MONEY, THE INTEREST RATE, AND OUTPUT: ANALYSIS AND POLICY

Chapter 24
MONEY, THE INTEREST RATE, AND OUTPUT: ANALYSIS AND POLICY

**goods market** The market in which goods and services are exchanged and in which the equilibrium level of aggregate output is determined

**money market** The market in which financial instruments are exchanged and in which the equilibrium level of the interest rate is determined

- Only by analyzing the two markets together, we can determine the values of aggregate output (Y) and the interest rate (r) that are consistent with the existence of equilibrium in both markets
THE LINKS BETWEEN THE GOODS MARKET AND THE MONEY MARKET

• There are two key \textit{links} between the goods market and the money market:

Link 1: Income and the Demand for Money

Link 2: Planned Investment Spending and the Interest Rate
THE LINKS BETWEEN THE GOODS MARKET AND THE MONEY MARKET

Link 1: Income and the Demand for Money
• Income, which is determined in the goods market, has considerable influence on the demand for money in the money market
  • The demand for money depends on income (Y)
  • An increase in output, with the interest rate (r) held constant, leads to an increase in money demand

Link 2: Planned Investment Spending and the Interest Rate
• The interest rate, which is determined in the money market, has significant effects on planned investment in the goods market
  • Planned investment spending (I) depends on the interest rate
  • The higher the interest rate is, the lower the level of planned investment spending
THE LINKS BETWEEN THE GOODS MARKET AND THE MONEY MARKET

Goods Market

\[ Y = C + I + G \]  
(determines \( Y \))

\( I \) depends on \( r \)

Money Market

Money demand \( = \) Money supply 
(determines \( r \))

Money demand depends on \( Y \)

Links Between the Goods Market and the Money Market
THE LINKS BETWEEN THE GOODS MARKET AND THE MONEY MARKET

INVESTMENT, THE INTEREST RATE, AND THE GOODS MARKET

• Investment refers to a firm’s purchase of new capital—new machines and plants.

• Whether firm decides to invest in a project depends on whether the expected profits from the project justify its costs—that is the interest cost.
  • When the interest rate rises, it becomes more expensive to borrow and fewer projects are likely to be undertaken; increasing the interest rate is likely to reduce the level of planned investment spending.
  • Reducing the interest rate is likely to increase the level of planned investment spending.
THE LINKS BETWEEN THE GOODS MARKET AND THE MONEY MARKET

INVESTMENT, THE INTEREST RATE, AND THE GOODS MARKET

When the interest rate falls, planned investment rises.

When the interest rate rises, planned investment falls.
THE LINKS BETWEEN THE GOODS MARKET AND THE MONEY MARKET

• We can know use the fact that planned investment depends on the interest rate to consider how this relationship affects planned aggregate expenditure (AE)

\[ AE \equiv C + I + G \]

• When the interest rate \((r)\) changes, planned investment \((I)\) changes

• A change in the interest rate \((r)\) will lead to a change in total planned spending \((C+I+G)\) as well
THE LINKS BETWEEN THE GOODS MARKET AND THE MONEY MARKET

The Effect of an Interest Rate Increase on Planned Aggregate Expenditure
The effects of a change in the interest rate include:

- High interest rate \((r)\) discourages planned investment \((I)\)
- Planned investment is a part of planned aggregate expenditure \((AE)\)
- Thus, when the interest rate rises, planned aggregate expenditure \((AE)\) at every level of income falls
- Finally, a decrease in planned aggregate expenditure lowers equilibrium output (income) \((Y)\) by a multiple of the initial decrease in planned investment
- Using a convenient shorthand:

\[
\begin{align*}
    r & \uparrow \rightarrow I \downarrow \rightarrow AE \downarrow \rightarrow Y \downarrow \\
    r & \downarrow \rightarrow I \uparrow \rightarrow AE \uparrow \rightarrow Y \uparrow
\end{align*}
\]
THE LINKS BETWEEN THE GOODS MARKET AND THE MONEY MARKET

• The other half of the story
  • The ways in which the goods market affects the money market
• We explored the demand for money by households and explained why the demand for money depends negatively on the interest rate

• An increase in the interest rate raises the opportunity cost of holding money, encouraging people to keep more of their funds in bonds and less in checking account balances
  • Downward sloping money demand curve
THE LINKS BETWEEN THE GOODS MARKET AND THE MONEY MARKET

• The demand for money also depends on the level of income
  • An increase in income shifts the money demand curve to the right

• We assume that the Central Bank’s choice of amount of money to supply does not depend on the interest rate
  • The money supply curve is a vertical line

• The equilibrium interest rate is the point at which the quantity of money demanded equals the quantity money supplied
  • If MS>MD, excess supply of money, interest rate will fall
  • If MS<MD, excess demand for money, interest rate will rise
THE LINKS BETWEEN THE GOODS MARKET AND THE MONEY MARKET

MONEY DEMAND, AGGREGATE OUTPUT (INCOME), AND THE MONEY MARKET

Equilibrium in the Money Market
THE LINKS BETWEEN THE GOODS MARKET AND THE MONEY MARKET

• What will happen to the interest rate when there is an increase in aggregate output (Y)?

• The increase in Y will cause the money demand curve to shift to the right

• With a fixed supply of money, there is now an excess demand for money (MD>MS) at the initial interest rate

• This causes the interest rate to rise
THE LINKS BETWEEN THE GOODS MARKET AND THE MONEY MARKET

The Effect of an Increase in Income \( (Y) \) on the Interest Rate \( (r) \)
• The equilibrium level of the interest rate is not determined exclusively in the money market.
• Changes in aggregate output (income) ($Y$), which take place in the goods market, shift the money demand curve and cause changes in the interest rate.
• With a given quantity of money supplied, higher levels of $Y$ will lead to higher equilibrium levels of $r$.
• Lower levels of $Y$ will lead to lower equilibrium levels of $r$, as represented in the following symbols:

\[
\begin{align*}
Y & \uparrow \rightarrow M^d \uparrow \rightarrow r \uparrow \\
Y & \downarrow \rightarrow M^d \downarrow \rightarrow r \downarrow
\end{align*}
\]
COMBINING THE GOODS MARKET AND THE MONEY MARKET

• The link between the goods market and the money market

• To see how the two markets interact, it will be convenient to consider the effects of changes in fiscal and monetary policy on the economy
  • What happens to the equilibrium level of aggregate output ($Y$) and the interest rate ($r$) when certain key variables - government spending ($G$), the taxes ($T$) and money supply ($MS$) – increase or decrease
COMBINING THE GOODS MARKET AND THE MONEY MARKET

EXPANSIONARY POLICY EFFECTS

**expansionary fiscal policy**  An increase in government spending or a reduction in net taxes aimed at increasing aggregate output (income) ($Y$)

**expansionary monetary policy**  An increase in the money supply aimed at increasing aggregate output (income) ($Y$)
COMBINING THE GOODS MARKET AND THE MONEY MARKET

Expansionary Fiscal Policy: An Increase in Government Purchases ($G$) or a Decrease in Net Taxes ($T$)

- Two tools of government fiscal policy
  - Government spending ($G$)
  - Net taxes ($T$)

- The government can increase aggregate output ($Y$) either by
  - Increasing government purchases
  - Reducing net taxes
COMBINING THE GOODS MARKET AND THE MONEY MARKET

• Consider an increase in government purchases (G)

• This increase in expenditure causes firms’ inventories to be smaller than planned

• Unplanned inventory reductions stimulate production and firms increase output (Y)

• Added output means added income, some of which is spent, consumption spending also increases (C)

• Again, the inventories will be smaller than planned and output will rise even further

• The final equilibrium level of output is higher by a multiple of the initial increase in G
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• However, the multiplier story is incomplete
  • We previously assumed that planned investment (I) is fixed at a certain level, but we now know that planned investment depends on the interest rate

• Return to the multiplier story
  • The stage that firms begin to raise output in response to an increase in government purchases
COMBINING THE GOODS MARKET AND THE MONEY MARKET

• As aggregate output \( (Y) \) increases, the increase in income increases the demand for money

• We still assume that money supply is constant

• The resulting disequilibrium, with the quantity of money demanded greater than the quantity of money supplied, causes the interest rate to rise

• The increase in \( G \) increases both \( Y \) and \( r \)
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• The increase in \( r \) causes planned investment spending \((I)\) to decline

• As planned investment spending is a component of planned aggregate expenditure \((C+I+G)\), the decrease in \((I)\) works against the increase in \(G\)
  • An increase in \(G\) increases planned aggregate expenditure and increases aggregate output
  • A decrease in \((I)\) reduces planned aggregate expenditure and decreases aggregate output
COMBINING THE GOODS MARKET AND THE MONEY MARKET

crowding-out effect The tendency for increases in government spending to cause reductions in private investment spending

• Without any expansion in the money supply to accommodate the rise in income and increased money demand, planned investment spending partially crowded out by the higher interest rate
  • The extra spending created by the rise in G is somewhat offset by the fall in (I)
  • Income still rises, but the multiplier effect of the rise in G is lessened because of the higher interest rate’s negative effect on (I)
COMBINING THE GOODS MARKET AND THE MONEY MARKET

The Crowding-Out Effect

Planned aggregate expenditure, $C + I + G$

Aggregate output (income), $Y$

Note: $G_1 > G_0$

$I_1 < I_0$
COMBINING THE GOODS MARKET AND THE MONEY MARKET

• An increase in government purchases from $G_0$ to $G_1$ shifts the planned aggregate expenditure curve $(C + I_0 + G_0)$ upward $(C + I_0 + G_1)$

• The increase in $(Y)$ from $Y_0$ to $Y_1$ causes the demand for money to rise, which results in a disequilibrium in the money market

• The excess demand for money raises the interest rate, causing $I$ to decrease from $I_0$ to $I_1$

• The fall in $I$ pulls the planned aggregate expenditure curve back down $(C + I_1 + G_1)$, which lowers the equilibrium level of income to $Y^*$
COMBINING THE GOODS MARKET AND THE MONEY MARKET

Effects of an expansionary fiscal policy:

\[ G \uparrow \rightarrow Y \uparrow \rightarrow M^d \uparrow \rightarrow r \uparrow \rightarrow I \downarrow \]

\[ Y \text{ increases less than if } r \text{ did not increase} \]
COMBINING THE GOODS MARKET AND THE MONEY MARKET

• What about the changes in net taxes?

• The expansion of Y that a tax cut brings about will lead to an increase in the money demand and the interest rate and thus a decrease in planned investment spending

• The ultimate increase in Y will be less than it would be if the interest rate did not rise
COMBINING THE GOODS MARKET AND THE MONEY MARKET

Expansionary Monetary Policy: An Increase in the Money Supply

- Central Bank decides to increase the supply of money through open market operations
- Open market operations inject new reserves into the system and expand the quantity of money supplied
- The money supply curve shifts to right
- Because the quantity of money supplied is now greater than the amount households want to hold (MS>MD), the equilibrium rate of interest falls
- Planned investment spending increases when the interest rate falls
COMBINING THE GOODS MARKET AND THE MONEY MARKET

• Increased planned investment spending means planned expenditure is now greater than aggregate output.

• Firms experience unplanned decreases in inventories and they raise output (Y).

• An increase in the money supply decreases the interest rate and increases Y.

• However, the higher level of Y increases the demand for money.

• The demand for money curve shifts to right.

• This keeps the interest rate from falling as far as it otherwise would.
COMBINING THE GOODS MARKET AND THE MONEY MARKET

Effects of an expansionary monetary policy:

\[ M_s \uparrow \rightarrow r \downarrow \rightarrow I \uparrow \rightarrow Y \uparrow \rightarrow M^d \uparrow \]

\[ \rightarrow r \text{ decreases less than if } M^d \text{ did not increase} \]
COMBINING THE GOODS MARKET AND THE MONEY MARKET

Expansionary Fiscal Policy Accommodated by Increasing the Money Supply
COMBINING THE GOODS MARKET AND THE MONEY MARKET

CONTRACTIONARY POLICY EFFECTS

Contractionary Fiscal Policy:
A Decrease in Government Spending (G) or an Increase in Net Taxes (T)

contractionary fiscal policy  A decrease in government spending or an increase in net taxes aimed at decreasing aggregate output (income) (Y)

• Opposite of the effects of an expansionary fiscal policy
COMBINING THE GOODS MARKET AND THE MONEY MARKET

- A decrease in government purchases or an increase in net taxes leads to a decrease in aggregate output \((Y)\), a decrease in the demand for money and a decrease in the interest rate \((r)\).

- The decrease in \(Y\) that accompanies a contractionary fiscal policy is less than it would be if we did not take the money market into account.

- The decrease in \(r\) also causes planned investment \((I)\) to increase.

- This increase in \((I)\) offsets some of the decrease in planned aggregate expenditure brought about by the decrease in \(G\).
COMBINING THE GOODS MARKET AND THE MONEY MARKET

Effects of a contractionary fiscal policy:

\[ G \downarrow \text{ or } T \uparrow \rightarrow Y \downarrow \rightarrow M^d \downarrow \rightarrow r \downarrow \rightarrow I \uparrow \]

\[ \downarrow \rightarrow Y \text{ decreases less than if } r \text{ did not decrease} \]
COMBINING THE GOODS MARKET AND THE MONEY MARKET

Contractionary Monetary Policy: A Decrease in the Money Supply

**contractionary monetary policy** A decrease in the money supply aimed at decreasing aggregate output (income) \((Y)\)

- As money supply decrease, interest rate increases, planned investment spending decreases

- Lower equilibrium level of income results in a decrease in the demand for money, which means that the increase in the interest rate will be less than it would be if we did not take the goods market into account
COMBINING THE GOODS MARKET AND THE MONEY MARKET

Effects of a contractionary monetary policy:

\[ M^s \downarrow \rightarrow r \uparrow \rightarrow I \downarrow \rightarrow Y \downarrow \rightarrow M^d \downarrow \]

\[ r \text{ increases less than if } M^d \text{ did not decrease} \]