Chapter 15: Labor Markets

Evidence on Large Flows

Size of flows into and out of employment
  Large job creation and destruction
Size of flows into and out of unemployment
  Low duration of unemployment
Size of flows into and out of the labor force
  Total flows are 10x flows of new workers and those retiring

Worker heterogeneity
  Younger workers have much higher separation rates than older workers
  Women have slightly higher separation rates than men

Time series of the unemployment rate
  Small upward trend in the postwar period
  Large fluctuations in the rate over the cycle

Effects on individual workers
  Fewer hires implies fewer job openings
  More applicants and fewer hires implies longer duration of unemployment
  Lower chance of finding job for unemployed and higher chance of losing job if employed
  Data verifies this intuition as fraction of unemployed workers falls and the separation rate increases as the rate of unemployment rises

Wage determination
  Workers paid more than reservation wage
  Wages depend on labor-market conditions
  In the absence of collective bargaining, workers have bargaining power
    Skilled or tenured workers may be harder to replace than unskilled workers
    Low unemployment rate implies harder for firms to find replacements
  Firms may want to pay high wages to avoid shirking by workers or avoid constant retraining

\[ W = PeF(u,z) \] where \( Fu<0 \) and \( Fz>0 \)

Price determination

\[ Y = AN \] (production function)
\[ P = W(1+\text{markup})MC \] (non-competitive product markets)
\[ MC = 1/A \] (constant marginal cost)

Natural rate of unemployment and output

\[ P=Pe \]
\[ Y = AL(1-u) \]

Chapter 16: General Equilibrium

Aggregate Supply (Ys)
  Plug Wage-setting into Price-Setting and use \( u = (AL-Y)/AL \)
  Curve is upward-sloping in P-Y space
  Different from LRAS (natural rate of output) due to \( P<>Pe \)
  Increases in \( Pe \) shift the curve up and to the left

Aggregate Demand (Yd)

\[ Yd = Y(M/P,G,T) \] where all three partials positive
Derived from IS-LM comparative statics on each variable
Note curve is downward sloping in P-Y space
Slope motivated by higher prices increase demand for money which increases the interest rate and lowers investment (not typical demand curve)

General Equilibrium
Described by (P,Y,i) and illustrated by Ys = Yd and IS = LM
Long-run equilibrium described by natural output (from natural rate of unemployment), price implied from Yn = Yd, and interest rate from IS = LM at Yn

Comparative Statics
Impose expected price = last period’s price
Demand shocks (M,G,T)
1. Shift IS-LM to figure out which way to shift AD
2. Shift AD and locate short-run equilibrium (P,Y)
3. Update expectations and shift AS curve accordingly
4. Continue updating until AS and AD intersect at natural output

Note IS-LM dynamics
Changes in prices shift the LM curve to reverse initial change in output
In the long run Yd = Yn so interest rate changes if IS shock or no change if LM shock

Supply shocks (A,markup,unemployment benefits,proportion of long-term unemployed)
1. Note supply shock has no effect on IS-LM curves so AD does NOT shift
2. Compute the new Yn and shift the LRAS curve
3. Shift the SRAS curve b/c shock but not Pe fixed (so economy not in long-run equilibrium)
4. Locate short-run equilibrium (P,Y) where new AS and old AD intersect
5. Update expectations and shift AS curve accordingly
6. Continue updating until AS and AD intersect at new natural output

Note IS-LM dynamics
Only shifts in the LM curve due to changes in prices
In the long-run Yd = Yn in IS-LM so interest rate must change

Chapter 17: The Phillips Curve

Start from AS and do first-order Taylor-series expansion on (1+markup)PeF(u,z)

Original Phillips curve
Negative relationship between unemployment and inflation
Price expectations zero
Equivalent to upward-sloping AS (derived from this)
No natural rate of unemployment (always a tradeoff)

Breakdown due to average inflation becoming positive in late 1960s

Modified Phillips curve
Negative relationship between change in inflation and unemployment (or excess unemployment)
Expected inflation = last period’s inflation
Define the NAIRU when change in inflation is zero (so unemployment at natural rate)

Wage indexation changes the modified Phillips curve
Complete indexation implies unemployment always at its natural rate (RBC interpretation)
More indexation increases fluctuations in the rate of inflation
Note differences in NAIRU across time and countries

**Chapter 18: Disinflation**

Okun’s Law derived from GE model
- Requires long-run growth
- Requires either labor hoarding or movements into or out of the labor force

**Aggregate Demand**
- Time difference of Taylor Series expansion of Yd, ignoring G or T
- Inflation is the difference between nominal money growth and output growth

**Long-run**
- Nominal money growth fixed
  - Unemployment rate constant (bounded) so Okun’s law says output growth at natural rate
  - Aggregate demand implies inflation constant (difference between nominal money and output growth)
  - Phillips curve says unemployment must be at natural rate

**Disinflation** is reducing long-run inflation (so reducing long-run money growth)
- Sacrifice ratio is 1/alpha is point-year excess unemployment required to reduce inflation by 1%
- Central bank can control distribution of unemployment of time of disinflation but not total point-years given the new inflation target
- Okun’s law implies fast deflations can result in sharp reductions in output (severe recessions)

**Lucas critique** says model of expectations incorrect
- A credible central bank can reduce inflation w/o increasing unemployment

**Fisher-Taylor** says credibility doesn’t matter
- Pre-existing and overlapping contracts restrict the speed of disinflation possible w/o any increase in unemployment

**Empirical evidence** suggests that
- Disinflations lead to higher unemployment for some time
- Faster disinflations are associated with smaller sacrifice ratios (supports Lucas)
- Sacrifice ratios smaller in countries with shorter wage contracts (supports Fisher)

**Chapter 19: Inflation, Interest Rates, and Exchange Rates**

**The Fisher Hypothesis**
- Assume no long-run growth in output so there exists a real interest rate consistent with the natural level of output
- The nominal interest rate is the sum of real interest rate and expected inflation
- In the long-run, expected inflation is equal to actual inflation is equal to nominal money growth, implying that the long-term nominal interest rate is simply the sum of the real interest rate consistent with natural output plus nominal money growth (Fisher)

**Fisher Dynamics** (The nominal interest rate falls in SR but increases in LR)
- Aggregate demand identify implies that faster nominal money growth and sticky prices implies real money increase and output increases
- The real interest rate falls (due to shift in LM) as does the nominal rate, as expected inflation is fixed instantaneously
- An increase in inflationary expectations reduce the real interest rate further (as LM curve shifts right)
- In time note that output above the natural level implies unemployment is below the natural rate implies accelerating inflation by the Phillips curve
Faster inflation implies real money growth falls and thus output growth decreases and LM shifts back and to the left, increasing the real and nominal interest rates.

In the long-run inflation is expected inflation and output is natural output so the real interest rate returns to the level consistent with natural output (as LM returns to its initial position) and the nominal interest rate is permanently higher by the change in the growth rate of nominal money.

Evidence on Fischer (all supportive)
The increase in inflation from 1960s – 1980s was associated with parallel increase in nominal interest rate and decrease in inflation since early 1980s consistent with lower nominal interest rate.

There are short-run dynamics (like the J-curve) as the nominal interest rate lagged inflation of the 1970s and disinflation of the 1980s.

High but short-live inflation during and after the Second World War did not show up in nominal interest rates.

Aggregate Demand and Fixed Exchange Rates
Note domestic price level in both money market (nominal income) and goods market (real exchange rate) equilibrium equations.

Higher domestic prices, given domestic income, increase money demand and thus the real interest rate, shifting the LM curve left while given the domestic interest rate, higher prices reduce net exports due to a real appreciation, shifting the IS curve left.

The of an increase in domestic has an ambiguous effect on interest rates but reduces demand, so the Aggregate Demand curve remains downward-sloping.

From natural output, a devaluation causes a real depreciation, increasing net exports in the short run and shifting the AD curve to the right. The increase in prices reverses the real devaluation so that in the long run the exchange rate is neutral and the real exchange rate returns to its initial value.

For a country with an overvalued exchange rate in recession, doing nothing requires the AS curve to slowly adjust and prices to fall (a real devaluation) while a nominal devaluation causes a much quicker adjustment to natural output.

A country can eliminate a trade deficit without changing output through a fiscal contraction and nominal devaluation.

Arguments against devaluation
1. The economy will adjust without devaluation
2. Devaluation defeats the purpose of fixed exchange rate regimes
3. Devaluation may hurt reputation in the long-run and invite future currency crises.

Chapter 20: High Unemployment

Facts of the Great Depression
Size and speed of the initial decline (1929-32 output on average fell 8.9% annually and unemployment increased by 20 percentage points)

Character of the recovery (1933-1941 average output growth 7.7% annually but unemployment still 9.9% in 1941, consistent with Okun’s law).

Causes of the Great Depression
The fall in spending shifts IS to left
- Stock market crash reduced consumer wealth and increased uncertainty about future, purchases of durables dropped dramatically.

The contraction in nominal money shifts LM to left
- Sharp reduction in M1 driven by reduction in multiplier while high-powered money roughly constant.
Fall in multiplier driven by loss of confidence in banking system and increase in currency holdings relative to deposits (driven by bank failures)

Expected deflation shifts LM to left

1931 deflation at 10% annually
nominal interest rate of zero implies real interest rates ten percent (very expensive to borrow)

The Recovery
Dramatic increase in nominal (and consequently real) money growth driven by high-powered money, probably the most important part of the recovery

The New Deal
Established the FDIC
National Recovery Administration (promote orderly competition)
National Industrial Recovery Act (limit wage cuts)

Deflation and depression ended in most countries about the same time (even those w/o massive government programs like the New Deal, so economists skeptical important in the recovery)

Facts about European Unemployment
Higher unemployment in the 1970s associated with higher inflation (supply shocks)
Higher unemployment in the 1980s associated with lower inflation (disinflation)
Unemployment around 11% in 1995 while inflation roughly constant suggest high natural rate

Explaining high unemployment (Eurosclerosis)
Labor market rigidities increase z and reduce the markup
Many of these regulations in place since 1960s and no evidence of structural change in response to increased competition from foreign firms

Explaining high unemployment (Hysteresis)
The natural rate may depend on the sequence of unemployment rates
High unemployment may lead to more generous unemployment benefits
More long-term unemployed may reduce the sensitivity of wage demand to the unemployment rate as these workers have lost skills and/or work habits
Argument implies that a sustained increase in demand which reduces unemployment for several periods may reduce natural unemployment (effectiveness depends on irreversibility of hysteresis)
Argument also implies disinflations may be more costly that suggested above

Note Krugman’s lecture notes on high unemployment in Japan

Chapter 21: Seignorage and Hyperinflation

Government deficit can be financed in two ways
Sale of bonds to public
Sale of bonds to central bank (which creates money to purchase bonds) called monetazation

Seignorage = dM/P = (dM/M)(M/P) = Revenue needed by the government
In the short-run price expectations are fixed so the central bank can generate as much revenue for the government as needed by increasing the growth rate of nominal money creation
In the long run (if output growth is zero) inflationary expectations are inflation are nominal money growth so money balances fall as money growth rises, and at high enough rates of money creation, increasing money growth actually reduces revenues in the long-run
Hyperinflations caused by a persistent need for finance by the government which is supplied by the central bank, but as inflationary expectations increase (and real money balances fall) the central bank must increase the growth rate of nominal money to raise revenue
As inflation increases, the budget deficit generally worsens as taxes are computed on prior year’s income so the real value of revenues falls
Chapter 22: The Facts of Growth

Note need for purchasing-power-parity numbers for per capita GDP

Evidence (for OECD countries)
- Strong growth over the last 40 years (doubled standard of living in the United States)
- Growth has slowed down since the mid 1970s
- Levels of output per capita have converged over time

Historical Evidence
- Growth of per capita output a recent phenomenon
- Per capita levels indicate more leapfrogging than convergence

Cross-country Evidence
- Above facts consistent with all OECD and Asian Tigers
- African countries are exception to the rule

See handout on Growth (covers theory for Chapters 22-24) under LECTURE

Conclusions
- Aggregate production function with constant returns to scale and diminishing returns to each factor of production implies that long-run growth cannot be sustained through capital accumulation and thus the saving rate does not affect the rate of long-run growth
- Technological progress is the only source of growth

Chapter 23: Saving, Capital Accumulation, and Output

See handout on Growth (covers theory for Chapters 22-24) under LECTURE

Main conclusions (same as above but derived more formally in this chapter)
- The saving rate has no effect on the growth rate of output in the long run which is equal to zero (because no change in technology or labor force here)
- The saving rate determines level of output per worker in the long-run
- Increase in saving rate leads to higher growth temporarily but no effect on growth in long run

Chapter 24: Technological Progress and Growth

See handout on Growth (covers theory for Chapters 22-24) under LECTURE

Technological progress driven by spending on research and development by firms
- The fertility of applied research (how spending yields ideas) is driven by many things, most importantly the state of basic research in the field
- The appropriability of research results (how ideas yield profits) is driven by patent law and the pace of technological progress in the market

Technological progress (and labor force growth) yield long-run growth in per-capita income (either one would be sufficient)

In balanced growth steady-state, output, capital, and effective labor grow at the same rate, and per capita output grows at the rate of technological progress.

Changes in saving rates again do not affect long-run growth but do affect long-run capital per effective worker and affect growth in the short-run

Theory and Evidence
- Fast postwar growth due to fast technological progress
Slower growth since 1970s due to slower technological progress
Convergence due to faster productivity growth by the initially poorer countries, not through faster capital accumulation
Technological progress has slowed down because of a reduction in the fertility of research, not a reduction in research spending

Note Krugman’s lecture notes on measuring productivity as a residual