

## 5 Forward Looking Models of Consumption Demand

**Definition 61** *CONSUMPTION SMOOTHING*. People prefer consumption to be stable from year to year.

**Definition 62** *PERMANENT INCOME HYPOTHESIS*. proposes that individuals will spend a proportion of the present value of their expected lifetime consumption.

Suppose we live for  $N$  years. Then:

$$PV = \sum_{i=1}^N \frac{Y_i^d}{(1+r)^i} \quad (60)$$

$$C_i^d = \frac{1}{N}PV \quad (61)$$

Ignoring discounting, as I did in class, simplifies the above to:

$$PV = \sum_{i=1}^N Y_i^d \quad (62)$$

$$C_i^d = \frac{1}{N}PV \quad (63)$$

- We don't change our spending pattern much unless we believe that there is a change in permanent income.
- Temporary tax cuts result in little change in spending.

**Definition 63** *LIFE CYCLE HYPOTHESIS* says that consumption is related to our situation in life, whether we are growing, working, or retired.

- Students: borrow against future expected income (negative saving,  $mpc > 1$ ).
- Workers: save for retirement and to pay off student loans (positive savings,  $mpc < 1$ ).
- Retirees: spend savings (negative saving,  $mpc > 1$ ).

Both theories smooth consumption. Both theories show that temporary tax cuts have little effect on spending. However, the life cycle theory points out that retirees and students who are borrowing-constrained, may spend a large fraction of even temporary tax cuts.

## 6 Interest rate

The primary determinant of investment spending demand is the interest rate.

All income that is not consumed is saved. Savings are in turn spent on investment spending.

If interest rates fall, then buying new houses plants and equipment is cheaper, and so investment spending rises.

## 7 Taxes

Taxes on investment reduce investment spending. These include:

1. Changes in Depreciation allowance.
2. Investment tax credits.
3. Capital Gains tax cut.

## 8 Expectations

An increase in confidence about the economy causes firms to start new businesses and expand existing plants. Households are more confident in their jobs and buy bigger houses. The result is an increase in investment spending.

Expectations are quite volatile, which Keynes called “animal spirits.”

## B Government Spending Demand

Government spending is determined primarily by the demand for public goods, not  $r$ .

**Definition 64** *A POLICY VARIABLE is a variable under control of the government.*

$G$  is a policy variable. The government may raise or lower  $G$  in an attempt to improve the performance of the economy.

## C Net Export Demand

If domestic interest rates rise, our investments become more attractive to foreigners. Thus foreigners demand our dollars to buy our assets. The value of the dollar, or nominal exchange rate, rises. A higher exchange rate implies that US exports are more expensive and US imports are cheaper. Thus exports fall and imports rise. Thus Net exports fall. In effect,

foreigners buy more US assets and less US goods. The increase in US asset purchases are traded for imports.

$$\uparrow R \Rightarrow \uparrow E \Rightarrow \downarrow X \uparrow M \Rightarrow \downarrow (X - M) \quad (64)$$

Effect of an increase in interest rates on spending:

1. Consumption falls, because savings is more attractive.
2. Investment spending falls, because it is more expensive to borrow to buy new houses and new businesses.
3. Net exports fall because the increased demand for US assets and driven up the exchange rate, making exports more expensive and imports cheaper.

These are all shifts of the spending line, because they are caused by  $r$  changing, not  $y$ .

The decline in spending means store owners and workers have less income, which means store owners and workers spend less, and so on until we converge to the new equilibrium with lower  $C$ ,  $I$ ,  $X - M$ ,  $Y$ , and spending.

## II Aggregate Demand and Inflation

- NOT TRUE: that inflation makes things more expensive, so aggregate demand falls. Aggregate demand includes all goods, so we cannot substitute to a lower priced good when prices rise.
- TRUE: Inflation raises interest rates, which in turn reduces  $C$ ,  $I$ , and  $X - M$ , and thus total spending.

**Definition 65** *TAYLOR RULE.* A formula for determining the FED's policy on  $M$  and  $r$  from macroeconomic conditions.

The FED's primary goal is to keep inflation at some target level. When inflation rises above the target level, the FED reduces the money supply and increases interest rates (recall  $MV = PY$ , so a decrease in the growth of  $M$  reduces inflation). If inflation is below the FED's target, the FED will increase the money supply and lower interest rates.

$$\uparrow \pi \rightarrow \text{FED raises } r \rightarrow \downarrow C, I, X - M \rightarrow \downarrow AD$$

So aggregate demand is downward sloping.

### III Equilibrium

#### A Potential GDP

Long run production depends only on capital, labor, and technology, not inflation.

#### B Inflation Adjustment Line

Firms change production and not raise prices in the short run, because of:

1. Menu costs: costs to quickly changing prices, associated with printing new menus and catalogs.
2. Contracts: some prices are fixed by contract for a period of time.

Firms increase production in the short run by increasing capacity utilization (running factories more hours or bringing idle factories on line) and by hiring extra workers, which decreases unemployment.

**Definition 66** *INFLATION ADJUSTMENT LINE (IA)*. Short run aggregate supply curve.

The IA line is horizontal because the inflation rate is fixed in the short run.

#### C Aggregate Demand

Aggregate Demand: increased inflation causes the FED to raise  $R$ . Increased  $R$  causes lower  $C$ ,  $I$ ,  $X - M$ .

Short run equilibrium is then where the IA line crosses the AD line. In that case:

1. Equilibrium exists in that  $\pi$  is such that the short run supply of goods equals aggregate demand.
2. Equilibrium exists in that  $r$  balances demand and supply of loans.
3. Equilibrium exists in that  $E$  is such that supply equals demand in the foreign exchange market.
4. Equilibrium exists in that the quantity of labor demanded is set at the wage floor.
5. Spending, Income, and short run production are equal.

Long run equilibrium is where IA, AD, and potential GDP all intersect. At that point, 1-5 above hold plus:

6. Long run aggregate supply equals aggregate demand.

## D Proof of Long run equilibrium

Suppose potential GDP exceeds aggregate demand. GDP is below potential and hence the economy is in a recession. Capacity utilization is low and unemployment is high. Firms have an incentive to cut prices and increase production, since it is relatively cheap to bring some factories online and produce more goods. This causes the IA line to shift down. Inflation falls, so the FED is less concerned about inflation and lowers  $r$ . But then  $C$ ,  $I$ , and  $X - M$  rise, increasing aggregate demand up to potential.

## E Recessions and Booms

General form of fall in AD:

1. Always start in a long run equilibrium.
2. In the short run:
  - AD shifts to the left. Spending falls, which means less income for store owners and workers, which means store owners and workers reduce consumption, and so on. Income and spending fall
  - The shift to the left on the AD-AS graph includes both the initial reduction in AD and subsequent reductions due to the fall in income.
  - Firms do not raise prices but reduce capacity and hiring, causing higher unemployment.
  - GDP growth is below potential, a recession.
  - The economy is in a short run equilibrium since AD crosses IA.
3. In the Long run:
  - AD is less than potential GDP. Firms have surplus capacity and workers, and will thus lower prices. The IA line thus shifts down.
  - The FED responds to the lower inflation by decreasing interest rates.  $C$ ,  $I$ , and  $X - M$  rise.
  - Spending rises, which generates more income, more consumption spending, and so on.
  - The economy recovers from the recession.

## IV Application: Fiscal Policy

### A Increase in Government Spending, financed by borrowing

The increase in  $G$  has to come from somewhere. The government borrows it from a consumer. The consumer only spends a part ( $b$ ) of the income, whereas the the government spends all of it. Thus spending goes up.

RULE 1: An increase in  $G$  financed by either higher taxes or borrowing dominates the reduction in spending caused by higher taxes or borrowing.

Thus an increase in  $G$  financed by either higher taxes, or more borrowing, increases total spending.

The long run effect is relative to the initial equilibrium, not relative to the short run equilibrium.

RULE 2: If income returns to potential, there is no income effect on consumption in the long run.

Thus if  $C$  falls in the short run due to a fall in income, and rises in the long run as income returns to potential, the overall effect is that  $C$  returns to normal.

**Definition 67** *CROWDING OUT.* Government spending tends to replace private spending.

In the short run, an increase in  $G$  can cause a boom, but in the long run, an increase in  $G$  simply replaces private spending.

**Definition 68** *TWIN DEFICITS.* Budget deficits cause trade deficits.

Here the twin deficits occurs because the increase in  $G$  caused the budget deficit. The government had to increase borrowing, and the rise in  $r$  caused a rise in  $E$  which made US exports more expensive and imports cheaper, worsening the trade deficit.

### B Permanent increase in income taxes, financed by less borrowing

The increase in taxes comes from household income, in the form of reduced consumption and savings. The government saves all of the tax increase, thus overall spending falls.

Rule 3: In the short and long run  $Y = C + I + G + X - M$ .

Consumption changes for 3 reasons:

- taxes are up ( $C$  falls),
- income is down and then up (by Rule 2, these effects cancel and there is no income effect on  $C$ ),

- and interest rates fall ( $C$  rises).

Since  $I$  and  $X - M$  are up, we must have  $C$  decreases because  $Y = C + I + G + X - M$ .

### C Increase in Government Spending, financed by an increase in taxes

Overall spending still rises, by Rule 1.

Short run change in  $C$ : Suppose government spending rises by  $\Delta G$ . Then taxes also rise by  $\Delta G$ , so consumption falls by  $b \cdot \Delta G$  (the rest was moved from saving to government consumption). Now  $C$  rises due to the increase in income. Income rises one for one with spending, so income rises by  $(1 - b) \Delta G$ . So spending rises by  $b \cdot (1 - b) \Delta G$ . In general:

$$\Delta C = b \cdot (1 - b) \Delta G + b^2 \cdot (1 - b) \Delta G + \dots - b \Delta G \quad (65)$$

$$= b \frac{1 - b}{1 - b} \Delta G - b \Delta G = 0 \quad (66)$$

So consumption is constant in the short run.

### V Application: Monetary Policy

Suppose the FED decides to TARGET A HIGHER INFLATION RATE. At the current equilibrium, the the interest rate is just low enough to generate the given inflation rate  $\pi$ . To raise the inflation rate, the FED must reduce interest rates. By loaning printed money in the FED Funds market, the money supply rises and the FED Funds rate falls.

The FED is lowering  $r$ , but *not because of a change in  $\pi$* . Therefore, we shift AD to the right.

**Definition 69** *NUETRALITY OF MONEY. Changes in monetary policy do not affect real variables.*

Inflation is a nominal variable so the model implies money is neutral in the long run but not in the short run.

Now a loose monetary policy has short run benefits (an increase in  $Y$ ), but long run costs (an increase in  $\pi$ ). Thus the model predicts that an independent central bank with a longer term view should propose lower inflation than a central bank which is less independent.

## VI Application: Price Shock

Suppose an increase in the price of oil increases the price of most goods. This is called a positive price shock in that prices go up, even though it is a bad thing. We are changing  $\pi$ , so we move along the curve.

**Definition 70** *STAGFLATION*. Simultaneous high inflation and a recession

The model predicts a price shock causes stagflation in the short run.

## VII Application: Counter-Cyclical Policy

**Definition 71** *COUNTER CYCLICAL POLICY*. Changing government policy so that spending moves in the opposite direction as GDP.

### A Counter-Cyclical Monetary Policy

Suppose a fall in business expectations. FED uses a counter cyclical policy of increasing the inflation target. If the FED acts in the short run, the recession is shorter.

### B Counter Cyclical Fiscal Policy

We can also use  $G$  and  $T$  to smooth the cycle.

These counter-cyclical policies must be both timed perfectly and have perfect magnitude. If the timing is too late or if the size of the recession is underestimated, the economy may overshoot the long run equilibrium, causing some long run inflation.

**Definition 72** *AUTOMATIC STABILIZERS*. Counter cyclical policies which take effect automatically.

Policies such as income taxes are automatic stabilizers. When income falls, households pay less taxes automatically.