PS 651: Introduction to Basic Macro- & International Economics for C&IPE

I. Outline

A. Supply & Demand

1. Market Equilibria
2. Consumer & Producer Surplus
3. Distortions, Deadweight Loss (DWL), & Harberger Triangles
4. Elasticities: Ramsey Rule (Public Finance)

B. Market Failures

1. Market Power: (Natural) Monopoly, Monopsony, etc.
2. Externalities, Positive & Negative
3. Information Asymmetry: Credibility, Moral Hazard, Adverse Selection

C. Macroeconomic Accounting Identities:

1. AD=AS
2. MV=PQ

D. Rational Expectations:

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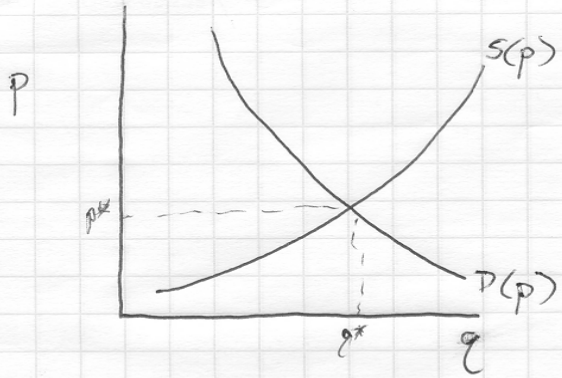
2. Long-Run Monetary Neutrality
3. Ricardian Equivalence / Tax Smoothing

E. International Economics

1. Open-Economy Macroecon: IS-LM-BoP
2. Trade
   a) Comparative Advantage (Ricardo)
   b) HORSS (Hecksher-Ohlin, Rhybscinsky, Stolper-Samuelson)
   c) Specific-Factors (Ricardo-Viner)
3. Tariffs, Quotas, & VERs
4. Purchasing-Power Parity & Interest Parity

F. Long-Run Growth (Development)

1. Solow Growth Model
2. Convergence Hypothesis
3. Growth Accounting
4. New Growth Models



→ Notes -- backward US way

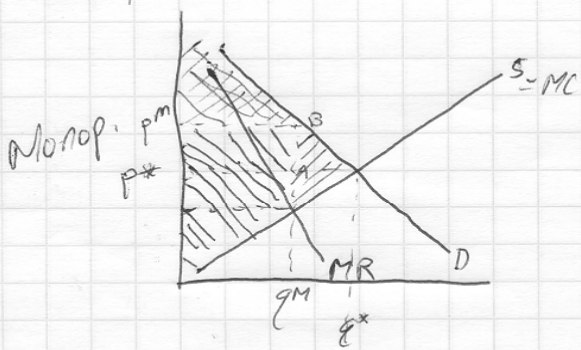
→ Individual Interp. / Micro
S: Increasing Marginal Costs
-- elaborate
D: want more as price falls

→ Market Interp / Agg / Macro
D: more & more from each
S: bring best factors/tech/resources first

→ Aggregation Issues

→ Equilibrium ⇒ (q^*, p^*)
⇒ Cons & Prod. Surp.

Monop. v. Perf. Comp. (Micro):



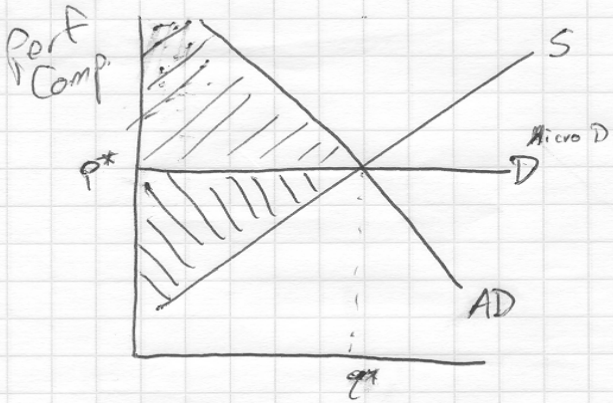
• monopoly: faces steeper marginal-rev. curve than demand curve
⇒ π-max @ MR = MC

Profit

DWL

Cons. Surp.

Trans. Cons. to Monop.



AD - S ⇒ eqbm.

• individ. supplier faces perfectly elastic demand curve ⇒ no MR-D deviation

Cons Surp

(Agg) Prod. Surp.

II. Supply & Demand

A. Market Equilibria:

a) 2 interpretations S & D curves: micro & macro

2. Market S&D:

a) Aggregation issues

b) Why curves slope way they do

3. Micro S&D

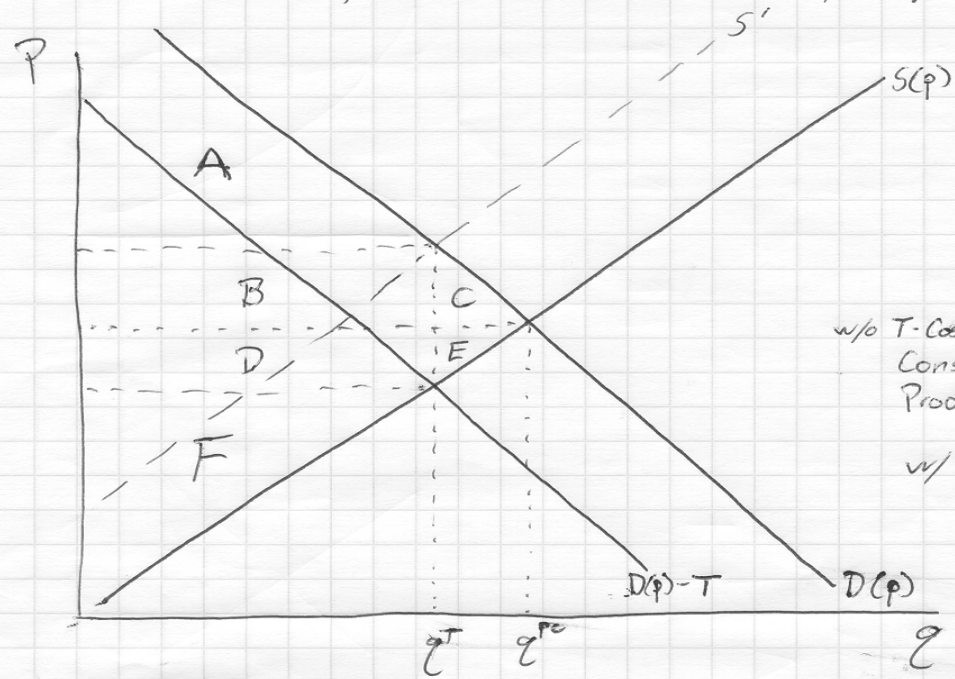
a) Slopes & interpret. under perfect competition

b) Slopes & interpret. under imperfect competition

B. Consumer & Producer Surplus

C. Distortions, DWL & Harberger Triangles, & Rents…

Distortions (Taxes, Externalities, T-Costs, Info Asymm., Quotas, Price Ceilings/Floors, Etc.)



T-Cost Example
↳ T-costs open a wedge b/w what seller receives & buyer pays

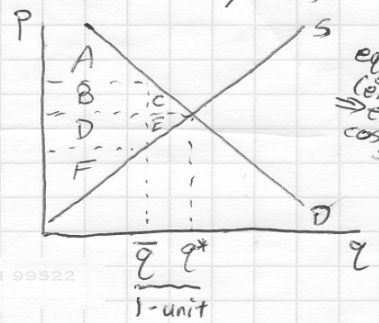
w/o T-Cost:
Cons: A + B + C
Prod: D + E + F

w/ T-cost:
Cons: A
Prod: F
T-Costs:
Borne: B+D
Unconsumated Trades: C+E
(Harberger)

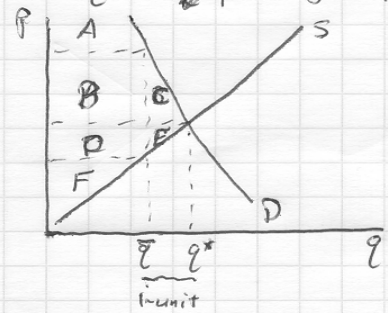
- So, if T = tax, B+D = tax revenue
  C+E = DWL / Harberger

- Notes:
  → Even more pessimistic in dynamic models (North, e.g.)
  → Symmetry/Irrelevance of who bears cost nominally -- relative elasticities of D & S actually determine share of cost (if buyers pay it, e.g., they perceive a net S' supply)
  ↳ see below
  → For any T, ∃ an equivalent $\bar{q}$ or $\bar{p}$ (given partic. S&D condits)

Ex:



equal (slopes (elasts) ⇒ equal cost share



D twice as sloped (elast) as S ⇒ D pays 2x cost (B = 2D)

D. Marginals & Elasticities

1. Centrality of marginals & changes, relatives; near irrelevance of averages & levels

a) Marginals ($\frac{\partial Y}{\partial X}$), changes ($\frac{\Delta Y}{\Delta X}$), & elasticities ($\frac{\partial Y / \partial X}{Y / X}$ or $\frac{\Delta Y / \Delta X}{Y / X}$; n.b., = marginals/changes over averages, but also written & nicely interpretable as $\frac{\partial Y / Y}{\partial X / X}$ or $\frac{\Delta Y / Y}{\Delta X / X}$, i.e., $\frac{\%\Delta Y}{\%\Delta X}$) generally more important than averages

(1) Note: linearity often used/assumed to simplify; marginals & averages equivalent there.

b) Actors optimize by equating marginal costs & benefits. Examples:

(1) Individuals (e.g., consumers) maximize utility by equating marginal utility to marginal cost (price).

(2) Firms maximize profits by equating marginal revenue to marginal cost

c) In deciding optimal allocations (of efforts or investments, of factor-use, of consumption, etc.), only relative prices matter, average or aggregate levels do not. Examples:

(1) *Inflation Irrelevant* (?):

(a) If increase price of all things sold in economy (including labor) 10%, the relative costs and benefits of working & consuming, & of consuming different items stay unchanged; therefore, so too does optimal behavior => price levels & general inflation irrelevant!

(b) Ah, but inflation (depending on its true generality) may change relative price of current & future goods or of domestic & foreign goods), or its volatility may raise uncertainty or information costs (implying some relative changes), so maybe not quite irrelevant.

(2) *Comparative Advantage*: only relative productive capacities matter for trade (see below).

2. Elasticities: The Ramsey Rule Example (from Public Finance) (see two pages down)

a) See, e.g., Robert Frank's micro textbook Figs. 5.11 & 5.14 on elasticities (see next page)

b) <u>Ramsey Rule</u>: Consider government trying to minimize cost of generating revenue by several tax instruments…

c) Other situations: e.g., *E&PBC* w/ multiple instruments => all in proportion elasticity marginal net benefit

FIGURE 5.11

Note that at the midpoint of the demand curve (*M* in the top panel), total expenditure attains its maximum value (middle panel), and price elasticity takes the value unity (bottom panel).

Demand, Total Revenue, and Price Elasticity

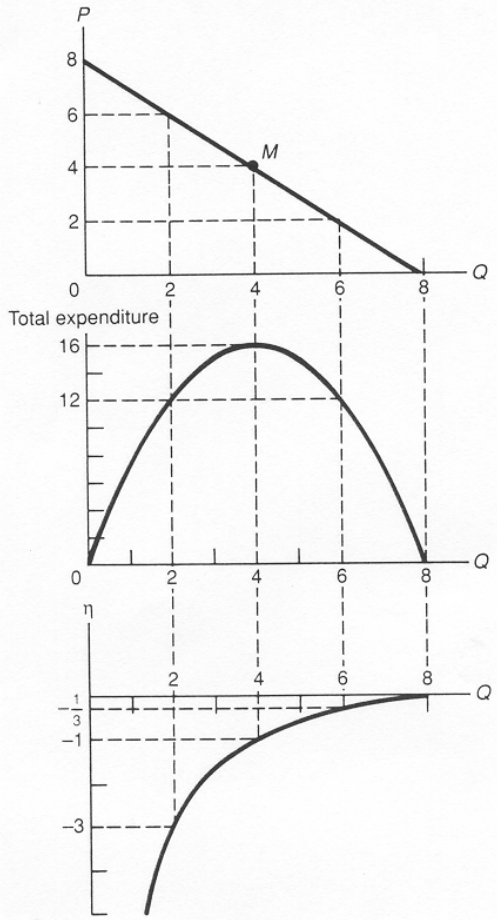
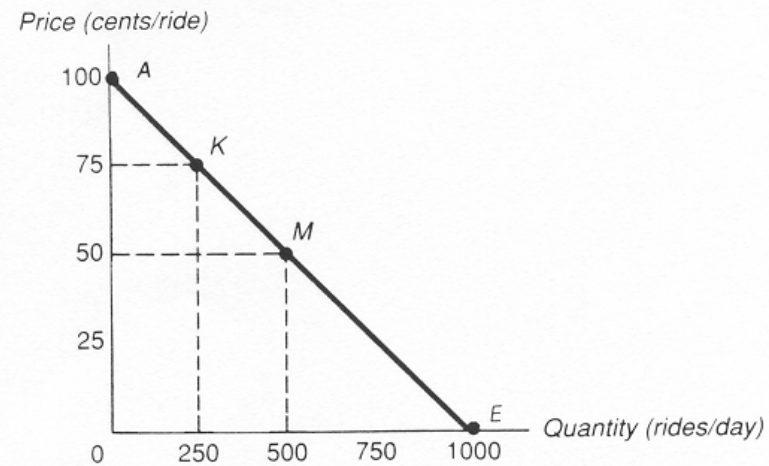


FIGURE 5.12

At a price of 50 cents/ride, the bus company is maximizing its total revenues. At a price of 75 cents/ride, demand is elastic with respect to price, and so the company can increase its total revenues by cutting its price.

The Demand for Bus Rides



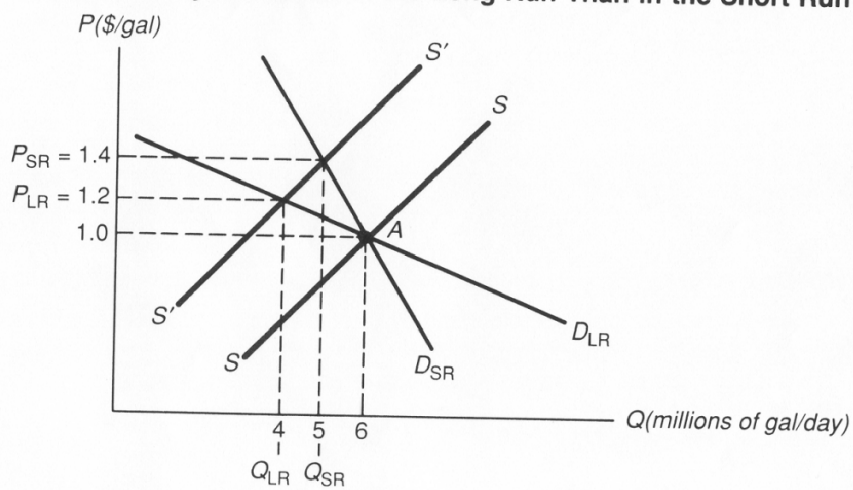
Note: P×Q, e.g., expenditure, revenue, etc. max at unit elasticity.

Note: Long-run opp's substitute greater short-run, so slopes D (& S?) curves flatter (more elastic).

FIGURE 5.14

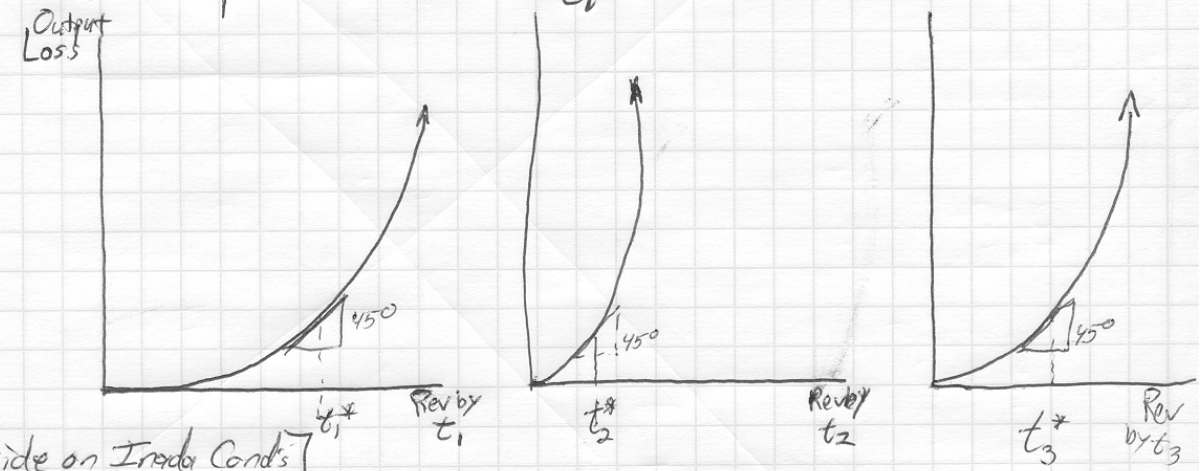
The more time people have, the more easily they can switch to substitute products. The price effects of supply alterations are therefore always more extreme in the short run than in the long run.

Price Elasticity Is Greater in the Long Run Than in the Short Run



Ramsey Rule:

- Imagine a govt trying to min. cost of raising some given revenue w/ multiple tax instruments that all create Harbergers $\triangle$ DWL of output, but the elasticity of output w.r.t. the t_i differ:



[Aside on Inada Cond's]

- As can see, gen'ly output more elast thus: $t_2 > t_3 > t_1$
- How optimize (min. cost.)? . . . . . Equate Marg Costs = slopes @ partic rev., just say @ 45° (unit marg. cost)

⟹ RAMSEY RULE

1. Use All Instruments.
2. Use them ~~in prop. to relative elasticities~~ ~~(in case prop. if not abs. val. the elasts)~~ in inverse prop. to their rel. elasticities.

1a. If rev. need ↑↓, then ↑↓ all instruments

2a. If rev. need ↑↓, then ↑↓ all in prop. to rel. elast.'s.

Long-Run v. Short-Run Elasticities: See Frank's Fig 5.14

III. Market Failures (for now, mostly see above on *distortions*)

A. Market Power:

1. (Natural) Monopoly, Monopsony, Cournot/Bertrand (Duopoly, Oligopoly) Competition, etc.

2. Monopoly:

   a) Saw above main implication monopolistic power: Demand not flat => MR steeper => supply restrict to increase price & profit => DWL

   b) *Natural Monopoly*: if sufficient economies scale (primarily), single-producer may be lowest-cost option (as >1 producing at lower scale than total demand more costly), even given monopoly power.

3. Monopsony:

   a) Single (oligopolistic) buyer(s) => market power too. Can restrict demand to affect price.

   b) Relative monopolistic *vs.* monopsonistic power tends determine divvy of rents from market distortion.

4. Cournot & Bertrand Duopoly/Oligopolistic Competition:

   a) If # producers (buyers) < ∞ (i.e., outside perfect competition), competition strategic => game theory.

   b) Cournot competition (games): actors compete in (i.e., strategic variable is) quantities => oligopolistic power works like proportionate version of monopolistic power.

   c) Bertrand competition (games): actors compete in (i.e., strategic variable is) price =>, if & insofar as cooperation (collusion) fails, competitors bid away the rents.

B. Externalities, Positive & Negative:

1. *Externality*: Not all of benefits & costs of some activity accrue to the actor.
2. => total net benefit (cost) not maximized (minimized) by private behavior.
3. If *positive externality*, activity under-provided; if *negative externality*, activity over-provided.
4. Olsonian *Collective Action Problem* an example of positive externality. (Optimal) Solutions:
   a) Internalize the externality (e.g., by taxation), bringing individual cost-benefit to match total
   b) Shift decision-making locus to the aggregation that internalizes the externality.
   c) Mandate/regulate the optimal quantities of activity [generally considered inferior to previous two].

C. Imperfect &/or Asymmetric Information:

1. <u>*Uncertainty*</u>: Von Nuemann – Morgenstern Expected-Utility Model
   a) Max $pU_p+(1-p)U_{1-p}$ (i.e., expected utility, not utility of expectation)
   b) Note: Jensen's inequality => $E(U(x))<U(E(x))$ for concave utility; i.e., risk aversion.
2. <u>*Credibility*</u>: Proposed actions (e.g., policy/platform promises) must be *incentive compatible*.
3. *Moral Hazard*: Given asymmetric info, party with info advantage incentive to *shirk* (ex post).
4. *Adverse Selection*: Given asym. info, parties that enter some market may be *inferior types*.

IV. Macro-Accounting Identities: AD=AS & MV=PQ

A. Hibbs (Chapter 1) Postwar Macroeconomic Performance:

1. In Historical Perspective: Figures 1.1-1.6 tell the tale (*pp. 14-15*)

   a) Figures 1.1 & 1.2: Real Growth

   b) Relatively greater postwar growth (Fig. 1.1)

   c) Relatively greater stability of postwar growth rates (Fig. 1.2 & Table)

2. Figures 1.3 & 1.4: Unemployment

   a) Postwar UE is lower than pre-depression, but not dramatically (Fig. 1.3)

   b) Postwar stability: UE dramatically more stable (Table below Fig. 1.3, Fig. 1.4)

3. Figures 1.5 & 1.6: Inflation

   a) Postwar steady ↑ price-level in sharp contrast to flat prices Civil to WWI: prices stable in peace, rise in war, & return, but bit higher, true well b4 Civil War insofar as known (Fig 1.5)

   b) Postwar greater inflation-rate stability not obvious from fig's but there (Fig. 1.6 & its Table)

A. Striking features of postwar US macroeconomic performance in historical perspective

1. Three notable features

   a. Comparatively high real growth (absolutely & *per capita*)

   b. Comparatively stable macroeconomy: fluctuations quite muted compared to prewar eras

   c. Near-continuous INF: price level rises steadily postwar; long-run flat before

2. H stresses several important institutional & policy changes since Great Depression as underlying these changes:

   a. Enhanced macroeconomic stability, & so growth, and individual security through the *Keynesian-&-Welfare State*;

   b. But also ⇒ altered private-sector (firms', workers') expectations ⇒ ↑INF expectations & inflationary pressure;

   c. Monetary policy & institutional changes (off gold standard, then off Bretton Woods) allowed these pressures to produce sustained inflation.

C. Policy options, economic theory, & policy effectiveness:

1. **Four basic policy options:** monetary, fiscal, direct controls, rhetoric & persuasion. Regardless of which we stress, we must adopt a theory of how the economy works (i.e., how it responds to these policies) ⇒

2. **Monetarism:** most economists now concur that sustained INF cannot occur w/o money-supply expansion accompanying (some debate remains over whether money is *only cause* of INF & whether INF may occur for "unsustained" periods w/o accompanying money growth).

   a. **Monetarism version 1** (one to which H refers):

      (1) Many economists skeptical discretionary tax & spending manipulations can influence real economy much w/o cooperative monetary policy.

      (2) I.e., monetary policy is the powerful instrument; fiscal policy, not so much.

   b. **Monetarism version 2** (a.k.a., classical):

      (1) Some economists now seriously doubt whether even money has much if any effect on real economy; at least not beyond very short-run responses unexpected moves.

      (2) ⇒ So-called classical divide: nothing nominal, or at least certainly nothing expected & nominal, affects anything real & *v.v.*

c. **Either way**, monetarist views see Keynesian activist position that govt can & should stabilize economy at very least to rely heavily on supportive monetary.

3. Keynesianism:

a. **Old Keynesianism**: large fiscal policy effect on real economy; monetary-policy primarily to provide liquidity (*i.e.*, keep money-supply growth at least sufficient for constant prices).

(1) Govt can & should work to stabilize economy by adjusting budgets counter-cyclically. (Larger) deficits, i.e., ↑G↓T, in busts; surplus (less deficits) in booms

(2) Little or no distinction between short run & long run; issue not much analyzed.

(3) Keynes famously: "In the long run, we're all dead."

b. **New Keynesianism**: both fiscal & monetary policy can & do have sizable short-run impacts, but doubtful govt can do much about long-run conditions (except *via* public invest., esp. in edu. *etc.*). New-Keynesian-type results supported by economic models w/ following features:

(1) Nominal contracting/bargaining ("sticky" wages and/or prices) or other nominal rigidities: debate about how important these are, how short the short run, *etc.*

(2) Multiple non-competitive markets, *i.e.*, monopoly power: *e.g.* non-competitive labor & product markets. *Combo of 1 & 2 produces esp. effective policy.*

(3) Limited rationality of actors

4. **Neoclassical Economics**

   a. Ricardian Equivalence: debt, if sustainable [define]—& if everyone rational & foresighted it must be—is virtually irrelevant. Merely shifts timing of revenue collection relative to expenditure, which, because...

   b. ...Rational Expectations & Rational Intertemporal Optimization ⇒ foreseeable counter-cyclical policies are at best powerless & at worst counterproductive.

   c. ⇒ some optimum level of govt activity (mostly public-goods production & public investment): policy should be fixed at those levels.

5. **⇒ Modern political economists face formidable challenge: must be economists *and* political scientists.**

   a. Quite difficult to get very far relying on "economic consensus" b/c, if such ever existed, not now.

   b. May be near consensus around a neoclassical/neo-Keynesian synthesis: short-run effectiveness of demand-management policy, especially insofar as unforeseen, but "long-run neutrality" (real-nominal divide).

      (1) (But how short/long is short/long run?)

   c. I'll offer here a suggested intro-level set of macroeconomic understandings that should help.

A. In Historical Perspective: Figures 1.1-1.6 tell the tale

1. Figures 1.1 & 1.2: Real Growth

a. Relatively greater postwar growth (Fig. 1.1)

b. Relatively greater stability of postwar growth rates (Fig. 1.2 & Table)

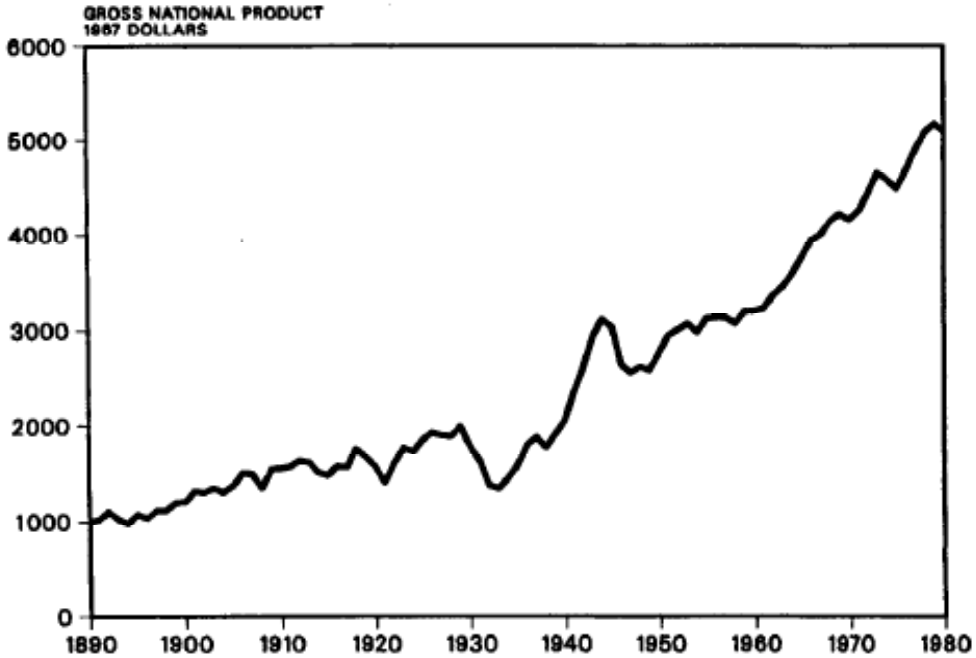


Figure 1.1 Gross National Product per capita 1890–1980 (1967 dollars). *Sources:* U.S. Department of Commerce, *Historical Statistics of the United States, Colonial Times to 1970*, Series F 1-5, 1971; and TROLL-Citibank Economic Database, Series NBER-GNPP72.

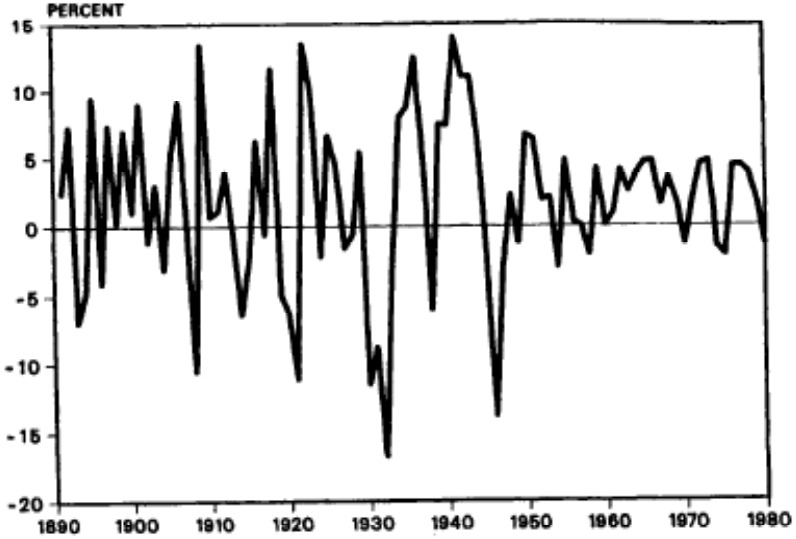


Figure 1.2 Real output stability over time: real GNP per capita growth rates (percent per annum), 1891–1980. *Sources:* U.S. Department of Commerce, *Historical Statistics of the United States, Colonial Times to 1970*, Series F 1-5, 1971; and TROLL-Citibank Economic Database, Series NBER-GNPP72.

	1891–1929	1930–1949	1950–1980
Mean ($\bar{x}$)	1.78	1.32	2.17
Standard deviation (σ)	6.28	9.22	2.65
Coefficient of variation ($\sigma/\bar{x}$)	3.54	6.99	1.22

2. Figures 1.3 & 1.4: Unemployment

a. Postwar UE is lower than pre-depression, but not dramatically (Fig. 1.3)

b. Postwar stability: UE dramatically more stable (Table in Fig. 1.3; Fig. 1.4)

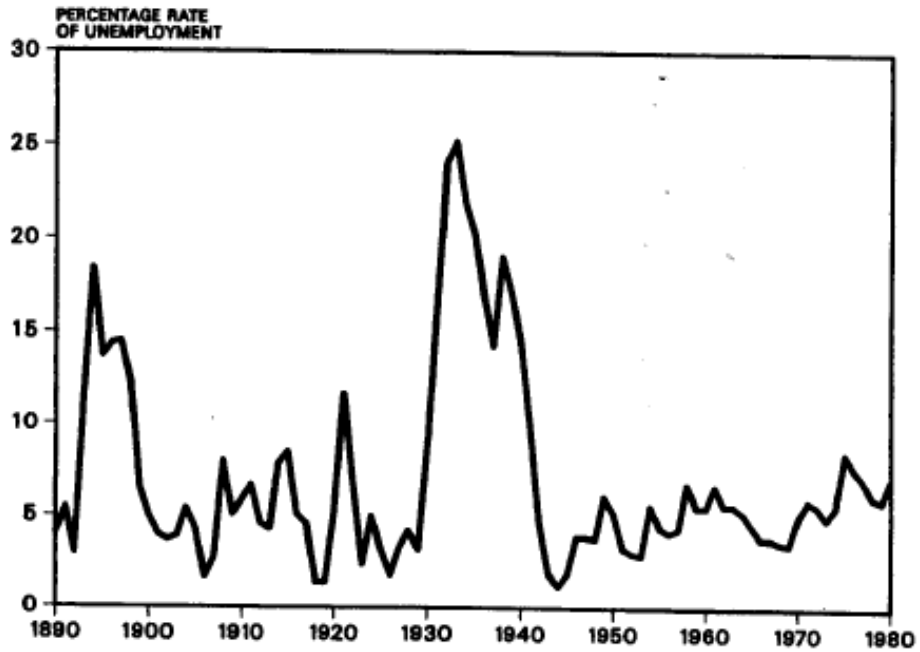


Figure 1.3 The unemployment rate, 1890–1980. *Sources:* U.S. Department of Commerce, *Historical Statistics of the United States, Colonial Times to 1970*, Series D 1-10, 1971; and TROLL-Citibank Economic Database, Series NBER12-LHUR.

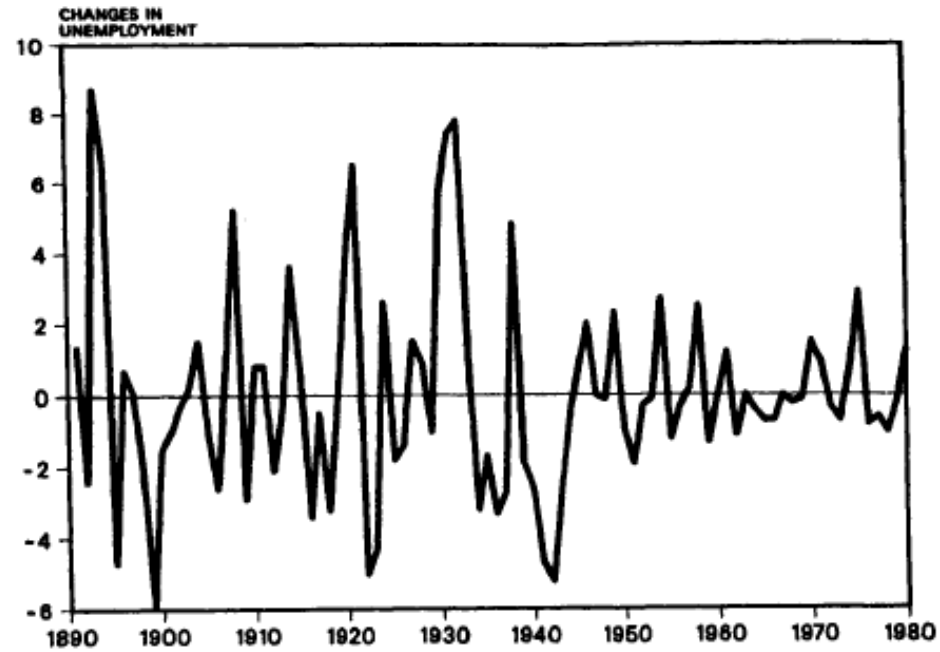


Figure 1.4 Year-to-year changes in the unemployment rate, 1891–1980. *Note:* Standard deviation (σ) for 1891–1929 is 3.24; 1930–1949, 3.85; 1950–1980, 1.18.

	1890–1929	1930–1949	1950–1980
Mean ($\bar{x}$)	6.12	11.81	5.23
Standard deviation (σ)	4.07	8.10	1.39
Coefficient of variation ($\sigma/\bar{x}$)	0.66	0.69	0.27

3. Figures 1.5 & 1.6: Inflation

a. Postwar steady ↑ price-level in sharp contrast to flat prices Civil to WWI: prices stable in peace, rise in war, & return, but bit higher, true well b4 Civil War insofar as known (Fig 1.5).

b. Postwar greater INF-rate stability not as obv. from fig's but there (F & T 1.6)

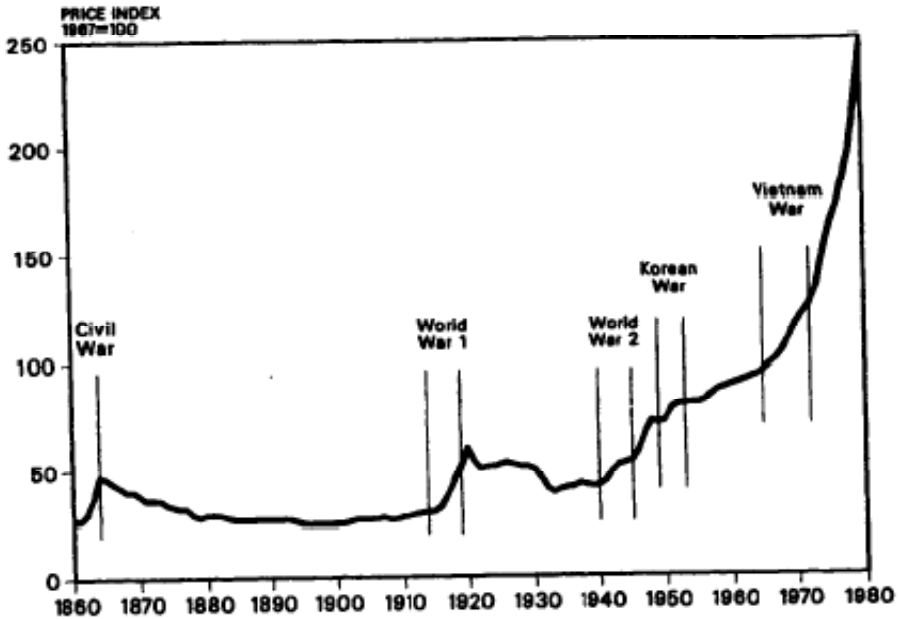


Figure 1.5 The Consumer Price Index, 1860–1980. *Sources:* U.S. Department of Labor, *Handbook of Labor Statistics, 1978*, Table 116; and TROLL-Citibank Economic Database, Series NBER12-PU.

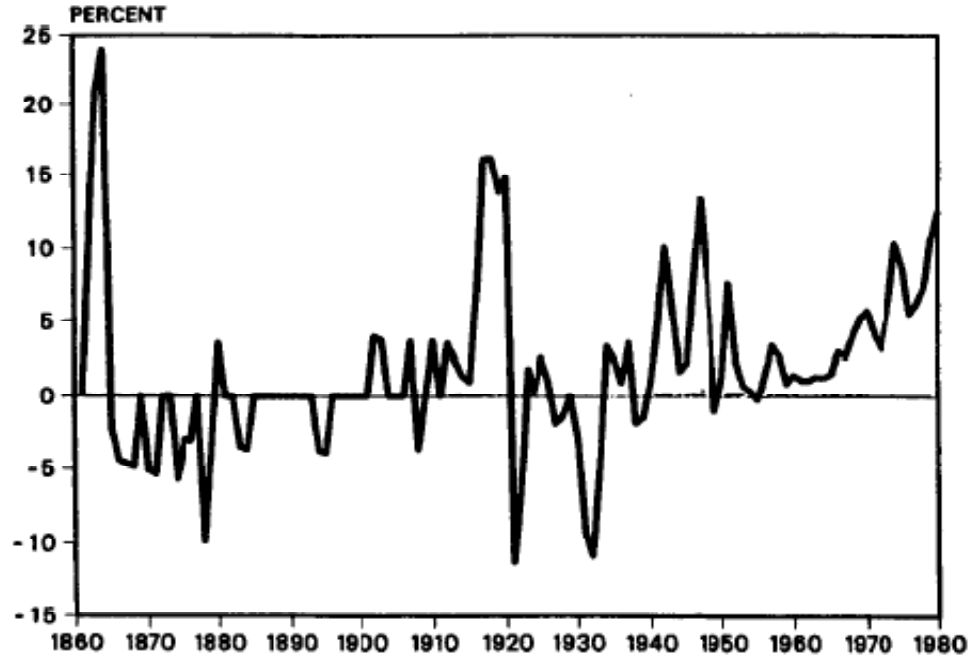


Figure 1.6 Consumer price inflation and deflation, annual rates, 1861–1980.

	1861–1929	1930–1949	1950–1980
Mean ($\bar{x}$)	0.93	1.65	4.00
Standard deviation (σ)	6.27	6.04	3.39
Coefficient of variation ($\sigma/\bar{x}$)	6.74	3.66	0.85

B. In International Perspective:

1. N.b., there is very little of the US postwar experience that is unique

2. ⇒Are H's arguments persuasive considering that effects to explain not US-unique—gen. enough to have explained similar facts elsewhere?

C. Some interesting notes about these comparisons:

1. Postwar era saw historically high regulation, controls, cyclical intervention, taxes, & spending. It also saw historically high growth & stability though continuous inflation.

2. Almost decade of stagflation in '70s may have bolstered those calling for reversing trend of rising government intervention. Era's worst recession, Volker/Reagan deflation of '82, slammed INF to halt, but at big macroec. cost (much debate on how avoidable)

D. How does Hibbs explain these prominent facts?

V. Some background macroeconomics, a brief introduction:

A. $MV \equiv PQ$ (money supply × velocity of monetary exchange = price level × quantity of output)

1. An accounting identity: true by definition.

2. Economic thry enters only when choose what endog. & what exog.; e.g.:

   a) Strict Friedman-esque monetarism & neoclassical: **Q** & **V** exogenous ⇒ $(dM)V=(dP)Q$

   b) Old Keynesian & much New Keynesian: **V** exogenous, **P** adjusts slowly ⇒ $(dM)V=(dP)Q+P(dQ)$.

B. $Y^d \equiv C + I + (G\text{-}T) + (X\text{-}M)$ (aggregate demand = consumption + investment + net government (discretionary) spending + net exports)

1. This also an identity: true by definition (n.b., Y^d=aggregate demand, not necessarily supply)

2. Theory enters in deciding how/if demand is equated to supply &, in particular, what we decide regarding incurrence of debt $(G\text{-}T)>0$ or accumulation of public assets $(G\text{-}T)<0$.

   a) *Neoclassical*: Supply, Y^s, exogenous to these factors ⇒ altering **G-T** only adjusts temporal allocation of government-revenue collection. **C** & maybe **I** & **X-M** adjust to counter **G-T** movements, leaving real economy unaffected. The exogenous supply is fully determinant. (Public debt, **G-T**, is not net wealth; just shift of it.)

   b) *New Keynesian*: for any or all of various reasons (like listed above) **G-T** only partially if at all offset by adjustments in the other variables; supply, Y^s, endogenous.

VI. Longer intro, & H's explan. for 3 big facts of postwar macro:

A. 3 striking facts about postwar compared to prewar economic history:

1. **Postwar:** high & sustained real income growth; relatively stable macroeconomy & higher individual security; sustained inflation

2. **Prewar:** growth lower; economy far more unstable, w/ far more severe depressions & more erratic booms; & prices almost perfectly stable long-run (inflation & deflation averaged quite nearly zero over decades).

3. All of these seem different again now, why?

4. [At least, all were different as of 25 years ago. Two deep recessions (early 80s, & '08/'09-), a pair of booms (late 80s; mid-90s-to-late-00s), with a smaller recession between... Have we moved back to prewar sorts of macroeconomic performance & functioning? Could/would be consistent with Hibbs' explanation for this striking prewar/postwar difference, actually…]

B. A first important macroeconomic identity:

1. **MV ≡ PQ**

   a. *Accounting identity*:

      (1) Amount of money in circulation times velocity with which it circulates through economy = price level of goods times quantity of goods produced & exchanged.

      (2) Essentially, **V** is defined such that this identity holds.

   b. Becomes theory (e.g., *quantity theory of money*) when we add assumptions about which elements in equation are exogenous (given outside the equation) & which endogenous (within the equation).

2. **New monetarism** or **new classical theory** argues that

   a. Velocity (**V**) determined by outside technology. Financial-technical changes (ATM's, checking accounts, credit cards, internet banking, 24/7 worldwide...)

   b. Real quantity of output (**Q**) also determined outside the system by real factors like existent labor supply & capital, relative preferences of people for labor & leisure, *etc.*

   c. Since **V** & **Q** exogenous, i.e., fixed with respect to the moveable, endogenous, parts, the growth rate of the money supply directly determines the growth of prices (inflation) ⇒ (d**M**)**V** = (d**P**)**Q**.

   d. From this standpoint, nothing nominal (money, prices) affects anything real (velocity, quantity); this is the so-called *classical* or *real-nominal divide*.

   e. Money determines inflation; real economy exogenously given; end of story.

3. **Old Keynesianism & old monetarism**, contrarily,

   a. Less sanguine re: quickness prices & wages (**P**) adjust to monetary moves.

   b. Agree that velocity is rather exogenous, but prices do not necessarily adjust smoothly & quickly to monetary changes, so ⇒ **(dM)V=(dP)Q+P(dQ)**

   c. ⇒ money growth partly met by price & partly by quantity increases (INF & real dY). So, money has some real effect, at least short run, and, for Old Keynesians: "in the long run, we're all dead."

4. **New Keynesianism:**

   a. Remains convinced that, for one reason or another, prices &/or wages do not adjust fluidly <u>in short run</u>, so money growth can have short-run effects on real.

   b. In long-run, prices may well adjust completely to return real output to some "natural" level.

      (1) NAIRU: "Non-Accelerating-Inflation Rate of Unemployment", self-explanatory

      (2) Or "Natural Rate of Unemployment (or Output)", that rate obtained at equilibrium labor (output) supply & demand, absent stimulus or deflationary policy.

      (3) Closely related.

   c. Note: Some Neo-Keynesian and Neo-Classical synthesis over past 10-15yrs.

5. **General agreement**: inflation cannot be sustained w/o accommodating money growth.
   a. If prices continue to trend upward & money does not follow suit, looking back at **MV=PQ** we see that output must continue to fall.
   b. This is unsustainable. So, first part of puzzle regarding inflation must be sought in explaining how money would & was expected to follow suit.

C. ⇒ Hibbs' first point: A key factor was removal of gold standard.

1. Under gold standard, money supply fixed to amount of gold.
   a. Thus, money can't grow to keep pace any swifter than gold supply.
   b. Which, only by mining *etc.*, so, absent technological or financial innovation, money growth was slow at best.
   c. Thus, prices kept in tight line under Gold Standard ⇒ expectations d**M** could or would not accommodate expansionary policy or wage-price settlements.
2. Once gold standard removed, *opportunity* for steady inflation present
   a. New-classical stops there: seek incentives for continual ↑**M** in post-gold era.
   b. Hibbs' new-Keynesian story is a bit more revealing.

D. **Second important accounting identity**:

1. $\mathbf{Y}^d = \mathbf{C} + \mathbf{I} + (\mathbf{G}-\mathbf{T}) + (\mathbf{X}-\mathbf{M})$

   a. Aggregate demand ($\mathbf{Y}^d$) equals private consumption (**C**) + investment (**I**) + net government spending (**G-T**) + net exports (**X-M**, exports – imports).

   b. Once again, an identity—it becomes a theory when we start specifying how the various quantities in the eq. derive (& whether & how $\mathbf{Y}^d$ & $\mathbf{Y}^s$ equate).

VI. A simple Keynesian model, ignoring government & ignoring the international economy. (Also a crude picture of what roughly true for 1st half of 20th C: very small governmentt by modern standards & high protection so little or no trade.)$\Rightarrow \mathbf{Y}^d \approx \mathbf{C}+\mathbf{I}$.

$\mathbf{Y}^d \approx \mathbf{C}+\mathbf{I}$

A. Now, the Keynesian parts of the theory are that:

1. Economy could very easily become stuck in position where demand insufficient & so output (supply) could be higher if demand boosted *(⇒ output demand-constrained)*;

   a. Animal spirits of investors and *self-fulfilling prophecies*:

   b. In brief: if think economy will grow, will invest, & so it will; &/but also *v.v.*

2. Individuals' *consumption behavior is relatively exogenous*; people follow simple "rules" for savings & consumption rates: e.g., "put aside" or save 20% of income. (Incidentally, consumption rates have been fairly constant at around 80% in the US pre & postwar.)

B. These imply two things:

1. In equilibrium, $\mathbf{Y}^d$ = aggregate demand = income = output = $\mathbf{Y}^s$; and
2. $\mathbf{C = cY}^{disp}$ where **c** is "marginal propensity to consume" from income, say 80%, and $\mathbf{Y}^{disp}$ is disposable (after-tax-&-transfer) income, then:

C. With small (0 for convenience) T&T: $\mathbf{Y = cY + I}$ [substituting C=cY into Y=C+I]

1. ==> Y-cY=I
2. ==> (1-c)Y=I
3. **==> Y=[1/(1-c)]I**

D. [1/(1-c)] here is the so-called Keynesian multiplier.

1. *E.g.*, if c=.8, then dY = 5*(dI). *I.e.*, exogenous movements in investment create 5 times larger movements in output & income!
2. Generalizing, exogenous (outside) movements in anything in C + I + (G-T) + (X-M) are multiplied 5*X* in their total effect on output (Y).

VII. What could have caused postwar economy to be so much more stable than prewar?

A. Govt's now tax & spend much more, & do so largely in manner tied *automatically* to income of individuals. Called *automatic stabilizers*...

1. *E.g.*, income taxes & income-related transfers create net income-tax rate of *t*. Say 20%.
2. This changes C = cY from above because now individuals can only consume from their disposable (after-tax) Y. Say c = .8 like before, then:
   a. **$Y = c(Y^{disp}) + I$ where $Y^{disp} = Y - tY$ = income after the net income-tax**
   b. ==> $Y = cY - ctY + I$
   c. ==> $Y - cY + ctY = I$
   d. ==> $Y(1 - c + ct) = I$
   e. ==> **$Y = [1/(1-c+ct)]I$** or, equivalently, **$Y = [1/(1-c\{1-t\})]I$**
3. So, if c=.8 still & t=.2 (roughly true of postwar era), then $Y = I/(1-.8+.16) = I/.36 \approx 2.78*I$

4. Hibbs' next point: **Changing Multiplier Explains Much of Pre/Post-War Stability Difference**

   a. Multiplier now ≈2.78. Pre-war, ≈5. [Back-of-envelope guesstimates.]

   b. Any random shocks that hit exogenous factors (fluctuations in those animal spirits, e.g.) were multiplied 5-fold pre-war, now, thanks to dampening effects of tax-and-transfer system, they are only multiplied 2.78-fold.

   c. Thus, postwar stability is very easy to explain from Keynesian or New Keynesian viewpoint. Less obvious what classical explanation would be.

B. What about the postwar inflation record?

1. H's arg simple: stability & security from postwar Keynesian policies also insulated wage & price setters from most disastrous effects of refusing to moderate wage/price-growth
2. **MV=PQ**: Under gold std, **M** relatively fixed by gold supply, **V** exogenous ⇒ any attempt to raise prices beyond velocity increase results in ↓ output (UE, ↓ profits, bankruptcy)
3. **MV=PQ**: Now **M** free from gold supply⇒ price & wage setters know that if demand too-big raises (d**P**), govt may/likely to accom. by ↑ money (d**M**), or real-demand if can, i.e. if fiscal effective, (d**Q**).
4. Price setters therefore (relatively) less afraid of excessive price hikes, knowing policymakers (govt, bank (b/c govt leans on it), both) will bail-out by ↑ demand &/or money.

VII. Neoclassical Attack:

A. **C**=c**Y** is *ad hoc*; in particular: c, the marginal propensity to consume, is endogenous:

1. People adjust spend, save, invest to E(econ situation), including E(policy) [the *Lucas Critique*]

2. ⇒, e.g., if govt ↑(**G-T**), no real multiplier effects; private actors just ↓ (**C** & **I**) to cover E(↑future taxes) … so-called *Ricardian Equivalence* [see below]

B. Inflation is "always & everywhere" money-supply growth:

1. Wage & price settlements only proximate π causes; root cause of inflation always money growth

2. ⇒ causes π must lie in incentives facing monetary policymakers, not directly in any new insensitivity of w & p setters to excessive hikes. [See, e.g., *rational expectations* and *expectations-augmented Phillips Curve* below…]

C. Neoclassical theory must provide some other set of explanations for Hibbs' facts 1, 2, 3 about pre- vs. post-war econ history. [We'll see (parts of) such explanation below & later...]

D. Hibbs' argument, essentially a (new) Keynesian one, is simpler:

1. High, sustained real-income growth unexplained in my view
   a. H argues +/- explicitly that successful KWS implementation spurred growth.
   b. KWS: Keynesian macroeconomic policy + automatic stabilizers in tax-and-transfer & related systems (safety-net, welfare state).
2. Macro stability & individual security stems very directly from KWS.
3. Removal Gold Std ⇒ opportunity for sustained INF; motive force behind the sustained INF is actually the stability & security achieved by KWS.

Table 1.1 Response of inflation to business cycle contractions, 1890–1980

Response to—	Change in the CPI inflation rate	Change in the gap between actual and trend log per capita Real GNP (× 100)
Mild and moderate contractions		
1895–1896	+3.92	−5.46
1903–1904	−3.77	−4.56
1923–1924	−1.58	−3.67
1926–1927	−2.85	−3.05
1937–1938	−5.43	−7.51
1953–1954	−0.25	−5.19
1957–1958	−0.81	−3.95
1959–1961	+0.20	−3.09
1969–1970	+0.52	−3.47
1973–1975	+2.71	−8.29
1979–1980	+2.05	−4.37
Strong contractions		
1892–1894	−3.77	−14.6
1907–1908	−7.27	−12.0
1919–1921	−25.1	−20.4
1929–1933	−5.27	−45.4
(1929–1932)	(−10.9)	(−41.4)

Note: The gap between actual and trend log (base e) real GNP per capita measures the severity of cyclical contractions. Trend values are the fitted values from the regression $\ln Y_t = a + bT + \text{error}$, where Y is real GNP per capita and T is a time index. Trend values are obtained from regressions applied to two separate time periods: 1890–1949 and 1950–1980. Mild contractions refer to cycles in which the change in the gap (× 100) between actual and trend real GNP per capita was less than 5.0; moderate contractions designate cycles in which the change in the gap fell between 5.0 and 10.0; strong contractions denote cycles where the change in the gap was greater than 10.0.

IX. Direct evidence relating to these arguments:

A. INF response to econ. booms & slumps (Table 1.2, p. 24)

1. Prices (i.e., inflation) relatively insensitive to (real) slumps post-war. Increasingly so over time.
2. Gen'ly, real slumps had induced (or were induced by) deflations or disinflation in pre-war.
3. More rigorously:

4. Using Annual Data from 1890-1949:

$$DCPI_t = +0.07 + 0.54\sum_i DCPI_{t-i} + 30.4[\ln Y - (\ln Y)^*]$$
$$\text{T-stats:} \quad (0.09) \quad (3.21) \quad (2.92) \qquad R^2 = 0.38$$

5. Using Annual Data from 1950-1980:

$$DCPI_t = +0.32 + 1.01\sum_i DCPI_{t-i} + 9.00[\ln Y - (\ln Y)^*]$$
$$\text{T-stats:} \quad (0.51) \quad (5.97) \quad (0.83) \qquad R^2 = 0.69$$

Table 1.2 Regression of consumer price inflation rate on lagged inflation and deviations of ln per capita real GNP from trend, 1890–1929 and 1950–1980

Model: $DCPI_t = a_0 + \sum_{i=1}^{3} a_i(DCPI_{t-i}) + a_4[\ln Y_t - (\ln Y_t)^*] + u_t$

Time period	Coefficients			
	a_0	$\sum a_i$	a_4	$\bar{R}^2$
1890–1949	0.07	0.54	30.4	0.38
	(0.09)	(3.21)	(2.92)	
1950–1980	0.32	1.01	9.00	0.69
	(0.51)	(5.97)	(0.83)	

Notes: The t statistics appear in parentheses; $DCPI_t = \ln(CPI_t/CPI_{t-1}) \cdot 100$, the annual percentage rate of change of the Consumer Price Index; $\ln Y$ = natural logarithm of per capita real GNP; and $\ln Y^*$ = trend $\ln Y$ as predicted from regressions performed separately in each period of $\ln Y$ on linear-time trend terms.

6. Equations demonstrate 3 things:
   a. Price level was mean-reverting pre-war but strongly trended postwar (seen in 2nd coefficients being <1 or ≈1, respectively).
   b. Overall predictability of inflation increased dramatically, nearly doubling (compare R^2).
   c. Prices responded more & more certainly to output booms & slumps in prewar than in postwar period (seen in 3rd coeff's & s.e.'s).

7. Hibbs already offered one important argument as to why; he now adds a more-proximate cause that wages increasingly set in staggered, long-term (3-yrs on average), nominal contracts in postwar period as unions became firmly established aspect of political-economic landscape.

   a. Wages, ∴, simply cannot adjust as swiftly & surely to output fluctuations. His point: such contracting practice would not have been sustainable if postwar KWS hadn't assured that cost of failure to adjust would be mitigated.

   b. Firms, meanwhile, knew unions there to stay & that KWS operating, so could allow such wage rigidity to buy some labor peace (avoiding strikes & other disruptions, *etc*.).

      (1) Note: this one version of what sometimes called 'the historic (class) compromise' or 'the postwar settlement'

8. This may all be changing or have changed to considerable degree:

   a. Declining unionization & relative decline of unionized, mass, standardized production sectors

   b. Increasing openness [Why would this matter?]

   c. Back-to-back severe recessions '79-80 & '81-'82 may have changed political & economic landscape for long time to follow.

B. Other key changes in the institutional structure of American pol-econ

1. **Financial System**: government (& esp. central bank) as *lender of last resort* (part of FDR's *New Deal*)

   a. Federal deposit insurance (FDIC, FSLIC) ⇒ bank panics have vanished. Hard to over-estimate importance. Almost every prewar depression (which were massive by modern standards remember) began w/ bank panics.

      (1) Bank collapses have occurred; but not general panics.

      (2) (Fear, but not panic, in 2008 started our most-recent, and most-severe since at least early 80s, probably since Depression, recessionary bout.)

   b. Large network of federal loan guarantees, subsidies, & agencies ⇒ socialization of risk, lowers effective interest rates facing many buyers & so allows many more transactions to occur that o/w could not (remember supply & demand curves & triangles of lost exchanges)...

2. Introduction of a central bank with legal capacity/responsibility to conduct counter-cyclical monetary policy for nation (**Treasury-Federal Reserve Accord of 1951**):

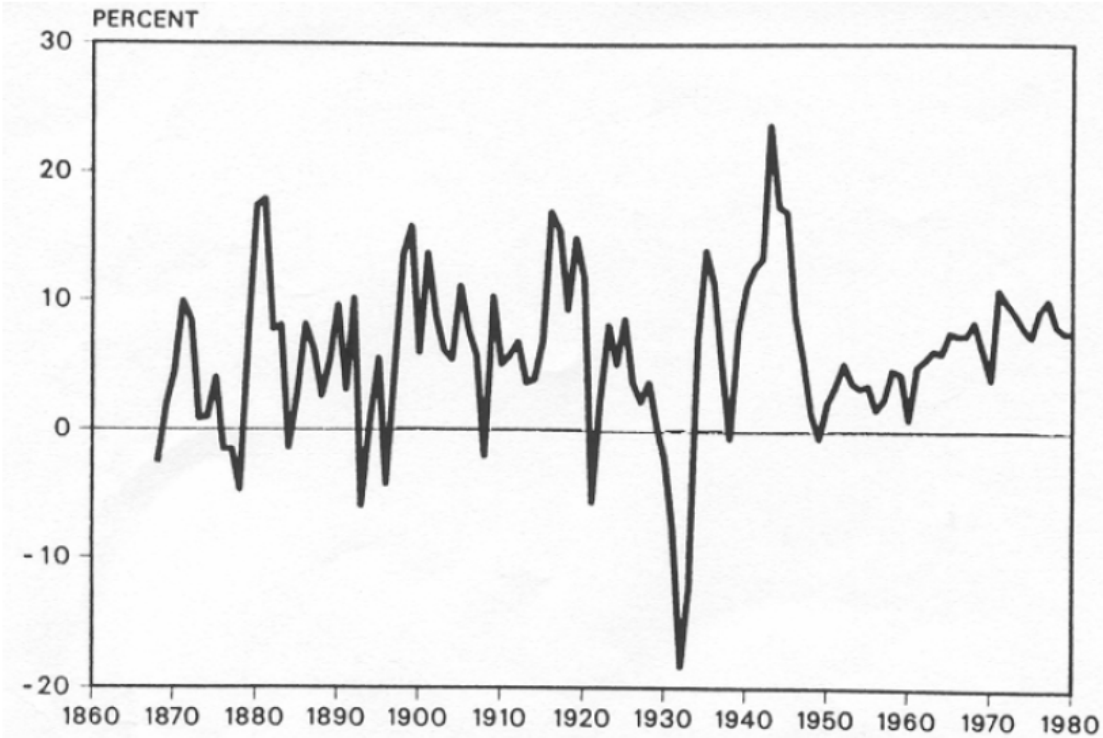


Figure 1.7 Monetary stability over time: M2 growth rates (percent per annum), 1868–1980. *Sources:* U.S. Department of Commerce, *Long Term Economic Growth 1860–1965*, Series B112, 1966; and TROLL-Citibank Economic Database, Series NBER12-FMM2X.

	1868–1929	1930–1949	1950–1980
Mean ($\bar{x}$)	5.78	5.80	6.08
Standard deviation (σ)	5.69	10.47	2.68
Coefficient of variation ($\sigma/\bar{x}$)	0.99	1.81	0.44

a. Using Annual Data from 1890-1929 **(Table 1.3, p. 32)**:

$$DM2_t = +4.85 \quad +0.25DM2_{t-1} \quad -0.01DM2_{t-2} \quad +0.06DCPI_{t-1} - 10.9[\ln Y_{t-1} - (\ln Y_{t-1})^*]$$

T-stats: (2.43) (1.19) (-0.05) (0.24) (-0.72) $R^2 = 0.00$

b. Using Annual Data from 1950-1980:

$$DM2_t = +1.62 \quad +0.52DM2_{t-1} \quad +0.07DM2_{t-2} \quad +0.29DCPI_{t-1} \quad -19.0[\ln Y_{t-1} - (\ln Y_{t-1})^*]$$

T-stats: (1.91) (2.88) (0.41) (2.01) (-1.79) $R^2 = 0.55$

c. These equations demonstrate two things:

(1) Monetary policy became much more predictable [what part tells you that?]

(2) Monetary policy became much more counter-cyclical [what part tells you that?]

3. Whether this had large effect in achieving postwar stability much debated [I find evidence here & elsewhere pretty convincing (see, e.g., Galí in AER on continued empirical power of AD-AS model)—when policy actually conducted counter-cyclically.]

C. Plus the fiscal-policy changes & introduction &/or ↑T&T & other automatic stabilizers.

VIII. Rational Expectations:

A. Expectations-Augmented Phillips Curve

1. Workhorse model of much macro-economic CPE

2. $y = y_n + \alpha(\pi - \pi^e) \ldots + \varepsilon$

2. Aside: Elaboration of PE Theory CBI

a) PolSci & Econ gen'ly agree CBI ↓ infl; both also similarly def CBI as degree of autonomy of (conservative) CB from political authority in making monetary pol.

(1) From PolSci view:

(a) CB=bureaucratic institution, populated by financial experts generally hawkish on inflation, whether socialized to that view or coming from a population w/ those interests.

(b) Govt instead, & especially in democracy, more responsive to various societal pressures that may emerge for inflation.

(c) Only most conservative Govts as anti-inflationary as CB, so delegation of monetary-policy authority to CB, i.e., CBI, ↓ inflation.

(2) From the (neoclassical) economist's view:

(a) Monetary policy involves a *time-inconsistency problem* ⇒ inflationary bias if policy controlled by a discretionary, i.e., responsive, authority.

(b) Credible delegation of monetary authority to an independent & conservative (i.e., a non-responsive) CB offers commitment device to evade time-incons. & so infl. bias ⇒ CBI ↓ infl

b) *Aside*: Elaboration of neoclassical model monetary policy by rule vs. discretion:

(1) Start with a "rational expectations" model of a perfect-competition economy:

(a) Equation (1), the economy: $Y = Y_n + \alpha(\pi - \pi^e)$.

(i) I.e., output (Y) generally equal to natural output (Y_n), but short-run prices may be sticky so, if monetary authority created INF>expected INF (i.e., if $\pi - \pi^e > 0$), then Y temporarily exceeds natural rate. I.e. short-run (or expectations-augmented) Phillips curve (with slope α).

(2) Now suppose the policymaker has value function given by:

(a) Equation (2), policymaker's objective: $V = -(1/2)A(Y - Y^T)^2 - (1/2)\pi^2$

(i) I.e., policymaker does not like deviations of output from some (presumably high) target rate Y^T, & also dislikes inflation (deviations from target, set to 0 for simplicity).

(3) So, policymakers w/ preferences described by (2) facing economy described by (1) & controlling INF rate directly (*a simplification*), will act as if solving following maximization:

(a) $\text{Max}_\pi -(1/2)A(Y_n + \alpha(\pi - \pi^e) - Y^T)^2 - (1/2)\pi^2$ where, notice, (1) has been substituted into (2)

(b) $\Rightarrow -A\,\alpha\,(Y_n + \alpha(\pi - \pi^e) - Y^T) - \pi = 0$ ...maximize by taking derivative of expression to be maximized w/ respect to control variable (π) & setting result equal to zero...

(c) $\Rightarrow \pi = -A\alpha^2\pi - A\alpha\,(Y_n - \alpha\pi^e - Y^T)$ ...rearranging...

(d) $\Rightarrow \pi(1 + A\alpha^2) = -A\alpha\,(Y_n - \alpha\pi^e - Y^T)$ ...rearranging again...

(e) $\Rightarrow \pi(1 + A\alpha^2) = A\alpha^2\pi^e - A\alpha\,(Y_n - Y^T)$ ...and again...

(e) $\Rightarrow \pi(1+A\alpha^2) = A\alpha^2\pi^e - A\alpha\,(Y_n - Y^T)$ ...and again...

(4) So, policymakers w/ preferences (2), facing economy (1), choose INF given by (3e),

(a) but here's the *rational expectations* part: Price setters know policymakers behave this way, so their π^e expectations also given by (3e). I.e, in eqbm, something Abe-Lincoln-like: "you can't fool all the people all the time". On average, π^e will equal π. So, rewriting (3) with $\pi^e=\pi$ gives you:

c) *Rational-Expectations Equilibrium*: $\pi = A\alpha(Y_n - Y^T)$; and, substituting $\pi^e=\pi$ back into economy, (1), we also get that in eqbm: $Y = Y_n + \alpha(\pi - \pi^e) = Y_n$. I.e., monetary policy has no real effects in eqbm. (Note: if so, then to avoid real costs of monetary contraction: simply announce contraction soon enough & be believed so $\pi^e=\pi$ reflected in wage & price contracts will include expected contraction...]

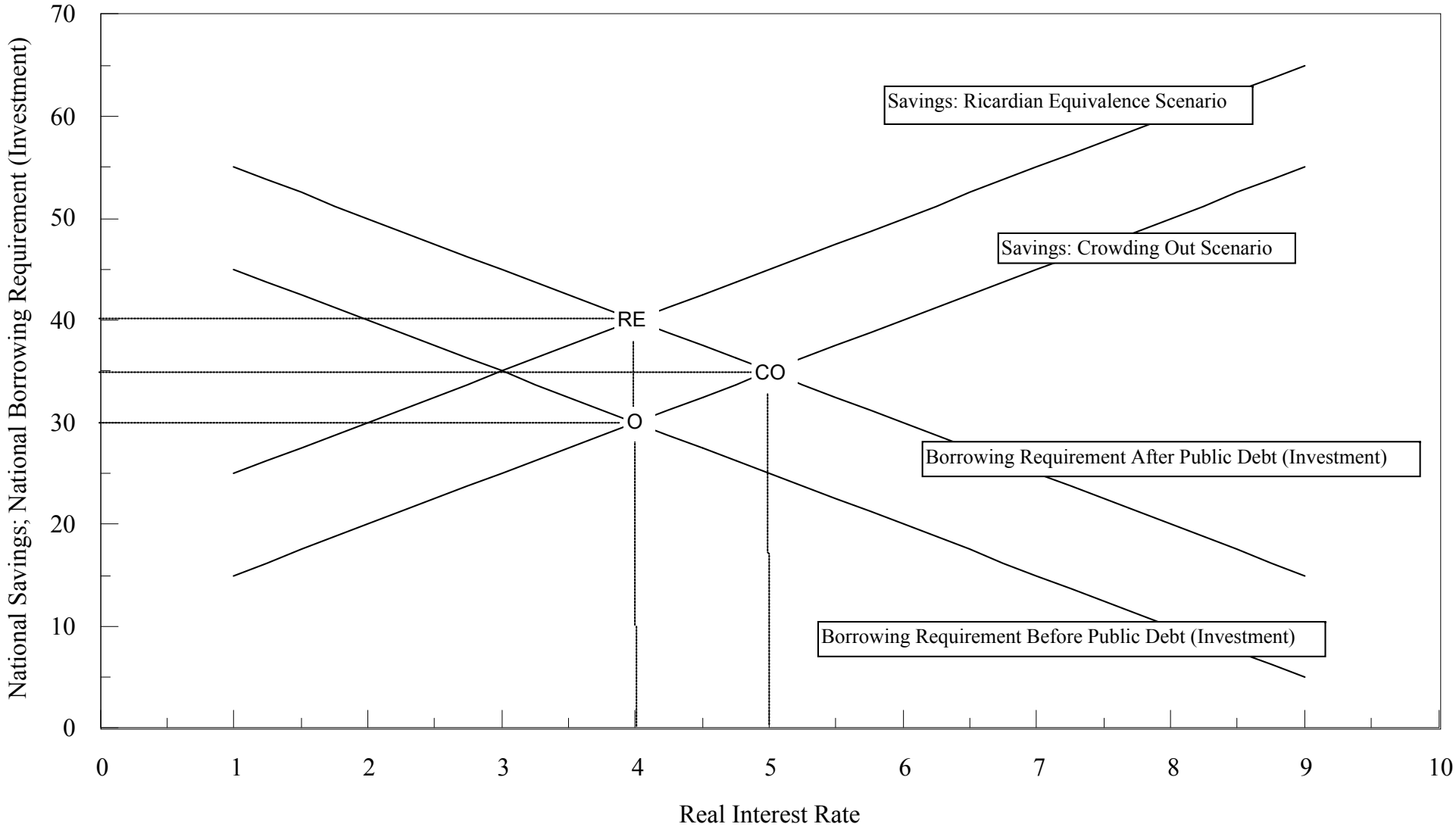
B. Ricardian Equivalence/Tax-Smoothing; Crowding in & out

1. Most agreed pre-RE that deficits = short-term ↑ real demand &, thereby, real output & income but accumulated debt also *crowded out* private investment long-run, eventually hindering growth.

2. Crowding-out logic:

   a) Higher public borrowing = ↑ demand for savings, so, absent some ↑ savings-rate schedule, extra borrowing-demand would ↑ interest rates, forcing private actors to forego some **I** that could have profited at lower rates.

   b) Fig I.9, purely pedagogical, start at *O*, where real *i* 4% & savings=private invest at 30, & suppose govt borrows 10. Total borrowing req. shifts up, &, since no shift in savings schedule, new eqbm is at CO where real *i* 5% & total of private invest & public borrow=35. Pub borrow=10, so private invest down to 25



c) ∴, in basic Keynesian macro, pub deficit ⇒↑ disposable *y* (by raising G-T) in short-run, giving consumption-boost to economy. In long-run, pub borrow came partly at private-borrow expense, exactly how much depending on elasticities of savings & invest schedules (slopes of funds demand- & supply-lines in Fig I.9).

d) Flatter save/steeper invest curves⇒more crowd out; 'course, costs also depended relative efficiency pub & priv consumpt & invest so financed.

3. Crowding *in*:

a) Some discussion of possibility that govt & private debt instruments sufficiently complimentary (as asset holders' investments) that ↑pub debt could actually crowd *in* private investment.

b) Not considered empirically plausible in total, but does suggest that public-borrowing instruments that more complimentary (less substitutes) for private-debt assets are better for public borrowing. Some lit on this.

4. RE revolution ⇒ ("rediscovery" of) **Ricardian equivalence theorem** (Barro'74,'79): whether govt borrows or taxes to finance any given amount of public spending is irrelevant to real economy.

a) In Fig: priv sect now knows ↑ borrow today=>higher taxes tomorrow to repay debt & so it ↑ savings when govt borrows by enough to cover net-pres value of req'd future taxes. Happens be exactly net pres value debt!

b) Starting from O again; govt borrows 10, private ↑ savings to cover. New eqbm at RE, where real *i* remains 4% & pub borrow+private invest = 40. Again, 10 = public borrowing, leaving private invest unchanged at 30.

c) Govt debt per se no drag on economy, though what does w/ borrowed money remains critical of course.

IX. International Economics

A. Motivation:

1. To understand PE of international trade, money, & finance, must have working knowledge some int'l econ. Much PE lit assumes readers familiar basic trade theory & open-econ macroecon.

2. Two models that PS PE's use most frequently: classical model of trade & IS-LM-BoP model.

   a) Hays' notes (from which below) based on selected chs. *The World Economy* (Yarbrough&Yarbrough, 2nd ed).

B. Trade

1. Comparative Advantage (Ricardo)

2. HORSS (Hecksher-Ohlin, Rhybscinsky, Stolper-Samuelson)

3. Specific-Factors (Ricardo-Viner)

C. A Trade-Theory Primer (Based on Chapters 2, 3, and 4 in Y & Y)

1. All standard trade models rely on set of common assumptions:

   a) Perfect competition in all goods & factor markets ⇒ price of goods = marginal cost & price of factors = value of their marginal product.

   b) Fixed factor-endowments, all factors fully employed in production process.

   c) No transportation costs or the like.

2. Ricardian (Classical) Model and the Principle of **Comparative Advantage**

a) 2 countries, A & B, 2 goods, X & Y, & 1 factor of production (Labor, L).

b) 1 country has ***absolute advantage*** in production of particular good, if can produce good more efficiently. Country A has absolute advantage in production good X, if $a_{LX}>b_{LX}$ in below.

c) ***Production functions***: equations that map input (L) into output (X or Y). E.g.:

$$X = a_{LX}L \; ; X = b_{LX}L$$

d) a_{LX} is country A's input coefficient for X, etc. Inverse of input coefficient gives units labor needed produce 1 unit of X, so more-efficient technologies = larger input coefficients.

e) If $a_{LX}>b_{LX}$ and $b_{LY}>a_{LY}$, so A absolute adv. in X & B in Y, then intuitive that A&B each gain from trade. Not so obvious that both countries would benefit from trade even if 1 had absolute adv in production both goods.

f) Gains from trade if countries specialize according to their **comparative advantages**.

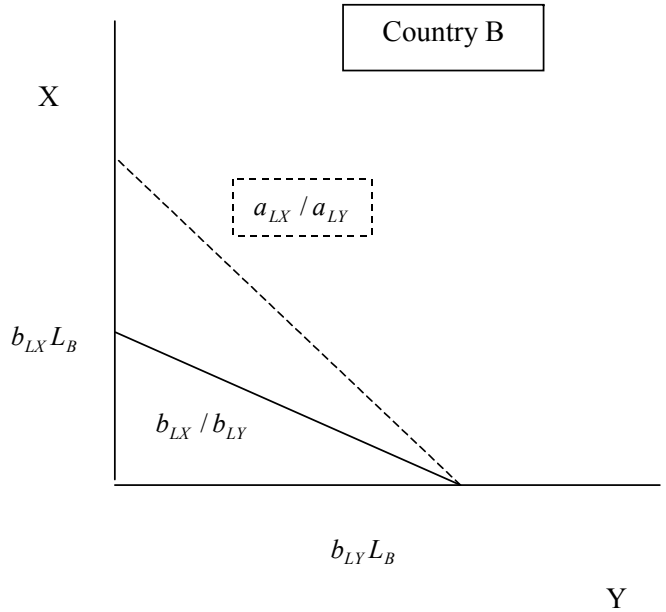
(1) Ricardo's example showed industrially advanced Britain would benefit from trade (exporting cloth) w/ less economically developed countries (Portugal, exporting wine) or that less-developed ones would also gain & not lose by such exchange.

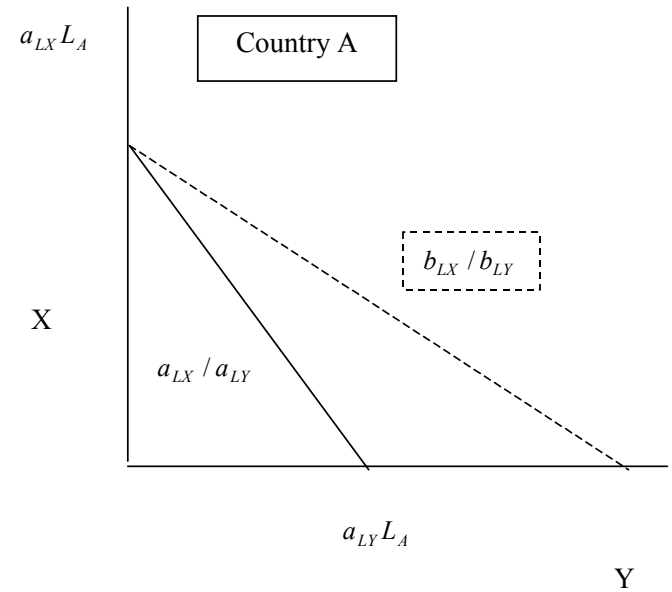
g) DEFINITION: A has **comparative advantage** in X, relative to B, (& ∴ B comp adv in Y) if A's opportunity cost of producing X in terms of good Y is less than B's opportunity cost, or in production functions above if:

A has Comparative Advantage in X, and B in Y iff: $a_{LX}/a_{LY} > b_{LX}/b_{LY}$

h) NOTE: If Country A has comp adv in X, Country B must have comp adv in Y because impossible that both $a_{LX}/a_{LY} > b_{LX}/b_{LY}$ and $a_{LY}/a_{LX} > b_{LY}/b_{LX}$ true.

i) One way see how & why both benefit from trade uses ***production possibility frontiers***: PPF's give max of 1 good econ can produce given amount production other. Represent limits of economies' productive capacity. Trade beneficial b/c frees countries produce & consume different mixes & so consume beyond their PPF. To get PPF, need to add following resource constraint (full employ, fixed endow): $L_A = L_{AX} + L_{AY}$.





j) ⇒ PPF's $X = a_{LX}L_A - (a_{LX}/a_{LY})Y$ for A & $X = b_{LX}L_B - (b_{LX}/b_{LY})Y$ for B

k) If A comp adv in X, has steeper PPF than B, so if A specializes production X and trades X for Y, will trade at price somewhere b/w two *autarky* prices (i.e., b/w a_{LX}/a_{LY} and b_{LX}/b_{LY}), which allows A to consume at somewhere above its PPF, up to dashed line (budget constraint at B's autarky price).

l) Notes: Only source comp adv in Ricardian model is differences production tech (i.e., input coefficients). Model also assumes constant costs to production

3. Worth showing PPF's with indifference curves, and the tabular input-table version above results

4. An example illustrating implications trade integration if network of political-economic institutions part of national production function (so shapes PPF's: Franzese & Mosher 2002):

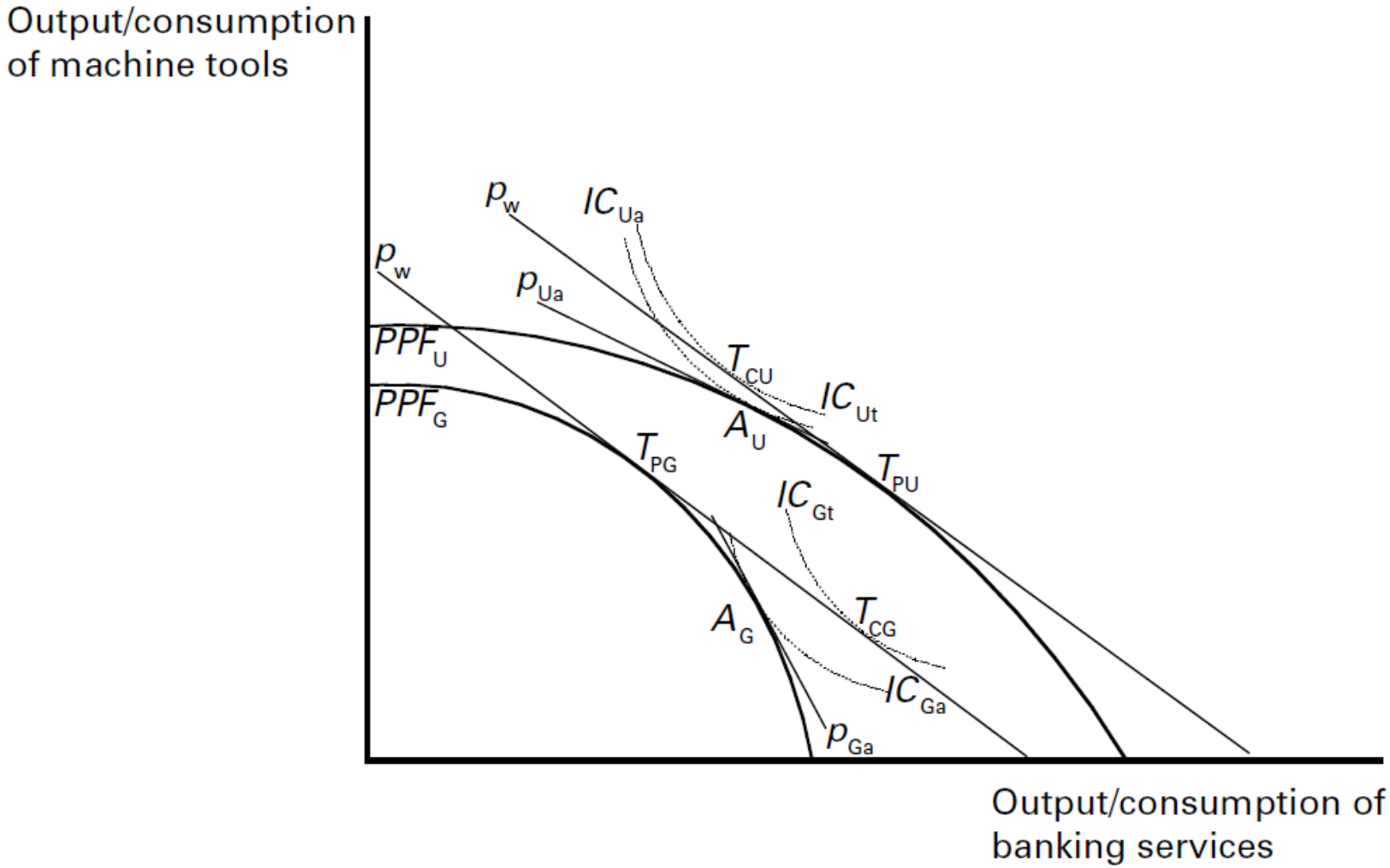


Figure 3 Trade with strictly inferior (superior) institutions.

D. The Neoclassical Model of Trade and the Heckscher-Ohlin Theorem

1. Std neoclassical trade model (2x2x2): 2 goods, 2 factors production, capital (K) & labor (L), 2 ctrys.

   a) Both goods use both factors in production, but not equally. One uses capital rel'ly intensively (=>other L).

   b) =>, e.g., for any factor prices, production of K-intense good uses more K/L than L-intensive good will use.

   c) Finally, unlike Ricardian model, neoclassical model assumes increasing costs to production.

2. Country A has ***comparative advantage*** in producing good X if relative price of X to Y in A is lower than in Country B—that is, if $(P_x/P_y)^A < (P_x/P_y)^B$. ***Gains from Trade*** because:

   a) Autarky (no trade) eqbm: relative price good X to Y equals both rate X transformable into Y on production side (***marginal rate of transformation***) & rate consumers willing substitute X for Y (***marginal rate of substitution***), so each ctry can produce its comp-adv good at rel price below what consumers in other ctry willing pay for it.

   b) Under free trade, relative price X to Y settles somewhere b/w the relative prices in A & B under autarky, so, at free-trade price, both ctrys can increase consume 1 good w/o lower other. So free trade increases their utility.

3. Model clarifies sources *comparative advantage* beyond diff's production technologies. One such is factor endowment. Even w/ same product tech, differ factor abundance => gains from trade.

4. A capital abundant if more capital per unit labor than B: $K^A/L^A > K^B/L^B$.

   a) If A capital abundant, then B labor abundant. Ctry has comparative advantage in production good that uses its abundant factor intensively =>

   b) ***Heckscher-Ohlin Theorem***: under free trade, each ctry specializes in production of (& exports) good that uses its abundant factor intensively.

E. The Mobile Factors Model and the Stolper-Samuelson Theorem

1. Consequences of trade in goods for returns to factors in their production: key issue is factor mobility
2. *Mobile Factors:* capital and labor can shift production X into Y & vice versa (freely) =>
3. ***Stolper-Samuelson Theorem***: Δ p good $\Rightarrow$ more-than-proportional Δ (same dir) p factor used intensively in its production (*Rhybscinsky magnification effect*). Combined w/ H-O (ctry specialize in production good using its abundant factor intensively), $\Rightarrow$ $\uparrow$ trade benefits owners ctry's rel'ly abundant & hurt owners rel'ly scarce factor.

   a) Logic:

   (1) Under free trade, ctry specializes in producing good using its abundant factor intensively, produces lot, exports what not consumed. Produces little of good using scarce factor intensively, importing rest of its consumption. So, trade $\uparrow \Rightarrow$

   (2) Price imported good $\downarrow$ as domestic production replaced w/ more-efficient foreign; rising costs $\Rightarrow$ price exported good $\uparrow$.

   (3) $\uparrow$ ($\downarrow$) production exported (imported) good $\Rightarrow$ $\uparrow$ ($\downarrow$) demand both labor & capital since both used.

   (4) Exported (imported) good uses (scarce) abundant factor intensively, so strong net $\uparrow$ ($\downarrow$) demand abundant (scarce) factor.

   (5) So price paid abundant (scarce) factor $\uparrow$ ($\downarrow$). Factor markets clear, so price abundant (scarce) factor must $\uparrow$ ($\downarrow$) by more than $\uparrow$ ($\downarrow$) price exported (imported) good: ***magnification effect***: Δ output prices have magnified effect on input prices.

   (6) *Why?* Factor endowments assumed fixed, so for factor markets to clear under $\uparrow$ ($\downarrow$) production exported (imported) good, production both goods must become more scarce-factor intensive. Can only occur if price abundant (scarce) factor $\uparrow$ ($\downarrow$) by more than price exported (imported) good, which needed to induce necessary Δ production input-choices.

   (7) *Example:* Ctry labor abundant, produces capital-intensive steel and labor-intensive cloth. $\uparrow$trade $\Rightarrow$ First, ctry will $\uparrow$ ($\downarrow$) production cloth (steel). Price cloth $\uparrow$ (steel $\uparrow$). The $\downarrow$ steel production $\Rightarrow$ $\downarrow$ demand cap & lab, frees lot capital and little labor. $\uparrow$ cloth production will greatly $\uparrow$ demand labor & only slightly $\uparrow$ demand capital. Thus, price lab $\uparrow\uparrow$ and price cap $\downarrow\downarrow$. For lab & cap markets clear, $\uparrow$ production cloth ($\downarrow$ steel) must absorb (shed) more (less) cap than would under existing mix: both must become more capital intensive. Can only occur if p(lab) $\uparrow$ > p(cloth) $\uparrow$ & p(cap) $\downarrow$ > p(steel) $\downarrow$.

   (8) $\Rightarrow$ those supplying labor (capital) pay $\uparrow$ ($\downarrow$) > than p both goods, so workers (capitalists) unambiguously better (worse).

F. The Specific Factors (Ricardo-Viner) Model

1. Specific-factors (or Ricardo-Viner) model assumes instead one factor of production immobile or specific to a particular good while other factor mobile, general, used in production both goods. ⇒
   a) Free trade benefits (harms) factor specific to good using country's abundant (scarce) factor intensively.
   b) Effect on mobile factor ambiguous, depends if country abundant in mobile or immobile factor and whether owners mobile factor consume more of imported or exported good.
2. Logic:
   a) Again, under free trade: ctry specializes production good using abundant factor intensively, produce lot of & export it; produce little of & import scarce-factor-intensive good. So, ↑ trade ⇒ p(imported good) ↓ as domestic replaced w/ more-efficient foreign production; increasing costs ⇒ p(exported good) ↑.
   b) Price paid immobile factor = value marginal product (VMP, assumes perf. comp.). Assume productivity one factor depends positively on quantity other factor being used (e.g., Cobb-Douglas production function): as mobile factor out of imported into exported good, price paid factor specific to exported good ↑. This will ↑ factor's VMP further: owners this (other) specific-factor unambiguously better (worse) off.
   c) ↑ (↓) production exported (imported) good ⇒↑ (↓) demand mobile factor. If ctry abundant (scarce) in mobile factor, net ↑ (↓) demand for mobile factor. If abundant (scarce), price paid mobile factor ↑ (↓), but by less ↑ (↓) price of exported (imported) good. Thus, net gain/loss depends relative export/import consumption.
3. An Example:
   a) Ctry labor abundant, produces cap- (lab-)intense steel (cloth), but capital is either steel or cloth specific.
   b) Trade ⇒ ↑ (↓) price & produce cloth (steel). ↑ produce cloth (↓ steel) ⇒ ↑↑ (but only ↓) demand labor. Net ↑ D, so p(labor) ↑. Cap in cloth fixed, D ↑↑, so VMP and p(ClothCap) ↑↑↑, more than p(cloth). Reverse for SteelCap. Between for Labor (the mobile factor). (Lab, the mobile, is better than if had been scarce…)

X. Open-Economy Macroeconomics: The *IS-LM-BoP* Model

A. Open-Economy Macroeconomics (Based on Chapters 16 and 17 in Y & Y)

1. IS-LM-BoP model most-common tool assessing effects fiscal & monetary policy under fixed & float exchange-rate regimes.

2. General-equilibrium model in sense that macroeconomic outcomes (endogenous variables: interest rate (*price*) & level national income (*quantity*)) determined by simultaneous equilibration of a country's money market (*LM: liquidity market, supply & demand money*), goods-&-services market (*IS: supply & demand savings/investment*), & its balance of payments (BoP: supply & demand of domestic & foreign goods (*trade*) & funds (*capital*)).

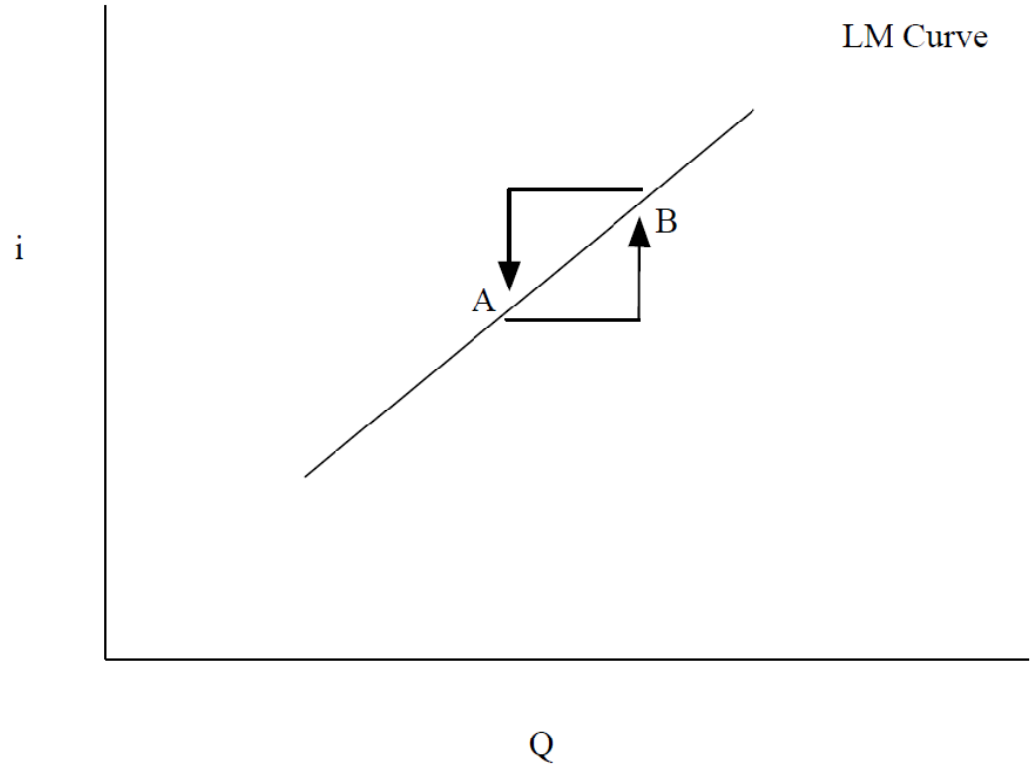
3. General Equilibrium = combo interest rates (i) and national income (Q) that simultaneously clears a ctry's money & goods markets & balances its external accounts.

4. Easiest to start from equilibration in each market; and easily presented graphically.

B. <u>Partial Equilibrium in the IS-LM-BoP Model</u>: The LM Curve (Money-Market Eqbm)

1. ***Money-Market Eqbm***: outstanding stock money willingly held; i.e., demand = supply for/of money.

2. Given fixed money stock, for every level of national income (Q), a corresponding interest rate (i) will clear money market (i.e., equate supply and demand). The relationship depicted as ***the LM curve***.



3. LM slope up or down? ↑ income, money-supply fixed, requires ↑ i.

   a) Primary reason hold money is to facilitate economic transactions (buy things). So ↑ income means more transactions means more demand money; supply fixed, so need price money, which is i, ↑.

   b) Primary reason not hold money is opportunity cost, which = i could have earned. Thus, LM curve slopes up.

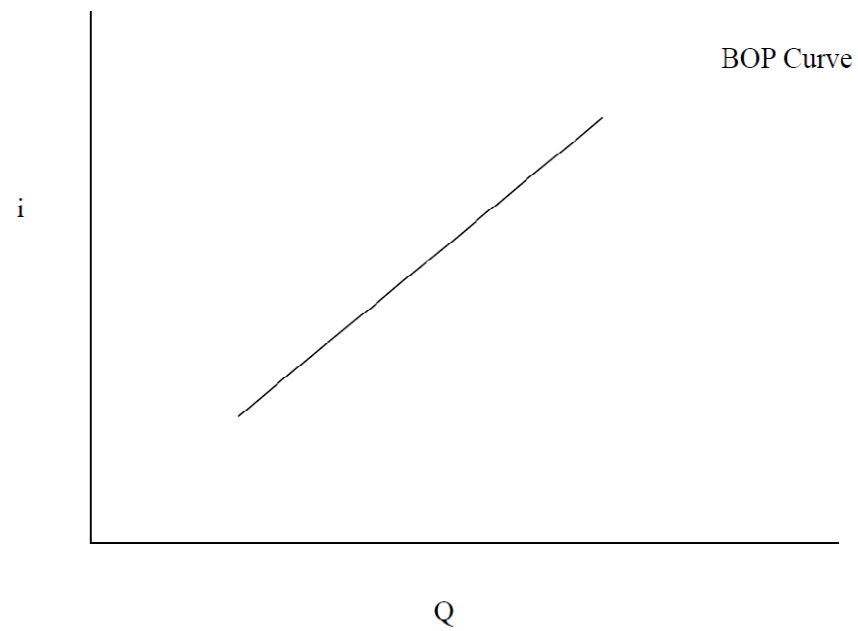
C. <u>Partial Equilibrium in IS-LM-BoP</u>: The BoP Curve (Balance-of-Payments Eqbm)

1. ***Balance-of-payments eqbm***: current account balances capital account (*Current + Capital Account = 0*).

2. Trade deficit/surplus (negative/positive current-account) requires equivalent capital inflow/outflow (positive/negative capital-account). E.g., trade surplus (positive current-account: earnings, inflow) balanced by foreign investment (domestic invest abroad, a negative capital-account, an outflow):

$$(X - M) + \text{Net Capital Flows} = 0$$

Net trade flows, exports (X) minus imports (M), balance net capital flows, capital outflow minus inflow



3. Again, for every level of national income (Q), a corresponding interest rate (i) yields balance of payments equilibrium by equilibrating domestic and foreign demand & supply of goods & capital.

4. The BoP curve reflects this equilibrium relationship. Does BoP curve slope up or down?

   a) $\uparrow Q \Rightarrow \uparrow$ consume foreign goods (imports), no effect exports (which depend foreign Q) $\Rightarrow$ current-account deficit. Ctry toward *BoP* deficit, cap inflows insufficient to finance imports. i must $\uparrow$ to attract foreign capital.

   b) Hence, external balance also requires $i \uparrow$ with Q: BoP curve, like the LM curve, slopes up.

5. Importantly, magnitude slope BoP curve (eleasticity) reflects degree capital mobility. High capital mobility $\Rightarrow$ capital flows extremely sensitive to movements i (elastic w.r.t. i). Flat at perfect mobility.

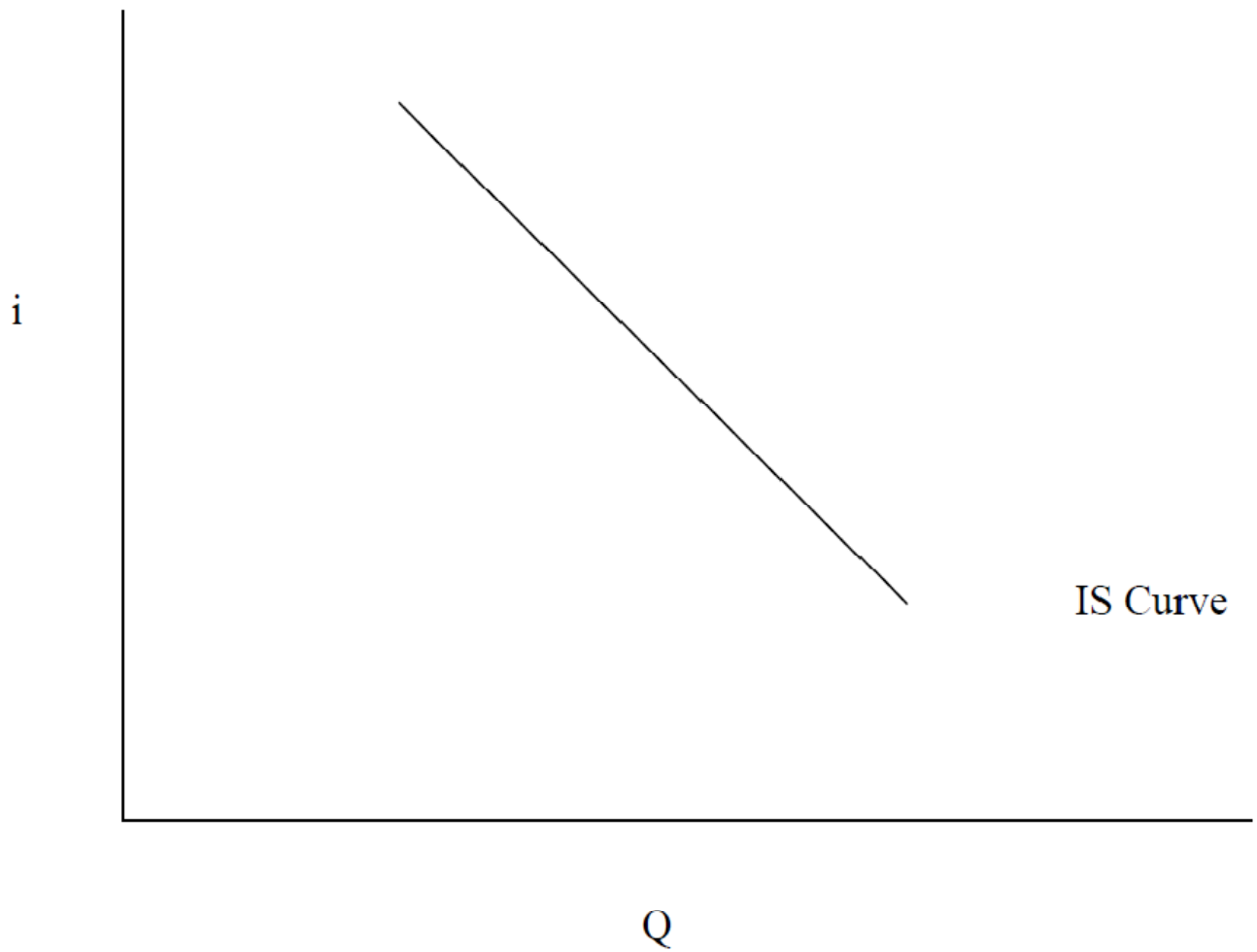
D. <u>Partial Eqbm in IS-LM-BoP</u>: The IS Curve (Goods-Market, Investment-Savings Eqbm)

1. Goods-&-Services market eqbm: production = consumption. National income (Q), production, = total ntl expenditures (E), consumption. $Q=E$ (i.e., AD=AS). Decompose E into its constituent parts: private consumption (C), private investment (I), govt spending (G), & trade balance ($X-M$).

$$Q = C + I + G + (X - M)$$

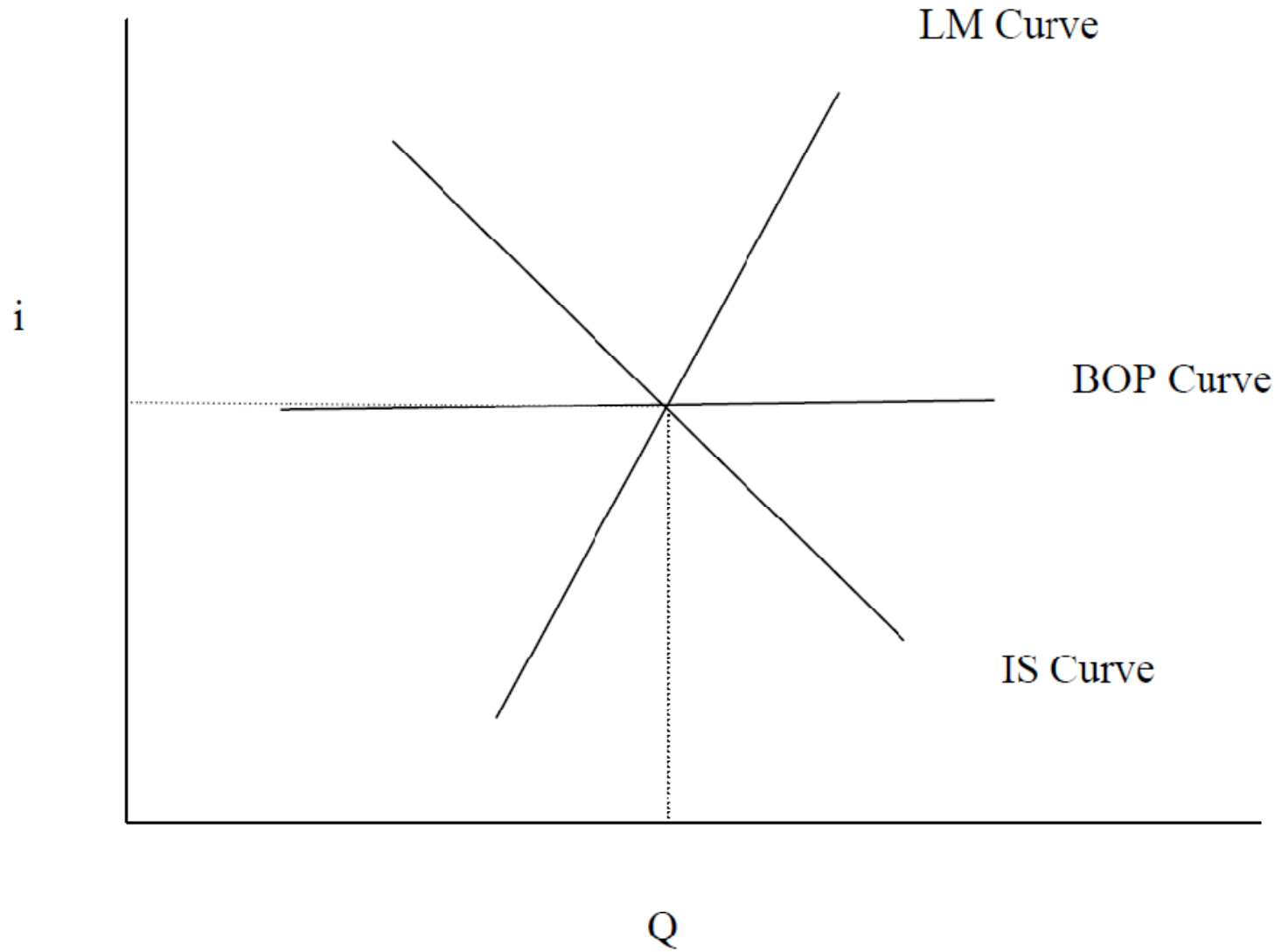
2. Again, for every level Q corresponds an i that will clear goods markets: ***IS curve***, slopes down.

3. Think *I*nvestment: $\downarrow i \Rightarrow \uparrow I$, & so Q. Or, if $\downarrow Q$, demand imports, M, $\downarrow$ moving trade to surplus. For goods & services to clear at lower Q, another part E must $\downarrow$, e.g., I, so i must rise. Goods-market partial-eqbm Q & i inversely related.



E. General Equilibrium in the IS-LM-BoP Model

1. In theory, general equilibrium in IS-LM-BoP model when domestic goods & money markets both clear and balance of payments in eqbm. Graphically, occurs at intersection of all three curves.



2. Some important IS-LM-BoP results/conclusions/intuitions associated w/ Mundell-Fleming:

a) Capital Mobility, Exchange-Rate Regime, and Fiscal & Monetary Policy Efficacy:

(1) Capital Immobile: Fiscal & Monetary Policy Effective. Exchange-rate Regime irrelevant (b/c no exchange, i.e. cap move)

(2) Capital Mobile, Float E.R.: Monetary Policy (especially) effective; Fiscal Policy (relatively) ineffective.

(3) Capital Mobile, Fixed E.R.: Monetary Policy ineffective (act'ly: immovable,unavailable); Fiscal Policy (especially) effective

b) Capital Mobility, Fixed Exchange-Rates, & Monetary-Policy Autonomy: *The Unholy Trinity* or *Trilemma*

(1) By above: cannot simultaneously pursue / have mobile capital, fixed exchange-rates, and monetary-policy autonomy.

c) Mundell-Fleming Condition (for exchange-rate depreciation to improve current-account (trade) balance):

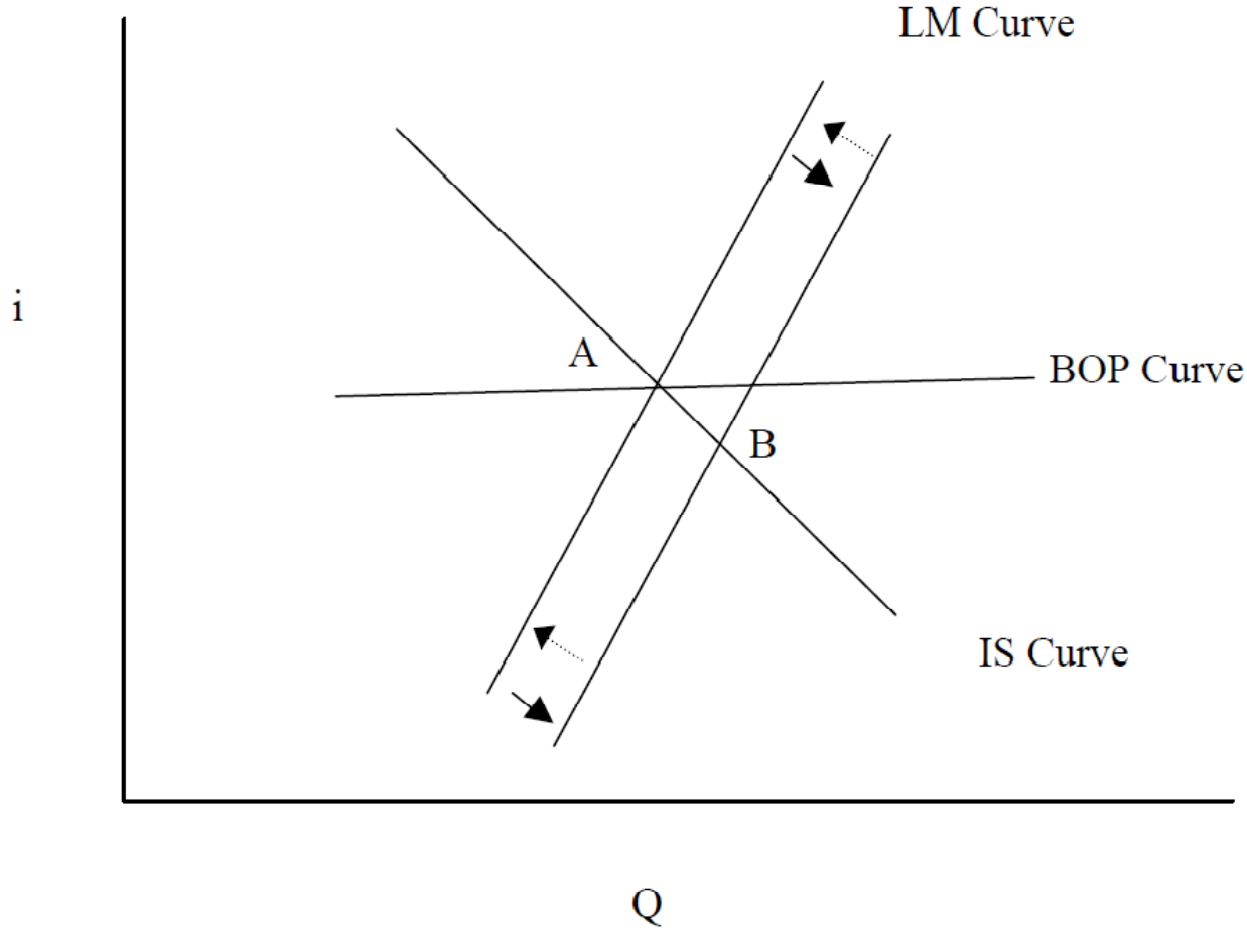
(1) Net elasticity of imports & exports (i.e., of the trade balance) w.r.t. exchange-rate must exceed 1: …else, effect of price increase (decrease) imports (exports) outweighs quantity decrease (increase).

3. Using the IS-LM-BoP Model for Policy Analysis

a) CASE #1: Money Policy Under a Fixed Exchange Rate *(Ineffective: unavailable, immovable, actually)*

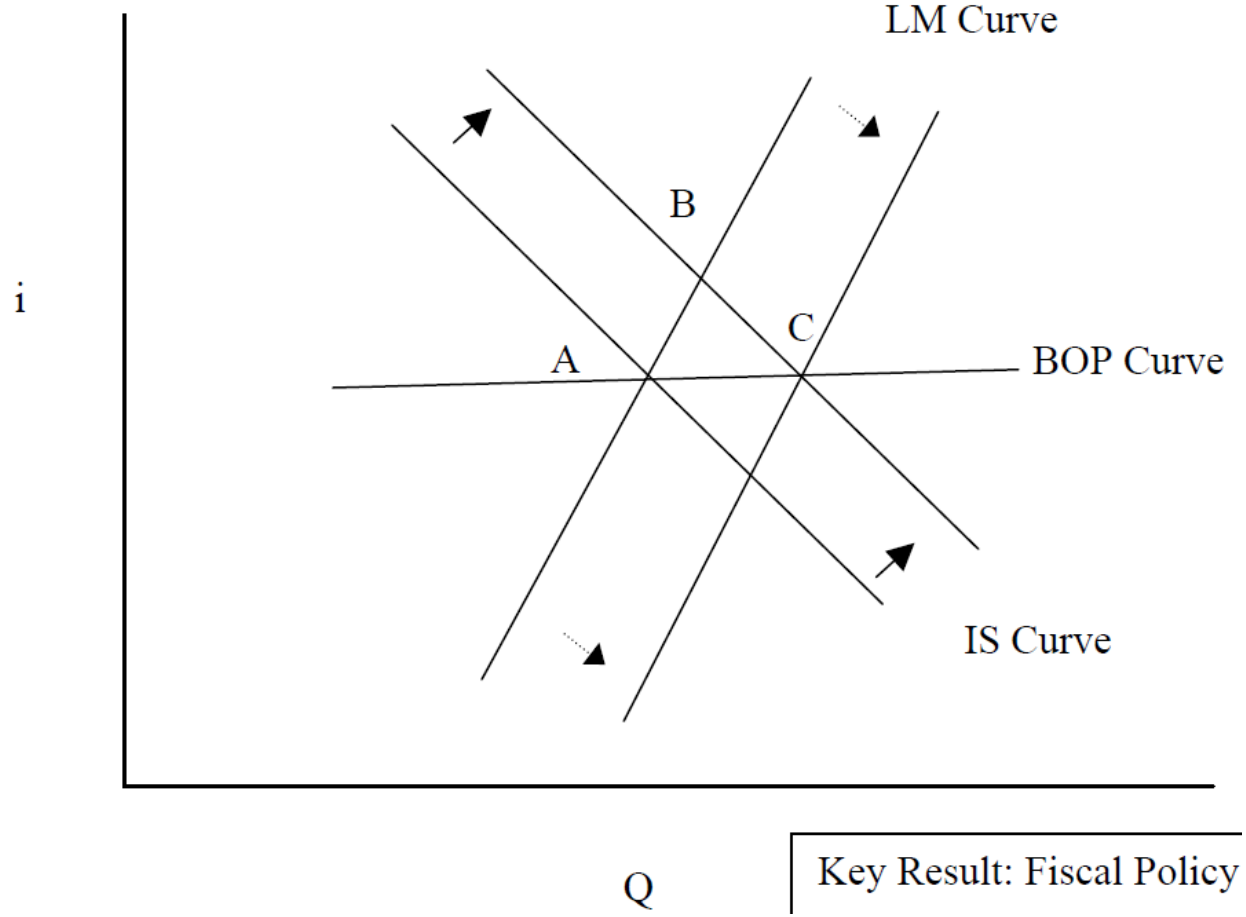
(1) Monetary Expansion: exogenous money-supply increase ⇒ lower i for each Q (& v.v.) ⇒ down (right) shift LM curve.

(2) Economy moves from point A to point B. But ↓ I ⇒ foreign capital flows out, so currency depreciates. But central bank to maintain pegged exchange-rate must defend currency by intervening to buy domestic-currency in foreign-exchange market. But CB buying own currency is removing money from circulation, i.e., shrinking domestic money-supply back to where it was. The LM curve shifts back and general equilibrium restored right back at point A.



b) CASE #2: Fiscal Policy Under a Fixed Exchange Rate *(Effective: in fact, doubly effective)*

(1) Expansionary fiscal policy: outward (up-right) shift IS curve (Greater E (specifically, G-T) for each *i*).



Key Result: Fiscal Policy

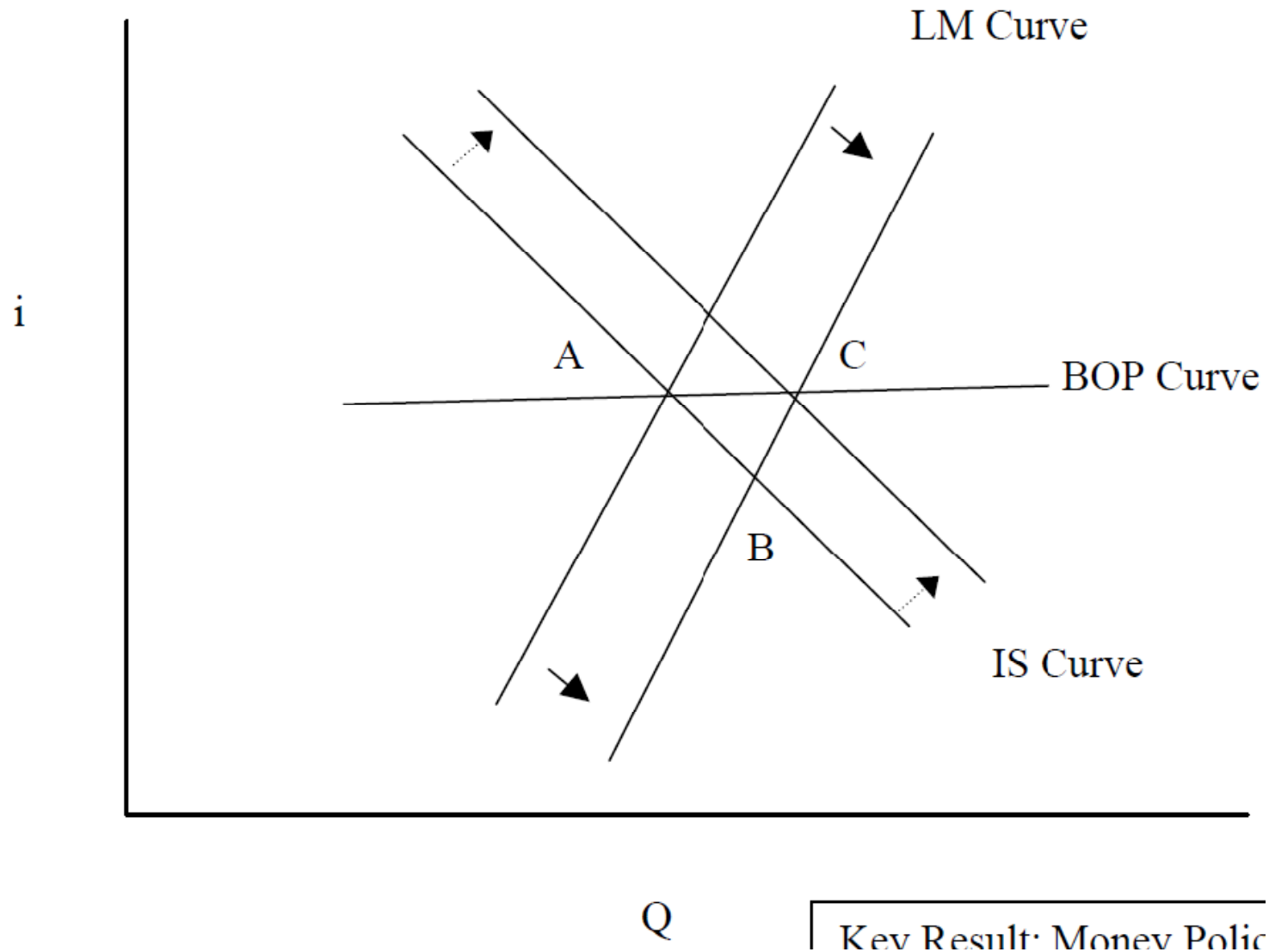
(2) Outward shift IS causes economy move A to B. Increased *Q/E* but fixed money supply, so *i* rises along LM. This same as closed-economy analysis above. With (open economy and) capital mobile, *i* ↑ causes foreign capital inflow, which appreciates domestic currency. To maintain fixed exchange rate, CB must intervene in foreign-exchange market by selling domestic currency; i.e., expanding domestic money supply (money previously held by CB, so out of circulation, now in). LM curve shifts outward too, & general equilibrium restored at C.

(3) Fiscal policy induces supportive monetary policy, & so especially effective in this way.

c) CASE #3: Money Policy Under a Floating Exchange Rate *(Effective: in fact, especially effective.)*

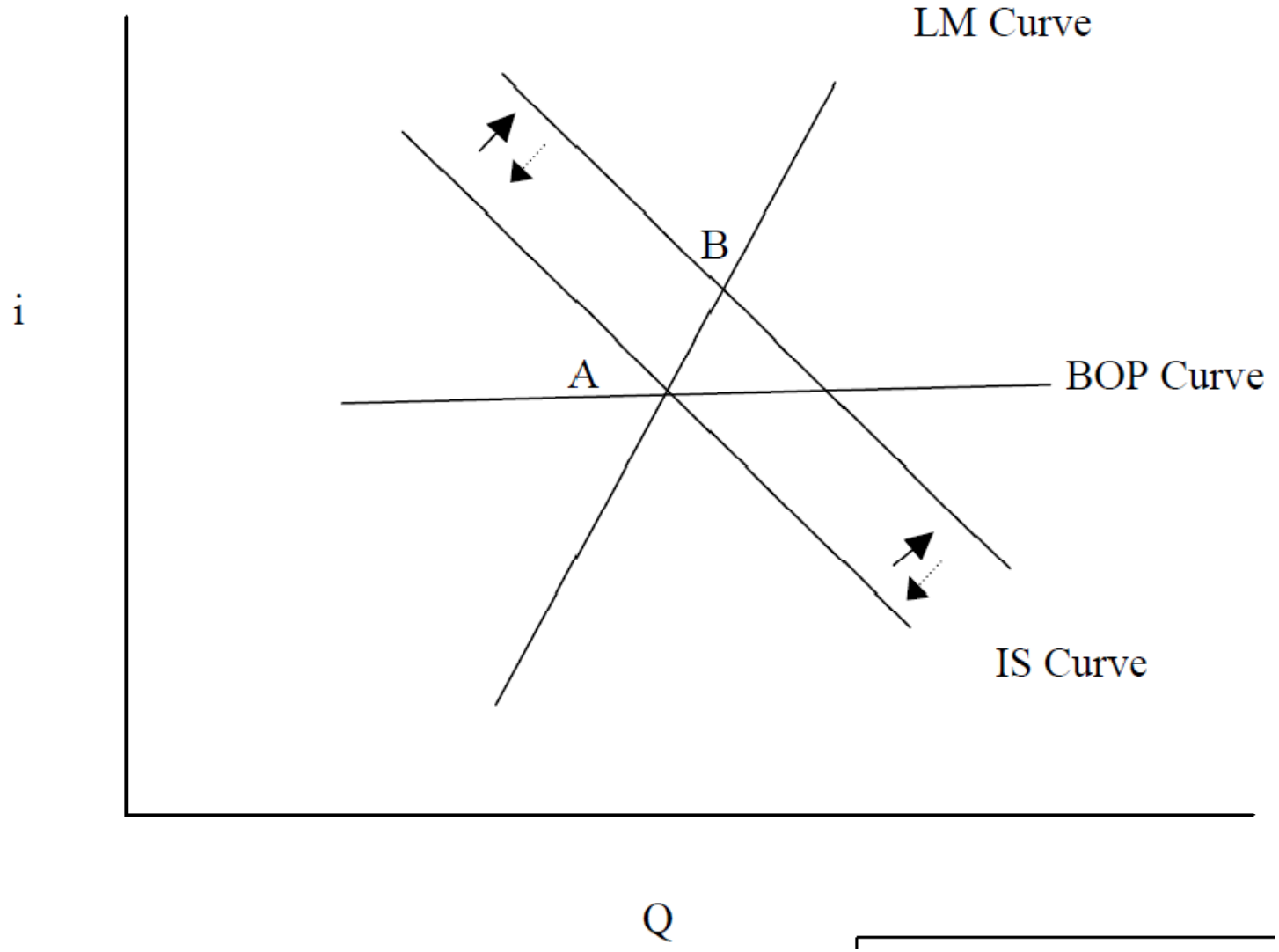
(1) Monetary Expansion: outward shift LM, as before. Induces ↓ *i* as before, & so capital outflow & depreciation, as before.

(2) Economy moves A to B, but this time CB doesn't resist. The allowed depreciation boosts (X-M), i.e., induces an IS curve shift outward. Balance of payments equilibrium restored at C.



Key Result: Money Polic

d) CASE #4: Fiscal Policy Under a Floating Exchange Rate: *(Relatively) Ineffective*



(1) Expansionary fiscal policy = outward shift IS. Economy moves A to B; *i* rises, foreign capital flows into domestic econ, & currency appreciates. This reduces exports & stimulates imports, causing IS curve to shift back. Balance of payments equilibrium restored somewhere back toward A, perhaps all the way back. Depends relevant set relative elasticities…

XI. Trade and Tariffs: Welfare Gains and Losses

Trade and Tariffs: Welfare Gains and Losses

Figure 1 demonstrates the welfare gains that accrue from free trade. Under autarky (i.e., no trade), the market equilibrium price and quantity are P^A and Q^A respectively. Consumer surplus is the region labeled "C" and producer surplus is equal to the sum of regions "A" and "B." With free trade the price of the good drops to the world price P^W, the quantity of the good produced domestically drops to Q^P, and the quantity of the good consumed increases to Q^C. The volume of imports is $Q^C - Q^P$. Under free trade, producer surplus shrinks from A+B to just A. Consumer surplus increases from C to C+B+D+E. Trade hurts producers; consumers benefit from trade; but consumers gain more than producers lose. In other words, there is a net increase in welfare that results from free trade.

Figure 1. The Gains from Trade

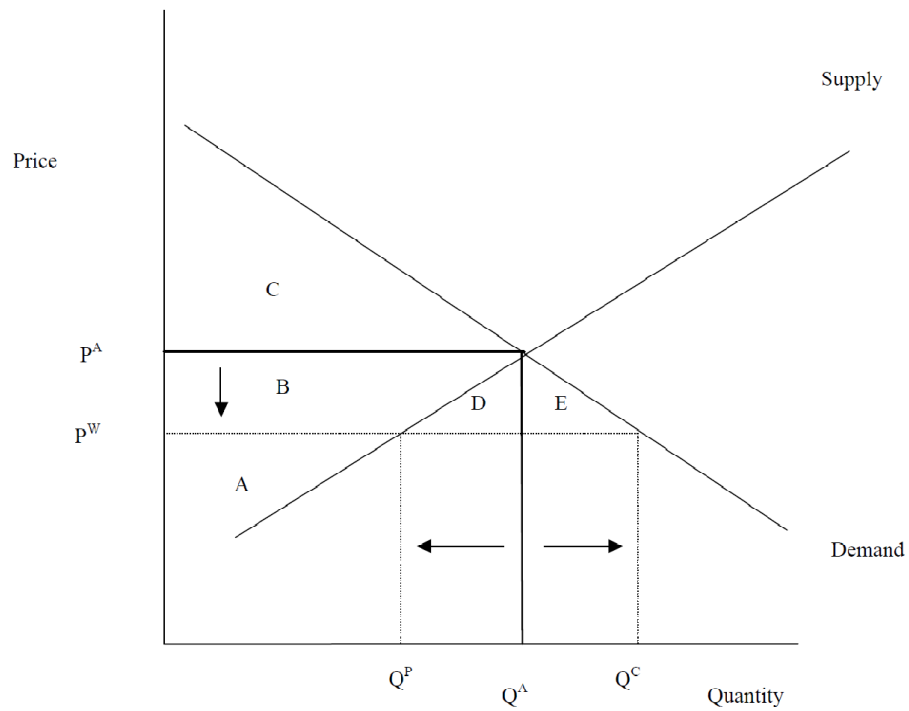
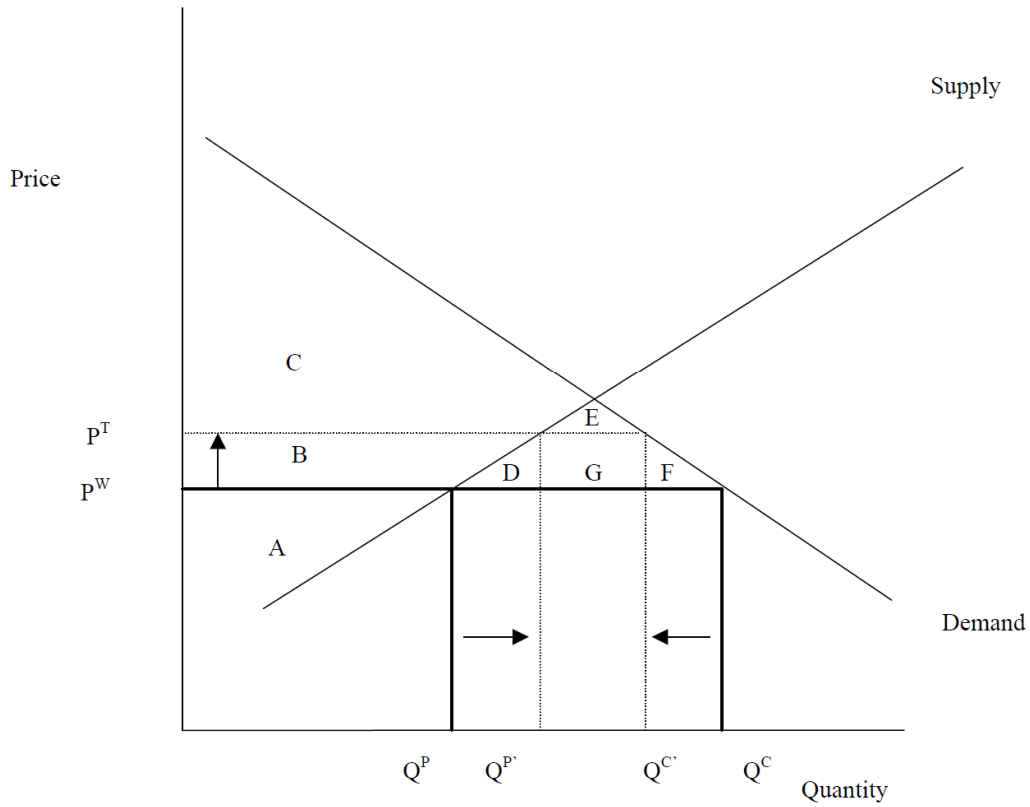


Figure 2 demonstrates why tariffs decrease aggregate welfare in small countries. Small countries are price takers. When they change their level of consumption it does not affect world prices. This time we start from the free trade equilibrium. Under free trade, the price of the good is P^W. Consumer surplus is B+C+D+E+F+G. Producer surplus is A. Imposing a tariff (a tariff is just a tax on imports) raises the domestic price of the good to P^T. (The tariff does not affect world prices.) Domestic production of the good goes from Q^P to $Q^{P'}$ and consumption decreases from Q^C to $Q^{C'}$. Consumer surplus shrinks to C+E. Producer surplus expands to A+B. The government collects G in revenue. (G is just the size of the tax ($P^T - P^W$) multiplied by the quantity of imports ($Q^{C'} - Q^{P'}$)).

Note that one effect of the tariff is to transfer welfare. So producers and the government gain at the expense of consumers. However, there are also losses in consumer surplus that are not transferred to other actors. These are called deadweight losses. In figure 2, these losses are the triangles D and F, which are sometimes referred to as "Harberger Triangles."

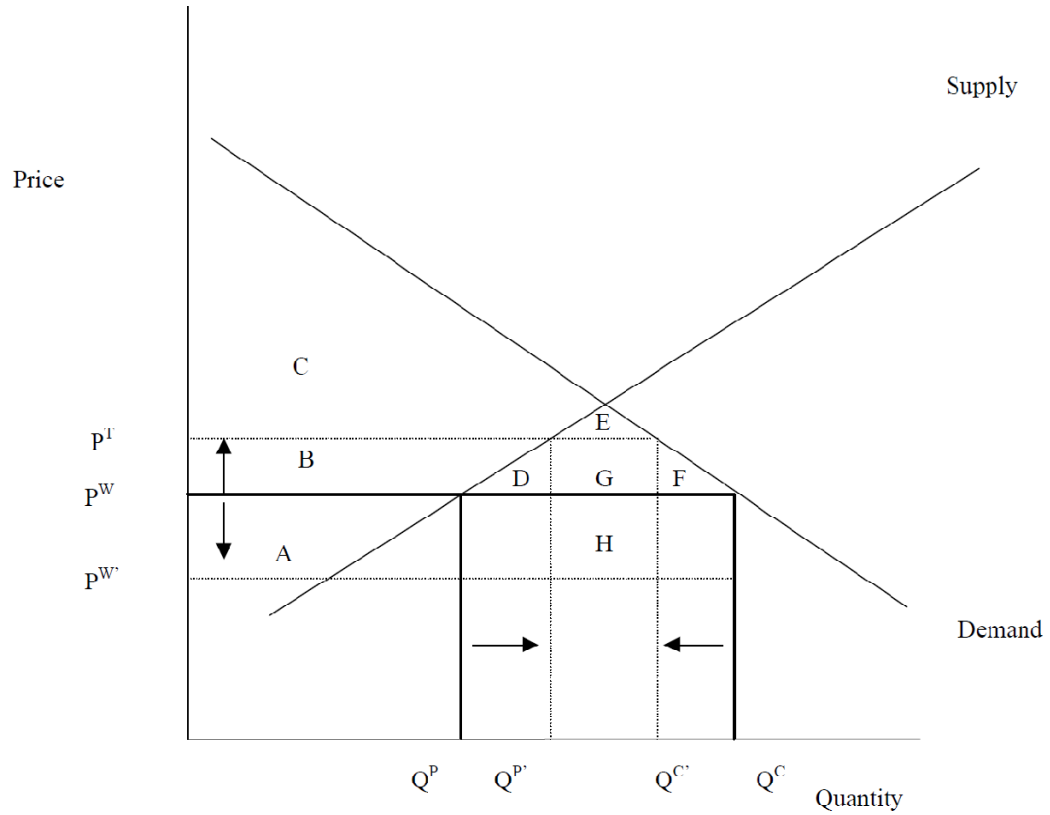
Figure 2. Tariffs in a Small Economy (Deadweight Losses)



If a country is large enough to have monopsony power, it may gain in the aggregate by imposing tariffs. A country has monopsony power, if it can push down the world price by limiting its consumption. How could this happen? If one country imports a substantial proportion of the total foreign goods produced for export, and it cuts its imports, this will create an excess supply of the good, which, in turn, will push its price down. If, by imposing a tariff, a government can push the world price down, it may be able to collect enough revenue to offset the deadweight losses in consumer surplus. If this is true, we say there is an optimal tariff.

This case is represented in Figure 3. If the government chooses a tariff rate so that the domestic price is P^T. Producer and consumer surplus are the same as in Figure 2. The only difference is that now, because the drop in consumption (from Q^C to $Q^{C'}$) pushes the world price down, the government collects G+H in revenue. If H > D+F, the country gains from the tariff.
N.B. If countries are large enough they have nonzero optimal tariffs, we can think of international trade cooperation as a prisoner's dilemma.

Figure 3. Monopsony Power and Optimal Tariffs



XII. Purchasing-Power Parity & Interest Parity

A. *PPP*: $P=EP^*$ or, in logs (ln), $p=e+p^*$

1. Logic of no-arbitrage-opportunity conditions
2. Empirical: holds very long run, to a constant; not at all short-run

B. (Uncovered) IP: $i = i^* + E(\Delta e)$

1. Logic very similar, relies on no-arb in different markets though
2. Empirical: holds very well up to extremely short-run, but VERY flexible given second term on right

XIII. Long-Run Growth (due to Paul Bergin UC-Davis)

A. Solow Growth Model

B. Convergence Hypothesis

C. Growth Accounting

D. New Growth Models

Lecture 5: Growth part 1: Solow Growth Model

(1st half of chapter 4)

1a) Definitions

Want to understand output per person,

Know what determines the amount of output:

$Y = F(K,L)$

Can divide by L, for representation of output per worker:

$Y/L = F(K/L,L/L)$

Can do this if production function is constant returns to scale, where using 1/L as the Z we are multiplying by.

Rewrite with $y = Y/L$, $k = K/L$:

$y = F(k,1)$ or $y = f(k)$

example: cobb-douglas:

$Y = A K^{\alpha} L^{1-\alpha}$

$Y/L = A (K/L)^{\alpha} (L/L)^{1-\alpha}$

$y = A k^{\alpha}$

So to find out what determines output per worker, need know what determines level of capital per worker.

b) What determines capital stock?:

increase capital stock by investing: creation of new capital.

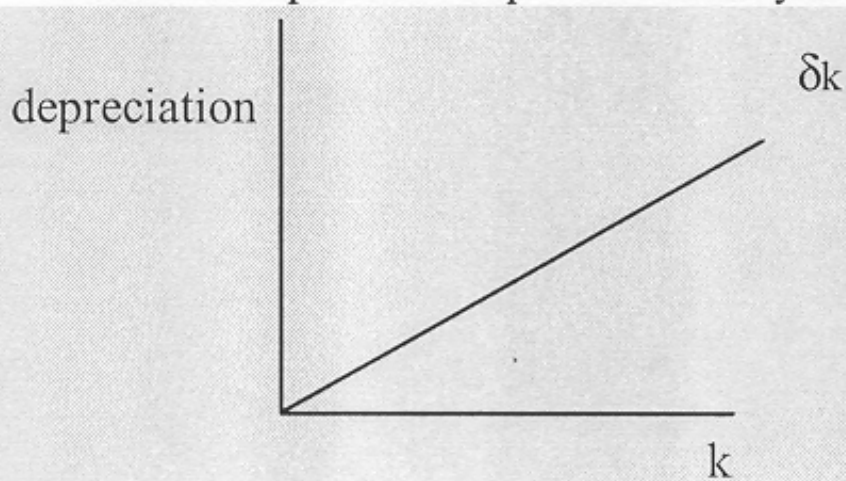
But over time old capital wear out: depreciation.

Δk = investment - depreciation

c) Consider **Depreciation:**

Will assume a certain fraction of capital stock wears out each year. Call δ the depreciation rate. Example, if piece of capital lasts average of 25 years, then depreciation rate is 4% per year, $\delta = 0.04$.

Amount of capital that depreciates each year is: Total depreciation = δk.



d) What determines level of investment?:

begin with national income accounts in per capita terms, where for moment abstract from government expenditure.

$y = c + i$

Solow model assumes that the consumption function takes a simple form:

A certain constant fraction of income is consumed. Remainder is saved, so write:

$c = (1 - s)\, y$

(like consumption function in last lecture, but with no constant term)

where s = saving rate: fraction of income saved.

Put back into accounting identity:

$y = (1 - s)y + i$

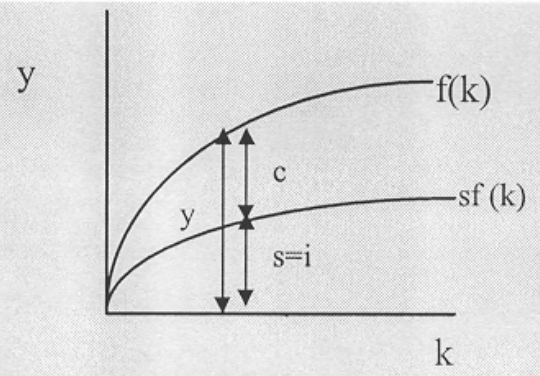
or $i = sy$

since investment equals saving, investment will also be a constant fraction of output, the fraction that is saved.

Recall from above that output depends on k:

$y = f(k)$

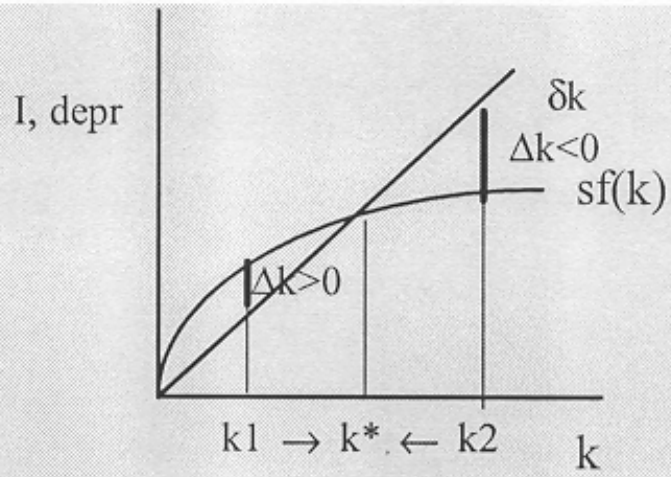
so $i = s\, f(k)$



e) Put these together:

$$\Delta k = \text{investment} - \text{depreciation}$$
$$= sf(k) - \delta k$$

When investment exceeds depreciation, then capital stock will on net be increasing.



shows are two forces at work: If starting off at low capital stock, k1, depreciation is very low. But investment is higher. So capital stock will on net be accumulating. Moving toward right on bottom axis year by year.

But if start of at high capital stock, k2, depreciation is very high, while investment is lower. So on net will be losing capital stock - not able to replace all that is depreciating. So will be moving to left on bottom axis year by year.

Why is it that if starting from a low capital stock, it tends to increase over time, while if starting at high, it tends to decrease over time?

At low capital stock, each unit of capital is very productive, so each unit produces much income, hence there is much saving and investment generated per unit of capital.

But at high levels of capital per labor, each unit of capital is contributing less to output, and hence generating less saving and hence investment. So then it is possible that depreciation exceeds new investment.

There is one level of capital stock at which is no tendency for k to change. Once reach it, will stay there.

Steady state level of capital: level of k where k neither increases nor decreases, that is level of k where will settle to in long run.

f) <u>Numerical example</u>:

suppose production function:	$Y = K^{1/2}L^{1/2}$
get per worker	$Y/L = K^{1/2}L^{1/2}/L$
or	$y = k^{1/2}$

assume $s = 0.3$, and $\delta=0.1$
suppose begin at $k = 4$

then we can compute that	$I = 0.3*4^{1/2} = 0.6$
	$\delta k = 0.1 * 4 = .4$
	so $\Delta k = 0.6 - 00.4 = 0.2$

So second year $k_2 = k_1 + \Delta k = 4.2$

If do it again, get $k_3 = 4.395$, $k_4 = 4.584$, $k_5 = 4.768$, …eventually converges to $k^* = 9$.

<u>Algebraic way to compute the steady state</u>:

know k^* defined by	$\Delta k = 0$
where	$\Delta k = sf(k^*) - \delta k^*$
so	$0 = sf(k^*) - \delta k^*$
or	$k^*/f(k^*) = s/\delta$
in our case	$k^*/(k^{*1/2}) = .3/.1$
	$k^{*-1/2} = 3$
	$k^* = 9$
and steady state output:	$y^* = k^{*1/2} = 3$

2) **Convergence:**

An implication of Solow growth model is:

convergence: tendency of a poor economy to grow at higher rate per capital than a rich economy and thereby to catch up to the rich economy.

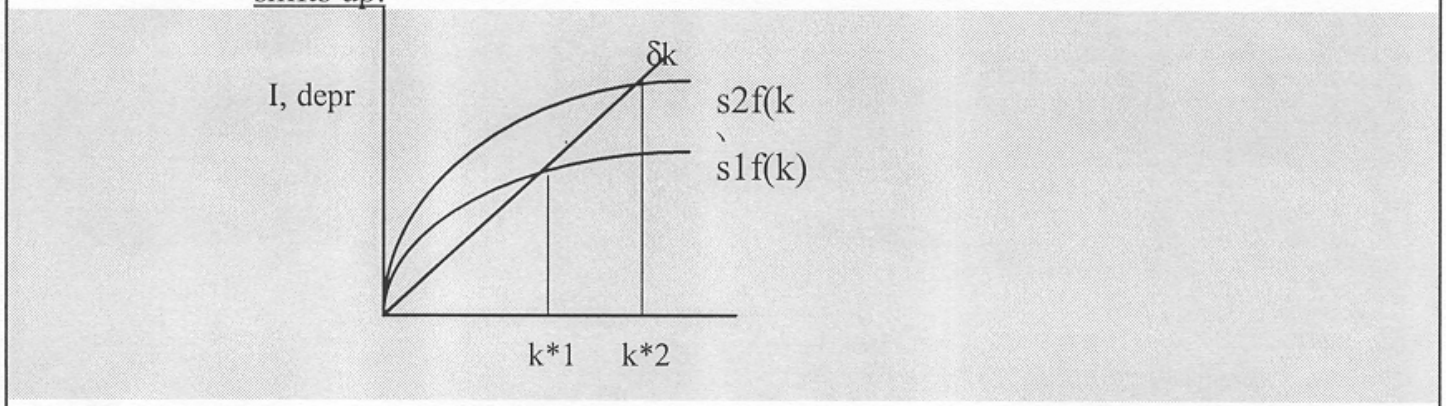
Look at data on growth rates in regions and countries. (shown in class) Regions within the US converge, but countries in the world seem not to converge.

Reconsider theory: If two countries are different in these respects, will converge to different steady states. US states similar to each other in production technology and saving behavior. Europeans fairly similar. Countries of whole world show much more diversity. So refine our conclusion:

Conditional convergence: convergence of two economies depends on whether their saving rates, production functions or other parameters are the same.

3) **Change in saving rate:**

Consider what happens if country raises its saving rate from s1 to s2. Then for each unit of output, more is being saved and invested in higher capital stock. Curve s*f(k) shifts up:



When saving rises, investment now above depreciation again, so capital stock begins to rise over time. Not in steady state any more, steady state has shifted to new point k2*.

But note when k rises to k2*, it will stop growing again. Implies 2 lessons in Solow growth model:

1) Saving rate is a key determinant of the steady-state capital stock. If the saving rate is high, the economy will have a large capital stock and high output level in steady state.

2) An increase in the saving rate will raise the steady state levels of k and output, but it will only generate growth temporarily, while the economy is converging to the new steady state.