Lecture 19
Keynesian Policy Analysis
Monetary Policy

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Economics 312
Firms take as given effort curve. Problem now:

$$\max_N F(K, e(w)N) - wN$$

First order condition: $e(w)F_N(K, e(w)N) = w$. Gives firm labor demand for any real wage.

But how to choose wage to set? Want to minimize cost of inducing effort. Choose efficiency wage to maximize $e(w)/w$.

$$\max_w e(w)/w \Rightarrow w = e(w)/e'(w)$$

Note the real wage is then rigid. Changes in labor supply then only affect level of unemployment, not employment. No downward pressure on wages with excess labor supply, since if firms reduce wages effort will decline.
Efficiency wage leads to vertical output supply curve $Y^s$ ($FE$): $w$ determined by efficiency considerations, then $N$ determined, giving $Y^s$ via production. Does not depend on $N^s$, hence no dependence on $r$.

Effect on aggregate depends on whether prices are sticky or not. Typically assume sticky prices as well: horizontal SRAS.

The model is qualitatively like the sticky price model but now long-run equilibrium is independent of labor supply.
Figure 16.21  Unemployment in the Efficiency Wage Model

(a) Equilibrium Unemployment

(b) No Equilibrium Unemployment
Figure 16.22 The Output Supply Curve in the Efficiency Wage Model
Long-run equilibrium in the Keynesian Model: Efficiency wages
Increase in government spending: Shifts the IS curve out. In short run, $Y$ and $r$ interest rate increase.

The multiplier $m_g = \frac{\Delta Y}{\Delta G}$ gives the increase in output due to government spending.

Much original Keynesian theory thought $m_g > 1$. Government spending leads to higher private output.

With efficiency wages, $FE$ line unaffected. Labor supply only determines unemployment.

As prices adjust, $LM$ curve shifts up. New general equilibrium has higher $r$, same $Y$. 
Short-run Effect of Increase in Govt Spending
Long-run Effect of Increase in Govt Spending

G increase
P increase

\[ IS \quad IS' \quad LM(P') \quad LM(P) \]

\[ Y^* \quad Y' \quad Y \]

\[ r^* \quad r' \quad r \]

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Effects of Monetary Policy

- Increase in money supply: not neutral in short run. Shifts $LM$ curve out, increasing $Y$ decreasing $r$.
- Shifts $AD$ curve out. Effect on prices depends on whether they’re sticky or not.
- With sticky prices no effect on price. With sticky wages, price level increases, shifting $LM$ curve part of way back in.
- In long run, prices or nominal wages adjust, shifting $LM$ curve and $SRAS$ curve. $Y$ decreases and $r$ increases to original levels.
- Short-run non-neutralities lead to role of monetary policy in smoothing responses to shocks: stabilization policy.
Short-run Effect of Increase in Money Supply

The diagram illustrates the effect of an increase in money supply (M increase) on the market. The IS curve shifts upward, indicating a decrease in the interest rate (r*) and an increase in income (Y*). The upward shift in the LM curve from LM(P) to LM'(P) reflects the decrease in the interest rate.
Long-run Effect of Increase in Money Supply: 
Money is neutral in the long-run.
Stabilization Policy

- Classical theory gave no role for government to offset shocks. At best, government policy was neutral.
- In Keynesian model, since markets may be out of equilibrium in the short run, role for government to smooth fluctuations.
- Example: Reduction in investment demand shifts the IS curve down. Keynes’s “animal spirits”. Causes recession in short run.
- If government does nothing, price level will eventually decline, shifting LM. Output decline will endure for a while.
- Govt. could increase $M$, shifting LM curve down to general equilibrium. Same as doing nothing but happens faster.
- Govt. could increase $G$, shifting IS curve back up.
- Taking policy action has potential benefit of shortening recession. Leads to higher price level than if no action.
Short-run Effect of Shock to IS Curve
Response to Shock: Nothing or Monetary Policy
Response to Shock: Fiscal Policy
Effect of the IS Shock: $AD-AS$
Effect of the IS Shock: Nothing
Effect of the IS Shock: Monetary or Fiscal Policy
Limitations on Stabilization & Liquidity Traps

- Generally have monetary policy smooth cyclical fluctuations. Fiscal policy takes longer to implement, money is more direct.

- Limitation on monetary policy: nominal interest rates are bounded at zero. Can’t set nominal interest rates negative: everyone would want to borrow.

- Means $LM$ curve very flat near zero interest rates. So increases in money supply have little effect at low rates: a liquidity trap.

- Very relevant for Japan (+ US recently). From 1960 to 1990, Japan’s economy grew over 6% per year. But the Japanese economy slumped in the 1990s, with growth near zero. Stock and land prices fell from excessive levels, hurting banks. Bank’s financial distress caused lending to fall, reducing investment.
Growth in Interest Rates in Japan

Japan: Annualized Growth of Real GDP, 1993–2004

Japan: Money Market Interest Rate, 1993–2004
A Liquidity Trap: Increase in $M$ Powerless
Policy in a Liquidity Trap

- Interest rates near zero and remained there. Low inflation or even deflation, so real rates also near zero.
- Possible to run expansionary fiscal policy to shift IS curve to restore equilibrium.
- Was tried but unsuccessful – some say it wasn’t enough. In combination with expansionary
  Problem with monetary policy is zero (expected) inflation. If could engineer an inflation, then possible to have equilibrium with negative real rates but positive nominal (Krugman).
  Also no reason to force Japanese to consume.
- Not clear how to commit to it – Bank of Japan known inflation fighter. Possible to do so by depreciating currency (Svensson).
A Liquidity Trap: Fiscal Policy
A Liquidity Trap: Increase Inflation
Fed has recently announced plans to keep interest rates near zero for extended period of time.
Fed has also backed away from explicit short-term inflation target, seeming to be willing to allow inflation to rise in short run. Has stressed that 2% inflation target is for the “medium term”.
Fed has also become much more explicit recently, announcing forecast paths for future interest rates.
All of these steps geared toward guiding expectations, and committing to allowing inflation to rise. Inflation has remained low, but success of policy would require low rates even when inflation picks up. Given dissent on Board, in press, profession, not clear this would happen.
Others have argued that Fed should raise inflation target as long as economy remains below trend growth. Potential problem on how to reduce inflation once it takes hold.
Monetary policy in US administered by the Federal Reserve. Leadership of the Fed is provided by the Board of Governors in Washington, D.C.

- 7 governors, appointed by the President, and have 14-year terms. Chairman of the Board of Governors has considerable power, and has a term of 4 years.

- Monetary policy decisions are made by the Federal Open Market Committee (FOMC): consists of the 7 governors plus 5 presidents of the Federal Reserve Banks on a rotating basis (with the New York president always on). FOMC meets eight times a year, may meet more.
The Federal Reserve officially identifies Districts by number and Reserve Bank city. In the 12th District, the Seattle Branch serves Alaska, and the San Francisco Bank serves Hawaii. The System serves commonwealths and territories as follows: the New York Bank serves the Commonwealth of Puerto Rico and the U.S. Virgin Islands; the San Francisco Bank serves American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands. The Board of Governors revised the branch boundaries of the System in February 1996.
Traditionally, largest asset was holdings of Treasury securities, also owns gold, makes loans to banks, and holds other assets including foreign exchange and federal agency securities.

Largest liability is currency outstanding. Another liability is deposits by banks.

Fed makes profit on security portfolio, which it pays to Treasury. In 2012 transferred $88.4 billion to Treasury.

In response to financial crisis and recession of 2007-present, balance sheet of Fed has expanded to include wide array of assets, direct bank lending, and mortgage-backed securities.
Main instrument of conventional policy is the Federal Funds rate. An extremely short-term interest rate: the rate on overnight loans from one bank to another.

Uses as implicit means of changing money supply. Policy carried out via open market operations by trading desk at New York Fed. Buy and sell government securities so that market for overnight cash clears at the target rate.

Again in response to recent crisis and recession, direct lending and other purchases of assets have become an important component of policy response. “Unconventional” monetary policy.
FOMC Intended Federal Funds Rate, Discount Rate, and Primary Credit Rate
Other Policy Instruments

- Also can adjust reserve requirements, minimum fraction of each type of deposit that a bank must hold as reserves.

- Discount window lending: lending reserves to banks so they can meet depositors’ demands or reserve requirements, interest rate on such called the discount rate, role of lender of last resort.

- A discount loan increases the monetary base, increases in discount rate discourage borrowing, reduce the monetary base.

- In past, Fed discouraged banks from borrowing from the discount window. Instead, banks borrow from each other in the Federal funds market. Interest rate is the Fed funds rate. In recent years has encouraged discount window borrowing.
**Forms of Federal Reserve Lending to Financial Institutions**

<table>
<thead>
<tr>
<th>Regular OMOs</th>
<th>Single-Trade OMO Program</th>
<th>Discount Window</th>
<th>Term Discount Window Program</th>
<th>Term Auction Facility</th>
<th>Primary Dealer Credit Facility</th>
<th>Transient Credit Extensions</th>
<th>Reciprocal Currency Arrangements</th>
<th>Securities Lending</th>
<th>Term Securities Lending Facility</th>
<th>Term Securities Lending Facility Options Program</th>
<th>ABCP Money Market Fund Liquidity Facility</th>
<th>Commercial Paper Funding Facility</th>
<th>Money Market Funding Facility</th>
<th>Term Asset-Backed Securities Loan Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Who can participate?</strong></td>
<td>Primary dealers</td>
<td>Primary dealers</td>
<td>Depository institutions</td>
<td>Primary credit-eligible deposits</td>
<td>Primary credit eligible deposits</td>
<td>Primary dealers</td>
<td>U.S. and London interbank dealer subsidiaries of Goldman Sachs, Morgan Stanley, Merrill Lynch</td>
<td>Select central banks to lend to banks in their jurisdiction</td>
<td>Primary dealers</td>
<td>Primary dealers</td>
<td>Depository institutions, bank holding companies, U.S. branches and agencies of foreign banks</td>
<td>Eligible CP issuers</td>
<td>Eligible Money Market Mutual Funds</td>
<td>All U.S. persons that own eligible collateral</td>
</tr>
<tr>
<td><strong>What are they borrowing?</strong></td>
<td>Funds</td>
<td>Funds</td>
<td>Funds</td>
<td>Funds</td>
<td>Funds</td>
<td>Funds</td>
<td>U.S. Dollars</td>
<td>U.S. Treasuries</td>
<td>U.S. Treasuries</td>
<td>Funds</td>
<td>National and international depository institutions</td>
<td>Funds</td>
<td>Funds</td>
<td>National and international depository institutions</td>
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<tr>
<td><strong>What collateral can be pledged?</strong></td>
<td>U.S. Treasuries, agency MBS</td>
<td>U.S. Treasuries, agency MBS</td>
<td>Full range of Discount Window collateral</td>
<td>Full range of Discount Window collateral</td>
<td>Full range of Discount Window collateral</td>
<td>Full range of Discount Window collateral</td>
<td>Full range of Discount Window collateral</td>
<td>Central bank pledge foreign currencies and bond against eligible collateral in their jurisdiction</td>
<td>U.S. Treasuries</td>
<td>Schedule 1: U.S. Treasuries, agencies MBS</td>
<td>Schedule 1: Schedule 1 plus all investment grade debt securities</td>
<td>Schedule 2: TALF collateral</td>
<td>First-tier ARCP</td>
<td>Newely issued 3-month unsecured and asset backed CP from eligible U.S. issuers</td>
</tr>
<tr>
<td><strong>Is there a reserve impact?</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No (loans are for lending)</td>
<td>No (loans are for lending)</td>
<td>No (loans are for lending)</td>
<td>No (loans are for lending)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td><strong>Typically, term is:</strong></td>
<td>Overnight</td>
<td>Overnight</td>
<td>Up to 30 days</td>
<td>28 days</td>
<td>28 days or 44 days</td>
<td>Overnight</td>
<td>Overnight</td>
<td>Overnight</td>
<td>28 days</td>
<td>Typically 2 weeks or less</td>
<td>Typically 2 weeks or less</td>
<td>3 months</td>
<td>N/A</td>
<td>At least one year</td>
</tr>
<tr>
<td><strong>Schedule 1: U.S. Treasuries, agency MBS</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>N/A</td>
<td>No</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>N/A</td>
<td>Yes</td>
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<tr>
<td><strong>Which Reserve Banks conduct operations?</strong></td>
<td>FRBNY</td>
<td>FRBNY</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>FRBNY</td>
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<td><strong>How frequently is the program accessed?</strong></td>
<td>Typically once a week</td>
<td>Typically weekly</td>
<td>As requested (standing facility)</td>
<td>As requested (standing facility)</td>
<td>Every other week, or as necessary</td>
<td>As requested (standing facility)</td>
<td>As requested (standing facility)</td>
<td>As requested (standing facility)</td>
<td>As requested (standing facility)</td>
<td>As requested (standing facility)</td>
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<td>As requested (standing facility)</td>
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<td><strong>Schedule 2: Weekly</strong></td>
<td>Daily</td>
<td>Schedule 1: Every other week</td>
<td>Schedule 2: Monthly</td>
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<td><strong>Schedule 3: Monthly</strong></td>
<td>As necessary</td>
<td>As requested (standing facility)</td>
<td>As requested (standing facility)</td>
<td>As requested (standing facility)</td>
<td></td>
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<tr>
<td><strong>Which OMOs activity is in effect?</strong></td>
<td>Temporary OMO activity</td>
<td>Temporary OMO activity</td>
<td>H.A.1 - Factors Affecting Reserve Balances</td>
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<td>TAFO activity</td>
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<td><strong>Where are statistics reported publicly?</strong></td>
<td>Temporary Securities Lending Facility activity</td>
<td>Term securities lending facility activity</td>
<td>Term securities lending facility activity</td>
<td>Term securities lending facility activity</td>
<td>Term securities lending facility activity</td>
<td>Term securities lending facility activity</td>
<td>Commercial paper funding facility activity</td>
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1. Discount Window includes primary, secondary and seasonal credit programs.
3. The PDCF, TSLF and AMLF will remain in operation through August 30, 2009 as announced on December 2, 2008.
4. The PDCF, TSLF and AMLF were created December 17, 2008.
5. The PDCF, TSLF and AMLF were created September 16, 2008.
6. The PDCF, TSLF and AMLF were created September 16, 2008.
7. The PDCF, TSLF and AMLF were created September 16, 2008.
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31. The PDCF, TSLF and AMLF were created September 16, 2008.
FOMC meets 8 times per year to set target rate.

Directives from Congress to pursue price stability and full employment.

Prior to meetings intensive staff briefings, laying out policy options, scenarios, and likely effects.

For many years the Fed resisted committing to an explicit inflation target. Now explicitly 2%. Many other central banks around the world explicitly announce inflation targets, target interest rate paths.
For immediate release

Information received since the Federal Open Market Committee met in January indicates that growth in economic activity slowed during the winter months, in part reflecting adverse weather conditions. Labor market indicators were mixed but on balance showed further improvement. The unemployment rate, however, remains elevated. Household spending and business fixed investment continued to advance, while the recovery in the housing sector remained slow. Fiscal policy is restraining economic growth, although the extent of restraint is diminishing. Inflation has been running below the Committee's longer-run objective, but longer-term inflation expectations have remained stable.

Consistent with its statutory mandate, the Committee seeks to foster maximum employment and price stability. The Committee expects that, with appropriate policy accommodation, economic activity will expand at a moderate pace and labor market conditions will continue to improve gradually, moving toward those the Committee judges consistent with its dual mandate. The Committee sees the risks to the outlook for the economy and the labor market as nearly balanced. The Committee recognizes that inflation persistently below its 2 percent objective could pose risks to economic performance, and it is monitoring inflation developments carefully for evidence that inflation will move back toward its objective over the medium term.

The Committee currently judges that there is sufficient underlying strength in the broader economy to support ongoing improvement in labor market conditions. In light of the cumulative progress toward maximum employment and the improvement in the outlook for labor market conditions since the inception of the current asset purchase program, the Committee decided to make a further measured reduction in the pace of its asset purchases. Beginning in April, the Committee will add to its holdings of agency mortgage-backed securities at a pace of $25 billion per month rather than $30 billion per month, and will add to its holdings of longer-term Treasury securities at a pace of $30 billion per month rather than $35 billion per month. The Committee is maintaining its existing policy of reinvesting principal payments from its holdings of agency debt and agency mortgage-backed securities in agency mortgage-backed securities and of rolling over maturing Treasury securities at auction. The Committee's sizable and still-increasing holdings of longer-term securities should maintain downward pressure on longer-term interest rates, support mortgage markets, and help to make broader financial conditions more accommodative, which in turn should promote a stronger economic recovery and help to ensure that inflation, over time, is at the rate most consistent with the Committee's dual mandate.

The Committee will closely monitor incoming information on economic and financial developments in coming months and will continue its purchases of Treasury and agency mortgage-backed securities, and employ its other policy tools as appropriate, until the outlook for the labor market has improved substantially in a context of price stability. If incoming information broadly supports the Committee's expectation of ongoing improvement in labor market conditions and inflation moving back toward its longer-run objective, the Committee will likely reduce the pace of asset purchases in
further measured steps at future meetings. However, asset purchases are not on a preset course, and the Committee's decisions about their pace will remain contingent on the Committee's outlook for the labor market and inflation as well as its assessment of the likely efficacy and costs of such purchases.

To support continued progress toward maximum employment and price stability, the Committee today reaffirmed its view that a highly accommodative stance of monetary policy remains appropriate. In determining how long to maintain the current 0 to 1/4 percent target range for the federal funds rate, the Committee will assess progress—both realized and expected—toward its objectives of maximum employment and 2 percent inflation. This assessment will take into account a wide range of information, including measures of labor market conditions, indicators of inflation pressures and inflation expectations, and readings on financial developments. The Committee continues to anticipate, based on its assessment of these factors, that it likely will be appropriate to maintain the current target range for the federal funds rate for a considerable time after the asset purchase program ends, especially if projected inflation continues to run below the Committee's 2 percent longer-run goal, and provided that longer-term inflation expectations remain well anchored.

When the Committee decides to begin to remove policy accommodation, it will take a balanced approach consistent with its longer-run goals of maximum employment and inflation of 2 percent. The Committee currently anticipates that, even after employment and inflation are near mandate-consistent levels, economic conditions may, for some time, warrant keeping the target federal funds rate below levels the Committee views as normal in the longer run.

With the unemployment rate nearing 6-1/2 percent, the Committee has updated its forward guidance. The change in the Committee's guidance does not indicate any change in the Committee's policy intentions as set forth in its recent statements.

Voting for the FOMC monetary policy action were: Janet L. Yellen, Chair; William C. Dudley, Vice Chairman; Richard W. Fisher; Sandra Pianalto; Charles I. Plosser; Jerome H. Powell; Jeremy C. Stein; and Daniel K. Tarullo.

Voting against the action was Narayana Kocherlakota, who supported the sixth paragraph, but believed the fifth paragraph weakens the credibility of the Committee's commitment to return inflation to the 2 percent target from below and fosters policy uncertainty that hinders economic activity.

Statement Regarding Purchases of Treasury Securities and Agency Mortgage-Backed Securities
Press Release

Release Date: December 16, 2008

For immediate release

The Federal Open Market Committee decided today to establish a target range for the federal funds rate of 0 to 1/4 percent.

Since the Committee's last meeting, labor market conditions have deteriorated, and the available data indicate that consumer spending, business investment, and industrial production have declined. Financial markets remain quite strained and credit conditions tight. Overall, the outlook for economic activity has weakened further.

Meanwhile, inflationary pressures have diminished appreciably. In light of the declines in the prices of energy and other commodities and the weaker prospects for economic activity, the Committee expects inflation to moderate further in coming quarters.

The Federal Reserve will employ all available tools to promote the resumption of sustainable economic growth and to preserve price stability. In particular, the Committee anticipates that weak economic conditions are likely to warrant exceptionally low levels of the federal funds rate for some time.

The focus of the Committee's policy going forward will be to support the functioning of financial markets and stimulate the economy through open market operations and other measures that sustain the size of the Federal Reserve's balance sheet at a high level. As previously announced, over the next few quarters the Federal Reserve will purchase large quantities of agency debt and mortgage-backed securities to provide support to the mortgage and housing markets, and it stands ready to expand its purchases of agency debt and mortgage-backed securities as conditions warrant. The Committee is also evaluating the potential benefits of purchasing longer-term Treasury securities. Early next year, the Federal Reserve will also implement the Term Asset-Backed Securities Loan Facility to facilitate the extension of credit to households and small businesses. The Federal Reserve will continue to consider ways of using its balance sheet to further support credit markets and economic activity.

Voting for the FOMC monetary policy action were: Ben S. Bernanke, Chairman; Christine M. Cumming; Elizabeth A. Duke; Richard W. Fisher; Donald L. Kohn; Randall S. Kroszner; Sandra Pianalto; Charles I. Plosser; Gary H. Stern; and Kevin M. Warsh.

In a related action, the Board of Governors unanimously approved a 75-basis-point decrease in the discount rate to 1/2 percent. In taking this action, the Board approved the requests submitted by the Boards of Directors of the Federal Reserve Banks of New York, Cleveland, Richmond, Atlanta, Minneapolis, and Chicago. The Board also established interest rates on required and excess reserve balances at 1/4 percent.
From the Norges Bank Inflation Report, 1/07

Chart 1.9a  Projected key policy rate in the baseline scenario with fan chart. Per cent. Quarterly figures. 05 Q1 – 10 Q4

Chart 1.9b  Estimated output gap in the baseline scenario with fan chart. Per cent. Quarterly figures. 05 Q1 – 10 Q4

Chart 1.9c  Projected CPI in the baseline scenario with fan chart. 4-quarter change. Per cent. Quarterly figures. 05 Q1 – 10 Q4

Chart 1.9d  Projected CPI-ATE in the baseline scenario with fan chart. 4-quarter change. Per cent. Quarterly figures. 05 Q1 – 10 Q4
**Chart 3** Key policy rate in the baseline scenario in IR 3/06 with fan chart and key policy rate in the baseline scenario in MPR 1/07 (red line). Per cent. Quarterly figures. 04 Q1 – 09 Q4

**Chart 5** Key policy rate in the baseline scenario in IR 3/06 with fan chart and the isolated effect of stronger krone exchange rate (red line). Per cent. Quarterly figures. 04 Q1 – 09 Q4

Source: Norges Bank