased, so \( TR \) will \( \uparrow \)
**FISHER EFFECT**

\[ i = r + \Pi \]

\[ i = \text{nominal interest rates} \]

\[ r = \text{real interest rates} \]

\[ \Pi = \text{expected rate of inflation} \]

So; \hspace{1cm} \text{Real interest rates} = \Pi - i
International Fisher Effect

\[ \frac{S_1 - S_2}{S_2} \times 100 = i_s - i_y \]

Example:

- $ based investor buys a 10-year Yen bond earning 4%, compared with 6% interest available on $.
  
  - Investor expects Yen to appreciate against $ by at least 2% per year during 10 years.
  
  - If not, $ based investor will be better off.
  
  - If Yen appreciates by 3% during 10 years, $ based investor would earn 1% higher return of bonus.
Interest Rate Parity

\[
(1 + i_S) = S^{SF/\$} \times (1 + i^{SF}) \times \frac{1}{F^{SF/\$}} \quad (1 + 0.02) = 1.4800 \times (1 + 0.01) \times \frac{1}{1.4655}
\]

\[
\frac{F}{S} = \frac{(1 + i_{SF})}{(1 + i_S)} \Rightarrow \frac{SF1.4655 / \$}{SF1.4800 / \$} = \frac{1.01}{1.02} = 0.99 = 1.00
\]

\[
i_S - i_{SF} = \frac{F - S}{S} \quad \rightarrow \quad \text{IRP}
\]

\[
F_n = SF / \$ \times \left[ \frac{1 + \left( i_{SF} \times \frac{n}{360} \right)}{1 + \left( i_S + \frac{n}{360} \right)} \right] \quad \rightarrow \quad \text{Calculation of Forward Rates at IRP}
\]
**Exhibit 5.5**

**Interest Rate Parity (IRP)**

**Start**

- $1,000,000

**End**

- $1,020,000

\[ i_\$ = 8.00\% \text{ per annum} \]

\[ (2.00\% \text{ per 90 days}) \]

\[ S = SF1.4800/\$ \]

\[ F_{90} = SF1.4655/\$ \]

\[ i_{SF} = 4.00\% \text{ per annum} \]

\[ (1.0\% \text{ per 90 days}) \]

**Dollar money market**

**Swiss franc money market**

\[ S \times 1.02 \]

\[ SF1,480,000 \times 1.01 \]

\[ SF1,494,800 \]
"Morning Quotations: Hong Kong Calling the Euromarkets"

Start
$1,000,000

Times 1.04

End
$1,040,000
$1,044,638

Dollar money market

180 days

Yen money market

$106,000,000

Times 1.02

$108,120,000

Euroyen rate = 4.00% per annum

Eurodollar rate = 8.00% per annum

$S = $106.00/$

$F_{180} = $103.50/$

Divided by
IRP and Equilibrium

Exhibit 5.7

Interest Rate Parity and Equilibrium

Percent difference between foreign (¥) and domestic ($) interest rates.

\[
\frac{¥106.00/¥ - ¥103.50/¥}{¥103.50/¥} \times \frac{360 \text{ days}}{180 \text{ days}} \times 100 = 4.83\%.
\]
Covered Interest Arbitrage

\[ i_s - i_{sf} > \frac{F - S}{S} \]

Funds move from USA to Switzerland

Example:

\[ i_s = 10\% \quad i_{TL} = 70\% \quad S = 1\$: 430,000 TL \]

\[ 0.70 - 0.10 = \frac{F - 43000}{430000} \quad F = 1\$: 688,000 TL \]

If \( F = 1\$: 550,000 TL \), then;

\[ 0.70 - 0.10 > \frac{550000 - 430000}{430000} \Rightarrow 0.60 > 0.28 \]

Funds move from Turkey to USA

There will be arbitraging profit activity