

## Money

Pure gold standard (commodity based) – people use gold coins as money.

Gold exchange standard (commodity backed)– people use paper money that is backed by gold stored in warehouses. Gold certificates.

Fiat money – is paper money that is not backed by a commodity in the sense that people cannot trade it for a particular commodity at a fixed price.

It is interesting that we choose to use pieces of paper with pictures of dead Presidents on them as money. US dollars are fiat money. That is, they have no intrinsic value. It used to be the case that you could trade in a dollar bill for a specified amount of gold (or silver). This is no longer true. **A dollar bill has value only insofar as someone else is willing to accept it.** Why is a \$5 bill worth “5 dollars” but my picture of Abraham Lincoln on a green piece of paper not worth \$5?

### Benefits of holding money

1. Medium of exchange
2. A store of value
3. Unit of account

**Medium of exchange** - The big-ticket item is that money is a medium of exchange. That is, money is important because it eliminates barter. Barter is the situation where no currency is involved. Goods are traded directly for other goods (I will give you 2 CDs for a case of beer). The big problem with barter is that it requires “a double coincidence of wants”. That is, if you have beers and want CDs, to get to trade, you need to find someone who has CDs and wants beers. This might be hard to do. Money eliminates this need. You can trade your goods for money, and then trade money for other goods.

If you are not thoroughly convinced that barter is such a bad thing, imagine that the only thing you have to trade is a horse. You want a beer. How do you trade part of your horse for a beer? Which part? Try this at your favorite bar or convenience store.

**Store of value** – any good or asset that people can store while it maintains some or all of its value. Money is not a perfect store of value (why does it lose some of its value?), but it’s better than an ice cream cone. Gold is a decent store of value. Roberto Alomar rookie cards are not, especially when he spits on someone.

**A unit of account** – a measure for stating prices.

We will want to measure the total benefits of holding money. For our purposes, the benefit of holding money is that you are able to transact. The more transactions you make the larger the benefits of holding money.

We will use GDP (Y) as a proxy for the number of transactions for the economy as a whole, and thus as a measure of the overall benefit of holding money.

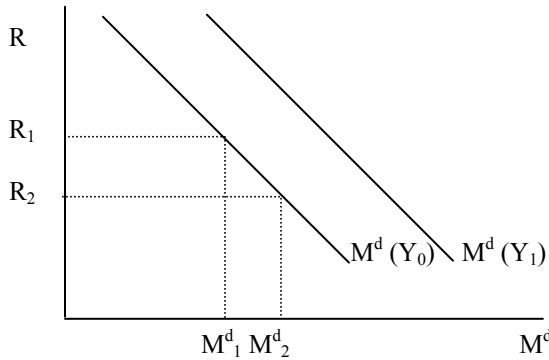
### Cost of holding money

The nominal interest rate is the opportunity cost of holding money. If you were not holding money in your wallet, you could put it in the bank and earn R% per year on your money. The higher the nominal interest rate, the more costly it is to hold money (the more interest you are giving up by holding money).

We will talk about two different “demand curves” for money. The first will be a demand curve in the more traditional sense. The second will be a bit strange, but will prove to be more useful later.

The Demand Curve for Money, Part I

We can draw a demand curve for money. The price of money (opportunity cost) is the nominal interest rate. At higher levels of Y, the demand curve will shift to the right.



As the nominal interest rate increases, the cost of holding money increases, and thus people hold a smaller quantity of money. As income (or GDP) increases, people will need to conduct more transactions, and thus the entire curve will shift to the right.

Note: **NEVER DRAW THIS DEMAND CURVE FOR MONEY AGAIN.**

The Demand Curve for Money, Part II

Another way to look at money is look at the link between  $M^d$  and Y

$$M^d = k * Y$$

k = desired cash balance ratio (think of k as money demand in the future)

An example, in per capita terms: If income is \$30,000 and the amount of money demanded is \$6000 the desired cash balance ratio  $k = M^d / Y = 6,000 / \$30,000 = 1/5$

We can think of k as the fraction of people's income that they want to hold in cash.

A rise in k - people will want to hold more money at any given level of income - is called an increase in the demand for money (see graph below)

A decline in k - people will want to hold less money at any given level of income - is called a decrease in the demand for money (see graph below)

If the nominal interest rate (R) increases, this means the cost of holding money has increased. People will want to hold less money at each income level. Thus, money demand will decrease. This is a decline in k (a decrease in money demand).

If the nominal interest rate (R) decreases, this means the cost of holding money has fallen. People will want to hold more money at each income level. Thus, money demand will increase. This is an increase in k.

From now on, we will concentrate on this type of demand for money relationship. When you think of k, you should think of k as "the demand for money". When I say there is an increase in money demand, you should think of an increase in k. When I say there has been a decrease in k, you should think of a decrease in money demand.

Below is a graph with both an increase in money demand and a decrease in money demand. We measure the quantity of money demanded on the vertical axis ( $M^d$ ) and income or GDP ( $Y$ ) on the horizontal axis.



The graph shows an increase in money demand ( $k_1$ ) and a decrease in money demand ( $k_2$ ).

**Money Supply**

We'll assume for now that the money supply is set by some government official. They set the level of the money supply at some number, maybe \$4 billion. Alan Greenspan picks it. More later...

**Money demand and money supply determine GDP**

- (1)  $M^d = k * Y$  money demand
- (2)  $M^s = M$  money supply
- (3)  $M^s = M^d$  equilibrium condition

Then, in equilibrium, quantity supplied = quantity demanded.

Substitute 1 and 2 into 3, manipulate slightly.

$Y = M / k$

This tells us that the level of GDP,  $Y$ , is determined solely by the money supply and money demand. If we know  $M$ , and we know  $k$ , we'll know the level of GDP. Burn this equation into your head.

Examples:  $M = \$1000, k = 1/5$   
 $Y = M / k = \$1000 / (1/5) = \$5000$

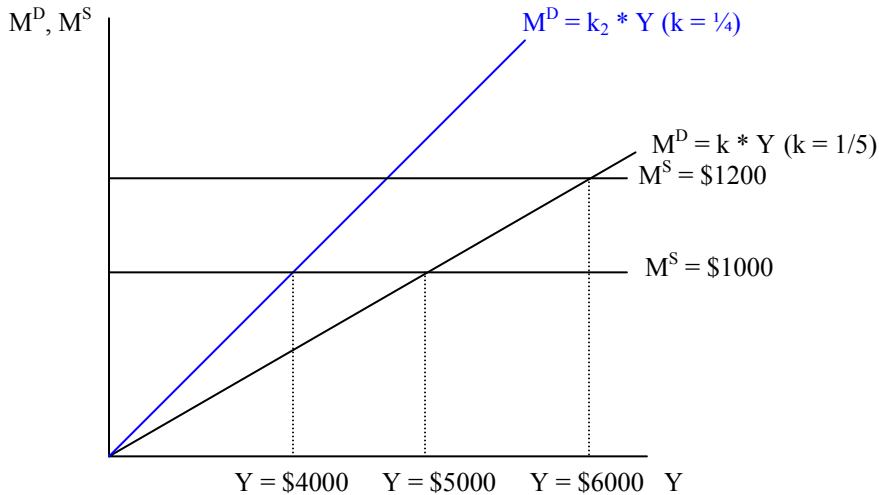
Now a rise in  $M$  to \$1200  
 $Y = M / k = \$1200 / (1/5) = \$6000$  ( $M \uparrow \Rightarrow Y \uparrow$ )

A rise in  $k$  to  $1/4$ , given  $M = \$1000$  (back to the original level of  $M$ )  
 $Y = M / k = \$1000 / (1/4) = \$4000$  ( $k \uparrow \Rightarrow Y \downarrow$ )

You should also decrease  $M$  and decrease  $k$  and see what you get.

Determining the effects on  $Y$  for changes in  $M$  and  $k$  can also be done graphically. You should do whatever you are most comfortable with; however, the algebra will save you oodles of times on the test. The picture below reproduces the changes I have talked about above.

We've talked about how to draw  $M^D$  above. Since  $M^S$  is just some number, independent of the level of income, it is just drawn as a horizontal line at the appropriate level. Equilibrium occurs where  $M^D = M^S$ . From this intersection, you can read of  $Y$ , aggregate demand.



Confirm on the graph that we get the same results. An increase in  $M$  causes an increase in GDP. An increase in  $k$  leads to a decrease in GDP.

Does this make sense?

Think about an increase in  $M$ . You wake up in the morning, and you have an extra \$100. What do you do?

First, given that your income level hasn't changed, you still want to hold the same fraction of your income as money. You have too much money relative to your income level. You would like to get rid of some of your money. How do you get rid of money? Burn it? Shred it? Stick it up your nose? No, you spend it.

So everyone would run out and spend money. Everyone would try to go out and buy goods. As everyone is trying to buy goods and spend money, we'd expect prices to rise. For sure, we'll see that all this spending will increase GDP. We'll look at this in more detail in the future...

What should I read?

Chapter 16 – p. 331 – 335 for now, though we will cover the rest of Chapter 16 later.

I am taking a slightly different approach than the text book here. Much of what we have discussed here and will in the next lecture is contained in Chapter 17, with yet another representation of the demand for money. If you are brave, take a look. There is also a blurb on the Wizard of Oz that should be ok to read on p. 370 – 372. It's all over the web if you're interested as well.