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A Reading on Money and Money Creation

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A Reading on Money and Money Creation

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Abstract A difficulty in teaching undergraduate courses from a non-orthodox perspective is the lack of written material to draw upon. This reading, written for an introductory macroeconomics course, is an attempt to fill a small part of that void by providing a discussion of money creation from an endogenous money perspective. By focusing on the ability of banks to engage in asset and liability management, the reading makes it easy for students to comprehend why investment is never constrained by a lack of saving. For those who are compelled to also present the orthodox perspective, the question is which view to discuss first. Based on readings in cognitive science, unveiling the non-orthodox material first will greatly increase the chances students will analyze social problems from a non-orthodox perspective. Consequently, this reading is designed to be the student's first encounter with the subject of money and money creation. Orthodox textbooks usually omit from their balance sheets the two items that allow banks to make loans without excess reserves. By presenting the non-orthodox view first, students easily see the problems with the orthodox money multiplier approach.

Keywords: economic education, macroeconomics, money and banking, endogenous money

NOTE TO INSTRUCTORS

This reading is written from a postKeynesian/institutionalist perspective for students studying introductory macroeconomics. For those professors who feel compelled or are compelled to also teach the orthodox perspective, the question always arises as to which view to present first. The author believes, based on readings in cognitive science (Lakoff, 2006a, 2006b; Bransford, 2000) and on

personal experience, that if one wishes to greatly increase the chances students will analyze social problems from a non-orthodox perspective, then one should present the non-orthodox material first.¹ Consequently, this reading is presented as the student's first encounter with the subject of money and money creation.

INTRODUCTION

Learning how money is created, and how banks operate, is in itself a worthwhile venture. Many are confused on how this process works; even those who write professionally on financial matters sometimes make serious mistakes. However, our goal in investigating this subject is far broader. What we shall discover has major implications for what would be the best policy for stimulating investment. Several measures—like the Bush tax cuts—have been enacted based, in part, on claims that they would stimulate investment by increasing savings. The assumption underlying these assertions is that what constrains investment is a lack of loanable funds. This stems from the view that the money supply is created from outside the banking system; that is, that the money supply is determined exogenously. As will be shown, with a modern banking system the quantity of money is determined endogenously by the interaction of creditworthy borrowers and profit-seeking banks. Creditworthy businesses are never constrained by a lack of loanable funds. What constrains the level of investment is normally a lack of creditworthy business ventures. After briefly defining what constitutes money, we shall discuss how it is created.

¹ Lakoff emphasizes again and again that people do not think logically; they think within frames and metaphors. If orthodox theory is good at anything, it is supplying students with a series of easily digested frameworks (e.g. supply and demand analysis, the production possibilities frontier, the money multiplier story). Since non-orthodox theory often cannot be reduced to a graph or a simple metaphor, it is at a competitive disadvantage from a pedagogical standpoint. This disadvantage becomes even greater if the orthodox theory is taught first. According to Lakoff, thought is physical, "the concepts we think with are physically instantiated in the synapses and neural circuitry of our brains" (2006a). When activated, these brain circuits are strengthened. Whichever theory/framework is taught first, the brain circuits associated with that framework will be the first to be developed in this subject area. These brain circuits will be strengthened and reinforced not only by the repetition in teaching the first theory, but also when teaching the second theory, since it is difficult to teach a second framework without referring back to the first one. Cohn's (2007) introductory macro textbook, which is designed to be used after the orthodox material has been presented, constantly refers to the AS/AD model. Furthermore, "neural circuits, once established, do not change quickly or easily" (2006a); thus having established brain circuits of the money multiplier story, it will be difficult to get students not to think within that framework. Finally, if one is presenting the non-orthodox model second and expecting to use facts and figures to logically disprove the orthodox model, this may not be as successful as hoped. "Facts can be assimilated into the brain only if there is a frame to make sense out of them" (2006b) and, therefore, if "a fact is inconsistent with the frames and metaphors in your brain that define common sense. Then the frames or metaphor will stay, and the fact will be ignored" (2006a). Facts and figures meant to disprove orthodox theory may just confuse students if they are using the orthodox framework to process information. Bransford (2000) reinforces and elaborates on the ideas that thought is physical, and that people process new information through preexisting frameworks.

MONEY DEFINED

What is money? It is what we use to purchase goods and services and to pay off debts. Historically, three types of money have been used. In general, societies have not moved back and forth between these different types of money, but rather, over time, as the confidence in money, banks, and the financial system has grown, society has tended to move from one form of money to the next.

The first type of money is known as commodity money. This type of money is one where the item used as money has the same value in use as it does in exchange. The fact that the first monies were commodity monies is not surprising. Because the concept of money would have been foreign, what you would have been willing to exchange for had to be worth at least as much in use to you as what you gave up just in case no one else was willing to accept this object as money. The first commodity monies appear to have been grains (Wray, 1990). However, grains are very unwieldy, and will rot over time. Eventually, metal coins were used.

The second type of money is known as representative commodity money. The money itself has little or no value, but it can be exchanged for gold or silver equal to its face value. In the nineteenth century, banks in the US issued pieces of paper known as bank notes. You could take these notes to the bank that issued them and exchange them for gold or silver coins. Up until 1933, currency issued by the US government could also be exchanged for gold.

The third type of money is credit money. "By credit money, or debt money, we mean any money, except representative full-bodied [commodity] money, that circulates at a value greater than the commodity value of the material from which it is made." (Goldfeld & Chandler, 1986) Like representative commodity money, it has little or no value, but unlike representative commodity money it cannot be exchanged for gold or silver coins. All of the money currently used in the US—currency, checking accounts, and even our coins—is credit money. We also use credit cards to make purchases. The use of credit cards causes a change in the volume of credit money. I will address how credit cards work after we understand how money is created. There is another definition of credit money, one which is narrower and more technical, but is very useful in thinking about how money is created in a modern capitalist society. "Credit money is the liability of the issuing bank, and is backed by borrowers' liabilities (IOUs) in the bank's possession. The supply of credit money varies with changes in the demand for bank credit" (Moore, 2003). As we shall see, expansions in the money supply come about through

increases in the volume of checking accounts, which are triggered by increases in the demand for loans, by creditworthy customers.

MONEY CREATION

When I was growing up in the suburbs of Washington, DC, my grade school class visited the US Treasury. I remember peering through a small thick window into a room where money was being printed. Sheets of paper from giant rolls were whizzing down the conveyor belts. They were printing \$20 bills. I thought to myself, if I could just get in through the window and grab that giant roll of \$20s, I would be rich forever. The printing presses of today are no doubt faster and more efficient than the ones I watched. But what was true then is still true today—not one penny of the money *created* in the USA was created by those printing presses. Not one single penny! All that money I saw being printed was either used to replace currency that was already in circulation or was given to bank customers who wished to exchange some of their deposits for currency. It is the banks, not the Federal government, that create money in our economy. They do so whenever they please, for whomever they please, and they do it right out of thin air. Since there are approximately 7000 banks with this power, clearly the government has no direct control over the amount of money in the system. The Federal Reserve does have some indirect control, through its ability to set short-term interest rates. To understand how and why banks create money, we need to know how banks operate.

To go into business as a bank requires a charter, issued by either the state or the federal government, and at least a certain amount of initial capital. It also requires an organizing group, generally with a minimum of five people who have, among them, a great deal of experience in banking and business as well as a detailed business plan for the proposed bank.²

As with any business, a bank's goal is to maximize profits. Profit-maximization requires keeping total revenues as high as possible above total costs. The bank's sources of revenue are the interest paid on loans and securities, as well as the payment of fees. A bank's costs include the interest paid on deposits and

² Capital and other requirements to start a bank vary greatly from state to state. By statute you need a minimum of \$1.5 million in Oregon, but as practical matter it takes a minimum of \$10 million (Oregon Statutes, 2007). In Florida, the suggested capital requirement is \$6 million for a bank in a metropolitan area and \$4 million for a bank in a rural area (Obringer, 2002). There is no stated minimum for a federal charter. The Office of the Comptroller of the Currency sets the minimum for new banks based on the risk involved (Office of the Comptroller of the Currency, 2009). The members of the organizing group must supply a certain percentage of the initial capital, generally between 10% and 25%. The rest is raised from outside investors via the sale of stock (Obringer, 2002).

borrowed funds, wages and salaries paid to employees, and the cost of purchasing buildings and equipment. Loans that are repaid are a bank's biggest source of profit.³ It is in the act of lending money to customers that banks create money.

To understand how money is created in this process, it is necessary for us to understand the working of the bank's balance sheet. For simplicity, we will have just three items on the asset side and three items on the liability side. An asset is what the bank owns, either a physical object like a building or a piece of paper saying someone owes the bank money. A liability is what the bank owes to someone else, such as funds in checking accounts that it owes to its depositors. The assets on our balance sheet are reserves, loans, and T-bills. The liabilities are checking accounts, borrowed funds, and net worth. Below is the balance sheet of the fictitious Bank A, where the units are millions of dollars.

Balance Sheet 1	
Bank A	
Assets	Liabilities
20 Reserves	200 Checking Accounts
140 Loans	30 Borrowed Funds (Fed Funds)
90 T-bills	20 Net Worth
Total 250	250

ASSETS

- *Reserves*: In order to have sufficient cash on hand to pay depositors, banks must keep a percentage of their deposits on reserve, either as cash in their vaults or in their accounts at the Federal Reserve. Our asset "Reserves" is a combination of vault cash and funds in the bank's Federal Reserve account. Banks face a trade-off: since reserves do not earn interest, the more reserves a bank holds the less revenue it will receive. However, the more reserves a bank holds, the smaller is the chance that it would be unable to pay depositors in the event that a large number of them ask for their money at once. Based on the actions of others in financial markets, if we left the decision solely to the

³ It is not just the favorable interest rate spread which makes business loans so valuable to banks. Establishing a customer relationship with borrowers, especially corporate borrowers, can enhance bank profits because such borrowers "are associated with valuable deposit balances and the use of ancillary services that generate fee income. Banks' attempt to get existing customers to use more bank services is referred to as cross-selling" (Sinkey, 1989).

individual banks, the amount of reserves held would differ considerably from bank to bank. Some place a higher value on profitability, while others value safety. However, part of the Federal Reserve's job is to ensure the safety of the banking system as a whole. As a result, the Fed requires all banks to hold a minimum of 10% of their checking accounts on reserve. Anything above that amount is referred to as excess reserves. Given the low level of excess reserves held in the US banking system, it is assumed that most banks would prefer to hold less than the Fed's minimum, and, therefore, these banks will not hold any excess reserves. Bank A just meets its reserve requirement; 10% of its \$200 million worth of checking accounts is \$20 million. Because most banks do not like to hold excess reserves, they will lend them out (e.g. on the fed funds market, the market where banks borrow and lend to each other).

- *Loans*: Loans are, in essence, pieces of paper signed by the bank's loan customers promising to repay the bank the borrowed amount plus interest (IOUs).
- *T-bills*: Banks hold a variety of securities: state and local bonds, Treasury bonds (T-bonds), and Treasury bills (T-bills). Banks can buy and sell securities at any time. For simplicity, we will assume that our banks just hold T-bills.⁴ A T-bill is a promise by the US Treasury to pay the holder the face value on a particular date, which will occur within one year.

LIABILITIES

- *Checking accounts*: Bank customers can deposit money into either a checking account (an account primarily for making payments) or a savings-type account (an account primarily for earning interest). Checks are, essentially, bank promises to pay the holder the amount of the check as long as the customer has sufficient funds. Debit cards operate like a reusable check where the funds are transferred instantaneously. Savings-type accounts are also liabilities, but because these accounts do not play a role in money creation, it is assumed that Bank A only has checking accounts.
- *Borrowed funds*: Borrowed funds are funds the bank has borrowed on the open market. Banks can borrow from a variety of sources—corporations, fund managers, other banks, the overseas Eurodollar market, and the Federal Reserve. These tend to be short-term borrowings, from overnight to

⁴ Banks hold securities because they provide both returns and liquidity. T-bills are held primarily for liquidity, because they easily convert to reserves, face little price risk, but have a low return. State and local bonds and long-term T-bonds are held primarily for their returns. Medium length T-bonds play an in-between role (Sinkey, 1989).

2 years. A bank can readily increase or decrease its level of borrowed funds at any time. For simplicity, we will have Bank A borrow only on the fed funds market.

- *Net worth:* Net worth, also referred to as capital or bank capital, is the difference between assets and liabilities; it is placed in the liability column so that the balance sheet balances. This is the value of what bank stockholders own. A healthy bank generally has a net worth of between 4% and 8% of assets. With its \$250 million worth of assets, Bank A's net worth of \$20 million is 8%.

One of the features of a balance sheet is that it always balances; therefore, any time you are working with a balance sheet, an excellent internal check of your work is to make sure it balances at every step. As we can see, in Balance Sheet 1, both the assets and liabilities columns add to \$250 million. We now have the basic tools necessary to understand how money is created.

Let us assume that Pizza Bob comes to Bank A for a \$10 million loan. The bank asks Bob for a great deal of information to determine if he is creditworthy. His creditworthiness depends on the quality of his business plan, and whether the bank believes there will be sufficient demand for his product. Assume Bob is deemed creditworthy, and the bank gives him the loan. He fills out a series of papers, essentially IOUs to the bank stating when and how much he will repay the bank. In exchange, the bank gives Pizza Bob money. Bank A could give him cash out of its vaults. However, loans made with vault cash appear to be rare;⁵ the money given to customers almost always comes in the form of a checking account. If Bob already has an account at Bank A, as is normally the case, Bank A makes the loan by adding \$10 million to it. If he does not, Bank A creates a new account and enters \$10 million. This loan transforms the balance sheet, increasing both loans and checking accounts by \$10 million.⁶ (These changes are shown in bold.) Note: in Balance Sheet 2, Bank A is not meeting its reserve requirement. We shall deal with this problem in the section on Asset and Liability Management.

⁵ Based on a literature search and inquiries at the Federal Reserve's Board of Governors, it appears that no data is or has been collected on the percentage of bank loans made with cash. Staff economists at the Federal Reserve with whom I spoke speculated that the percentage of loans made with cash is very small. A survey of local bankers found that the frequency of vault cash loans varied from "rarely occurs" to "never." This certainly makes sense; loans made via the creation of new checking accounts are more convenient. In addition, to be in compliance with the Bank Secrecy Act of 1970, any loan of over \$10,000 made with currency would require filling out IRS Form 8300.

⁶ In reality, loans will increase by \$10 million plus the interest paid on the loan, checking accounts will increase by \$10 million, and net worth will increase by the interest paid. For simplicity, interest payments are left out of these examples.

Balance Sheet 2
Bank A

Assets	Liabilities
20 Reserves	210 Checking Accounts
150 Loans	30 Borrowed Funds
90 T-bills	20 Net Worth
Total 260	260

Thus, with the stroke of a keyboard, checking accounts at Bank A and in the USA increased by \$10 million. The money was created right out of thin air. It can be created by any of the 7000 banks, at any time, and for anyone these banks choose. There is not one commodity, one piece of gold, one anything to back up this new money. What holds the system together is the confidence people have in accepting checks as payment for goods and services. If you're feeling a little queasy, and you think the nation could be on the brink of collapse, relax. Although problems occasionally occur, procedures exist to prevent the abuses you may have imagined.⁷

Furthermore, and significantly, this process whereby banks create checking accounts to meet the needs of creditworthy customers means business investment is rarely constrained by a lack of savings. As long as the lending officer believes the project has a very good chance of being profitable, the bank has an incentive to create money for the business customer.

It is worth clarifying a point that tends to confuse students. "Loans" is an item on the asset side, but the actual process of making a loan involves both the asset and liability sides of the balance sheet. As we have seen, to make a loan the bank creates a checking account in the borrower's name, an action on the liability side. In exchange, the borrower promises to repay the bank, an IOU on the asset side. This fits perfectly with Moore's definition of credit money discussed earlier: "Credit money is the liability of the issuing bank, and is backed by borrowers' liabilities (IOUs) in the bank's possession. The supply of credit money varies with changes in the demand for bank credit."

⁷ The system actually allows the economy to perform more smoothly and expand more quickly than it would otherwise. But this is not without potential costs. The benefits of the banking system depend on the vast majority of loans being repaid. If this is not the case, due to either extending loans to risky customers or a set of unexpected events, then banks and other financial firms will suffer large loan losses, and that could reduce their net worth to point where the financial firms themselves face bankruptcy. If this happens on a large enough scale, the extension of credit contracts rapidly, throwing the economy into deep and potentially long lasting recession (e.g. The Great Depression, Japan in the 1990s and 2000s and the USA from 2008 to the present). This is one reason why regulatory agencies are supposed to monitor loan quality.

ASSET AND LIABILITY MANAGEMENT

Banks do not need excess reserves in order to make loans; they can accommodate their loan customers' needs by adjusting their balance sheets after the fact through a process known as asset and liability management. We can demonstrate this process with our example of Bank A and Pizza Bob. Bank A had zero excess reserves before it made the loan to Pizza Bob, as can be seen in Balance Sheet 1. The loan to Pizza Bob causes Bank A to fall below its reserve requirements. How far below depends on to whom Pizza Bob gives the \$10 million. We shall look at the two extremes.

Let's assume Pizza Bob purchases lumber from Uncle Buck's lumberyard. Uncle Buck also banks at Bank A. When he deposits Pizza Bob's check, Bank A deducts \$10 million from Pizza Bob's account and adds it to Uncle Buck's. The total amount of checking deposits at Bank A has not changed. Therefore, the balance sheet for Bank A (Balance Sheet 3) is the same as Balance Sheet 2.

Balance Sheet 3 Bank A	
Assets	Liabilities
20 Reserves	210 Checking Accounts
150 Loans	30 Borrowed Funds
90 T-bills	20 Net Worth
Total 260	260

Notice that the amount in checking accounts is \$210 million. With a 10% reserve requirement, Bank A should have \$21 million in reserves, but it only has \$20 million. Bank A must increase reserves by \$1 million. It can do this in one of two ways. It could sell \$1 million in T-bills and put the proceeds into reserves (shown below).

Balance Sheet 4 Bank A	
Assets	Liabilities
21 Reserves	210 Checking Accounts
150 Loans	30 Borrowed Funds
89 T-bills	20 Net Worth
Total 260	260

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Or it could borrow an additional \$1 million on the fed funds market and put those proceeds into reserves (shown below).⁸

Balance Sheet 5

Bank A

Assets		Liabilities	
	21 Reserves		210 Checking Accounts
	150 Loans		31 Borrowed Funds
	90 T-bills		20 Net Worth
Total	261		261

What if Uncle Buck banks with Bank B rather than Bank A? When he deposits Pizza Bob's check, Bank B adds \$10 million into Uncle Buck's account, then sends the check to Bank A and says "pay up". Bank A deducts \$10 million from Pizza Bob's account, then ships \$10 million from reserves to Bank B. Balance Sheet 6 is Bank A's new balance sheet.

Balance Sheet 6

Bank A

Assets		Liabilities	
	10 Reserves		200 Checking Accounts
	150 Loans		30 Borrowed Funds
	90 T-bills		20 Net Worth
Total	250		250

Again, Bank A is short on reserves. It can raise the funds the same way as above. However, this time it would have to raise \$10 million.⁹ Changing the level of

⁸ Banks may wish to reduce the amount of funds they are required to borrow, or the amount of securities they are required to sell. A bank can achieve this if it can induce customers to move funds from checking to saving accounts. Since the reserve requirement on savings accounts is zero, this switch will lower the amount of reserves a bank needs to hold. Therefore, under certain conditions, it may be worthwhile for the bank to increase the interest rate gap between savings and checking accounts to induce customers to make this switch. One such time would be if a bank is approaching one of its maximum prudent leverage ratios (see footnote 9).

⁹ There are limits to how much a bank can expand its loan portfolio and hence a limit to how much money it can create. Loans are more risky than securities. Borrowed funds are more risky than deposits. During expansions, the ratio of loans/securities, borrowed funds/deposits and loans/net worth all tend to increase. This increases the level of risk and decreases the amount of liquidity in the bank's balance sheet. "Prudent leverage ratios are established by a combination of experience and rules of thumb." If the expansion were to continue for long enough, eventually banks "will come up against the maximum 'prudent' leverage ratio" (Wray, 1990). The bank will, at that point, either raise interest or put the brakes on loan growth. Bank regulators also track leverage ratios and may ask the bank, before it would have done so on its own, to slow loan growth.

securities and/or borrowed funds to meet the bank's reserve requirements is what is known as asset and liability management.¹⁰

OFTEN-ASKED STUDENT QUESTIONS

Would not a bank get into trouble for being below its reserve requirement? Not immediately. A bank needs only average being at or above the reserve requirement over a 2-week time period. It can be below the reserve requirement for 13 of the 14 days as long as its reserves for the 1-day pull its average for the 14 days up to at least the reserve requirement.

What stops bank executives from creating money for themselves (or their friends), then going on a spending spree and not paying the bank back? Besides honesty, two factors prevent this. First, the reason why people become owners (stockholders) of a bank is that they expect the bank to be profitable, giving them a good return on their money. This will only occur if the bank's employees do a good job of distinguishing between those who will ultimately repay the bank and those who will not. Banks typically have to write off less than 1% of their loans (Ritter, Silber, & Udell, 2009). A bank that consistently takes losses or one that suffers a large loss will be closed down by regulators, causing the stockholders to lose their investment. Therefore, the board of directors, representing the stockholders, has a strong incentive to watch over bank managers to make sure they have a high percentage of performing loans (loans where the customer is repaying); the board has an especially strong incentive to make sure executives are not making loans to themselves that will not be paid back. However, it has been suggested that for large corporations, managers have such an informational advantage over the board of directors that the board's oversight is largely ineffectual (Galbraith, 2004). If this is true for large banks, then the second check must do all the work.

Government regulatory agencies oversee the operation of banks. Which regulatory agencies actually look at the bank's books depends on whether the bank received its charter from the state or the federal government, whether it is a member of the Federal Reserve System, and whether it is a member of the Federal Deposit Insurance Corporation (FDIC). On the federal level, primary oversight is provided by the comptroller of the currency, along with the Federal Reserve and FDIC. The exact laws differ depending on who is overseeing the bank's

¹⁰ In virtually every introductory orthodox textbook, "securities" and "borrowed funds" are missing from the balance sheets. In the orthodox story of money creation, banks need excess reserve in order to make loans, and the Federal Reserve controls the level of reserves. Thus, the Fed controls both the amount of money and the number of loans in our economy. If banks could engage in asset and liability management, then this entire story would fall apart.

operations; however, regardless of the situation, the bank is subject to strict rules about how much can be lent to employees and their families. This includes the CEO and members of the board of directors. The amounts that can be lent are very small, and the rules governing these loans are very precise. No employee can lend money to himself or herself. Regulatory agencies recognize how easy it is to rob a bank from the inside, and preventing it is one of their primary focuses.

How do credit cards work? A credit card is a legally binding line of credit. Many businesses set up loan agreements with banks in the form of a line of credit. This allows the firm to borrow from the bank a specified amount any time it chooses. The reason for these lines of credit is that a firm's expenditures are often not well matched with its revenue flows. For example, a firm may need to pay workers before it receives the revenue from selling its product. A credit card works similarly, except that it is for individuals. When one charges purchases on a credit card, one is contracting a loan from a bank.¹¹

What happens to the balance sheet if Pizza Bob does not pay back the loan? The moment Bob misses his first payment, nothing happens. However, once it becomes clear that Bob is not going to pay back the loan, the bank must eliminate Bob's IOU from its books. When Bob's \$10 million is written off, loans go down by \$10 million. Therefore, something on the liability side must decrease by \$10 million. The amount Bank A owes its depositors has not gone down, nor has what it owes other banks. The only item left is net worth. To see what happens, let us look at Balance Sheet 7, which is Balance Sheet 6 adjusted to reflect the bank's sale of T-bills to meet its reserve requirement.

Balance Sheet 7		
Bank A		
	Assets	Liabilities
	20 Reserves	200 Checking Accounts
	150 Loans	30 Borrowed Funds
	80 T-bills	20 Net Worth
Total	250	250

When Pizza Bob does not pay back the loan, the balance sheet changes to:

¹¹ Some cards are not directly issued by banks, but the issuers have agreements with banks to make the payments.

Balance Sheet 8
Bank A

Assets	Liabilities
20 Reserves	200 Checking Accounts
140 Loans	30 Borrowed Funds
80 T-bills	10 Net Worth
Total 240	240

Net worth has now dropped from 8% (20/250) to 4.17% (10/240) of assets. If net worth falls below 2%, the FDIC is required to start proceedings to close the bank.¹²

MONEY CREATION, THE BANKING SYSTEM AND THE FEDERAL RESERVE

So far, our discussion of money creation has dealt with a single bank. While the mechanics of money creation do not change with the number of banks involved, there is a larger concern about the operation of the banking system over the business cycle that is papered over when one discusses a single bank in isolation. We have assumed banks can always borrow funds or sell T-bills to meet the loan demand of creditworthy customers. However, during an expansion the loan portfolios of all banks are increasing; therefore, all banks must find additional reserves at the same time. The problem is that when a bank sells T-bills to individuals, corporations, or other banks, reserves are just transferred from one bank to another. No new reserves are created. The same can be said for most forms of borrowing.¹³ Thus, when the economy is in an expansion, the level of required reserves will increase for the system as a whole, and simply reallocating them between banks will not solve the problem. There needs to be a mechanism for increasing the amount of reserves. As it turns out,

¹² The FDIC uses a risk-based system to calculate value of assets and hence the percentage of net worth. Each asset is multiplied by some number between zero and one depending on its risk. Because cash is considered perfectly safe, it is multiplied by one. Business loans, considered risky, are multiplied by one. Mortgages are in between and are multiplied by one half (Ritter, Silber, & Udell, 2009). The point is that in the FDIC's calculation the value of assets is smaller than what we have used in our example, and therefore the bank's net worth would actually have to be less than the 2% we have calculated, before the FDIC would act to close the bank.

¹³ Banks can borrow overseas on the Eurodollar market (dollars held in overseas banks), and they can borrow from the Federal Reserve via the discount window. Both will increase the amount of reserves in the USA. More information on discount window borrowing is provided in footnote 15.

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the Federal Reserve's policy of interest rate targeting automatically supplies the needed level of reserves. Let us see how this works.

To illustrate the problem and the Fed's solution, let us assume that the banking system is made up of two banks, Banks X and Y. With only two banks, if one borrows on the fed funds market, the other must lend the same amount. The initial balance sheets for Banks X and Y are shown below.

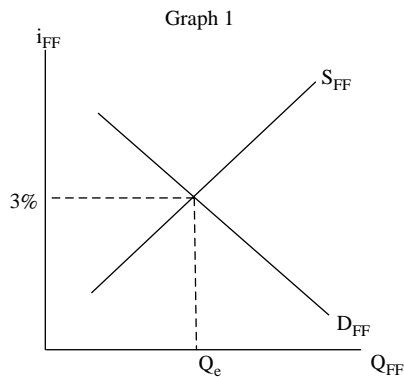
Balance Sheet 9 A Bank X			Balance Sheet 9 B Bank Y		
Assets		Liabilities	Assets		Liabilities
70 Reserves		700 Checking Accounts	60 Reserves		600 Checking Accounts
400 Loans		40 Borrow Funds	300 Loans		0 Borrowed Funds
230 T-bills		60 Net Worth	40 FF Loans		
			230 T-bills		50 Net Worth
800	800	Total	650	650	

During an expansion, banks' loan and deposit portfolios grow. According to Wray (1991), banks in the same area will tend to grow at roughly the same rate.¹⁴ Therefore, let us assume that the loan portfolios of each bank increases by \$100 million. Furthermore, loan customers spend their loans so that half is deposited into the other bank. Balance Sheets 10 A and B reflect the initial changes before the loans are spent. In addition, balance sheets 10 A and B also represent each bank's position after the loans are spent, as the \$50 million in reserves that flow from Bank X to Bank Y are matched by \$50 million in reserves flowing from Bank Y to Bank X.

Balance Sheet 10 A Bank X			Balance Sheet 10 B Bank Y		
Assets		Liabilities	Assets		Liabilities
70 Reserves		800 Checking Accounts	60 Reserves		700 Checking Accounts
500 Loans		40 Borrow Funds	400 Loans		0 Borrowed Funds
230 T-bills		60 Net Worth	40 FF Loans		
			250 T-bills		50 Net Worth
900	900	Total	750	750	

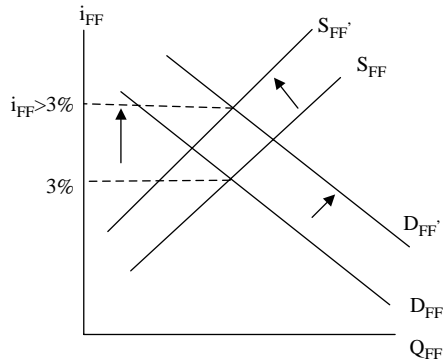
¹⁴ Our initial inclination is to believe that a firm that is growing faster than its rivals is doing well, but this is not necessarily true for banks. The faster expansion could be a result of superior advertising and/or customer service, but it could also reflect a lowering of standards of creditworthiness below that of its competitors. In this case, the bank's growth results from taking on riskier loans.

Each bank is now \$10 million below its reserve requirement. For simplicity, let us have the banks' attempt to solve their reserve shortfalls via the fed funds market. Prior to the expansion in loans, the fed funds market was at equilibrium at the Federal Reserve's target interest rate, shown as 3% in Graph 1. In the diagram of the fed funds market, the x -axis is the quantity of fed funds (Q_{FF}), and the y -axis is the interest rate on fed funds (i_{FF}). The demand for fed funds comes from banks that are short of their required reserves (D_{FF}). All else equal, the lower the fed funds rate the more often banks, who are short on reserves, will borrow on the fed funds market—the demand curve will be downward sloping. The supply of fed funds comes from banks that have excess reserves (S_{FF}). All else equal, the higher the fed funds rate the more often banks, with excess reserves, will lend on the fed funds market—the supply curve will be upward sloping. As we will see, for the banking system as a whole, a change in the amount of required reserves compared to the actual amount of reserve will shift both the demand and supply curves, because it simultaneously changes both the amount some banks are short of their required reserves and the amount other banks have in excess reserves.



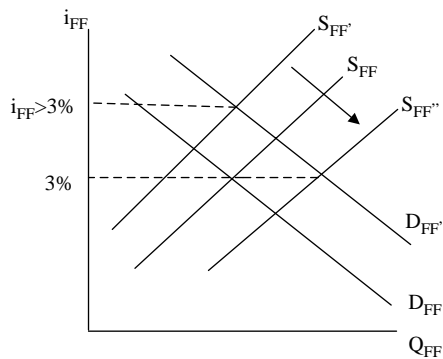
After the loans, Bank X attempts to borrow an additional \$10 million, causing the demand for fed funds to increase. Bank Y, on the other hand, will reduce its lending by \$10 million, causing the supply of fed funds to decrease. These changes are shown in Graph 2. Because demand now exceeds supply at the Federal Reserve's target rate of 3%, there is a shortage, and interest rates will rise.

Graph 2



Because banks' demand for fed funds is driven by their desire to lend to their most creditworthy customers, the Federal Reserve cannot control the demand for fed funds. (Decreasing demand by threatening bankers who increase loans with severe penalties is not considered a realistic policy option.) Therefore, the only way the Fed can maintain its interest rate target is to increase the supply of fed funds (Graph 3).

Graph 3



Although the Federal Reserve has several tools to alter the level of reserves,¹⁵ open market operations—the buying and selling of US Treasury and other Federal agency securities—is the tool used to achieve its interest rate target. To show how open market operations work, let us assume that the Fed buys \$1 million worth of T-bills from a bank. The bank sends the T-bills to the Fed, and the Fed adds \$1 million to the bank's account at the Fed. Thus, reserves at that bank and in the banking system rise by \$1 million. Just like when banks create checking accounts out of thin air for loan customers, the Fed creates reserves out of thin air for banks. If the Fed sells T-bills to a bank, it will send the bank the T-bills and then subtract the value of those T-bills from that bank's account at the Fed, reducing the level of reserves.¹⁶ Therefore, if the Fed wishes to increase reserves, it buys securities; if it wishes to decrease reserves, it sells them.

In sum, as the economy expands, the demand for loans by creditworthy borrowers increases. Meeting that increased loan demand results in an increase in required reserves, which both increases the demand for fed funds and reduces their supply. This drives up the interest rate in the fed funds market. In order to return the fed funds rate to its target, the Fed must buy securities so that the supply of reserves meets the increased demand. Therefore, in order to maintain its interest rate target during an expansion, the Fed must passively supply whatever reserves the banking system demands. As long as the Fed seeks to maintain a target interest rate, bank lending cannot be constrained by a lack of loanable funds. The Fed is not required by law to target interest rates; it is a choice they make. However, in

¹⁵ Economics textbooks often have a section entitled “the three tools of the Fed,” in which they discuss the ways the Fed can affect the level of reserves in the system. Open market operations is one tool; the other two are the setting of reserve requirements and discount window borrowing.

Currently, the Fed has a 10% reserve requirement on checking accounts and 0% on all other liabilities. In the past, the reserve requirement on checking accounts was higher and other types of liabilities had small reserve requirements; e.g. saving accounts had a reserve requirement of 3%. However, the Fed rarely changes its reserve requirements, the last time was in 1990.

It is also possible for banks to borrow directly from the Fed, referred to as discount window borrowing. In the past, some have theorized (Moore, 1988) that discount window borrowing played an important role in the Fed targeting of interest rates. However, in 2003, the Fed changed the interest rate on discount window borrowing from below the fed funds rate to above it; typically, the discount rate runs between a quarter to 1% above the fed funds rate. As a result, banks no longer see borrowing at the discount window as a cheap alternative to borrowing fed funds.

¹⁶ In actuality, the Fed's trading of securities is with a short list of primary security dealers (approximately 20). The reserves and securities are exchanged electronically. Most of the dealers are themselves banks.

the post WWII era, there is only one short period, 1979–1982, when the Fed did not target interest rates.¹⁷

THE GENERAL PRINCIPLE AND CREDIT CRUNCHES

In the introduction, I stated the general principle to be derived from this reading: “creditworthy businesses are never constrained by a lack of loanable funds. What constrains the level of investment is normally a lack of creditworthy business ventures.” A key phrase is “creditworthy business ventures.” Because banks, and banks alone, define what it means to be a “creditworthy business venture,” an economic downturn can be accompanied by what may be referred to as a credit crunch. Banks tighten credit standards during a recession because the potential profitability of business ventures declines, banks’ financial condition declines, and banks’ own tolerance for risk declines. (Federal Reserve) As a result, some firms face reduced credit limits and more stringent loan conditions; others lose access to bank credit altogether. From the firm’s point of view, this is seen as a credit crunch. The more severe the recession, the greater will be the markdown of firms’ projected profitability and the greater will be the bank’s aversion to risk; therefore, the more severe will be the restriction on credit.¹⁸ Hence, during the recession of 2007–2009, a great number of businesses, particularly small businesses, had their credit lines severely limited or cut off altogether. Because banks’ lending is determined by their evaluation of business creditworthiness and not by the amount of reserves at banks’ disposal, the failure of banks to increase lending after the federal bank bailouts was, thus, predictable from the general principle.

There is a different type of credit crunch, and when it occurs, our general principle does not necessarily hold. This is when financial markets either partially

¹⁷ In textbooks and elsewhere, one often sees discussions of the Fed choosing to “accommodate” or “not accommodate” a surge in loan demand or an issuance of US Treasury bonds. In those instances, “accommodate” means the Fed increases reserves as a reaction to an increase in the demand for credit, although the writers often phrase it as the Fed increases the money supply. But this is essentially a false framework. For all practical purposes, the Fed does not have discretion over whether to “accommodate” or “not accommodate” any particular event or government action. Historically, the Federal Reserve has chosen a policy of interest rate targeting or money targeting. If The Fed chooses a policy of interest rate targeting, as it has for 65 of 68 years in the post WWII era, then it will automatically accommodate *all* changes in loan demand. If the Fed chooses to target money, then it will automatically *not* accommodate any change in loan demand, and must endure potentially large swings in interest rates. (In 1980, during the one period the Fed did target money, the three-month T-bill rate went from 15.02% in mid-March to 6.9% in mid-June and then back to 15.39% in mid-December.)

¹⁸ Wolfson (2003) presents a clear and straightforward model of credit rationing that is consistent with the views expressed in this reading.

or totally freeze. Lending comes to a halt because the normal market lenders become so fearful of not being repaid that they cease lending (e.g. 1970 Penn Central bankruptcy, 1982 Drysdale Government Securities' insolvency, and the 2008 Lehman Brothers collapse). These are potentially catastrophic events, containing the possibility of cascading business failures if major intervention by the Federal Reserve and/or other governmental agencies is not successful. Although these events punctuate the history of capitalist economies, they occur infrequently; since the Great Depression, government intervention has always successfully truncated the damage to financial markets. Minsky (1986) has written of the general tendency for financial markets to be unstable, requiring government to regulate these markets to prevent potential meltdowns.¹⁹ Currently, the prevailing "limited-government" ethos in the USA favors a decrease in government regulation. As a result, these events are likely to occur with greater regularity in the future. Nonetheless, the freezing of financial markets is still fairly uncommon, and our general principle, that investment is not constrained by a lack of loanable funds but by a lack of creditworthy business ventures, can be thought to hold in all but the rarest of times.²⁰

CONCLUSION

In the introduction, I stated that the investigation of how money is created would have major implications for what would be the best policy for stimulating investment. In this reading we have seen that banks have incentive, under normal conditions, to make all loans they believe will enhance the profitability of their loan portfolio. Their ability to do so is not constrained by their level of excess reserves. In the process of making loans, banks create money and then use asset and liability management to meet their reserve requirements. The Federal

¹⁹ We can use a metaphor of teenagers skating on a partially frozen lake to illustrate this part of Minsky's argument. In order to impress the girls with his bravery, a young male skates out onto the unproven ice. In financial markets, assets and strategies with higher returns have greater risk. Once one person has successfully skated out on the unproved ice, others will follow. So, to distinguish oneself one must skate out even further. Financial firms compete for business, and once a risky-high return strategy is used without disaster others are compelled to follow. To out-do their competitors, financial firms will therefore engage in even riskier strategies. Without a barrier, skaters will tend to go too far, and when one falls through, cracks in the ice will spread toward shore, imperiling all skaters. Without regulation and the active enforcement of those regulations, financial firms will take on too much risk and, when one collapses, it will often imperil the whole system.

²⁰ The freezing of financial markets is one reason why creditworthy businesses might not receive loans. There are other reasons that revolve around, either the decisions of regulators or the need to meet certain regulations. In these cases, the bank would like to give certain businesses loans, but is prevented from expanding its loan portfolio. But these events, like the freezing of financial markets, are infrequent.

Reserve, via its policy of interest rate targeting, ensures that there will be sufficient reserves to accommodate the existing loan demand. Thus, the supply of money is endogenously determined by the interactions of creditworthy borrowers and profit-seeking banks.

Because investment is never constrained by a lack loanable funds, policies that seek to increase savings in order to increase investment are misdirected. Such policies include:

- a. Changing from an income tax to a sales tax.
- b. Reducing the capital gains tax.
- c. Eliminating Social Security and/or Medicare.
- d. Reducing the income tax, especially for the rich.

The rationale for each of these policies is that, in one way or another, it will increase incentives to save. For example, if Social Security is eliminated, people will begin saving for their old age when they become part of the work force. Reducing the income tax will give people more disposable income from which they will increase savings, and so on.

Because banks can almost always create money when they want to make a profitable loan, what normally constrains investment is business' lack of profitable investment opportunities, not banks' lack of loanable funds. Profitable investment opportunities in turn depend on the state of the economy. Not only will policies designed to increase savings be ineffective at increasing investment, they may in fact reduce it. An increase in the savings rate directly reduces the rate of consumption, slowing economic growth. Not only will this reduce firms' creditworthiness in the eyes of banks, but weaker sales will reduce firms' desire to undertake investment projects in the first place. The principle we have developed implies that policies aimed at increasing investment should focus on increasing the number of creditworthy projects. This means the most effective way to produce a robust climate for investment would be to focus on policies designed to achieve and maintain a full-employment rate of output.

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