

Problem Set 1

ECON 40364: Monetary Theory and Policy

Prof. Sims

Spring 2022

Instructions: Please answer all questions to the best of your ability. You may consult with other members of the class, but each student is expected to turn in his or her own assignment. This problem set is due in class on January 25.

1. Suppose that Fred owns a Bigfoot statue that is worth \$100. He has \$200 in a checking account and holds \$100 in cash. He also holds \$100 in credit card debt.
 - (a) Use a T-Account to describe Fred's balance sheet, including his net worth.
 - (b) Suppose that Ted has \$100 in a checking account and \$100 in cash. He has owns nothing else, and owes nothing to no one. Use a T-Account to describe Ted's balance sheet, including his net worth.

Suppose that there are two banks (Bank A and Bank B) serving the economy. They hold deposits from many households (not just Fred and Ted), and invest in loans (to people other than Fred and Ted). The banks each have initial balance sheets of:

Bank A			
Assets		Liabilities + Equity	
Loans	\$800	Deposits	\$800
Reserves	\$200	Equity	\$200

Bank B			
Assets		Liabilities + Equity	
Loans	\$2000	Deposits	\$1500
Reserves	\$400	Equity	\$900

There is also a credit card company, Capital One. It has a balance sheet that looks like:

Capital One			
Assets		Liabilities + Equity	
Loans	\$1000	Borrowings	\$500
Deposits	\$200	Equity	\$700

Fred banks with Bank A. Ted banks with Bank B.

- (c) Suppose that Ted purchases the Bigfoot statue from Fred using cash. Show how the balance sheets of Fred, Ted, Bank A, Bank B, and Capital One change as a result.

- (d) Suppose instead that Ted purchases the Bigfoot statue from Fred by writing a check that Fred deposits into his bank account. Show how the balance sheets of Fred, Ted, Bank A, Bank B, and Capital One change as a result.
- (e) Suppose instead that Ted purchases the Bigfoot statue from Fred via credit card. As a result, Capital One deposits funds directly into Fred's checking account. Show how the balance sheets of Fred, Ted, Bank A, Bank B, and Capital One change as a result.
2. Suppose that an economy is comprised of five actors, and five actors only – two households, one non-financial firm, one commercial bank, and a central bank. This problem will give you balance sheet information on four of the five actors, and will ask you to infer the balance sheet of the fifth actor (one of the households). The two households (combined) own the non-financial firm and the commercial bank. This means that the total equity in non-financial firm and the bank is held in the form of stock by the two households. The central bank operates with zero equity.

The balance sheets of the non-financial firm, the commercial bank, and the central bank are, respectively:

Non-Financial Firm			
Assets		Liabilities + Equity	
Plant + Equipment	\$200,000	Bank loan	\$100,000
Checking account	\$100,000	Corporate Debt	\$50,000
		Equity	\$150,000

Commercial Bank			
Assets		Liabilities + Equity	
Business Loan	\$100,000	Deposits	\$200,000
Mortgage Loans	\$130,000		
Reserves	\$50,000		
		Equity	\$80,000

Central Bank			
Assets		Liabilities + Equity	
Corporate Debt	\$50,000	Reserves	\$50,000
		Equity	\$0

There are two households in the economy – Brian and Kelly. Brian's balance sheet is:

Brian			
Assets		Liabilities + Equity	
Home	\$100,000	Mortgage Loan	\$80,000
Checking Account	\$50,000		
Stocks	\$75,000		
		Equity	\$145,000

Note that Brian’s stock ownership could be both bank stock and stock in the non-financial firm, or just one or the other. For the purposes of this problem, it does not matter.

Now consider the second individual in the economy, Kelly. All you know about her balance sheet is that she lives in a home worth \$100,000. You will have to determine the rest of her balance sheet. We have:

Kelly	
Assets	Liabilities + Equity
Home	\$100,000
Currency	?
Checking Account	?
Stocks	?
	Mortgage Loan ?
	Equity ?

- (a) Given available information, determine the missing values in Kelly’s balance sheet.
 - (b) What is the total value of non-financial assets (physical capital) in this economy? Does this coincide with the total value of household equity summed across Bryan and Kelly?
 - (c) In what sense do the two households (combined) own the plant and equipment in possession of the non-financial firm? Explain briefly.
 - (d) What is the monetary base? What is the money supply (use $M1$, the sum of currency in circulation and deposits)? What is the ratio of the money supply to the monetary base? Does this coincide with the (general) formula for the money multiplier given in class (you do not need to know the split between required and excess reserves to answer this question)?
3. Go to the St. Louis Fed FRED website and look at weekly data on the currency component of $M1$ (available [here](#)). Produce a plot of total currency from September of 1999 through January of 2000. You can produce the figure either in Excel or directly on the FRED website. Aside from the upward trend, what jumps out at you from the figure? What historical event do you think can account for what we see in the figure? Briefly explain.
 4. Go to the St. Louis Fed FRED website and download data on $M2$ (available [here](#)) and the monetary base (available [here](#)). You will need to switch the frequency of the $M2$ series to monthly (click “edit graph” and change frequency to monthly using “average”). Download both series from the first month of 2000 through the present.
 - (a) Construct a measure of the $M2$ multiplier, and produce a plot to turn in.
 - (b) If you look at the class slides, the $M1$ money multiplier is smaller than the $M2$ multiplier. Why is this?
 - (c) If you look at the COVID-19 era, in class we showed that the $M1$ money multiplier increased. Is the same true for the $M2$ multiplier? What do you think could explain any divergence? Explain.