

# WELCOME!

Thank you for joining us.  
The webinar will begin shortly.

## Housekeeping Items:

- Please use the chat and/or Q & A function to ask questions or to notify moderator of issues
- The session will be recorded and emailed to participants in the next few days

# AP Macro Unit 5: Money Growth and Inflation

Live Webinar: October 24<sup>th</sup>, 2022



# Instructor Bio

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James Redelsheimer has been an AP and Regular Economics teacher at Robbinsdale Armstrong High School in Plymouth, Minnesota since 2003. James received his Bachelor's degree from St. Olaf College and his Master's degree at the University of St. Thomas. He received the 3M Economics Educator Excellence Award from the Minnesota Council on Economic Education and was named Visa's Practical Money Skills Innovative Educator of the Month.

James enjoys traveling and has been a guest lecturer in the economics department at the Batumi State University in The Republic of Georgia and has received travel grants and fellowships for study travel to learn about the economies of Japan, China, Turkey, Germany, Korea, among others, and studied economics of the environment in Costa Rica. He currently serves as an AP Economics reader, grading AP Economics exams. He enjoys teaching Economics because it relates to students' everyday lives.

# Webinar Objectives

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- In this webinar teachers will be able to:
  - Explain how inflation is related to growth in the money supply
  - Define and give examples of the quantity theory of money
  - Implement effective lessons to prepare students AP exam questions on money growth and inflation.

# Quantity Theory of Money

**If a train can carry a maximum of 200 passengers, how can it transport 1200 passengers a day?**

**If real GDP is \$400 billion but the amount of money in the economy is only \$100 billion, how are these transactions taking place?**

**The velocity of money is the average times a dollar is spent and re-spent in a year.**

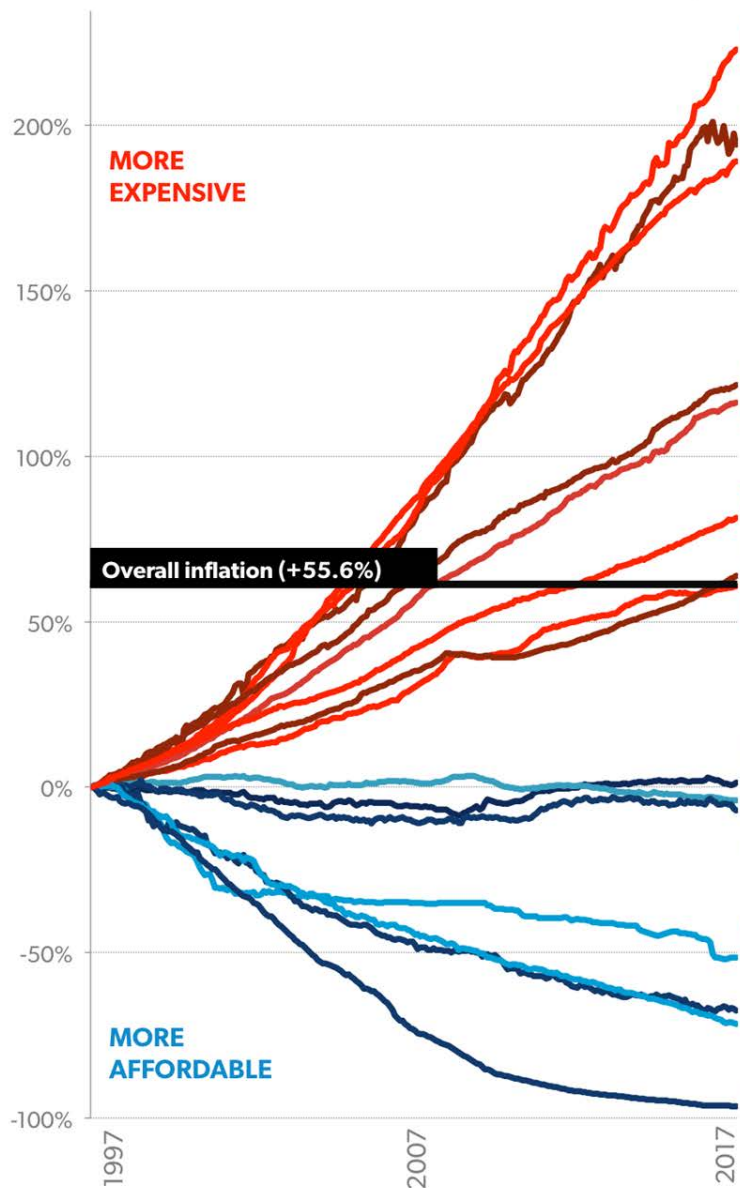
**What is the velocity of money in the above example?**

# Where do you think the goods/services below belong on the graph?

1. TVs
2. College Tuition
3. New Cars
4. Hospital Services
5. Toys

## Price changes (Jan. 1997–Dec. 2017)

Selected US Consumer Goods and Services, and Wages

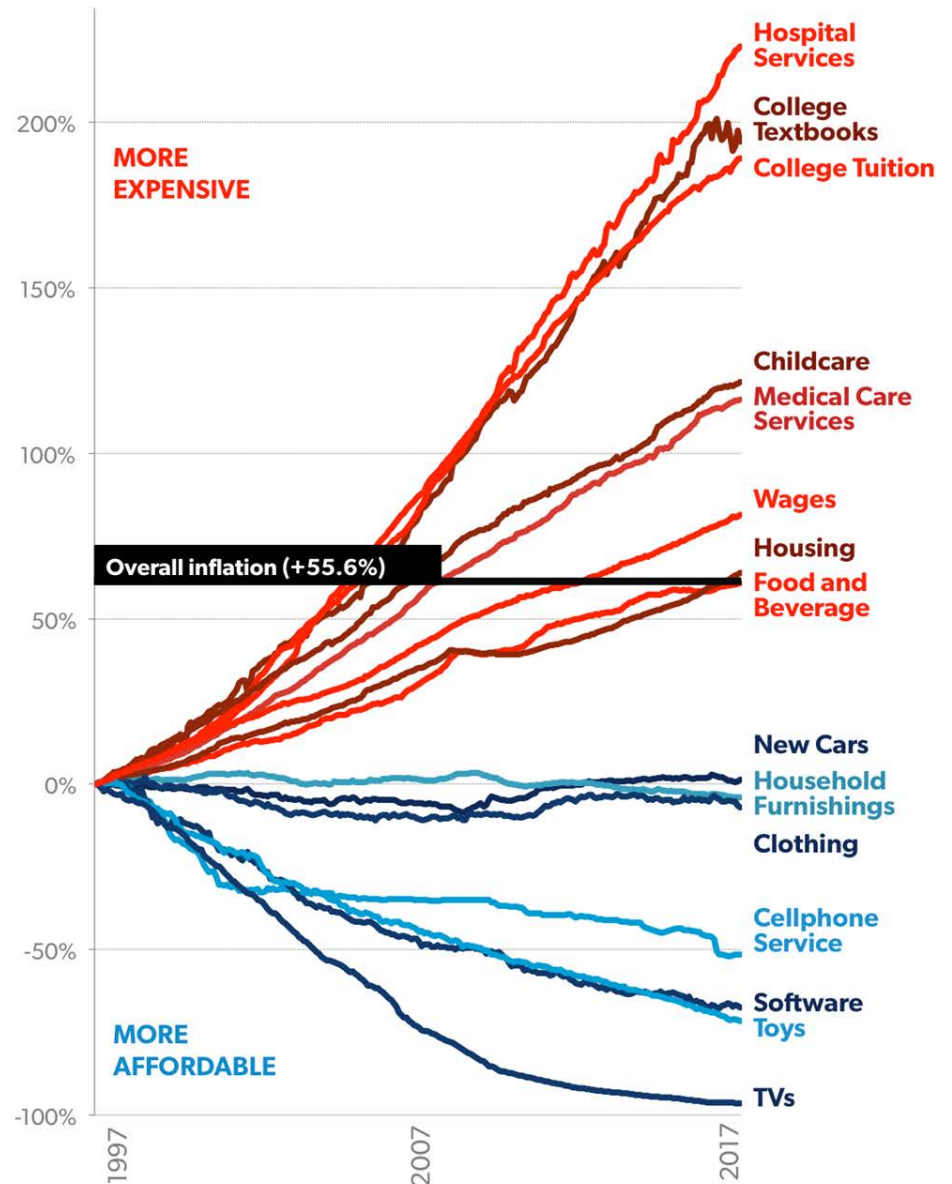


Where do you think  
the goods/services  
below belong on the  
graph?

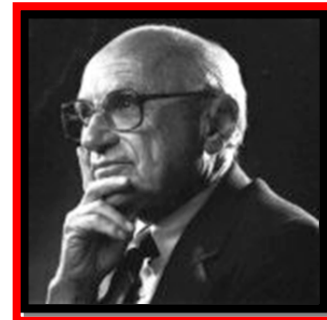
1. TVs
2. College Tuition
3. New Cars
4. Hospital Services
5. Toys

## Price changes (Jan. 1997–Dec. 2017)

Selected US Consumer Goods and Services, and Wages



# The Equation of Exchange or Quantity Theory of Money



$$M \times V = P \times Q$$

The equation is annotated with a green line and arrows connecting the 'M' and 'P' terms. The text "\$ spent" is positioned above the line, and "\$ received" is positioned below it. A small brown horse icon is placed on the line between 'V' and 'P'. Green stars are placed to the left of 'M' and to the right of 'P'.

1. M = Money Supply
2. V = Velocity. # of times a \$ is spent in a yr.
3. P = Prices
4. Q = Real Output

P X Q: Nominal GDP



# Quantity Theory of Money

$$M \times V = P \times Y$$

**M = money supply**

**P = price level**

**V = velocity**

**Y = quantity of output**

**Notice that  $P \times Y = \text{Nominal GDP}$**

**Assume that velocity is relatively constant because people's spending habits are not quick to change and that output (Y) is not affected by the quantity of money because it is based on production, not the value of the stuff produced.**

**If the government increases the amount of money (M), what will happen to prices (P)?**



100 000 000 000 000 RESERVE BANK OF ZIMBABWE

100 000 000 000 000

*I promise to pay  
the bearer on demand*

**ONE HUNDRED  
TRILLION  
DOLLARS**

*for the Reserve Bank of Zimbabwe*

AA3905431

  
Dr. G. Gono  
Governor

100 000 000 000 000 HARARE 2006



AA3905431





**WHO WANTS**  
*to be a*  
**TRILLIONAIRE?**



▶ ▶▶ 🔊 0:12 / 4:19



# Quantity Theory of Money

$$M \times V = P \times Y$$

**M = money supply**

**P = price level**

**V = velocity**

**Y = quantity of output**

**Notice that  $P \times Y = \text{Nominal GDP}$**

**Assume that velocity is relatively constant because people's spending habits are not quick to change and that output (Y) is not affected by the quantity of money because it is based on production, not the value of the stuff produced.**

**Ex: Assume money supply is \$5 and it is being used to buy 10 products with a price of \$2 each.**

- 1. How much is the velocity of money?**
- 2. If the velocity and output stay the same, what will happen if the amount of money is increased to \$10?**

# Money and Inflation

**What happens in the long-run when the central bank increases in the money supply?**

- Short-run spending eventually leads to higher resource prices and inflation.
- If inflation is bad enough, banks don't lend and the the economy tanks.

**Question: If this is true, why do many economists support expansionary monetary policy?**

**Answer: Monetary policy can increase real output in the short-run.**



# MACRO

$$M \times V = P \times Y$$



## *The Quantity Theory of Money*

The relationship among money, price, and real output can be represented by the *equation of exchange*, which typically takes the following form:

$$MV = PQ$$

where

M = the money supply

V = the velocity of money (the number of times an average dollar bill is spent)

P = the average price level

Q = real value of all final goods and services (real gross domestic product [GDP])

This equation shows the balance between “money,” represented on the left side of the equation, and goods and services, represented on the right side of the equation. The equation shows that, for a given level of V, if M increases more than Q there must be an increase in P (inflation) to keep the two sides of the equation equal. This means that an increase in the money supply not offset by an increase in real output will lead to inflation. Classical economists assumed that the velocity of money was stable (constant) over time because institutional factors—such as how frequently people are paid—largely determine velocity. Therefore, changes in the money supply will lead to inflation if the economy is at full employment.



1. Define (in your own words and in one or two sentences each) the four variables in the equation of exchange.

2. The product of  $V$  and  $M$  equals  $PQ$ . What is  $PQ$ ?

## Nominal GDP

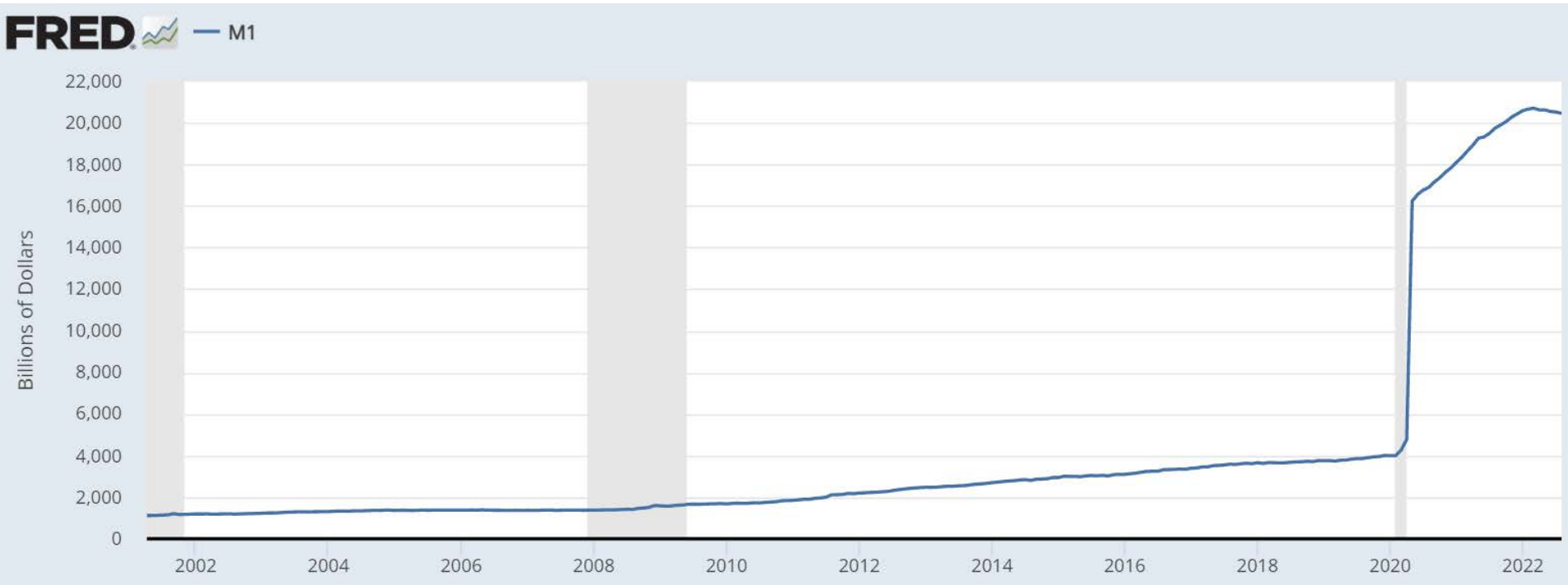
3. Suppose velocity remains constant, while the money supply increases. Explain how this would affect nominal GDP.

Nominal GDP ( $PQ$ ) would increase. If the economy is not at full employment, both  $P$  &  $Q$  could increase. If the economy is operating at full employment, only  $P$  would increase. This action could lead to extreme inflation if the economy is at full employment.

4. Changes in technology have led to increases in electronic transactions. Explain how these changes affect velocity.

$V$  would increase. A given stock of  $M$  could “work harder” and finance more transactions more quickly.

# M1 Money Supply in the US



44. Given a constant velocity of money, in the short run a 5 percent increase in money supply will translate to a 5 percent increase in
- (A) government budget deficit
  - (B) real gross domestic product
  - (C) nominal gross domestic product
  - (D) real interest rates
  - (E) nominal interest rates

If the velocity of money is constant and the aggregate supply curve is vertical, a doubling of the money supply would most likely result in a doubling of

(A) the unemployment rate

(B) real output

(C) the price level

(D) nominal interest rates

(E) real interest rates

. Assume that commercial banks must hold a minimum of 20% of their deposits as reserves. Now suppose that the central bank of the country sells \$100,000 of government bonds to commercial banks.

(a) Calculate the maximum change and state the direction of change in the money supply as a result of the central bank bond sale. Show your work.

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Calculate the maximum change in the money supply as a decrease of \$500,000 and show your work.

**1 point**

$$\text{Change in MS} = \text{Bond Sale} \times \text{Money Multiplier} = -\$100,000 \times \frac{1}{0.2} = -\$500,000$$

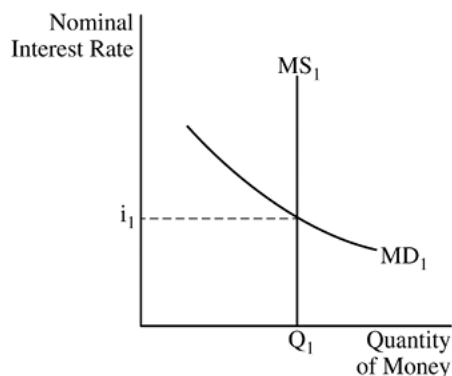
. Assume that commercial banks must hold a minimum of 20% of their deposits as reserves. Now suppose that the central bank of the country sells \$100,000 of government bonds to commercial banks.

(a) Calculate the maximum change and state the direction of change in the money supply as a result of the central bank bond sale. Show your work.

(b) Draw a correctly labeled graph of the money market and show the effect of the change in the money supply identified in part (a) on the nominal interest rate.

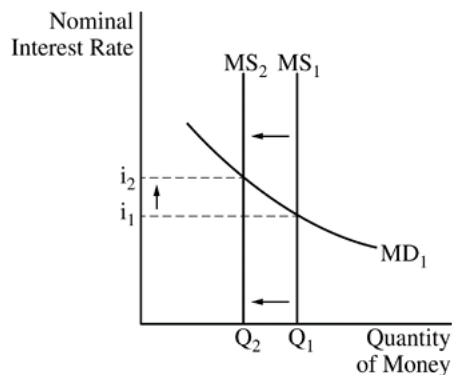
Draw a correctly labeled graph of the money market.

**1 point**



For the second point, the graph must show a leftward shift in the money supply curve, resulting in a higher nominal interest rate.

**1 point**



. Assume that commercial banks must hold a minimum of 20% of their deposits as reserves. Now suppose that the central bank of the country sells \$100,000 of government bonds to commercial banks.

(a) Calculate the maximum change and state the direction of change in the money supply as a result of the central bank bond sale. Show your work.

(b) Draw a correctly labeled graph of the money market and show the effect of the change in the money supply identified in part (a) on the nominal interest rate.

(c) Given the change in the money supply in part (a), if the velocity of money is constant, what will happen to the nominal gross domestic product? Explain.

State that nominal gross domestic product will decrease and explain that according to the quantity theory of money ( $MV=PY$ ), a decrease in the money supply will decrease nominal gross domestic product for a given velocity.

**1 point**

. Assume that commercial banks must hold a minimum of 20% of their deposits as reserves. Now suppose that the central bank of the country sells \$100,000 of government bonds to commercial banks.

(a) Calculate the maximum change and state the direction of change in the money supply as a result of the central bank bond sale. Show your work.

(b) Draw a correctly labeled graph of the money market and show the effect of the change in the money supply identified in part (a) on the nominal interest rate.

(c) Given the change in the money supply in part (a), if the velocity of money is constant, what will happen to the nominal gross domestic product? Explain.

(d) Based on the change in the nominal gross domestic product in part (c), what happens to the price level if the real gross domestic product is constant?

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State that the price level decreases.

**1 point**



7. Hyperinflation is typically caused by
- (A) high tax rates that discourage work effort
  - (B) continuous expansion of the money supply to finance government budget deficits
  - (C) trade surpluses that are caused by strong protectionist policies
  - (D) bad harvests that lead to widespread shortages
  - (E) a large decline in corporate profits that leads to a decrease in production

Which of the following is true when the velocity of money falls?

- A An increase in the money supply will have less effect on nominal gross national product.
- B A change in the money supply will affect output only.
- C The Federal Reserve will decrease the money supply.
- D Output will be greater for a given money supply.
- E The public will increase its holdings of assets other than money.

Country X's economy is currently at full employment. Assume Country X's central bank increases the money supply by 2 percent over a prolonged period. According to the quantity theory of money, which of the following will happen in the long run for a given velocity of money?

- (A) Unemployment will increase by 2%.
- (B) Real output will increase by 2%.
- (C) Nominal output will increase by 2%.
- (D) The price level will decrease by 2%.
- (E) The natural rate of unemployment will decrease by 2%.

# In the News: Hyperinflation

## Venezuela's Inflation Breaches 25,000%



**Steve Hanke** Contributor ⓘ

May 31, 2018, 03:00pm • 20,545 views • #Economy

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**What is causing inflation in Venezuela?  
What are the effects of hyperinflation?**

Inflation is expected to hit  
13,000% this year.

SUBSCRIBE

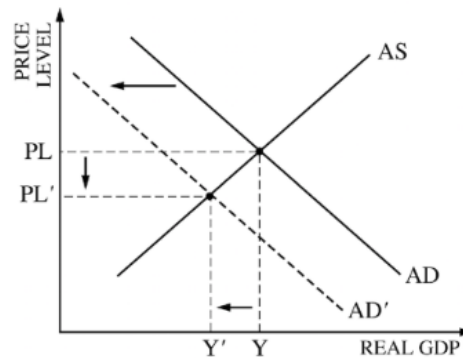
a. Using a correctly labeled aggregate supply and aggregate demand graph, show the impact of a sudden, large decrease in private investment spending on each of the following.

i. Output

ii. Price level

Part a. [0–2]

2 points



- 1 point: correctly labeled graph
- 1 point: leftward shift of AD, resulting in decrease in real output and decrease in price level

- a. Using a correctly labeled aggregate supply and aggregate demand graph, show the impact of a sudden, large decrease in private investment spending on each of the following.
- i. Output
  - ii. Price level
- b. Using the results in part (a), explain how employment is affected.

**1 point**

Employment will decrease because output decreases.

c. Identify one specific fiscal policy that might be implemented to offset the effects of the decrease in investment, and explain how the policy would affect each of the following in the short run.

i. Aggregate demand

ii. Output and the price level

iii. Real interest rates

**4 points (1 for the policy and 1 for explaining the changes in parts (i), (ii), (iii))**

- 1 point: correct policy – increase  $G$  or decrease taxes ( $T$ )
- 1 point: AD increases (shifts to the right) because  $G$  increases or  $T$  decreases, since both  $G$  and  $C$  (which increases when  $T$  decreases) are components of AD
- 1 point: output and price level increase because AD increases
- 1 point: real interest rate increases because government borrowing in the loanable funds market increases the interest rate. Also, the increase in income increases the demand for money, which raises the interest rate.



d. Given a banking system with limited reserves, identify an open-market operation that the central bank might implement to offset the effects of the decrease in investment, and explain how the policy would affect each of the following in the short run.

i. Real interest rates

ii. Aggregate demand

iii. Output and the price level

**4 points (1 point for the policy and 1 point each for each of the explanations)**

- 1 point: the central bank buys government bonds to increase the money supply
- 1 point: real interest rate decreases because the money supply increases
- 1 point: AD increases because investment spending and interest sensitive consumption spending will both increase, and I and C are components of AD
- 1 point: output and price level will increase because AD has increased

e. If the central bank continues the open-market operation described in (d), explain the long-run effects on each of the following.

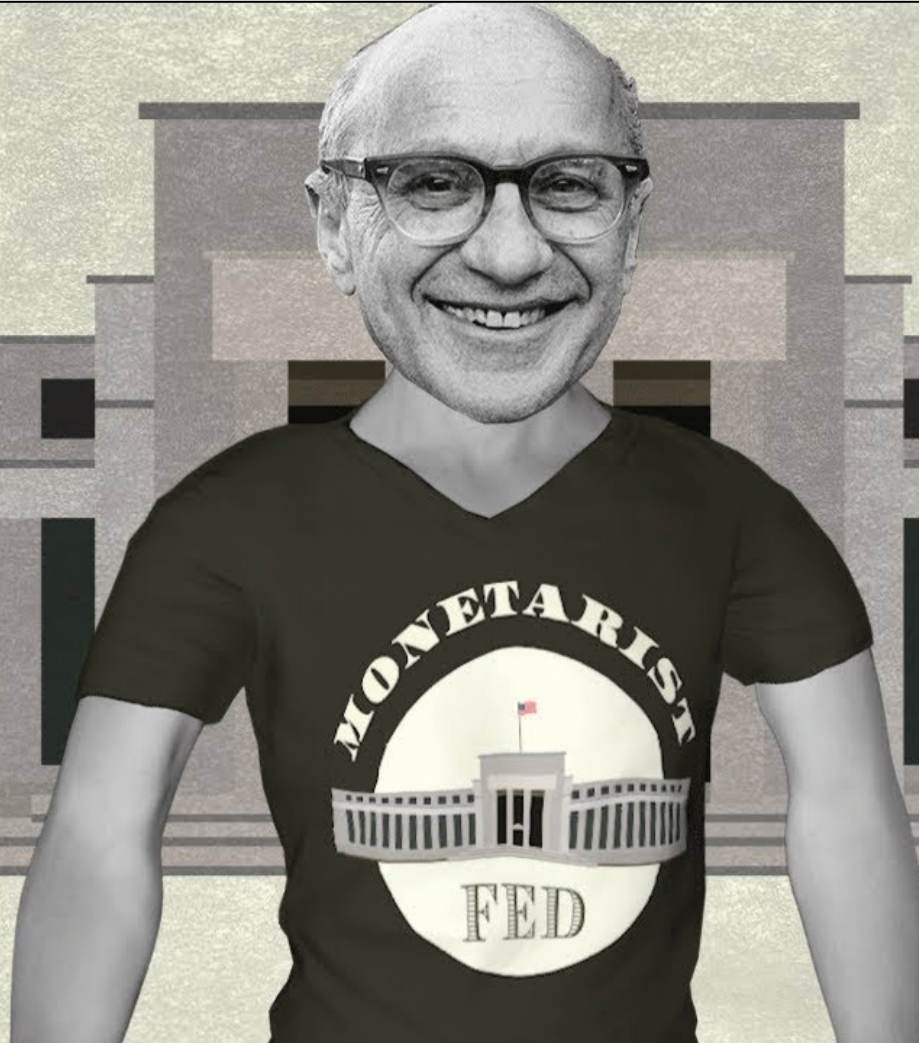
i. Inflation

ii. Value of the domestic currency in foreign exchange markets

**2 points**

- 1 point: inflation rises because of the increase in the money supply
- 1 point: the value of the domestic currency will decrease because the interest rate is lower and the price level is higher relative to the rest of the world

# MACRO



# Any Questions?

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# Thank You!

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