Economics

12 FIRMS AND MARKET STRUCTURES

12.1 Breakeven, Shutdown, and Scale

- **Short run vs. long run:**

  - **Short run:** Some inputs (e.g., capital) are fixed, so plant size/scale cannot change. Fixed costs must still be paid.
  - **Long run:** All costs are variable, and the firm can change scale (e.g., let leases expire, sell equipment).

- **Breakeven point (BEP):**

  - Occurs where Price $= AR = ATC$.
  - $\pi_{econ} = 0$, firm earns normal profit.

- **Shutdown decision under perfect competition:**

  - If $AR < AVC$: shut down immediately in short run.
  - If $AVC \leq AR < ATC$: continue in short run (covering variable costs, but not all fixed costs).
  - If $AR \geq ATC$: continue in both short and long run.

- **General decision rules:**

Condition	Short Run	Long Run
$AR \geq ATC$	Operate	Stay in market
$AVC \leq AR < ATC$	Operate (minimize losses)	Exit in long run
$AR < AVC$	Shut down	Exit in long run

  Table 1: Shutdown and Breakeven Rules (Perfect Competition)

- **Shutdown decision under imperfect competition:**

  - Marginal revenue $\neq$ price (since demand is downward sloping).
  - Better to compare total revenue (TR), total cost (TC), and total variable cost (TVC).

Condition	Decision
$TR = TC$	Break even
$TC > TR > TVC$	Operate in short run, exit in long run
$TR < TVC$	Shut down in both short and long run

Table 2: Shutdown and Breakeven Rules (Imperfect Competition)

- **Examples:**

  - **Short-run shutdown:**
    Legion Gaming:

    $$TR = 700{,}000, \ TVC = 800{,}000, \ TFC = 400{,}000$$

    $\Rightarrow TR < TVC$.
    If operate: Loss $= TC - TR = 1{,}200{,}000 - 700{,}000 = 500{,}000$.
    If shut down: Loss $= TFC = 400{,}000$.
    $\Rightarrow$ Better to shut down.

  - **Long-run shutdown:**
    If $TR = 850{,}000$, then:

    $$TVC = 800{,}000, \ TFC = 400{,}000$$

    Short run: $TR > TVC \rightarrow$ continue operating.
    Long run: $TR < TC = 1{,}200{,}000 \rightarrow$ exit eventually.

- **Economies and diseconomies of scale:**

  - Long-run average total cost (LRATC) is U-shaped.

  - **Economies of scale (downward-sloping LRATC):**
    * Factors: labor specialization, mass production, more efficient technology, bulk input purchases.
    * Result: average costs fall as output increases.

  - **Minimum Efficient Scale (MES):** Point where LRATC is minimized.

  - **Constant returns to scale:** LRATC flat over a range of output.

  - **Diseconomies of scale (upward-sloping LRATC):**
    * Causes: bureaucracy, motivation/communication issues in large firms, barriers to innovation.
    * Result: average costs rise as firm grows too large.

- **Graphical intuition:**

  - **Short-run:** ATC, AVC, and MC curves determine shutdown/breakeven points.
  - **Long-run:** LRATC envelops all SRATC curves, showing optimal scale decisions.

12.2 Characteristics of Market Structures

LOS 12.b: Characteristics of Market Structures

- **Criteria to compare market structures:**

  1. Number of firms and relative sizes
  2. Degree of product differentiation
  3. Bargaining power in pricing
  4. Barriers to entry/exit
  5. Non-price competition (advertising, branding, features)

- **Market structures overview:**

Characteristic	Perfect Comp.	Monopolistic Comp.	Oligopoly	Monopoly
Firms	Many small	Many small/medium	Few large	Single
Products	Identical	Differentiated	Similar or diff.	Unique
Demand curve	Perfectly elastic	Downward-sloping	Downward-sloping	Market demand
Price power	None	Limited (brand-based)	Significant, interdependent	Full price-setter
Barriers	Very low	Low	High	Very high
Example	Wheat	Toothpaste	Autos, oil	Local utility, patents

Table 3: Comparison of Market Structures

—

LOS 12.c: Monopolistic Competition – Price/Output and Strategy

- **Key features:**

  - Many independent sellers with small market share.
  - Products differentiated (quality, features, branding).
  - Demand curve is downward sloping.
  - Low entry/exit barriers.
  - High advertising/marketing costs.

- **Short run:**

  - Profit maximization where $MR = MC$.
  - Firm charges price from demand curve: $P^* > ATC^*$.
  - Positive economic profit attracts new entrants.

- **Long run:**

  - Entry of new firms shifts demand downwards.
  - Long-run equilibrium when $P = ATC$ and $\pi_{econ} = 0$.

– Firms still produce where $MR = MC$.

- **Comparison with perfect competition:**

Feature	Monopolistic Comp.	Perfect Comp.
Price	$P > MC$	$P = MC$
ATC	Not at minimum (excess capacity)	Minimum ATC
Product differentiation	Present	None
Long-run profit	Zero	Zero
Efficiency	Lower	Higher

Table 4: Monopolistic vs. Perfect Competition

- **Example: Toothpaste market**

  – Firms differentiate with whitening, freshness, decay-prevention claims.

  – Advertising is key.

  – Consumers switch brands, but not perfectly elastic demand.

—

LOS 12.d: Oligopoly – Price/Output and Strategy

- **Key features:**

  – Few large firms, interdependent decisions.

  – High barriers to entry (scale, branding, capital intensity).

  – Products may be similar (oil) or differentiated (autos).

- **Models of Oligopoly:**

  1. **Kinked Demand Curve:**
     – Competitors unlikely to match price increase, but likely to match decrease.
     – Demand is elastic above P_K, inelastic below.
     – Leads to kink at P_K, Q_K.
     – MR has a discontinuity $\rightarrow$ price rigidity.

  2. **Cournot Duopoly Model:**
     – Two firms choose output simultaneously.
     – Each assumes other's output fixed.
     – Equilibrium: firms split market, price between monopoly and competition.
     – Generalizes to more firms $\rightarrow$ price approaches competitive level.

  3. **Stackelberg Model:**
     – Sequential decision-making.

- Leader sets price/output first, follower reacts.
- Leader captures larger share of profits.

4. **Nash Equilibrium (strategic games):**
   - Equilibrium when no firm can improve profits by changing strategy unilaterally.
   - Example payoff matrix:

	Firm B: High P	Firm B: Low P
Firm A: High P	$(1000, 600)$	$(600, 700)$
Firm A: Low P	$(500, 400)$	$(300, 300)$

   Nash equilibrium: Firm A = High P, Firm B = Low P.

- **Collusion (cartels):**

  - Firms agree to fix prices/output (illegal in many countries).
  - Maximizes joint profits (like monopoly).
  - Example: OPEC.
  - Success factors: fewer firms, homogeneous products, similar costs, frequent small purchases, credible retaliation, weak outside competition.

- **Dominant Firm Model:**

  - One large firm (DF) sets price, smaller competitive firms (CFs) take it as given.
  - DF determines price where $MR_{DF} = MC_{DF}$.
  - CFs produce where $MC_{CF} = P^*$.
  - If CFs cut prices, DF cuts price further $\rightarrow$ CFs lose share in long run.

- **Range of outcomes:**

  - Price lies between:
  $$P_{competition} < P_{oligopoly} < P_{monopoly}$$
  - π_{econ} between zero (competition) and maximum (monopoly).

- **Examples:**

  - **Autos:** Toyota vs. Ford, interdependent strategies.
  - **Oil:** OPEC cartel, collusion with occasional cheating.

12.3 Identifying Market Structures

LOS 12.e: Identify market structure and describe use/limitations of concentration measures

- **Identifying market structure:**

  - Based on characteristics: number of firms, entry barriers, product differentiation, substitutes, and pricing interdependence.
  - **Perfect Competition:** many firms, homogeneous products, no pricing power.
  - **Monopolistic Competition:** many firms, differentiated products, limited pricing power.
  - **Oligopoly:** few large firms, high barriers, interdependence, significant pricing power.
  - **Monopoly:** single firm, unique product, very high barriers, full price control.

- **Market structure overview (recap):**

Characteristic	Perfect Comp.	Monopolistic Comp.	Oligopoly	Monopoly
Firms	Many small	Many small/medium	Few large	Single
Products	Identical	Differentiated	Similar or diff.	Unique
Demand curve	Perfectly elastic	Downward-sloping	Downward-sloping	Market demand
Price power	None	Limited (branding)	Significant, interdependent	Full control
Barriers	Very low	Low	High	Very high
Example	Wheat	Toothpaste	Autos, oil	Local utility, patents

Table 5: Comparison of Market Structures (recap)

- **Measuring market concentration:**

  - Regulators assess market power via concentration ratios.
  - **N-firm concentration ratio:**

$$CR_N = \sum_{i=1}^{N} s_i$$

  where s_i = market share (%).
  - * Simple to calculate, but insensitive to distribution among top firms.
  - * E.g., 2 firms each with 30% vs. one firm 60% $\rightarrow$ same $CR_2 = 60\%$.
  - **Herfindahl-Hirschman Index (HHI):**

$$HHI = \sum_{i=1}^{N} s_i^2$$

  (shares expressed as decimals).

* Gives more weight to larger firms.
   * Sensitive to mergers → better measure of market concentration.

- **Example – Concentration ratio vs. HHI:**

Firm	Market Share (%)
Acme	25
Blake	15
Carter	15
Delta	10
Others	35

Table 6: Market Shares Before Merger

  - **Before merger:**
$$CR_4 = 25 + 15 + 15 + 10 = 65\%$$
$$HHI = 0.25^2 + 0.15^2 + 0.15^2 + 0.10^2 = 0.1175$$

  - **After merger (Acme + Blake = 40%):**
$$CR_4 = 40 + 15 + 10 + 5 = 70\%$$
$$HHI = 0.40^2 + 0.15^2 + 0.10^2 + 0.05^2 = 0.1950$$

  - **Interpretation:**
    * CR increased slightly (65% → 70%), suggesting modest concentration rise.
    * HHI rose significantly (0.1175 → 0.1950), reflecting higher dominance of merged firm.
    * Shows why HHI is more informative for mergers.

- **Limitations of concentration measures:**

  - Do not consider entry barriers: high share firms may still lack pricing power if entry is easy.
  - Do not directly measure demand elasticity.
  - Potential competition may discipline pricing even in concentrated markets.
  - Sensitive to market definition (geographic, product scope).

13 UNDERSTANDING BUSINESS CYCLES

13.1 Business Cycles

LOS 13.a: Describe the business cycle and its phases

- **Definition:** Business cycle = fluctuations in economic activity, measured mainly by real GDP.

- **Phases:**

  1. **Expansion:**
     - Real GDP rising, employment and investment increasing.
     - Inflation may accelerate near the peak.

  2. **Peak:**
     - Real GDP growth slows and turns negative.
     - Inflation typically highest here.

  3. **Contraction (Recession):**
     - Real GDP declining, unemployment rising, investment and spending falling.
     - Inflation decreases.

  4. **Trough:**
     - GDP growth turns positive again.
     - Inflation moderate/low, unemployment high but falling.

- **Alternative measures of cycles:**

  - **Classical cycle:** Real GDP relative to a base level.
  - **Growth cycle:** GDP relative to trend value.
  - **Growth rate cycle:** Changes in annualized growth rate (peaks/troughs detected earlier).
  - Preferred by economists = growth rate cycle.

- **Dating rules:**

  - Expansion: usually 2 consecutive quarters of positive GDP growth.
  - Recession: 2 consecutive quarters of negative GDP growth.
  - Official dating (e.g., NBER in the U.S.) uses broader data: unemployment, industrial production, inflation.

- **Important:** Cycles recur, but not at regular intervals (duration varies: 1 year to 10+ years).

—

LOS 13.b: Credit Cycles

- **Definition:** Cyclical fluctuations in interest rates and credit availability.

- **Expansion:** Loose credit, easier lending, lower interest rates → may fuel bubbles.

- **Contraction:** Tight credit, higher rates, less lending.

- **Amplification:** Expansions stronger and recessions deeper when coinciding with credit cycles.

- **Example:** Subprime mortgage bubble (2007–2009). Easy credit fueled housing bubble; crash amplified recession.

- **Duration:** Credit cycles often longer than business cycles.

—

LOS 13.c: Resource Use, Consumer/Business, Housing, External Trade

- **Inventories (resource use):**
  - Firms balance sales vs. inventory.
  - Near peak: sales slow, inventories rise $\to$ firms cut production.
  - Near trough: sales pick up, inventories depleted $\to$ firms raise production.

- **Labor and capital use:**
  - Short-term: adjust overtime, utilization of current workers and machines.
  - Long-term: hiring/layoffs and capital investment changes.

- **Consumer sector:**
  - Spending $\uparrow$ in expansions, $\downarrow$ in recessions.
  - **Durable goods:** highly cyclical (cars, furniture, appliances).
  - **Nondurables:** relatively stable (food, household supplies).
  - **Services:** moderately cyclical (travel, restaurants) but partly stable (healthcare, insurance).

- **Housing sector:**
  1. **Mortgage rates:** low $\to$ more buying, high $\to$ less.
  2. **Income vs. housing costs:** high affordability $\to$ $\uparrow$ demand.
  3. **Speculative activity:** expectations of rising prices $\to$ bubble risk (e.g., 2007–08).
  4. **Demographics:** young population (25–40 yrs) $\to$ $\uparrow$ demand; urbanization drives housing booms.

- **External trade sector:**
  - Domestic GDP $\uparrow$ $\to$ imports $\uparrow$.
  - Trading partners' GDP $\uparrow$ $\to$ exports $\uparrow$.
  - Exchange rate $\uparrow$ (domestic currency stronger) $\to$ exports $\downarrow$, imports $\uparrow$.

– Exchange rate $\downarrow \rightarrow$ exports $\uparrow$, imports $\downarrow$.

—

Summary of Phases and Characteristics

	Trough	**Expansion**	**Peak**	**Contraction**
GDP Growth	Neg. $\rightarrow$ Pos.	Increasing	Decreasing	Negative
Unemployment	High, $\downarrow$ overtime/temp	Decreasing	Low but $\downarrow$ slower	Increasing
Consumer Spending	Durables $\uparrow$	Strong $\uparrow$	Slower $\uparrow$	$\downarrow$ (esp. durables)
Investment	Low $\rightarrow$ rising	Rising	Slowing	Falling
Housing	May $\uparrow$ early	Rising	Slowing	Falling
Inflation	Moderate/$\downarrow$	Rising	Highest	$\downarrow$ (lagged)
Imports	Low	Increasing	High	Decreasing

Table 7: Characteristics of Business Cycle Phases

—

Economic Indicators Classification

- **Leading Indicators:** Change before peaks/troughs. Examples: Average weekly hours, new orders, stock prices, consumer expectations, housing permits, initial jobless claims.

- **Coincident Indicators:** Change at same time as economy. Examples: GDP, industrial production, personal income, non-farm employment.

- **Lagging Indicators:** Change after economy turns. Examples: Unemployment duration, inflation, labor cost per unit, commercial loans outstanding.

14 FISCAL POLICY

14.1 Fiscal Policy Objectives

LOS 14.a: Compare monetary and fiscal policy

- **Fiscal Policy:** Government use of taxation and spending to influence economic activity.

  - Balanced budget: Tax revenues = expenditures.
  - Surplus: Revenues > expenditures.
  - Deficit: Expenditures > revenues.
  - Expansionary: Increase deficit (or reduce surplus) $\rightarrow \uparrow$ GDP.
  - Contractionary: Reduce deficit (or increase surplus) $\rightarrow \downarrow$ GDP.

- **Monetary Policy:** Central bank actions influencing money and credit supply.

  - Expansionary (easy): Increase quantity of money/credit.

– Contractionary (tight): Decrease quantity of money/credit.

- **Both policies aim to:**

    – Maintain price stability.

    – Foster sustainable economic growth.

    – Fiscal policy additionally redistributes wealth and allocates resources.

	Fiscal Policy	Monetary Policy
Authority	Government (legislature, treasury)	Central Bank
Tools	Taxes, government spending	Money supply, interest rates, credit
Objective	Demand mgmt., redistribution, resource allocation	Inflation control, stability, growth
Expansionary	↓ taxes, ↑ spending	↓ interest rates, ↑ money supply
Contractionary	↑ taxes, ↓ spending	↑ interest rates, ↓ money supply
Time Lag	Longer (political process)	Shorter (policy committees)

Table 8: Comparison: Fiscal vs. Monetary Policy

—

LOS 14.b: Roles, Objectives, and National Debt Concerns

- **Roles and objectives of fiscal policy:**

    1. Influence aggregate demand and economic activity.

    2. Redistribute income/wealth.

    3. Allocate resources among sectors (e.g., infrastructure, education).

- **Mechanics:**

    – Expansionary: ↓ taxes or ↑ government spending → ↑ AD, ↑ GDP, ↑ employment.

    – Contractionary: ↑ taxes or ↓ spending → ↓ AD, ↓ GDP, ↓ inflation.

    – Automatic stabilizers: Built-in mechanisms (e.g., tax receipts fall + welfare spending ↑ in recession).

    – Discretionary policy: Active changes in taxation/spending to stabilize economy.

- **Schools of thought:**

    – **Keynesians:** Fiscal policy strongly effective at less than full employment.

    – **Monetarists:** Fiscal stimulus only temporary; monetary policy better for long-term inflation control.

- **Debt-to-GDP dynamics:**

$$\text{Debt Ratio} = \frac{\text{Government Debt}}{\text{GDP}}$$

- If $r > g$ (real interest rate $>$ real GDP growth) $\rightarrow$ debt ratio worsens over time.
- If $r < g$ $\rightarrow$ debt ratio improves over time.

- **Arguments <u>for concern</u> with high deficits:**

  - Higher future taxes $\Rightarrow$ $\downarrow$ incentives to work/invest $\Rightarrow$ $\downarrow$ growth.
  - Default/inflation risk if markets lose confidence (esp. if foreign currency debt).
  - Crowding-out: Government borrowing $\uparrow$ interest rates $\rightarrow$ $\downarrow$ private investment.

- **Arguments <u>against concern</u>:**

  - If debt mostly held domestically, risk overstated.
  - If debt finances productive investment, future gains repay debt.
  - Deficits may encourage tax reform.
  - Ricardian equivalence: Households save more today in anticipation of future taxes $\rightarrow$ offsetting effect.
  - At less than full capacity, deficits can boost GDP and employment without displacing private capital.

	Arguments For Concern	Arguments Against Concern
Future Taxes	Higher deficits $\rightarrow$ higher taxes, lower growth	Ricardian equivalence may offset via higher savings
Default Risk	Risk of default or inflation if markets lose confidence	Domestic-held debt less risky; gov. can service in local currency
Crowding-Out	Gov. borrowing $\uparrow$ interest rates, $\downarrow$ private investment	At less than full capacity, deficits $\uparrow$ GDP without displacing investment
Productivity	Debt not always productive	Productive debt $\rightarrow$ future gains cover repayment
Reform Impact	Higher taxes discourage work	Deficits may prompt tax reform

Table 9: Arguments For vs. Against Concern Over Fiscal Deficits

14.2 Fiscal Policy Tools and Implementation

LOS 14.c: Tools of Fiscal Policy (Advantages & Disadvantages)

- **Spending Tools:**

  - **Transfer payments:** Redistribution (e.g., Social Security, unemployment insurance). Not included in GDP.
  - **Current spending:** Ongoing purchases (e.g., defense, education, administration).
  - **Capital spending:** Infrastructure investment (roads, bridges, schools, hospitals). Boosts long-term productivity.

- **Revenue Tools:**

  - **Direct taxes:** Income, wealth, estate, corporate, capital gains, Social Security. Often progressive → redistribution.
  - **Indirect taxes:** VAT, sales taxes, excise taxes. Can discourage undesirable consumption (alcohol, tobacco).

- **Desirable tax attributes:**

  - Simplicity (easy to use and enforce).
  - Efficiency (minimal distortion to markets).
  - Fairness (horizontal = equal treatment, vertical = higher income → higher tax).
  - Sufficiency (enough revenue to meet spending needs).

	Advantages	Disadvantages
Indirect taxes	Quick to implement, raise revenue cheaply, influence social behavior (e.g., tobacco tax)	Can be regressive (hit low-income harder), distort consumption
Direct taxes	Redistributive, predictable revenue	Take time to implement, may reduce work incentives
Spending tools	Direct boost to AD, capital spending raises long-term productivity	Slow to implement (esp. infrastructure), effects lag actual need
Announcements	Expectations adjust immediately (can curb AD fast)	May dampen confidence, reduce investment

Table 10: Advantages and Disadvantages of Fiscal Policy Tools

—

Fiscal Multiplier

- Spending multiplier formula:

$$\text{Multiplier} = \frac{1}{1 - MPC \times (1 - t)}$$

where MPC = marginal propensity to consume, t = tax rate.

- Example: $MPC = 0.8$, $t = 0.25$:

$$\text{Multiplier} = \frac{1}{1 - 0.8(1 - 0.25)} = 2.5$$

⇒ A \$100 spending increase → \$250 increase in AD.

Balanced Budget Multiplier

- Example: Increase spending by \$100, financed by \$100 tax increase.

- Tax effect: Initial $\Delta C = 100 \times 0.8 = 80$; total effect $= 100(0.8)(2.5) = 200$ decrease.

- Net effect: $+250 - 200 = +50$.

- $\Rightarrow$ Balanced budget multiplier is **positive**.

Ricardian Equivalence

- If taxpayers fully anticipate future taxes to service debt, they increase savings today $\rightarrow$ offsetting government deficit.

- Then fiscal stimulus has no effect on AD.

- In reality, may not hold (taxpayers underestimate liability).

—

LOS 14.d: Implementation of Fiscal Policy

- **Expansionary:** $\uparrow$ spending, $\downarrow$ taxes $\rightarrow$ increase AD, GDP, employment.

- **Contractionary:** $\downarrow$ spending, $\uparrow$ taxes $\rightarrow$ reduce AD, inflation.

- Fiscal stance often measured by change in budget balance (surplus or deficit).

	Expansionary Policy	**Contractionary Policy**
Taxes	Decrease	Increase
Spending	Increase	Decrease
Budget	Larger deficit / smaller surplus	Larger surplus / smaller deficit
Impact	Boost AD, GDP, jobs	Slow AD, inflation control

Table 11: Expansionary vs. Contractionary Fiscal Policy

—

Difficulties in Implementation

1. **Recognition lag:** Time to identify recession/inflation.

2. **Action lag:** Time for political debate and legislation.

3. **Impact lag:** Time for spending/tax changes to affect economy.

Lag Type	Description
Recognition	Delay in recognizing downturn/overheating
Action	Time for government to approve policy changes
Impact	Delay between enactment and economic effect

Table 12: Fiscal Policy Lags

—

Complications and Limitations

- **Misreading economy:** If economy is already at full capacity, expansionary policy only fuels inflation.

- **Crowding-out effect:** Government borrowing raises interest rates $\rightarrow \downarrow$ private investment.

- **Supply constraints:** If slowdown is due to supply shortages, AD stimulus won't help.

- **Deficit limits:** Too much borrowing $\rightarrow$ loss of investor confidence, $\uparrow$ interest rates.

- **Multiple targets:** High unemployment + high inflation (stagflation) cannot be solved with one fiscal tool.

Structural Budget Deficit

- Adjusts deficit for cyclical effects (i.e., what deficit would be at full employment).

- Used to distinguish automatic stabilizers vs. discretionary policy.

15 MONETARY POLICY

15.1 Central Bank Objectives and Tools

LOS 15.a: Roles and Objectives of Central Banks

- **Roles of central banks:**

  1. Sole supplier of currency (legal tender, fiat money).
  2. Banker to government and other banks.
  3. Regulator/supervisor of payments system.
  4. Lender of last resort (prevents bank runs).
  5. Holder of FX and gold reserves.
  6. Conductor of monetary policy.

- **Primary objective:** Price stability (control inflation).

  - High inflation $\rightarrow$ uncertainty, menu costs, shoe leather costs.
  - Target inflation = 2–3% (avoid 0%, which risks deflation).

- **Other possible objectives:**

  - Stable exchange rates.
  - Full employment.
  - Sustainable positive economic growth.
  - Moderate long-term interest rates.

- **Country differences:**

  - U.S. Fed: dual mandate — maximum employment + moderate long-term rates (no explicit inflation target).

  - Bank of Japan: focus on avoiding deflation (not inflation).

  - Some developing countries: peg exchange rates to USD → manage money supply/interest rates to match U.S. inflation.

Country/Region	Primary Goal	Other Goals
U.S. Fed	Employment + moderate LT rates	Implicit inflation stability
ECB	Explicit 2% inflation target	Growth, stability
BoJ (Japan)	Avoid deflation	Growth support
Pegging countries	Exchange rate stability (vs. USD)	Implied inflation convergence

Table 13: Examples of Central Bank Objectives

—

LOS 15.b: Tools of Monetary Policy & Transmission Mechanism

- **Main tools:**

  1. **Policy rate (short-term interest rate):**
     - U.S.: Discount rate (borrowing from Fed).
     - ECB: Refinancing rate.
     - BoE: Two-week repo rate.
     - Fed also targets **federal funds rate** (interbank overnight rate).
     - Lower policy rate → cheaper borrowing, ↑ lending, ↓ interest rates.

  2. **Reserve requirements:**
     - ↑ reserve ratio → ↓ lending capacity, ↓ money supply, ↑ rates.
     - ↓ reserve ratio → ↑ lending capacity, ↑ money supply, ↓ rates.

  3. **Open market operations (OMO):**
     - Central bank buys securities → ↑ reserves, ↑ lending, ↑ MS, ↓ rates.
     - Central bank sells securities → ↓ reserves, ↓ lending, ↓ MS, ↑ rates.
     - Fed's most common tool to hit Fed funds target.

- **Monetary transmission mechanism:**

  - Step 1: Policy rate ↑ → short-term bank lending rates ↑.
  - Step 2: ↑ discount rate applied to bonds, equities → asset values ↓ (wealth effect).
  - Step 3: Expectations of growth ↓ → less consumption + investment.
  - Step 4: Higher rates attract foreign capital → currency appreciates → exports ↓, imports ↑.

16

– Net effect: ↓ aggregate demand → ↓ inflation, ↓ growth (short run).

Policy Action	Expansionary Effects	Contractionary Effects
Policy Rate	↓ borrowing costs, ↑ lending	↑ borrowing costs, ↓ lending
Reserve Requirements	↓ reserves held → ↑ money supply	↑ reserves held → ↓ money supply
Open Market Ops	Buy securities → ↑ reserves, ↓ rates	Sell securities → ↓ reserves, ↑ rates
Currency Impact	Depreciation → ↑ exports	Appreciation → ↓ exports

Table 14: Expansionary vs. Contractionary Monetary Tools

—

Relation to Growth, Inflation, Interest, FX

- **Expansionary Policy:**

  – ↑ reserves → ↓ rates, ↑ lending.

  – ↓ real interest rates → domestic currency depreciation.

  – ↑ investment (business), ↑ durable goods demand (consumers).

  – Net exports ↑ due to weaker currency.

  – Overall effect: ↑ AD, ↑ inflation, ↑ GDP, ↑ employment.

- **Contractionary Policy:**

  – Opposite effects: ↑ rates, ↓ asset values, ↓ investment, stronger currency.

  – ↓ AD, ↓ inflation.

- **Money neutrality:**

  – Long run: Monetary policy only affects price level (not real growth).

  – Short run: Monetary policy affects real GDP, inflation, interest rates, and FX.

Variable	Expansionary Policy	Contractionary Policy
GDP Growth	↑ (short run)	↓
Inflation	↑	↓
Interest Rates	↓	↑
Currency (FX)	Depreciates	Appreciates
Unemployment	↓	↑

Table 15: Effects of Monetary Policy on Key Variables

15.2 Monetary Policy Effects and Limitations

LOS 15.c: Qualities of Effective Central Banks

- **Independence**

  - *Operational independence*: central bank sets policy rate independently.
  - *Target independence*: central bank defines inflation computation, sets target, and time horizon.
  - Example: The ECB has both; most others only operational independence.
  - Importance: prevents political interference, e.g., politicians may want expansion before elections.

- **Credibility**

  - Central banks must follow through on commitments.
  - If credible, expectations align: e.g., if target inflation = 3%, wage contracts are based on 3%, making it self-fulfilling.
  - Governments with high debt lack credibility (incentive to allow higher inflation).

- **Transparency**

  - Regular reports (inflation outlook, policy rationale).
  - Improves credibility and makes policy changes easier to anticipate.

Inflation, Interest Rate, and Exchange Rate Targeting

- **Interest Rate Targeting** (used in the past)

  - Increase money supply if interest rates rise above target band.
  - Decrease money supply if interest rates fall below target.

- **Inflation Targeting** (most common today)

  - Used by UK, Brazil, Canada, Australia, Mexico, ECB.
  - Typical target: 2% with band 1–3%.
  - Example: If current inflation = 4%, central bank tightens policy; if 0%, expansionary stance.

- **Exchange Rate Targeting** (mainly developing countries)

  - Peg currency to another (often USD).
  - If domestic currency falls: buy domestic currency using reserves ⇒ reduces money supply, raises rates.
  - If currency rises: sell domestic currency ⇒ increases money supply, lowers rates.
  - Long-run effect: inflation rate converges to pegged country's inflation.
  - Limitation: foreign reserves may run out.

Limitations of Monetary Policy

- **Transmission mechanism limitations**:

  - Long-term rates may not move with short-term rates if expectations of inflation shift.
  - Example: If policy raises short-term rates but markets expect lower inflation, long-term rates may fall.

- **Liquidity Trap**:

  - Demand for money becomes elastic.
  - Individuals hold cash even with zero interest rates.
  - Policy becomes ineffective (e.g., Japan in 1990s, US/UK post-2008).

- **Deflation**:

  - Expansionary policy limited by zero lower bound (nominal rates cannot go below 0).
  - Harder to reverse than inflation.

- **Bank Lending Constraint**:

  - Even with higher reserves, banks may not lend (post-2008 credit crisis).
  - Led to **Quantitative Easing (QE)**:
    * UK: bought government bonds (3–5 year maturities).
    * US: QE1 = mortgage-backed securities, QE2 = long-term Treasuries.
    * Goal: lower long-term rates, improve balance sheets, stimulate lending.

Monetary Policy in Developing Economies

- Lack of liquid government debt market $\Rightarrow$ weak interest rate signals.

- Rapid growth $\Rightarrow$ difficult to estimate neutral rate.

- Financial innovation changes demand for money.

- Weak credibility if past inflation targets were missed.

- Limited independence from politics.

LOS 15.d: Interaction of Monetary and Fiscal Policy

Policy Mix	Effects on Economy	Example Scenario
Expansionary Fiscal + Expansionary Monetary	Highly expansionary; lower rates, strong GDP growth.	Post-2008 stimulus + QE in US.
Contractionary Fiscal + Contractionary Monetary	Strongly contractionary; lower GDP, higher rates.	Tight austerity with rate hikes.
Expansionary Fiscal + Contractionary Monetary	GDP up (from fiscal); higher interest rates (crowding-out). Govt spending/GDP rises.	US 1980s: Reagan fiscal expansion + Volcker tight money.
Contractionary Fiscal + Expansionary Monetary	Lower interest rates; private sector grows; govt spending/GDP falls.	EU post-crisis austerity + ECB loose policy.

Table 16: Interaction of Fiscal and Monetary Policy

- Fiscal multipliers vary:

  - **Highest**: direct government spending.
  - **Moderate**: transfers to poor.
  - **Lower**: tax cuts.

- **Key Insight:** Expansionary fiscal policy is most effective when combined with expansionary monetary policy.

16 INTRODUCTION TO GEOPOLITICS

16.1 Geopolitics

LOS 16.a: Geopolitics – Cooperation vs Competition

- **Definition:** Geopolitics = interactions among nations (state and nonstate actors) shaped by geography, economics, culture, and politics.

- **Cooperation:**

  - Areas: diplomacy, military alliances, trade, tariffs, technology exchange, cultural flows.
  - Example: *NATO as military cooperation; EU Single Market as economic cooperation.*

- **Competition / Noncooperation:**

- Countries prioritize national interest at expense of others.

- Example: *Trade wars, protectionist tariffs.*

- **Determinants of cooperation:** domestic politics, political cycles, resource endowment (e.g., mineral-rich but food-deficient nations must trade).

- **Nonstate actors:** Firms and NGOs push for regulatory harmonization (e.g., IFRS adoption).

- **Soft power:** Influence through culture, language, and IP (e.g., Hollywood exports).

LOS 16.b: Geopolitics and Globalization

- **Globalization:** Long-term integration of economies and cultures.

  - Trade openness grew from **25% (1970s)** to **60% (2008)** (World Bank).
  - Driven by cross-border flows of goods, capital, services, information.

- **Nationalism:** Prioritizing self-interest, protectionism, reduced openness.

- Spectrum: Countries fall between extremes of globalization vs nationalism.

Framework: Cooperation vs Globalization

	Cooperation	Noncooperation
Globalization	Multilateralism	Hegemony
Nationalism	Bilateralism	Autarky

- **Autarky:** Self-reliance, state dominance (e.g., North Korea).

- **Hegemony:** Global influence without cooperation (e.g., U.S. in some policies).

- **Bilateralism:** Two-country agreements (e.g., U.S.–Mexico trade).

- **Multilateralism:** Broad cooperation (e.g., WTO, EU, ASEAN).

LOS 16.c: International Trade Organizations

- **IMF (International Monetary Fund):**

  - Goals: Monetary cooperation, exchange stability, balanced growth, BoP support.
  - Tools: Lending, surveillance, policy advice.

- **World Bank:**

  - Mission: Poverty reduction, development support.
  - Institutions: IBRD (middle-income), IDA (poorest nations).
  - Provides: Low-interest loans, grants, capacity building.

- **WTO (World Trade Organization):**

  - Role: Enforce trade rules, reduce barriers, settle disputes.
  - Agreements: Legally binding trade frameworks.

LOS 16.d: Geopolitical Risk

- **Types of Risk:**

  - Event risk: Known timing, uncertain outcome (e.g., elections).
  - Exogenous risk: Unexpected events (e.g., war, terrorism, pandemics).
  - Thematic risk: Long-term patterns (e.g., cyber risk, migration).

- **Key dimensions:** Probability, Impact, Velocity.

- **Black swan risk:** Low probability, high impact exogenous risk (e.g., 9/11, COVID-19).

LOS 16.e: Tools of Geopolitics

- **National Security Tools:**

  - Armed conflict, espionage, treaties.
  - Active (in use) vs. Threatened (deterrent).

- **Economic Tools:**

  - Cooperative: Free trade areas, common markets, monetary unions.
  - Noncooperative: Tariffs, export restraints, nationalization.

- **Financial Tools:**

  - Cooperative: Capital mobility, FDI, currency convertibility.
  - Noncooperative: Capital controls, sanctions.

LOS 16.f: Investment Impact of Geopolitical Risk

- **Investment effects:**

  - Raises/lower risk premiums on assets.
  - Discrete (industry-specific) vs Broad (country/region-wide).

- **Business cycle sensitivity:** Risks have greater effects during recessions.

- **Analysis methods:**

  - Scenario analysis (qualitative/quantitative).
  - Signposts: Indicators signaling rising risk (e.g., CDS spreads, volatility indices).

Example Table: Risk Types vs Investment Impact

Risk Type	Example	Velocity	Investment Impact
Event	Election outcome	Medium	Policy shifts, sector winners/losers
Exogenous	War outbreak	High	Market crash, currency fall
Thematic	Cyber risk	Low–Medium	Tech sector costs, ESG implications

17 INTERNATIONAL TRADE

17.1 International Trade

LOS 17.a: Benefits and Costs of International Trade

- **Comparative Advantage:**

  - Countries specialize in goods with lower *opportunity cost.*
  - Example:
    * Country A: lower cost of steel $\rightarrow$ exports steel.
    * Country B: lower cost of textiles $\rightarrow$ exports textiles.
    * Both gain: total world output increases.

- **New Trade Theory (beyond Ricardo):**

  - Gains from **economies of scale**.
  - Variety of products increases.
  - Domestic monopolies lose pricing power $\rightarrow$ consumer welfare increases.
  - Example: automobile industry: Germany exports BMW, Japan exports Toyota, USA exports Ford — consumers get variety and lower prices.

- **Costs of Free Trade:**

  - **Job losses** in import-competing industries.
  - **Income inequality** may rise.
  - Example:
    * U.S. textile industry loses jobs when cheaper imports from Bangladesh enter the market.
    * Domestic steel consumers in importing country benefit from cheaper steel, but local steel workers lose.

- **Dynamic Adjustment:**

  - In the long run, workers retrain and reallocate to other industries.
  - Economic theory: **net welfare gains exceed losses**.

LOS 17.b: Trade Restrictions and Their Economic Implications

- **Motivations for Restrictions:**

  - Infant industry protection (valid argument).

  - National security goods (valid argument).

  - Protecting domestic jobs (weak argument).

  - Retaliation, tariff revenue, political lobbying.

- **Types of Restrictions:**

  1. Tariffs (taxes on imports).

  2. Quotas (quantity limits on imports).

  3. Export subsidies (government payments to exporters).

  4. Minimum domestic content rules.

  5. Voluntary export restraints (VERs).

- **Economic Implications:**

  - Tariffs $\rightarrow$ higher domestic price, lower imports, government gains revenue.

  - Quotas $\rightarrow$ same effect as tariffs but revenue depends on whether government sells licenses.

  - Export subsidies $\rightarrow$ help exporters but hurt domestic consumers.

  - VERs $\rightarrow$ benefit foreign exporters with licenses (quota rents).

Table 17: Comparison of Trade Restrictions

Policy	Winners	Losers	Govt. Revenue?
Tariff	Domestic producers, Govt.	Consumers, Foreign exporters	Yes
Quota (licenses sold)	Domestic producers, Govt.	Consumers, Foreign exporters	Yes
Quota (licenses free)	Domestic producers, Foreign exporters (quota rents)	Consumers	No
VER	Domestic producers, Foreign exporters with quota rents	Consumers	No
Export subsidy	Domestic exporters	Consumers (higher price), Govt. (costs subsidy)	Negative (budget loss)

Welfare Analysis:

- Consumer Surplus (CS) decreases.

- Producer Surplus (PS) increases.

- Govt. revenue depends on policy.

- Deadweight loss = welfare loss from lost efficiency.

LOS 17.c: Trading Blocs, Common Markets, and Economic Unions

- **Integration Types (in increasing order):**

  1. Free Trade Area (FTA): no tariffs among members. (e.g., NAFTA/USMCA)

  2. Customs Union: FTA + common external tariffs.

  3. Common Market: Customs Union + free movement of labor/capital.

  4. Economic Union: Common Market + shared institutions/policies. (e.g., EU)

  5. Monetary Union: Economic Union + single currency. (e.g., Eurozone)

- **Benefits:**

  - Increased efficiency and competition.

  - Larger markets, economies of scale.

  - Comparative advantage exploited more fully.

- **Costs:**

  - Job and wage losses in less competitive industries.

  - Possible trade diversion (switching imports from cheaper non-members to higher-cost members).

Table 18: Levels of Economic Integration

Feature	FTA	Customs Union	Common Market	Economic Union	Monetary Union
Free movement of goods/services	Yes	Yes	Yes	Yes	Yes
Common external tariffs	No	Yes	Yes	Yes	Yes
Free movement of labor/capital	No	No	Yes	Yes	Yes
Common policies/institutions	No	No	No	Yes	Yes
Single currency	No	No	No	No	Yes
Example	NAFTA/USMCA	MERCOSUR	—	EU	Eurozone

18 CAPITAL FLOWS AND THE FX MARKET

18.1: The Foreign Exchange Market

- **Functions of the FX Market:**

  - Facilitates cross-border trade in goods and services (denominated in foreign currencies).

  - Enables capital flows: purchase of foreign financial securities and physical assets.

  - Provides hedging opportunities against exchange rate risk (e.g., forward contracts).

  - Allows speculation on future movements of exchange rates.

- **Participants in the FX Market:**

  - **Sell side:** Large multinational banks (primary dealers in FX and originators of forwards).
  - **Buy side:**
    * *Corporations:* Conduct cross-border transactions, hedge FX risk.
    * *Investment accounts:*
      · Real money accounts: pension funds, insurance firms, mutual funds.
      · Leveraged accounts: hedge funds, proprietary trading firms.
    * *Governments and central banks:* Hold reserves, intervene for policy.
    * *Retail investors:* Households and small institutions (tourism, investments).

- **Types of Exchange Rates:**

  - **Nominal exchange rate:** Price of one currency in terms of another at current period.
    Example: $1.25\,\text{USD/EUR}$ means 1 EUR costs 1.25 USD.
  - **Real exchange rate:** Adjusted for relative price levels between two countries.

  $$R_{P/B} = \text{Nominal}_{P/B} \times \frac{CPI_B}{CPI_P}$$

  where P = price currency country, B = base currency country.

- **Direct vs Indirect Quotes:**

  - Direct quote: Price of one unit of foreign (base) currency in terms of domestic (price) currency.
  - Indirect quote: Price of one unit of domestic currency in terms of foreign currency.

  - Example:

Quote	USD-based investor	EUR-based investor
1.17 USD/EUR	Direct	Indirect
0.855 EUR/USD	Indirect	Direct

- **Effects of Exchange Rate Changes:**

  - If USD/EUR rises from 1.10 to 1.15:
    * EUR becomes more expensive for U.S. consumers.
    * Purchasing power of USD decreases.
  - If Eurozone prices rise relative to U.S. prices:
    * Real USD/EUR increases, reducing USD purchasing power.

- **Example – Real Exchange Rate:** Base period:

  $$\text{Exchange rate} = 1.70\,\text{USD/£}, \quad CPI_{US} = 100, \quad CPI_{UK} = 100$$

After 3 years:

$$\text{Exchange rate} = 1.60\,\text{USD/£}, \quad CPI_{US} = 110, \quad CPI_{UK} = 112$$

Calculation:

$$R_{USD/} = 1.60 \times \frac{112}{110} = 1.629\,\text{USD/£}$$

Interpretation: The real exchange rate fell from 1.70 to 1.629. The USD gained purchasing power, but less than if relative prices were unchanged.

- **Spot vs Forward Exchange Rates:**

  - Spot: Immediate delivery (usually T+2).
  - Forward: Agreed exchange at a future date (e.g., 30, 60, 90 days).
  - Example: A French firm receives £10m in 6 months. With forward rate $1.192\,\text{EUR/GBP}$, it locks in:
    $$10m \times 1.192 = 11.92m\,\text{EUR}$$
  - =¿ Eliminates FX risk.

- **Percentage Change in Currency Value:**

  - Formula:
    $$\%\Delta = \frac{S_t - S_0}{S_0}$$
    where S = exchange rate.
  - Example: USD/EUR falls from 1.42 to 1.39.

    $$\%\Delta_{\text{Euro}} = \frac{1.39}{1.42} - 1 = -2.11\% \quad \Rightarrow \text{Euro depreciated}$$

    Convert to EUR/USD:

    $$1/1.42 = 0.7042, \quad 1/1.39 = 0.7194$$

    $$\%\Delta_{\text{USD}} = \frac{0.7194}{0.7042} - 1 = +2.16\% \quad \Rightarrow \text{USD appreciated}$$

18.2: Managing Exchange Rates

- **Exchange Rate Regimes (IMF Classification):**

  - **Countries without their own currency:**
    * *Formal Dollarization:* Use another country's currency (e.g., Panama uses USD).
      · No independent monetary policy.
      · Inflation rate = inflation of adopted currency.
    * *Monetary Union:* Countries adopt a common currency (e.g., Eurozone).

· Shared monetary policy (ECB in Eurozone).

· Sacrifice national monetary sovereignty.

– **Countries with their own currency:**

* *Currency Board Arrangement:*

· Explicitly backs domestic money with foreign reserves at fixed rate.

· Example: Hong Kong Monetary Authority backs HKD with USD.

· Pros: Stability, credibility. Cons: No independent monetary policy.

* *Conventional Fixed Peg:*

· Peg within $\pm 1\%$ band to another currency or basket.

· Maintained by **direct intervention** (FX buying/selling) or **indirect intervention** (interest rates, regulation).

* *Pegged within Horizontal Bands (Target Zone):*

· Wider bands (e.g., $\pm 2\%$).

· Provides more monetary flexibility than conventional peg.

* *Crawling Peg:*

· Adjusted periodically to offset inflation differential.

· **Passive crawling peg:** Adjustments follow inflation.

· **Active crawling peg:** Pre-announced adjustments to influence expectations.

* *Crawling Bands:*

· Bands around peg widen over time.

· Used as transition from fixed to floating system.

* *Managed Float:*

· Exchange rate market-determined but monetary authority intervenes if needed.

· No specific long-run target.

* *Independent Float:*

· Fully market-determined exchange rate.

· Intervention only to reduce volatility (not target levels).

- **Summary Table of Regimes:**

Regime	Flexibility	Example	Policy Autonomy
Dollarization	None	Panama (USD)	None
Monetary Union	Shared	Eurozone	Limited (ECB level)
Currency Board	Very low	Hong Kong (USD peg)	None
Fixed Peg $\pm 1\%$	Low	Gulf states (USD peg)	Limited
Target Zone $\pm 2\%$	Medium	ERM II (EUR)	Moderate
Crawling Peg	Low	Some LatAm countries	Limited
Crawling Bands	Increasing	Transition cases	Rising
Managed Float	High	China (historically)	High
Independent Float	Full	USD, EUR, JPY	Full

- **Effects of Exchange Rate Changes on Trade & Capital Flows:**
    - If **USD/EUR decreases**, then USD appreciates:
        * Eurozone goods cheaper in USD $\to$ U.S. imports rise.
        * U.S. goods more expensive in EUR $\to$ Eurozone imports from U.S. fall.
    - Goods trade (exports/imports) adjusts **slowly**.
    - Capital flows (investment in assets, debt) adjust **quickly**.

- **Balance of Payments (BoP) Identity:**

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

  where:

    - $X - M$ = Net exports (trade balance).
    - $CI - CO$ = Net capital inflows/outflows.
    - $FI - FO$ = Net financial inflows/outflows.

  Alternative representation (from macro identity):

$$(X - M) = (S - I) + (T - G)$$

    - Trade deficit ($X - M < 0$) means savings $<$ investment $\to$ foreign capital needed.
    - Example: U.S. trade deficit with China is offset by China's purchase of U.S. Treasuries (capital inflow).

- **Capital Flows:**
    - **Short-run:** Determined mainly by capital flows (fast adjustment).
    - **Long-run:** Determined mainly by trade flows (goods/services adjust slowly).

- **Government Capital Restrictions (LOS 18.c):**
    - Objectives:
        * Reduce volatility of domestic asset prices.
        * Maintain fixed exchange rate targets.
        * Keep domestic interest rates low (restrict outflows).
        * Protect strategic industries (e.g., defense, telecom).
    - Example: China restricts capital outflows to maintain RMB peg and keep domestic rates low.

19 EXCHANGE RATE CALCULATIONS

19.1: Foreign Exchange Rates

- **LOS 19.a: Currency Cross-Rates**

  - Definition: A **cross rate** is the exchange rate between two currencies implied by their exchange rates with a common third currency (usually USD or EUR).

  - Formula:
  $$\text{Cross Rate (A/B)} = \frac{\text{A/USD}}{\text{B/USD}}$$
  if both rates are quoted against USD.

  - Key Rule: Ensure the bases of quotation match. If needed, invert the rate.

  - **Example 1: MXN/AUD**

    * MXN/USD = 10.70, USD/AUD = 0.60
    * Convert: MXN/AUD = (MXN/USD) × (USD/AUD) = 10.70 × 0.60 = 6.42
    * Interpretation: 1 AUD = 6.42 MXN.

  - **Example 2: CHF/NZD**

    * CHF/USD = 1.7799, NZD/USD = 2.2529
    * CHF/NZD = (CHF/USD) / (NZD/USD) = 1.7799 / 2.2529 = 0.7900
    * Interpretation: 1 NZD = 0.79 CHF.

- **LOS 19.b: Forward Exchange Rates and Arbitrage (Covered Interest Parity)**

  - **No-Arbitrage Principle:** An investor cannot earn more than the domestic risk-free rate by borrowing domestically, converting to foreign currency, investing abroad, and locking in a forward contract.

  $$F_{d/f} = S_{d/f} \times \frac{(1 + R_d)}{(1 + R_f)}$$

  where:

    * $F_{d/f}$ = forward exchange rate (domestic per foreign)
    * $S_{d/f}$ = spot exchange rate
    * R_d = domestic risk-free rate
    * R_f = foreign risk-free rate

  - **Example 1: 1-Year Forward ABE/DUB**

    * Spot: ABE/DUB = 4.5671
    * $R_{ABE} = 5\%$, $R_{DUB} = 3\%$
    * $F = 4.5671 \times \frac{1.05}{1.03} = 4.6558$
    * Forward premium $= \frac{4.6558}{4.5671} - 1 = 1.94\%$

* Interpretation: ABE has higher interest rate → expected depreciation.

– **Example 2: Arbitrage Profit if Forward Mispriced**
  * Given forward = 4.6000 (below no-arbitrage rate 4.6558).
  * Strategy:
    1. Borrow 1,000 DUB at 3% -¿ repay 1,030 after 1 year.
    2. Convert to ABE: 1,000 × 4.5671 = 4,567.1 ABE.
    3. Invest at 5% -¿ 4,795.45 ABE after 1 year.
    4. Sell forward at 4.6000 -¿ 4,795.45 / 4.6000 = 1,042.49 DUB.
    5. Net = 1,042.49 - 1,030 = 12.49 DUB arbitrage profit.
  * Arbitrage pushes spot and forward rates back into parity.

– **Short-Term Forwards:** For 30, 90, 180-day contracts, use money market rates:

$$F = S \times \frac{(1 + R_d \times \frac{t}{360})}{(1 + R_f \times \frac{t}{360})}$$

– **Forward Quotes in Points:**
  * Each point = last decimal place in spot.
  * Example: AUD/EUR = 0.7313, 1Y forward = +3.5 points.
  * Forward = 0.7313 + 0.00035 = 0.73165.

– **Forward Quotes in Percentage:**
  * Example: AUD/EUR = 0.7313, forward = -0.062% (120-day).
  * Forward = 0.7313 (1 - 0.00062) = 0.7308.

– **Forward Premium / Discount:**

$$\text{Premium or Discount} = \frac{F}{S} - 1$$

  * Example: USD/EUR spot = 1.312, forward = 1.320
  * Premium = 1.320 / 1.312 - 1 = 0.61% (Euro forward premium).
  * Annualized Premium = $0.61\% \times \frac{12}{3} = 2.44\%$
  * Interpretation: More USD needed to buy 1 EUR -¿ EUR expected to appreciate.

• **Summary Table: Cross-Rates and Forward Rates**

Concept	Formula	Example	Result
Cross Rate	A/USD ÷ B/USD	CHF/USD = 1.7799, NZD/USD = 2.2529	0.7900 CHF/NZD
Forward Rate (CIP)	$S \times \frac{1+R_d}{1+R_f}$	Spot 4.5671, $R_d = 5\%$, $R_f = 3\%$	4.6558
Points	$F = S + \frac{\text{points}}{10,000}$	0.7313, +35 points	0.73165
Percent	$F = S(1+q)$	0.7313, $q = -0.062\%$	0.7308
Premium/Discount	$\frac{F}{S} - 1$	1.312 vs 1.320	+0.61% premium