Keynesian Business Cycle Theory: Introduction (1/3)
Reading: Williamson, chapter 12

Basic formal model developed by Sir John Hicks in the late 1930s, and popularized by Paul Samuelson in his textbooks from the 1950s.

Keynesian business cycle models have been extremely influential with both academics and policy makers

Since 1960s, large scale versions of Keynesian business cycle models have been in use in forecasting and policy analysis:
- these "macroeconomteric" models still very much in use today.

Build on our monetary intertemporal model in constructing Keynesian business cycle model

Keynesian Business Cycle Theory: Introduction (2/3)

Defining characteristic of these models: not all prices and wages are completely flexible, i.e.,"sticky" prices or "sticky" wages

(Big) Difference between this model and earlier models:
- nominal wage rate is not sufficiently flexible to clear labour market in short run

We will model sticky wages here, but note that most Keynesian macroeconomic models model sticky prices instead.

Implication: money is not neutral in the short run; monetary policy has "real" effects. Hence, room for government to step in to use monetary policy to tweak economic performance ("fine-tuning")

Keynesian Business Cycle Theory: Introduction (3/3)

Keynesians typically believe that governments should play an active role in the economy through monetary and fiscal policies

Since labour market doesn't clear in short run $\Rightarrow$ unemployment!

Story: during great depression which started in late 1920s, Keynes called for increasing government expenditures, including digging up roads and repaving them and digging them up, etc., to boost GDP

Notice that neo-classical model has no unemployment. Why? And how do you justify this way of thinking when it's "obvious" that unemployment exists in the real world?

Labour Market in Keynesian Sticky Wage Model (1/3)

note: wages are typically set in nominal terms
like in earlier models, we look at equilibrium in goods and labour market in first period

Nominal wage rate W_1 is imperfectly flexible in short run. Why?
- wages typically set for length of time (costly to renegotiate constantly)
- costly to write a contract that covers all/most contingencies

Think of indexation: easy to do, but typically not done. Why?

Nominal wage rigidity captures the idea that W_1 does not respond to factors affecting labour market in the short run

Labour Market in Keynesian Sticky Wage Model (2/3)

But can think of W_1 being completely responsive to factors affecting labour market in the long run

Keynesian model can have unemployment! Imagine market real wage is no lower than the equilibrium (market-clearing) real wage, like in "figure 12.1"
- market real wage w^* could be "stuck" at such a high level because nominal wage was negotiated in the past such that the implied real wage was market clearing, but no longer so
- at w^*, firm demands N^* but worker supplies N^{**}

$(N^{**} - N^*)$: Keynesian unemployment, in the sense that worker cannot work as much as he would like to at the going wage

Labour Market in Keynesian Sticky Wage Model (3/3)

We will assume that market real wage w^* is no lower than the equilibrium (market-clearing) real wage w^{mc}.

Hence, employment determined by labour demand curve, and thus there is unemployment when $w^* > w^{mc}$, which is the case we're looking at

In "figure 12.1": employment determined by how much labour representative firm wants to hire, i.e., labour demand curve

Note: In this course, we deal with the case where market real wage is no lower than market clearing real wage, so employment determined by labour demand curve

Unemployment in Keynesian model (1/3)

What does unemployment with representative consumer mean?

Example #1:

1 representative consumer who wants to work 10 hours
1 representative firm who demands 5 hours
$\Rightarrow$ rep. consumer is employed, but underemployed

Example #2:

2 consumers who want to work 10 hours each
2 firms who demand 5 hours each
$\Rightarrow$ both consumers are employed, but both are underemployed

Unemployment in Keynesian model (2/3)

Example #3:

3 consumers: Mr A, Mr B and Mr C

$$\begin{aligned} Mr\ A &: \text{wants to work 15 hours} \\ Mr\ B &: \text{wants to work 10 hours} \\ Mr\ C &: \text{wants to work 5 hours} \end{aligned}$$

Average number of hours supplied: 10
Can think of representative consumer as Mr Average.

2 firms: Firm 1 and firm 2:

$$\begin{aligned} Firm\ 1 &: \text{demands 5 hours} \\ Firm\ 2 &: \text{demands 5 hours} \end{aligned}$$

Unemployment in Keynesian model (3/3)

Average number of hours demanded: 5

For example, Firm 1 employs Mr B (Mr B underemployed)
Firm 2 employs Mr C (Mr C employed at exactly number of hours he will like to work)
Mr A is unemployed.

Hence, underemployment and unemployment

Labour Market in Keynesian Sticky Wage Model

Recall that:

Nominal wage rate W_1 assumed to be imperfectly flexible in short run.

But can think of W_1 being completely responsive to factors affecting labour market in the long run

assume market real wage is no lower than the equilibrium real wage

employment determined by labour demand curve, and if market real wage is higher than equilibrium real wage there is unemployment

Constructing the Aggregate Supply AS curve (1/2)

Let W_1 be fixed at $\overline{W}_1$. Given price level $\widehat{P}_1$, $\overline{w}_1 = \frac{\overline{W}_1}{\widehat{P}_1}$, know $\widehat{N}_1$ and $\widehat{Y}_1$. So we have one point on AS_1 curve of $\left(\widehat{Y}_1, \widehat{P}_1\right)$

To derive AS_1 curve, let price increase from $\widehat{P}_1$ to $\widetilde{P}_1$. Since W_1 is fixed at $\overline{W}_1$, real wage falls to $\widetilde{w}_1 = \frac{\overline{W}_1}{\widetilde{P}_1}$, so we move down N_1^d curve, and current employment rises to $\widetilde{N}_1$, and output rises to $\widetilde{Y}_1$. Hence we have another point on AS_1 curve of $\left(\widetilde{Y}_1, \widetilde{P}_1\right)$

Continually changing prices, we can construct the whole AS_1 curve

Constructing the Aggregate Supply AS curve (2/2)

Notice that N_1^S doesn't matter at all, so didn't draw it. Only N_1^d matters.

Hence, aggregate supply curve does NOT depend on real interest rate, unlike what we've learnt for real and monetary intertemporal model

In fact, price level is on the vertical axis, not real interest rate

"Figure 12.3"

Factors Shifting AS_1 curve (1/2)

Look at what's on the vertical axis: today's price level. Changes in today's price level are movements along today's output supply curve, AS curve. Whatever affects output supply today so long as it's not price level changes today will shift the AS_1 curve.

1. increase in W_1 shifts AS_1 to the left

When $W_1 \nearrow$ from $\widehat{W}_1$ to $\widetilde{W}_1$, given any price level, say $\widehat{P}_1$, the real wage must have risen from $\frac{\widehat{W}_1}{\widehat{P}_1}$ to $\frac{\widetilde{W}_1}{\widehat{P}_1}$. But if real wage has risen, $\widehat{N}_1$ falls to $\widetilde{N}_1$ (movement along labour demand curve), and hence Y_1 falls from $\widehat{Y}_1$ to $\widetilde{Y}_1$. Hence, given price level $\widehat{P}_1$, Y_1 is now lower, i.e., AS_1 shifts to the left to $\widetilde{AS}_1$

("figure 12.4a")

Factors Shifting AS_1 curve (2/2)

2. decrease in current TFP z_1 shifts AS_1 to the left

When z_1 falls from $\widehat{z}_1$ to $\widetilde{z}_1$, production function shifts down, and labour demand shifts to the left for any given real wage (recall $F.O.C.(N_1)$ of firm). Given a price level $\widehat{P}_1$ and nominal wage $\widehat{W}_1$, real wage $\widehat{w}_1 = \frac{\widehat{W}_1}{\widehat{P}_1}$ hasn't changed, but labour demanded at this real wage has fallen. Hence, Y_1 falls from $\widehat{Y}_1$ to $\widetilde{Y}_1$. For a given level of price level, say $\widehat{P}_1$, output is now lower, which is illustrated by a shift leftward of AS_1 to $\widetilde{AS}_1$

("figure 12.4b")

Constructing the Aggregate Demand AD_1 curve
Step 1: IS_1 curve

Now that we have constructed the AS_1 curve, we're going to construct today's aggregate demand curve AD_1

Early Keynesian models often neglected aggregate supply and only focused on aggregate demand; these aggregate demand models are often referred to as IS-LM models

We want to draw an IS curve, or investment-savings curve, for today, which is equivalent to our Y_1^d curve from lecture 5 ("figure 12.5").

Every point on Y_1^d curve denotes combinations of real interest rate and output demanded today. Again, when r_1 falls, C_1 and I_1 rise, and Y_1^d rises (Y_1^d/IS_1 is downward sloping curve)

Shifts in IS_1 Curve

As IS_1 curve is just our Y_1^d curve, so anything that shifts Y_1^d shifts IS_1.
Factors that shift IS_1 to the right include:
- $\downarrow$ in PV of taxes, which $\nearrow$ demand for C_1
- an anticipated $\nearrow$ in future income/wealth, which $\nearrow$ demand for C_1
- $\nearrow$ in today's government expenditures
- expected $\nearrow$ in tomorrow's TFP, z_2, which $\nearrow$ demand for I_1

Clearly, factors that shift IS_1 to the left are:

Constructing the Aggregate Demand AD curve
Step 2: LM_1 curve (1/4)

Assume no long-run inflation, so today, $R_1 = r_1$. Know that demand for real money balances today is thus $L(Y_1, r_1)$, where $\partial L(Y_1, r_1)/\partial Y_1 > 0$ and $\partial L(Y_1, r_1)/\partial r_1 < 0$.

So we can plot money demand M_1^d as a function of real interest rate (rather than prices, as we did previously in lecture 7).

It is downward sloping as a function of real interest rate, given today's price level, which we suppose is $\widehat{P}_1$ and today's output, which we suppose is $\widehat{Y}_1$: $\widehat{M}_1^d = \widehat{P}_1 L\left(\widehat{Y}_1, r_1\right)$

Money supply determined exogenously by central bank; let it be $\overline{M}_1^S$
See "figure 12.6a"

LM_1 curve (2/4)

Equilibrium in money market today is when nominal money supply equals nominal money demand, or

$$\widehat{M}_1 = \overline{M}_1^S = \widehat{M}_1^d = \widehat{P}_1 L\left(\widehat{Y}_1, r_1\right)$$

at real interest rate $\widehat{r}_1$

LM_1 curve (3/4)

To derive LM curve, or "Liquidity-Money" curve, for today, suppose that money market was originally at equilibrium as described above.
Every point on LM_1 curve denotes an equilibrium in money market.
Hence, we already have one point, $\left(\widehat{Y}_1, \widehat{r}_1\right)$

Now let the level of real income rise to $\widetilde{Y}_1$. Hence, nominal money demand must increase for any given real interest rate, so $\widehat{P}_1 L\left(\widehat{Y}_1, r_1\right)$ shifts to the right to $\widehat{P}_1 L\left(\widetilde{Y}_1, r_1\right) = \widetilde{M}_1^d$. Real interest rate thus rises from $\widehat{r}_1$ to $\widetilde{r}_1$. Hence, $\left(\widetilde{Y}_1, \widetilde{r}_1\right)$ is another equilibrium point in money market, so we have another point on LM_1 curve.

Continually changing real income levels, we can derive the entire LM_1 curve, which is an upward sloping curve.

LM_1 curve (4/4)

It is upward sloping because: given real money supply level, $\frac{\widehat{M_1}}{\widehat{P_1}}$, real money demand increases as income rises, and for the money market to be in equilibrium, real interest rate needs to rise to dampen real money demand.

See "figure 12.6b"

Hence, we can draw IS_1-LM_1 curves as we do in "figure 12.7", thus determining $\left(Y_1^*, r_1^*\right)$

Shifts in LM_1 Curve (1/2)

Factors that shift LM_1 downwards include:

1. an $\nearrow$ in today's money supply (see "figure 12.8")
2. a $\downarrow$ in today's price level (see "figure 12.9")
3. $\downarrow$ in today's money demand (see "figure 12.10")

For 1., suppose today's money supply rises from $\overline{M}_1^s$ to $\widetilde{M}_1^s$. Equilibrium in the money market changes from $\left(\widehat{M}_1, \widehat{r}_1\right)$ to $\left(\widetilde{M}_1, \widetilde{r}_1\right)$. For any given level of output, say $\widehat{Y}_1$, real interest rate has now fallen, so LM_1 has shifted downwards to $\widetilde{LM}_1$

Shifts in LM_1 Curve (2/2)

For 2., suppose price level falls from $\widehat{P}_1$ to $\widetilde{P}_1$. Then demand for nominal balances must have fallen from $\widehat{M}_1^d = \widehat{P}_1 L\left(\widehat{Y}_1, r_1\right)$ to $\widetilde{M}_1^d = \widetilde{P}_1 L\left(\widehat{Y}_1, r_1\right)$ for a given real income $\widehat{Y}_1$. Hence, real interest rates fall from $\widehat{r}_1$ to $\widetilde{r}_1$. For a given real income $\widehat{Y}_1$, real interest rate has now fallen, so LM_1 has shifted downwards to $\widetilde{LM}_1$

For 3., if money demand falls from $\widehat{M}_1^d = \widehat{P}_1 L\left(\widehat{Y}_1, r_1\right)$ to $\widetilde{M}_1^d = \widehat{P}_1 \widetilde{L}\left(\widehat{Y}_1, r_1\right)$ for a given level of real income $\widehat{Y}_1$, real interest rates fall from $\widehat{r}_1$ to $\widetilde{r}_1$. For a given real income $\widehat{Y}_1$, real interest rate has now fallen, so LM_1 has shifted downwards to $\widetilde{LM}_1$

- money demand function may have a negative shift because, for example, there is a decrease in the risk associated with holding alternative assets to money, so for given level of real interest rate and real income today, holding money is less desirable

Constructing the Aggregate Demand AD curve
Step 3: Putting IS_1 and LM_1 together

Each point on AD_1 curve shows intersection of IS_1 and LM_1.

We want to construct the AD_1 curve, with real output on horizontal axis, and price level of vertical axis. To do so, we have to let price vary

Recall that we drew LM_1 curve for a given price level $\widehat{P}_1$. Suppose that IS_1 intersects LM_1 at $\left(\widehat{Y}_1, \widehat{r}_1\right)$. We have one point on our AD_1 curve, $\left(\widehat{Y}_1, \widehat{P}_1\right)$. Now suppose that $\widehat{P}_1$ falls to $\widetilde{P}_1$. We know from above that LM_1 shifts downwards to $\widetilde{LM}_1$ (see "figure 12.11"). IS_1 now intersects LM_1 at $\left(\widetilde{Y}_1, \widetilde{r}_1\right)$. So we now have another point on our AD_1 curve, $\left(\widetilde{Y}_1, \widetilde{P}_1\right)$. Continually changing prices, we can construct entire AD_1 curve, which is downward sloping.

Shifts in AD_1 Curve (1/2)

Any factor that causes IS_1 or LM_1 curves to shift will shift the AD_1 curve, except for price changes

Suppose IS_1 initially intersects LM_1 at $\left(\widehat{Y}_1, \widehat{r}_1\right)$

- If IS_1 shifts to the right to $\widetilde{IS}_1$, then AD_1 will shift to the right to $\widetilde{AD}_1$(see "figure 12.12")
  - because $\widetilde{IS}_1$ now intersects LM_1 at $\left(\widetilde{Y}_1, \widetilde{r}_1\right)$. For a given price level $\widehat{P}_1$, output is higher, i.e., AD_1 has shifted to the right to $\widetilde{AD}_1$

Shifts in AD_1 Curve (2/2)

- If LM_1 shifts downwards to $\widetilde{LM}_1$, then AD_1 will shift to the right to $\widetilde{AD}_1$(see "figure 12.13")
  because $\widetilde{IS}_1$ now intersects LM_1 at $\left(\widetilde{Y}_1, \widetilde{r}_1\right)$. For a given price level $\widehat{P}_1$, output is higher, i.e., AD_1 has shifted to the right to $\widetilde{AD}_1$

The Complete Keynesian Sticky Wage Model

see "figure 12.14"

Intersection of AS_1 with AD_1 give $\left(Y_1^*, P_1^*\right)$. As nominal wage is fixed at $\overline{W}_1$, we can determine real wage $w_1^* = \frac{\overline{W}_1}{P_1^*}$, and thus the equilibrium current employment N_1^*. Given P_1^* we know the position of LM_1 curve, and thus, knowing IS_1 curve, the intersection of IS_1 and LM_1 curve gives us real interest rate r_1^*.

Notice that the price level and real variables are determined jointly, so classical dichotomy doesn't hold.

Non-neutrality of Money in Keynesian Model

Non-neutrality of money means that changes in nominal money supply have real effects. Contrast this with the neutrality of money result that we obtained in our monetary intertemporal model in lecture 7.

We will see this in a few slides.

Should Governments Intervene (1/2)

Should governments act to smooth out business cycle fluctuations? To boost GDP when below trend, and to lower GDP when above trend?

Stabilization policy.

Since a consumer whose income is fluctuating will smooth consumption over time, so why not just smooth out business cycle fluctuations also?

Keynesians believe that governments should actively intervene to smooth out business cycle fluctuations, and we can use the Keynesian sticky wage model to show why they believe so

Should Governments Intervene (2/2)

Suppose a shock has hit the economy such that the real wage is above that which clears the labour market, and that it takes time for (sticky) nominal wages to adjust.

The intersection of IS_1 and LM_1 occurs at $\left(\widehat{Y}_1, \widehat{r}_1\right)$, and the intersection of AD_1 and AS_1 occurs at $\left(\widehat{Y}_1, \widehat{P}_1\right)$. The nominal wage is $\widehat{W}_1$, and the real wage is $\widehat{w}_1 = \frac{\widehat{W}_1}{\widehat{P}_1}$.

How do we restore equilibrium in the economy?

Method #1: Governments should do nothing and let market forces work (1/2)

As real wage is "too high", there is a tendency for nominal wage to fall. As nominal wage falls, move down the N_1^d curve from point c, and AS_1 curve shifts to the right, thus putting downward pressure on prices. As prices fall, however, LM_1 shifts down and this is a movement down the AD_1 curve from point b. As interest rates fall, labour supply $N_1^S(\widehat{r}_1)$ will shift to the left. Nominal wage will continue falling, interest rates will continue falling, and prices fall, till equilibrium is achieved, where $\widetilde{LM}_1$ intersects IS_1 at $\left(\widetilde{Y}_1, \widetilde{r}_1\right)$, $\widetilde{AS}_1$ intersects AD_1 at $\left(\widetilde{Y}_1, \widetilde{P}_1\right)$, and the labour market clears where $N_1^s(\widetilde{r}_1)$ intersects N_1^d at $\left(\widetilde{N}_1, \widetilde{w}_1\right)$, where $\widetilde{w}_1 = \frac{\widetilde{W}_1}{\widetilde{P}_1}$, where $\widetilde{W}_1$ is the nominal wage that economy settles at.

Method #1: Governments should do nothing and let market forces work (2/2)

See "figure 12.19"

Overall: today's real output $\nearrow$, today's employment $\nearrow$, consumption $\nearrow$, and investment $\nearrow$ (the latter two because real interest rate falls)

Method #2: Governments intervene through monetary policy (1/2)

Keynesians like to point out, that "in the long run, we are all dead"

Suppose that today's money supply rises from M_1^s to $\widetilde{M}_1^s$, which will turn out to be exactly large enough to restore equilibrium, so LM_1 shifts down to $\widehat{LM}_1$. IS_1 now intersects $\widehat{LM}_1$ at $\left(\hat{\hat{Y}}_1, \hat{\hat{r}}_1\right)$, and we know that AD_1 shifts to the right to $\widetilde{AD}_1$ by $\left(\hat{\hat{Y}}_1 - \hat{Y}_1\right)$. At the original price level $\hat{P}_1$, aggregate demand exceeds aggregate supply, so price level is going to rise. But as price level rises, $\widehat{LM}_1$ is going to start shifting upwards, from $\widehat{LM}_1$. This is a movement up the $\widetilde{AD}_1$ from point b. We also move upwards along the AS_1 curve from point c as price rises since we're moving down the N_1^d curve.

Method #2: Governments (central banks) intervene through monetary policy (2/2)

Equilibrium is restored when IS_1 intersects the new $\widetilde{LM}_1$ at $\left(\widetilde{Y}_1, \widetilde{r}_1\right)$, and $\widetilde{AD}_1$ intersects AS_1 at $\left(\widetilde{Y}_1, \widetilde{P}_1\right)$. In the labour market, $N_1^s\left(\widetilde{r}_1\right)$ shifts to the left as real interest rates have fallen until $N_1^s\left(\widetilde{r}_1\right)$. Furthermore, the rise in price level is sufficient to drive down real wages till $\widetilde{w}_1 = \frac{\widehat{W}_1}{\widetilde{P}_1}$, and employment has risen from $\widehat{N}_1$ to $\widetilde{N}_1$

see "figure 12.20"

In real terms, the economy is in the same situation with intervention as without intervention, except that with intervention the price level and nominal wage are higher.

Method #3: Governments intervene through fiscal policy (1/5)

Suppose government increases government expenditure today.

$\Delta G_1 > 0 \Longrightarrow \nearrow$ in PV of govt expenditures $\Longrightarrow \nearrow$ in PV of taxes as well, because for the government's LBC to hold:

$$\underbrace{G_1 + \frac{G_2}{1+r_1} + ...}_{PV \text{ of expenditures}} = \underbrace{T_1 + \frac{T_2}{1+r_1} + ...}_{PV \text{ of taxes, } \tau}$$

Hence,

$$\Delta G_1 = \Delta \tau$$

$\Longrightarrow \Delta \omega^d = -\Delta \tau < 0.$

Method #3: Governments intervene through fiscal policy (2/5)

In the labor market, $N_1^s(\widehat{r}_1)$ curve shifts to the right to $\widehat{N}_1^s(\widehat{r}_1)$ (ω^d falls and consume less leisure which is a normal good, that is, work more).

In terms of goods demanded, there are two effects:

1. the government spends more:

$$\Delta G_1 > 0$$

2. as consumer's ω^d has decreased, Y_1^d is affected by a change in consumption:

$$\Delta C_1 = MPC\Delta\omega^d = -MPC\Delta G_1 < 0.$$

Method #3: Governments intervene through fiscal policy (3/5)

Overall change in Y_1^d, ΔY_1^d, is:

$$\begin{aligned}
\Delta Y_1^d &= \left(\frac{1}{1-MPC}\right)(\Delta G_1 + \Delta C_1) \\
&= \left(\frac{1}{1-MPC}\right)(\Delta G_1 - MPC\Delta G_1) \\
&= \left(\frac{1}{1-MPC}\right)\Delta G_1(1-MPC) \\
&= \Delta G_1.
\end{aligned}$$

This means that Y_1^d changes by ΔG_1, i.e., Y_1^d, which is also IS_1, shifts out to the right to $\widetilde{IS}_1$.

Method #3: Governments intervene through fiscal policy (4/5)

This shift of IS_1 to the right to $\widetilde{IS}_1$ in turn causes AD_1 to shift to the right to $\widetilde{AD}_1$ by $\left(\widehat{\widetilde{Y}}_1 - \widehat{Y}_1\right)$ At the original equilibrium price $\widehat{P}_1$, aggregate demand exceeds aggregate supply, so the price will start to rise. This in turn causes LM_1 to shift up, which causes a movement up along $\widetilde{AD}_1$ curve from point b, and at the same time, we move up the AS_1 curve from point c due to a movement downwards along the N_1^d curve.

The shift up of LM_1 to $\widetilde{LM}_1$ is smaller than the shift to the right of IS_1 because an increase in government expenditures is expansionary. Hence, real interest rate has risen from $\widehat{r}_1$ to $\widetilde{r}_1$, real output has risen from $\widehat{Y}_1$ to $\widetilde{Y}_1$,

Method #3: Governments intervene through fiscal policy (5/5)

Price has risen from $\widehat{P}_1$ to $\widetilde{P}_1$. The increase in real interest rate causes labour supply to shift further. In equilibrium, labour supply will have shifted to $\widetilde{N}_1^s(\widetilde{r}_1)$, and prices have risen by enough to decrease real wages such that equilibrium is restored at the labour market at $\left(\widehat{\widehat{N}}_1, \widetilde{w}_1\right)$, where $\widetilde{w}_1 = \frac{\widehat{W}_1}{\widetilde{P}_1}$

Since labour supply here rises, employment here is necessarily higher than compared to "figure 12.20". Hence, output is also higher.

Keynesian Transmission Mechanism for Monetary Policy

An increase in money supply causes real interest rate to fall to equate money demand with the new (higher) money supply. This fall in real interest rate then increases the demand for consumption and investment goods, which leads to a rise in price level, which then lowers the real wage and increases employment.

In other words, monetary policy through changing money supply is not useless here, unlike in monetary intertemporal model.

However, this effectiveness is only in the short run. Most Keynesians do believe, that with enough time, the nominal wage will eventually adjust, and hence, money will be neutral then, just like what we studied with the RBC model.

Compare model to data, table 12.1

Transmission Mechanism for Monetary Policy in Practice

Banks are required to hold a fraction of their outstanding loans as reserves: **Required Reserve Ratio**. If they fall short of that ratio at the end of a day, they can go to Interbank market to borrow overnight (or longer). If they hold extra reserves, they can lend them out to earn interest on these.

If the central bank carries out an OMO by buying bonds from banks, it increases their reserves. Then banks hold reserves beyond the required level (and ratio). Supply of funds on Interbank market increases, and therefore the overnight interest rate falls, which makes is less costly for banks to fall short of required reserves. They will therefore increase the amount they loan out so effective money supply increases, i.e., M_1^s then really increases.

Comments (1/2)

Active intervention by governments to restore equilibrium seems good, but have to ensure that you know exactly by how much to change expenditures or money supply, or else you'll overshoot or undershoot.

Keynesians, by believing in the role of governments in actively intervening, must believe that markets fail to adjust quickly, and that any intervention by the government can be carried out in a timely manner and can be "just enough" to get the job done.

Comments (2/2)

Note: even though we've studied sticky wage model, we could also have studied a sticky price model. Why should prices be sticky? Think about airlines which raise fuel surcharges infrequently compared to how much the price of oil fluctuates. Think about restaurants. Do they change prices very often? No, in part because printing menus very often cost model. Hence, these models are often referred to as "menu cost models"

Criticisms of Keynesian Sticky Price/Wage Models (1/2)

1. they don't replicate the key business cycle regularities very well. In particular, they predict that real wage and average labor productivity are countercyclical, which are not true.

2. where is the theory underlying this price/wage stickiness? In our analysis, we assumed that wages were sticky. But why? For instance, it was proposed that nominal wage is fixed due to long term contracts. But this begs the question of why firms and workers will willingly undertake to such contracts in the first place. Need to explicitly write a model about labour contracting and show that workers and firms willingly choose to commit to these fixed nominal wages.

Criticisms of Keynesian Sticky Price/Wage Models (2/2)

3. Menu costs are very small, particularly when compared to changing output. For instance, if demand increases, restaurant can meet this demand by changing prices or changing output. Changing prices is easy: just print new menus. But to change output requires a lot more work in getting the space to accommodate more tables, hire and train more waiters and chefs, etc. Seems more reasonable to allow restaurant to change prices than changing output in response to change in demand.

4. Some economists have shown that for sticky prices to replicate magnitudes of some key business cycle regularities require that prices be extremely sticky