Classical vs Keynesian Theory
To sum up: What is an Equilibrium?

SHORT RUN EQUILIBRIUM:  \( AD = SRAS \) and \( IS = LM \)

- The Labor Market need not be in equilibrium
- We need not be at the potential level of GDP \( Y* \)
- If \( Y < Y* \) we are in a recession, if \( Y > Y* \) in a boom

LONG RUN EQUILIBRIUM:  \( AD = SRAS = Y* \) and \( IS = LM = Y* \) and \( N_d = N_s = N* \)

- By definition, the labor market will clear
- By definition, we will move to \( Y* \)
Classical Theory
Real Business Cycle (RBC)

• What really drives the business cycle?

• Kydland and Prescott developed the RBC theory that argues that real shocks to the economy are the primary cause of business cycle.

• Real shocks are shocks that affect the production function, the size of the labor force, the spending and savings decisions,…Nominal shocks are shocks to money supply or demand

• In particular the RBC theory refer to productivity shocks

• The RBC theory is consistent with our IS-LM and AD-AS models. A negative productivity shock (A decreases) has two effects:
  1) reduces MPN and hence the demand for labor and N*
  2) Decreases Y* directly

• Both effects make Y* to decrease (LRAS) and hence LM has to adjust!
Real Business Cycle (RBC)

2. Prices increase

2. Adverse supply shock

Figure by MIT OpenCourseWare.
Real Business Cycle: Facts

• Consistent with the following stylized facts:
  1) Continuous productivity shocks generate recurrent fluctuations
  2) Employment will move procyclically
  3) Real Wages will be higher in booms
  4) Average labor productivity is procyclical

• Fact 4 is crucial: with no productivity shocks, the expansion of employment during booms will tend to reduce average labor productivity because of diminishing marginal returns!

• Fact against RBC: inflation tends to slow down during or immediately after recessions (is this evidence controversial?)

• For RBC theory a negative shock is associated with inflation!
Real Business Cycle: Calibration

Figure by MIT OpenCourseWare.
Classical Economists

- Classical Economist believe that adjust instantaneously

- This implies that money is neutral, that is, monetary shocks do not affect real variables

- **Evidence: money is very procyclical!**

- Sometimes it can be reverse causation… (Money demand depends both on current and on expected future output!)

- However, more recently there is consensus that money is non-neutral! A classic study is “A Monetary History of United States, 1867-1960” by Milton Friedman and Anna Schwartz. Their findings:

  1) Money is procyclical
  2) The interrelation between monetary and economic changes has been stable
  3) Monetary changes have often had independent origin, they have not been simply a reflection of changes in economic activity (gold discoveries, changes in monetary institutions,…)


The Misperceptions Theory (Friedman, Lucas)

- A theory to explain an upward sloping aggregate supply, with classical principles

- Extra assumption: producers have imperfect information about the general price level.

- Hence, they sometimes can misinterpret changes in the general price level as changes in the relative prices of the goods that they produce.

- Even though prices are not slow to adjust, the aggregate supply curve can be upward sloping in the short run and money can be non-netural!

- **The aggregate quantity of output supplied rises above the potential level when aggregate price level is higher than expected.**
The Misperceptions Theory: Intuition

• Consider a bakery owned and operated by a single baker

• Then the price of bread is the baker’s nominal wage and the price of bread relative to the general price level is his real wage!

• Imagine the baker sees that the price of bread goes up. There can be two situations:
  1) The price of all goods went up
  2) The price of bread went up relative to the price of other goods

• If the price of bread goes up by 5% and the baker expects all prices to go up by 5%, then he believes that his real wage does not change!

• If the price of bread goes up by 5% and the baker expects all prices to go up by 3%, then he thinks that his real wage went up and increases the production of bread!
• Everybody thinks the same!

• The amount of output produced will depend on the actual general price level compared to the expected general price level

• If actual prices are higher than expected producers are fooled into thinking that the relative price of their own goods increased

• A possible representation:

\[ Y = Y^* + b^*(P - P^e) \]

• Output exceeds its potential level when prices are higher than expected!

• In the long run people learn what happens to prices and change their expectations accordingly \((P = P^e)\)!
Unanticipated Changes in $M$ are non-netural!

- According to the Misperception Theory, unanticipated changes in monetary policy have real effects in the short run.

- The reason: producers are fooled!

- Anticipated changes in monetary policy do not have real effects because the SRAS shifts accordingly.

- Are monetary policy good?

- Not clear because if agents have rational expectations, they will predict that the monetary authority will react to shocks and there will be no unexpected monetary policies!
Unanticipated Increase in M
Unanticipated Increase in M

Money is non-neutral in the short run!

\[ P \]

LRAS

\[ SRAS^1 \]

\[ AD1 \]

\[ Y^* \]

\[ Y_1 \]

\[ Y \]
Unanticipated Increase in $M_P$

In the long run is neutral!
Anticipated Increase in M

\[ P \]

LRAS

\[ \text{SRAS}^1 \]

\[ \text{AD1} \]

\[ Y^* \]

\[ Y_1 \]

\[ Y \]
Anticipated Increase in M

Money is neutral!

As M increases the AD shifts to the right but also expected prices increase!
Keynesian Theory
Road Map

• Recessions may be driven by:

  ▪ **demand shocks** (e.g. current recession) → P and Y co-move

  ▪ **supply shocks** (e.g. oil shocks) → P and Y move in ≠ directions

• How to get out from a recession? Self-Correcting Mechanism, Monetary Policy, or Fiscal Policy

• Brief History of the **Fed policy**: from output targeting to Taylor Rule

• Should the Fed react to **asset price bubbles**?
Example 1: Loss in Consumer Confidence

• Consider a loss in consumer confidence as in 1991 (and in the current recession!)

• Change in expectations about the future can have dramatic effects even if not founded!

• What does a loss of consumer confidence affect?
  
  – No effect on labor demand: A hasn’t really changed
  – Consumption changes and the AD and IS curves shift
  – Some effect on labor supply (income effect): PVLR decreased

• Assumptions for the following example:
  1. No income effect on labor supply (labor supply does not move)
  2. No change in A or A^f
  3. Consumers are standard PIH, no liquidity constrained, and non-ricardian
  4. Upward-sloping SRAS: sticky wages
Consumer Confidence: 1978M1 – 2009M1
Example 1: Graphical Representation

Assume we start at $Y^*$

- $Y^*_0$:
  - $Y^*_0$ on the horizontal axis.
  - $Y$ on the horizontal axis.
  - $P$ on the vertical axis.
  - $P_0$ on the vertical axis.
  - $r$ on the vertical axis.

Graphs:
- SRAS ($\bar{w}_0$)
- AD ($C_0$)
- LM ($P_0$)
- IS ($C_0$)
Example 2: Increase in Oil Prices

• Consider a negative supply shock: an increase in the oil price (as in 1974 and 1979)

• If oil prices increase, firms produce less with same N and K (it is like a decrease in A!)

• What does a permanent increase in oil prices affect?
  
  – Effect on supply: both SRAS and LRAS (Y*) shifts to the left
  – Labor demand shifts to the left: MPN decreases
  – Labor supply shifts a bit to the right (income effect): PVLR is lower
  – I decreases (MPK lower) and C decreases (PVLR lower): AD and IS shift left

• Assumptions for the following example:
  
  1. No income effect on labor supply (labor supply does not move)
  2. Consumers are standard PIH, no liquidity constrained, and non-ricardian
  3. Upward-sloping SRAS: sticky wages
Example 2: Graphical Representation

Responsible (partially) for the 1975 and 1979-1980 recession (OPEC I and II)
Analyzing Demand and Supply Shocks

- **DEMAND SHOCK**: unemployment and prices move in opposite directions if there are no policies!

  - Example: loss in consumer confidence (negative), increase in M (positive)

- **SUPPLY SHOCK**: unemployment and prices to move in the same direction if there are no policies!

  - Example: oil shocks (negative) or increase in productivity (positive)

- A negative supply shock is BAD!!!

**STAGFLATION**: increase in inflation + increase in unemployment
Reviewing The Data

From First Class:

1. Some falls in GDP were associated with no increase in prices.

2. Some falls in GDP were associated with large increase in prices.

Do our theories reconcile these facts?

– **YES!** Demand shocks explain (1)

– **YES!** Supply shocks explain (2)

You should really understand the difference between demand shocks (things that primarily affect AD) and supply shocks (things that primarily affect AS) on the economy - their implications are much different!
Historical Inflation: 1970M1 - 2008M12

Black line - trend in CPI over time (left axis)
Red line - trend in CPI inflation rate (percentage change in CPI) over time (right axis)
Shaded areas represent “official” recession dates (as calculated by National Bureau of Economic Research)
## Reinterpreting the Business Cycle Data 1970-2008

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970 recession</td>
<td>Inflation increasing at start of recession!</td>
</tr>
<tr>
<td></td>
<td>Supply shock: oil price + productivity + misguided Fed policy</td>
</tr>
<tr>
<td>1981 recession</td>
<td>Dramatic decrease in inflation at start of recession</td>
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<td></td>
<td>Demand shock: Volker (Fed starts to worry about inflation!)</td>
</tr>
<tr>
<td>1990 recession</td>
<td>Little increase in inflation/but low level of inflation</td>
</tr>
<tr>
<td></td>
<td>Demand shock: fall in consumer confidence</td>
</tr>
<tr>
<td>Rapid growth in mid 1990s</td>
<td>No inflation</td>
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<tr>
<td></td>
<td>Positive Supply shock: IT revolution</td>
</tr>
<tr>
<td>2001 recession</td>
<td>No inflation</td>
</tr>
<tr>
<td></td>
<td>Demand shock: firms overconfidence: inventory adjustment</td>
</tr>
<tr>
<td>Current recession</td>
<td>Inflation first up and then down. Supply: oil shock</td>
</tr>
<tr>
<td></td>
<td>Demand: credit crunch, confidence loss, drop in wealth</td>
</tr>
</tbody>
</table>
Self-Correcting Mechanism

• What would happen in the long-run after a negative shock if there was no policy?

• A Self-Correcting Mechanism will bring the economy back to the potential $Y^*$

• Mechanism: workers would like to work more, so firms at some point will decrease nominal wages, so that the labor market goes back to equilibrium!

• As nominal wages decrease, it is cheaper to produce and the SRAS will shift to the right!

• As wages decrease, prices decrease, the real value of money supply increase and the LM shifts to the right!

• As $M/P$ increases, the equilibrium interest rate has to decrease, stimulating $I$ and $C$!
Example 1: Self-Correcting Mechanism

Loss of Consumers’ Confidence

SRAS \( (W_0) \)

AD \( (C_0, M_0) \)

AD \( (C_1, M_0) \)

LM \( (M_0, P_0) \)

LM \( (M_0, P_1) \)

IS \( (C_0) \)

IS \( (C_1) \)
Example 2: Self-Correcting Mechanism

Oil price increase

SRAS ($W_0$)

$AD(C_0, M_0)$

$AD(C_1, M_0)$

$LM(M_0, P_0)$

$LM(M_0, P_1)$

$IS(C_0)$

$IS(C_1)$
Fed Policy versus Self-correcting Mechanism

• The Fed may decide to conduct an expansionary monetary policy (increase M) to fight the recession

• Trade-off: Fed policy may speed up the recovery, but pushes prices up!

COMPARISON:

1. Real variables go back to the same long run equilibrium (both Fed or self-correcting mechanism)

2. BUT prices and nominal wages behave differently: risk of inflation!

3. Fed can increase the speed of adjustment …
Example 1: Monetary Policy

Loss of Consumers’ Confidence

- SRAS($W_0$)
- AD($C_0,M_0$)
- AD($C_1,M_0$)
- LM($M_0,P_0$)
- LM($M_0,P_1$)
- IS($C_0$)
- IS($C_1$)

Diagram showing the effects of monetary policy on the economy.
Example 2: Monetary Policy

Oil price increase

SRAS ($W_0$)

$P$

$P_1$

$P_0$

AD ($C_0$, $M_0$)

AD ($C_1$, $M_0$)

LM ($M_0$, $P_0$)

LM ($M_0$, $P_1$)

IS ($C_0$)

IS ($C_1$)

$Y^*_1$

$Y^*_0$

$Y^*_0$

$Y^*_1$

$Y$
The Fed in the ’70s: push inflation

- After the negative supply shocks in the mid/late ’70s, the Fed adopted a policy mainly based on fighting the recession by increasing M.

- The Fed believed that the potential was still $Y_0^*$.

- The Fed tried to bring $Y$ back to the wrong potential, $Y_0^*$ instead of $Y_1^*$!

- This pushed prices up and then, through the adjustment of the labor market, wages even higher!

- This pushed the SRAS in, pushing inflation up! Say back to $Y_1^*$.

- But the Fed wants to go to $Y_0^*$, so increases M again…

- Amplifying mechanism: if workers expect high inflation they will try to get higher nominal wages!
New Fed view: Inflation Targeting

• Late ’70s: inflation was out of control also because of bad Fed policies!

• Friedman: the Fed has to control inflation! Reset, expected inflation rates.

• → 1982: Volker Recession

• Cold Turkey money cut to reduce inflation and change individuals’ perception of Fed policy (not try to stabilize output at the expense of inflation!)

• Cut inflation from double digits to 4%!

• However, this caused a short deep recession.
On unemployment and inflation...

- In the short run, the SRAS tells us that if output is high, or unemployment low, typically prices are high!

- If $Y < Y^*$, or $u > u^*$, output stabilization policies tend to generate inflation…

- If $Y = Y^*$, or $u = u^*$, but $P$ high, inflation control policies generate a recession…

- Phillips curve = relationship between inflation and unemployment: one-to-one relationship with the AS!

- Phillips discovered a negative correlation between unemployment rate and inflation rate across time in the 1950s (Phillips curve)

- Old Keynesians in the 1960s: there is a stable, exploitable trade-off between the rate inflation and unemployment. Maybe can permanently lower unemployment at the cost of permanently higher inflation!
Friedman: evidence killed it!

• **Milton Friedman in 1968**: the long run Phillips Curve is vertical at u*.

• This is because the LRAS is vertical at Y*!

• **Vindicating evidence**: the Phillips Curve broke down after 1970, as the Fed was trying to push Y above Y*

• Over time in the U.S., higher money growth just lead to more inflation and no higher real GDP

• Across countries, higher money growth just leads to more inflation and no higher real GDP.

• If anything, in the long run, real GDP appears to be hindered by high levels of inflation!
To sum up …

- In the **SHORT RUN** there is a tradeoff between the unemployment rate and inflation rate *changes*:
  
  - Inflation tends to fall in years following $U > U^*$.  
    The cost of a *permanently* lower inflation rate is a *temporarily* higher unemployment rate.
  
  - Inflation tends to rise in years following $U < U^*$.  
    The cost of *temporarily* lowering the unemployment rate is a *permanently* higher inflation rate.

- In the **LONG RUN** the unemployment rate is fixed at $u^*$ and any monetary policy will have only effects on the inflation rate.