Contents

Intermediate Macroeconomics — Typed Notes

(Transcription of the 60-page handwritten packet)

CH. 2: Tour of the Book

2-1 Aggregate Output

GDP: Production & Income

1. Value of final goods & services produced domestically.
2. Sum of value added by every producer in the economy.
3. Sum of incomes earned in the economy.

Nominal vs. Real GDP

$$\text{Nominal GDP} = \sum(\text{quantity of final goods}) \times (\text{current prices}).$$

Real GDP prices the same basket at constant prices to isolate the quantity effect.

GDP: Level vs. Growth

1. Output per capita $\rightarrow$ average standard of living.
2. GDP growth:
$$g_Y(t) = \frac{\Delta Y_t}{Y_{t-1}}$$
   - Expansion: $\Delta Y_t > 0 \Leftrightarrow g_Y(t) > 0$.
   - Recession: $\Delta Y_t < 0 \Leftrightarrow g_Y(t) < 0$.

2-2 Unemployment Rate

$$L = N + U, \qquad u = \frac{U}{L} = 1 - \frac{N}{L}.$$

Unemployment directly affects welfare; u signals whether resources are efficiently allocated.

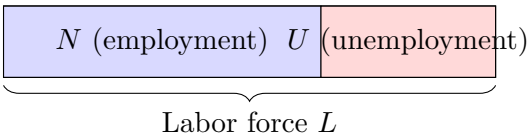

Figure 1: Labor-force composition.

2-3 Inflation Rate

$$P_t = \frac{\$Y_t}{Y_t^{\text{real}}}, \qquad \pi_t = \frac{\Delta P_t}{P_{t-1}}.$$

- GDP deflator $= \dfrac{\text{nominal GDP}_t}{\text{real GDP}_t} \Longleftrightarrow P_t$.
- Inflation $\pi_t = \dfrac{\Delta P_t}{P_{t-1}} = g(P_t)$.
- CPI = cost in dollars of a fixed basket of goods and services.
- GDP deflator tends to move with the CPI.

2-4 Okun's Law & Phillips Curve

Okun's Law: Negative relation between GDP growth $g_Y(t)$ and the change in unemployment Δu_t.

Phillips Curve: Negative relation between the change in inflation $\Delta\pi_t$ and unemployment u_t.

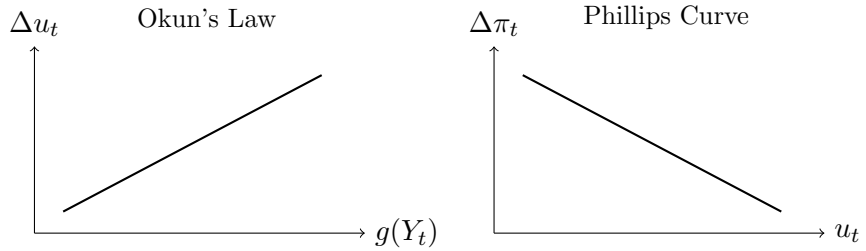

Figure 2: Axes mirrored exactly as in the handwritten Okun's Law and Phillips Curve sketches.

CH. 3: The Goods Market

3-1 Composition of GDP

$$Y = C + I + G + NX.$$

- Government purchases G exclude transfers (Medicare, Social Security, interest on debt). Transfers $\approx 39\%$ of total outlays.
- US GDP 2010 shares: $C \approx 70.5\%$, $I \approx 12\%$, $G \approx 20.4\%$, $NX \approx -3\%$.
- Production Y equals sales $(C + I + G + NX)$ plus inventory investment ($\approx 0.5\%$ in 2010).

3-2 Demand for Goods

Demand:

$$Z = C + I + G + X - IM.$$

Assumptions:

1. Single composite good produced by all firms.
2. Firms supply any Q at the given P.
3. Closed economy baseline $\Rightarrow X = IM = 0$.

Disposable income $Y_D = Y - T$. Consumption $C = c_0 + c_1 Y_D$ with $c_0 > 0$ and $c_1 =$ MPC. Investment $\bar{I}$ and $(\bar{G}, \bar{T})$ exogenous.

3-3 Determination of Equilibrium Output

$$Y = c_0 + c_1(Y - T) + \bar{I} + G \quad \Rightarrow \quad Y = \frac{1}{1 - c_1}\left(c_0 + \bar{I} + G - c_1 T\right).$$

The multiplier on autonomous spending is $\frac{1}{1-c_1}$. With $G = T$ the autonomous component is positive. US MPC ≈ 0.6 so multipliers are moderate.

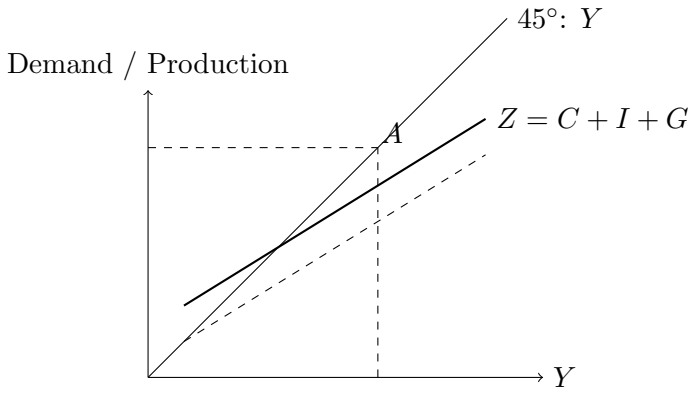

Figure 3: Keynesian cross: equilibrium where $Z = Y$.

3-4 Investment Equals Saving

$$\begin{aligned} S_{\text{private}} &= Y - T - C, \\ S_{\text{public}} &= T - G, \\ I &= S_{\text{private}} + S_{\text{public}}. \end{aligned}$$

Private saving schedule: $S = -c_0 + (1 - c_1)(Y - T)$ with $1 - c_1 =$ MPS. Budget surplus ($T > G$) vs. deficit ($T < G$).

CH. 4: Financial Markets

4-1 Demand for Money

- Money = currency (coins/bills) + checkable deposits. $M1$ = currency + checkable deposits.
- Bonds pay interest i but cannot execute transactions.
- Portfolio choice depends on transaction needs and i (opportunity cost of holding money).
- Money demand: $M^d = \$Y \cdot f(i)$ with $f' < 0$.

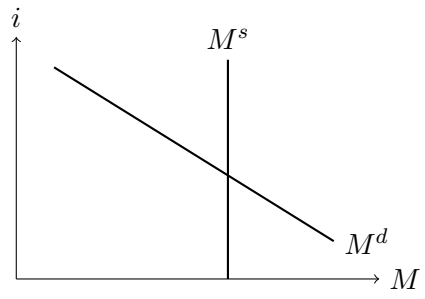

Figure 4: Money demand and vertical money supply exactly as sketched in the notes.

4-2 Determining the Interest Rate

Equilibrium satisfies $M^s = M^d$.

- $\uparrow M^s \Rightarrow \downarrow i$ (for fixed $\$Y$).
- $\uparrow \$Y \Rightarrow \uparrow i$ (for fixed M^s).

4-3 Monetary Policy & Open-Market Operations

1. Expansionary: buy bonds $\Rightarrow \uparrow M^s$.
2. Contractionary: sell bonds $\Rightarrow \downarrow M^s$.

One-year T-bill price $P_B = \dfrac{c}{1+i}$ (inverse relation between i and bond price). Fed targets an interest rate i^* via money supply.

4-3b Determining Interest Rate (II)

Balance sheets:

- Central bank: assets = bonds, liabilities = reserves + currency (central bank money).
- Banks: assets = reserves/loans/bonds, liabilities = checkable deposits; must satisfy reserve ratio.

4-4 Demand for Central Bank Money

$$C^d = cM^d, \quad D^d = (1-c)M^d, \quad R^d = \theta D^d,$$
$$H^d = C^d + R^d = [c + \theta(1-c)]\,\$Y \cdot f(i).$$

Money multiplier $= \dfrac{1}{c+\theta(1-c)}$. Fed funds rate determined by reserve market. Overall money supply-demand condition:

$$\frac{1}{c+\theta(1-c)}\,H = \$Y \cdot f(i).$$

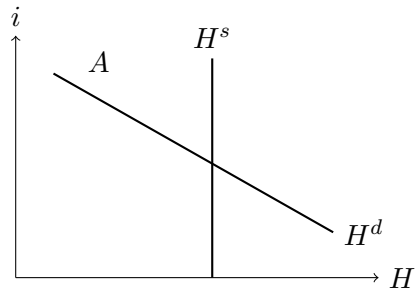

Figure 5: Market for central bank money (reserves) mirroring the handwritten diagram.

CH. 5: Goods & Financial Markets — IS/LM

5-1 Goods Market & IS Relation

Equilibrium:

$$Y = C(Y-T) + I(Y,i) + G.$$

Higher i lowers demand both directly (via I) and indirectly (via Y), giving a downward-sloping IS.

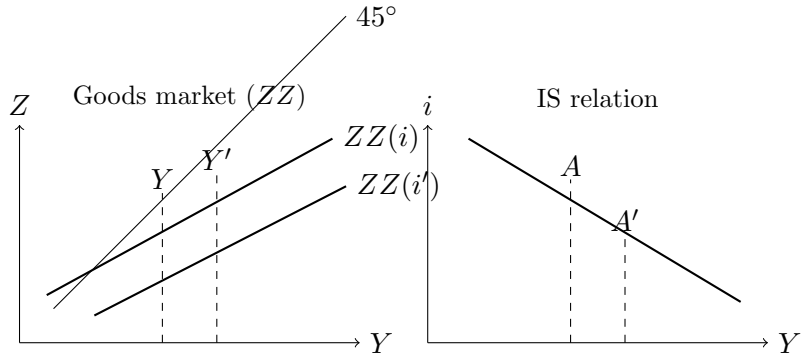

Figure 6: Goods-market diagram and associated IS schedule as drawn in the handwritten notes.

5-2 Financial Markets & LM Relation

Money-market equilibrium:

$$\frac{M}{P} = Y \cdot f(i).$$

Higher Y shifts money demand up $\Rightarrow$ higher i for a given M/P. Higher money supply shifts LM down.

5-3 Putting IS & LM Together

Intersection of IS and LM pins down (Y, i). Short run assumes fixed P (empirically reasonable) so there is a single relevant interest rate (short- and long-term move together).

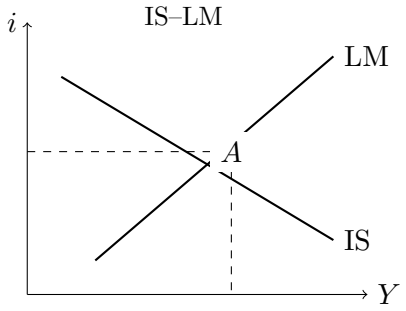

Figure 7: IS–LM equilibrium.

Policy Effects

- Fiscal contraction (lower $G - T$): IS $\leftarrow$, $Y \downarrow$, $i \downarrow$, movement along LM.
- Fiscal expansion: IS $\rightarrow$, $Y \uparrow$, $i \uparrow$.
- Monetary expansion ($\uparrow M$): LM $\downarrow$, $Y \uparrow$, $i \downarrow$.

Summary Box

Policy	IS shift	LM shift	ΔY	Δi
$\uparrow$ Taxes	$\leftarrow$	None	$\downarrow$	$\downarrow$
$\downarrow$ Taxes	$\rightarrow$	None	$\uparrow$	$\uparrow$
$\uparrow$ Spending	$\rightarrow$	None	$\uparrow$	$\uparrow$
$\downarrow$ Spending	$\leftarrow$	None	$\downarrow$	$\downarrow$
$\uparrow$ Money	None	$\downarrow$	$\uparrow$	$\downarrow$
$\downarrow$ Money	None	$\uparrow$	$\downarrow$	$\uparrow$

Fiscal & Monetary Policy Examples

- **Fiscal contraction (consolidation):** $\downarrow (G - T)$ via $\downarrow G$ or $\uparrow T$.

$$\downarrow G \Rightarrow \downarrow Y_d \Rightarrow \downarrow C \Rightarrow \downarrow Y \Rightarrow \downarrow M^d.$$

  With i fixed, the economy moves along LM from Y_1 to Y_2.

- **Fiscal expansion:** $\uparrow (G - T)$ shifts IS right, raising Y, i, C, and—for a given i—induces further $\uparrow Y$ to restore LM equilibrium.

- **Monetary expansion:** $\uparrow M^s \Rightarrow \downarrow i$, boosting I and shifting IS right; outcome $\uparrow Y$, $\uparrow C$, $\uparrow I$, $\uparrow E$ (depreciation), NX ambiguous.

- **Monetary contraction:** $\downarrow M^s \Rightarrow \uparrow i$, reducing I, Y, C, appreciating the currency, and lowering NX.

Liquidity Trap Supplement

- When i hits its lower bound, LM becomes horizontal: $\uparrow M$ no longer lowers i.
- Credit or quantitative easing can shift LM modestly but mainly fiscal policy is effective.
- In AD–AS space the AD curve becomes vertical because M/P changes cannot move i.

CH. 6: The Labor Market

6-1 Tour of Labor Market (US 2010)

- Total population: 308.7M; non-institutional civilian pop: 237.8M.
- Labor force: 153.8M $\Rightarrow$ participation rate $\approx 64.7\%$.
- Employment $E = 139$M, unemployment $U = 14.8$M $\Rightarrow u \approx 9.6\%$.
- Flows arise continuously via separations and hires.

6-2 Movements in Unemployment

- Annual changes in aggregate u align with recessions/expansions.
- If u is high:
  1. Probability of job loss for employed workers rises.
  2. Probability of job finding for unemployed falls.

6-3 Wage Determination

- Collective bargaining between unions and firms.
- Reservation wage makes workers indifferent between working and being unemployed.
- Wage > reservation wage reduces turnover.
- Bargaining power rises with higher replacement cost for firms and limited alternative jobs for workers.

Efficiency Wages & Price Setting (6-4)

$$W = P^e F(u, z),$$

where z captures unemployment insurance, employment protection, etc. Price-setting: $P = (1 + m)W$.

6-5 Natural Rate of Unemployment

Assuming $P^e = P$ in the medium run:

$$F(u_n, z) = \frac{1}{1+m}.$$

Higher unemployment benefits (higher z) or higher markup m raise u_n by shifting WS or lowering PS.

Natural Employment & Output

$$N_n = L(1 - u_n), \qquad Y_n = AN_n.$$

In the normalized notes $A = 1$, so $Y_n = N_n$. WS-PS differs from standard labor supply/demand:

1. Wage determined through bargaining vs. worker willingness to work.
2. Firms set prices/wages vs. price-taking in competitive model.
3. Involuntary unemployment present at equilibrium.

CH. 7: The AS–AD Model

7-1 Aggregate Supply

$$\begin{aligned} W &= P^e F(u, z), \\ P &= (1 + m)W, \\ u &= 1 - \frac{Y}{L}. \end{aligned}$$

Thus $P = P^e(1+m)F\left(1 - \frac{Y}{L}, z\right)$. Properties:

1. Given P^e, $\uparrow Y \Rightarrow \downarrow u \Rightarrow \uparrow W \Rightarrow \uparrow P$.
2. Given u, $\uparrow P^e \Rightarrow \uparrow P$ one-for-one.
3. $Y = Y_n \Rightarrow u = u_n \Rightarrow P = P^e$.

7-2 Aggregate Demand

Derived from IS–LM:

$$Y = Y\left(\frac{M}{P}, G, T\right).$$

Given (M, G, T), higher P lowers M/P and shifts LM up, so AD slopes downward. Any factor shifting IS or LM shifts AD.

7-3 Short-Run vs. Medium-Run Equilibrium

- Short run: intersection of AS and AD determines (Y, P) with P^e given.
- Medium run: P^e adjusts so that $Y \to Y_n$.

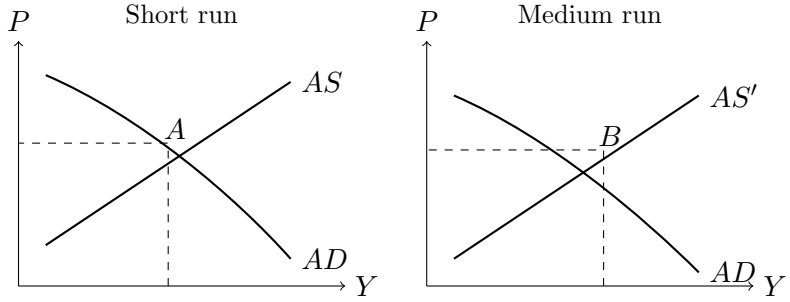

Figure 8: AS–AD diagrams showing the short-run and medium-run movements back to Y_n.

7-4 Effects of Monetary Expansion

- $\uparrow M$ shifts AD right $\Rightarrow Y \uparrow$, $P \uparrow$, $i \downarrow$ in the short run.
- Over time, lower unemployment raises wages and shifts AS up; Y returns to Y_n while P stays higher (neutrality of money in the medium run).

7-5 Decrease in Budget Deficit

- $\downarrow G$ (with constant M) shifts AD left $\Rightarrow \downarrow Y$, $\downarrow P$, $\downarrow i$ in short run.
- Falling P raises real money supply, shifting LM down; AS eventually adjusts so Y returns to Y_n with lower P and i.
- Composition of demand changes: lower G, higher I (crowding in).

7-6 Increase in Price of Oil

- Higher oil price raises production costs ⇒ higher markup m for given W.
- Lowers real wage, raises u_n, lowers Y_n.
- Short run: AS shifts left through point B; medium run: AS keeps shifting (if oil price permanent) to AS''; AD also shifts as expectations adapt.
- 2000s vs. 1970s: (1) workers had less bargaining power so accepted smaller real-wage cuts (smaller AS shift), (2) monetary policy was more credible so inflation expectations stayed anchored.

CH. 8: Phillips Curve, u_n, & Inflation

8-1 π, π^e, and Unemployment

With $F(u, z) = 1 - \alpha u + z$:

$$\pi_t = \pi_t^e + (m + z) - \alpha u_t.$$

8-2 Phillips Curve Evolution

- Early Solow–Samuelson: $\pi_t = (m + z) - \alpha u_t$ (assumes $\pi_t^e = 0$).
- 1970s: expectations became adaptive, $\pi_t^e = \theta \pi_{t-1}$ with θ rising toward 1.
- Post-1970 estimate: $\pi_t - \pi_{t-1} = 3.3\% - 0.55 u_t$.
- Friedman/Phelps: stable trade-off requires wage-setters to systematically underpredict inflation.

8-3 Summary & Warnings

- 1979 Volcker disinflation: tighten monetary policy, accept higher u to reduce π.
- Lucas critique: policy changes alter expectations; credibility matters.
- Wage indexation model with share λ indexed:

  $$\pi_t = \lambda \pi_t + (1 - \lambda)\pi_{t+1}^e - \alpha(u_t - u_n).$$

  Higher λ dampens the effect of $u_t - u_n$ on inflation.
- Deflation undermines Phillips relationship because indexation behaves differently when $\pi < 0$.

Neutrality of Money

In steady state,

$$Y_n = Y\left(\frac{M}{P}, G, T\right) \quad \Rightarrow \quad \pi = g_M$$

if fiscal policy is unchanged. Price-level changes that do not affect money growth have no long-run effect on inflation.

CH. 9: The Crisis

9-1 From Housing Problem to Financial Crisis

- Housing prices (Case–Shiller) surged 2000–06 due to low mortgage rates and rapid growth of subprime lending; plunged 2006–09.
- Mortgages went underwater; many risky NINJA loans became toxic.
- Banks as intermediaries: Assets = Liabilities + Capital. Insolvency ($A < L$) vs. illiquidity (insufficient liquid assets).
- Leverage ratio = $\frac{A}{C}$: high leverage ⇒ higher expected returns but higher insolvency risk.
- Complex securitization (MBS, CDO tranches) made valuation difficult; when underlying mortgages defaulted, securities became "toxic."

9-2 Use & Limits of Policy

- Liquidity/wholesale funding: banks borrowed short-term to finance long-term assets; fire sales depressed prices.
- TED spread (Libor − T-bill) normally < 100 bps but spiked mid-2007/08.
- Corporate borrowing rates decoupled from monetary policy (AAA/BBB spreads jumped).
- Confidence collapsed ⇒ fall in housing/stock prices and consumption.
- Initial responses:
  1. FDIC temporarily guaranteed deposits (up to \$250k).
  2. Fed provided liquidity facilities with broader collateral.
  3. TARP injected capital (shifted from asset purchases to equity stakes).
  4. Fed bought large quantities of MBS; T-bill yields $\approx 0\%$.
  5. ARRA 2009 raised G, cut T, pushing deficit from 1.7% to 9.2% of GDP.

CH. 10: Facts of Growth

10-1 Measuring Standard of Living

- Use output per capita to compare countries. Market exchange rates can mislead (volatility, differing price levels).
- Purchasing-power parity adjusts for relative prices; better for productivity comparisons.
- Consumption per capita is also relevant since welfare depends on consumption, not just output.

10-2 Growth in Rich Countries Since 1950

- Higher income strongly correlated with happiness, though distribution matters.
- Rich countries have experienced large increases in living standards and convergence of output per person since 1950.

10-3 Broader Look Across Time & Space

- Malthusian trap: for centuries, output and population moved proportionally (Europe from Roman Empire to 1500 $\Rightarrow \Delta Y/N \approx 0$).
- "Four Tigers" (Singapore, Hong Kong, South Korea, Taiwan) converged rapidly to high income levels.

10-4 A Primer

$$Y = F(K, N), \qquad \text{CRS}.$$

Technology differences explain cross-country Y given K, N. Sources of growth:

1. Capital accumulation & technological progress.
2. High savings raise the level of output but cannot sustain permanent growth on their own.

CH. 11: Saving, Capital, Accumulation, Output

11-1 Interactions Between Y & K

$$\frac{Y_t}{N} = F\left(\frac{K_t}{N}, 1\right), \quad I = S = sY \text{ (closed economy)}.$$

Capital accumulation:

$$K_{t+1} = (1-\delta)K_t + I_t.$$

11-2 Alternative Savings Rate

Higher s shifts $sf\left(\frac{K}{N}\right)$ upward relative to depreciation, increasing steady-state capital per worker.

11-3 Magnitudes (Example $Y = \sqrt{KN}$)

$$\frac{Y}{N} = \sqrt{\frac{K}{N}}, \qquad \Delta\left(\frac{K}{N}\right) = s\frac{Y}{N} - \delta\frac{K}{N}.$$

Steady state:

$$\left(\frac{K}{N}\right)^* = \left(\frac{s}{\delta}\right)^2, \qquad \left(\frac{Y}{N}\right)^* = \frac{s}{\delta}.$$

Higher s raises the level of Y/N but not its long-run growth. Golden rule:

$$\frac{c}{N} = \frac{s}{\delta} - \delta\left(\frac{s}{\delta}\right)^2 = \frac{s(1-s)}{\delta}$$

maximized at $s = \frac{1}{2}$.

11-4 Physical vs. Human Capital

$$\frac{Y}{N} = f\left(\frac{K}{N}, \frac{H}{N}\right).$$

Human capital H measured from relative wages (controversial). Endogenous growth: higher s or education/training can lead to sustained growth if they raise technology.

CH. 12: Technological Progress & Growth

12-1 Tech Progress & Rate of Growth

$$Y = F(K, AN), \quad k = \frac{K}{AN}, \quad y = f(k).$$

Dynamics

Steady-state condition:

$$(\delta + g_A + g_N)k = sf(k).$$

Hence $g(Y) = g(K) = g_A + g_N$ in steady state, independent of s. Higher s raises k^* and $Y/(AN)$ but not long-run growth. Temporary rise in s raises $g(Y)$ during the transition.

Open Economy Chapters (CH. 17–21)

Combining Exchange Rate & Fiscal Policies (19-4)

When $Y > Y_{TB}$ (trade deficit) but policymakers want $Y = Y_{TB}$ without changing total output:

- Use fiscal contraction to reduce domestic demand, moving from point C to D on the ZZ schedule.
- Depreciate the currency so that the current-account curve (NX vs. Y) shifts up, moving from D to B where $Y = Y_{TB}$ and the trade balance improves.

Dynamics: J-Curve (19-5)

Immediately after depreciation the value of imports (in domestic currency) jumps, so the trade balance can worsen before quantities adjust. Over time, exports rise and imports fall so NX improves, tracing a "J" shape ($A \to B \to C$). Assumes the Marshall–Lerner condition holds.

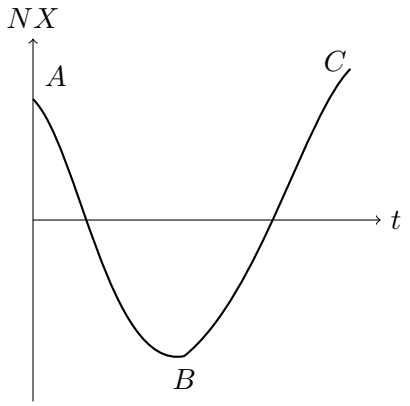

Figure 9: J-curve path of the trade balance after a depreciation.

17-1 IS Relation in Open Economy

$$Z = C + I + G - \frac{IM(Y, \varepsilon)}{\varepsilon} + X(Y^*, \varepsilon).$$

DD: domestic demand. AA: demand for domestic goods (domestic demand minus imports). AA flatter than DD because part of additional demand falls on foreign goods. Trade balance depends on Y relative to Y_{TB}:

$$Y < Y_{TB} \Rightarrow NX > 0, \qquad Y > Y_{TB} \Rightarrow NX < 0.$$

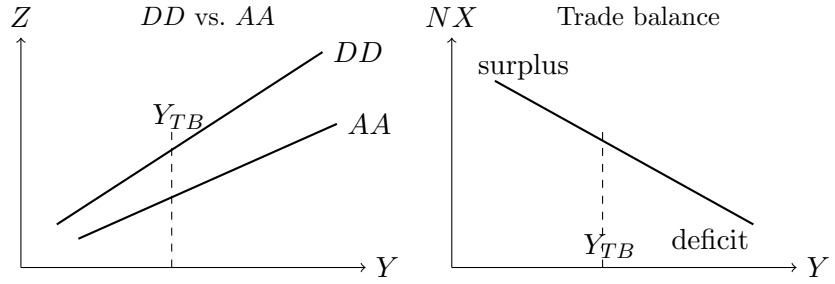

Figure 10: DD vs. AA and the corresponding trade-balance diagram, matching the handwritten sketches.

17-2 Equilibrium Output & Trade Balance

$Y = Z$ gives goods-market equilibrium; it need not align with Y_{TB}.

17-3 Increased Domestic Demand

- Assuming $Y^* = Y_{TB}$, higher G shifts ZZ up but creates a trade deficit.
- Multiplier smaller than in closed economy since ZZ is flatter than DD.

17-4 Increases in Foreign Demand

$\uparrow Y^*$ shifts ZZ upward, improving the current account ($\Delta NX > 0$).

17-4b Depreciation, Trade Balance, Output

Marshall–Lerner condition:

$$\frac{\Delta\varepsilon}{\varepsilon} + \frac{\Delta X}{X} - \frac{\Delta IM}{IM} > 0 \quad \Rightarrow \quad \Delta NX > 0.$$

Depreciation shifts demand toward domestic goods $\Rightarrow\uparrow Y$, improved trade balance, but higher import prices reduce real income.

17-5 Dynamics: J-Curve

After depreciation the trade balance can initially worsen because import values jump; over time, volumes adjust and NX improves.

17-6 Savings, Investment, Current Accounts

$$CA = S + (T - G) - I.$$

Usually $NX \approx CA - NI - NT$ with net income/transfers small.

CH. 18: Openness

18-1 Goods Markets

- US has become more open; NX usually negative.
- Real exchange rate $\varepsilon = E \cdot \frac{P^*}{P}$; appreciation $\Rightarrow$ domestic goods more expensive.
- Fixed exchange rates: revaluations ($\uparrow E$), devaluations ($\downarrow E$).

18-2 Financial Markets

- Need multilateral (trade-weighted) exchange rates when many partners are involved.
- Balance of payments:
  1. Current account (above the line): trade balance, net income, net transfers.

2. Capital account (below the line): net capital flows ⇒ foreign holdings of domestic assets minus domestic holdings of foreign assets.

- Statistical discrepancy = Current Account − Capital Account.
- GNP = GDP + net income (NI, usually small).
- Openness of financial markets allows large FX volumes (> \$4T/day) and financing of trade deficits/surpluses.

Choice Between Domestic & Foreign Assets

Uncovered interest parity:

$$(1+i_t) = (1+i_t^*)\frac{E_t^e}{E_t} \quad \Rightarrow \quad i_t \approx i_t^* - \frac{E_{t+1}^e - E_t}{E_t}.$$

Arbitrage equates expected returns unless governments tolerate large movements in E.

CH. 20: Output, Interest, Exchange Rate (Mundell–Fleming)

20-1 Goods Market

$$Y = C(Y-T) + I(Y,i) + G + NX(Y, Y^*, E),$$

with P (and P^*) given in the short run so $\pi_t^e = 0$ and $r_t = i_t$.

20-2 Financial Markets

Money demand $\frac{M}{P} = Y \cdot L(i)$. Money vs. bonds: no difference (perfect substitutability). UIP links i and E via $(1+i_t) = (1+i_t^*)\frac{E_t^e}{E_t}$.

20-3 Goods+Financial Markets Together

IS–LM in an open economy plus the interest parity (IP) relation. Fiscal policy affects both Y and E; monetary policy affects E via UIP.

20-4 Fiscal Policy in Open Economy

Fiscal expansion: IS shifts right, raising Y, i, and appreciating the currency (E falls), which worsens NX.

20-5 Fixed Exchange Rates

- **Peg:** currency is attached to another at fixed E.
- **Crawling peg:** predetermined rate of depreciation/appreciation.

- **EMS example:** exchange rates maintained within a narrow band around central parity; 1992 crisis precipitated the move toward the euro.
- With $E_t = E^e_{t+1} = \bar{E}$, UIP implies $i_t = i^*_t$. Thus $\frac{M}{P} = Y \cdot L(i^*)$ and the central bank cannot run an independent monetary policy; fiscal policy becomes the main stabilization tool.

CH. 21: Exchange Rate Regimes

21-1 Medium Run with Fixed Rates

AD depends on $\frac{EP^*}{P}$; if P rises, the real exchange rate appreciates, shifting demand away from domestic goods until AS adjusts and Y returns to Y_n.

21-2 Exchange Rate Crises & Case for Devaluation

- Devaluation (lower E) quickly shifts AD outward and lowers the real wage, speeding the return to Y_n, but the improvement in NX arrives with a lag (J-curve).
- Under floating rates E adjusts freely; under fixed rates, expected devaluation forces i higher:

$$i_t = i^*_t - \frac{E^e_{t+1} - E_t}{E_t}.$$

- If markets assign probability p to devaluation,

$$i_t = i^*_t - \left[p\frac{E^d_{t+1} - E_t}{E_t} + (1-p)\frac{E^e_{t+1} - E_t}{E_t} \right].$$

- Governments can try to reassure markets (promise no devaluation), raise i, or eventually adjust the parity.

21-3 Flexible Exchange-Rate Movements

$$E_t = \frac{1+i_t}{1+i^*_t} E^e_{t+1} \quad \Rightarrow \quad E_t = \prod_{\tau=0}^{n-1} \frac{1+i_{t+\tau}}{1+i^*_{t+\tau}} \, E^e_{t+n}.$$

Hence E_t moves one-for-one with expected future rates; long-run target (e.g., CA balance) anchors expectations but short-run E_t can be volatile.

Fiscal Policy Appendix (CH. 23)

23-2 Government Budget Constraint

$$D_t = rB_{t-1} + G_t - T_t, \qquad \Delta B_t = D_t, \qquad B_t = (1+r)B_{t-1} + (G_t - T_t).$$

Example: tax cut today ($B_1 = 1$) requires future primary surpluses to repay $1 + r$.

Debt Stabilization

$$\frac{\Delta B_t}{Y_t} = (r - g_Y)\frac{B_{t-1}}{Y_{t-1}} + \frac{G_t - T_t}{Y_t}.$$

To stabilize debt, set $D_t = 0$; to reduce it, require primary surplus when $(r - g_Y) > 0$.

Ricardian Equivalence

Under strong assumptions (infinitely lived altruistic families, perfect capital markets, fixed debt path) the timing of taxes does not affect demand: G financed via debt or taxes has same effect on Y.

Deficits, Stabilization, Wars

- Cyclical-adjusted deficit is the benchmark when $Y = Y_n$.
- Wars lead to large deficits; tax smoothing suggests running deficits when spending needs are high and surpluses otherwise.

Dangers of High Debt

- Goal: stabilize and eventually reduce B_t/Y_t.
- Default: creditors take a haircut, with severe domestic and external implications.
- Money finance under fiscal dominance: central bank purchases government bonds via money creation (ΔH).
- Seignorage revenue:

  $$\frac{\Delta H}{P} = \frac{\Delta H}{H} \cdot \frac{H}{P} = g(H) \cdot \frac{H}{P}.$$

  Financing a deficit equal to $x\%$ of GDP via seignorage requires $g(H) = x\%$; large $g(H)$ risks high inflation.

Note on Blank Pages

Scans 6, 10, 14, 28, 32, 48, and 60 contained no legible handwritten content (likely blank backs of sheets); they are intentionally omitted.