What is Money?

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April 4, 2013
It is early Spring 2013. A philosopher, an economist, an (ex-)banker and a computer scientist are having a meeting at CWI, the Dutch national centre for research in mathematics and computer science, in Amsterdam. Their plan is to arrive at a better understanding of the present international financial crisis by clarifying basic concepts and by learning from one another. They have decided to try to crack a difficult nut first: what is money?

Philosopher: Thanks for agreeing to take part in this discussion. In my invitation to you I challenged you to explain to me what money is. I have tried to prepare myself for this meeting by means of a bit of preparatory reading in economics textbooks, but if anything this left me more confused. It seems clear to me that money is an agreement in a community, just like a marriage agreement or an agreement about shared ownership. Money is part of the construction of social reality [6]. Yet, most textbooks I consulted treat money as some kind of ‘thing.’

Computer Scientist: I suppose in the days when people still paid their debts in coins made of precious metal, it was quite easy to understand what money was. Just pieces of convenient stuff valued by everyone, and therefore suitable as a medium of exchange.

Economist: Money whose value comes from a commodity that it is made of, such as gold, silver or copper, is called commodity money. Gold coins have value in themselves as well as value in their use as medium of exchange. Usually there is a government that sets the nominal value of the coins.

Computer Scientist: Thus creating all kinds of difficulties. I remember a time in the Netherlands when the silver in a one guilder coin was worth more than the nominal value of the coin. These silver guilders quickly disappeared from circulation.

(Ex-)banker: That is a well-known phenomenon called Gresham’s law. When a government undervalues one kind of money, that kind of money tends to disappear from circulation because it is hoarded.

Computer Scientist: Yes, these silver guilders were quickly replaced by nickel guilders. In normal circumstances, the metal value of coins is never more than its nominal value.

Philosopher: But if the government issues paper money, and rules that a paper guinea is worth the same as a guinea coin made of gold, then people
are not hoarding the gold guineas. Why not?

_Economist:_ Indeed, they will not, as long as they trust the statement of the government that the paper bills can be exchanged at any moment for the gold coins.

_(Ex-)banker:_ And historically it was banks who first issued paper notes. As long as people trust the bankers, they will not hoard gold but use the much more convenient promissory notes issued by the bank.

_Philosopher:_ And the bankers soon discover that it is not necessary to have one million pounds of silver in their vaults to cover the worth of one million promissory notes “Good for one pound of silver.”

_(Ex-)banker:_ This was in fact discovered by goldsmiths who gave out notes for gold deposited with them for safekeeping. They observed that people do not all reclaim their deposit at the same time, and they saw no objection to invest part of the gold that they had received for safekeeping.

_Economist:_ Indeed, as Adam Smith observed, two hundred thousand pounds of silver would be enough to cover the worth of promissory notes for one million pounds sterling. In fact, two hundred thousand government backed pound notes would also have been enough.

_(Ex-)banker:_ The reserve requirement (or cash reserve ratio) is a regulation by the central bank setting the minimum fraction of deposits and notes that each commercial bank should hold as reserve. The 20 percent that Adam Smith suggests is very high, by modern standards. Nowadays, Chinese banks have this. In the USA it is more like 10 percent. In the Euro zone it is much less still.

_Computer Scientist:_ And the converse of the cash reserve ratio, is that what is called the money multiplier?

_Economist:_ That’s right. But there is fierce debate among economists about whether the money multiplier exists [1].

_Computer Scientist:_ One way to think about the cash reserve ratio \( R \) is by saying that a bank is allowed to lend out \((1 - R)X\) of every deposit \(X\) that it receives. Next, this money can be put in deposit again, either with the same bank, or with another bank, it does not matter. Suppose for simplicity it gets deposited with the same bank. Then \(1 - R\) of the new deposit can be
loaned out again. This is \((1 - R)^2 X\). And so on. This is a geometric series. Let’s see. The original amount \(X\) gets multiplied to

\[X + (1 - R)X + (1 - R)^2 X + \cdots\]

Applying the formula for a converging geometric series this gives

\[\frac{X}{1 - (1 - R)} = \frac{1}{R} X.\]

So the money multiplier is indeed the converse of the reserve ratio.

*Economist:* An easier way to see this is as follows. The bank receives \(X\) in deposit. If the deposit consists of cash, it simply reasons, hey, we have to keep fraction \(R\) of our loans in reserve, so on the basis of this new cash deposit \(X\) in our vaults we can loan out \(\frac{1 - R}{R} X\). Together with the deposit \(X\) this gives \(X + \frac{1 - R}{R} X = \frac{1}{R} X\). So \(\frac{1}{R}\) is the money multiplier. This is explained in many places, in books you can download from internet [4; 5].

*(Ex-)banker:* The money multiplier explains why it is a severe threat to the financial system when a really large bank fails. If the bank is worth one billion dollars, we may assume it has a cash reserve of about one billion dollars. Assuming a reserve ratio of 10 percent, when it goes bankrupt ten billion dollars get destroyed. In fact much more gets destroyed, for the banks lend out much more than allowed by the cash reserve ratio.

*Computer Scientist:* Here is a famous quote:

Banking was conceived in iniquity and was born in sin. The Bankers own the earth. Take it away from them, but leave them the power to create deposits, and with the flick of the pen they will create enough deposits to buy it back again. However, take it away from them, and all the great fortunes like mine will disappear and they ought to disappear, for this would be a happier and better world to live in. But, if you wish to remain the slaves of Bankers and pay the cost of your own slavery, let them continue to create deposits.

*Philosopher:* Who said that?
Computer Scientist: Sir Josiah Stamp. He was president of the Bank of England in the 1920’s, and the second richest man in Britain at that time.

Philosopher: And was he serious?

(Ex-)banker: There is no doubt he was. And right too. The only surprising thing about the quote is that it is unusually frank and lucid, for a banker. You should know that I decided to quit my profession some time ago.

Computer Scientist: I can see that with a scheme like this backing up by some government assurance is important. But this government-backing has ceased, right? In 1971 Richard Nixon unilaterally cancelled the direct convertibility of dollar bills into the gold in Ford Knox.

Philosopher: And still, people continue to trust dollar bills.

Economist: Right now, the USA has an astronomical national debt of more that 11.500 trillion dollars, in the American sense of ‘trillion’. That is 11.500 times $10^{12}$ dollars. Mind you, this is the debt of the government that is backing up the dollar bills.

Philosopher: So why do people still trust dollar bills? Can anyone explain this to me, please?

Economist: Frankly, I cannot. But maybe we should talk a bit more about what money is, and then hope that gradually things will become clearer. For it is definitely not true that all money consists of either government-backed notes or bullion. In fact, most money is of a different kind.

(Ex-)banker: Money not backed by a guarantee of convertibility to anything else is called fiat money. What gives fiat money its value is the ruling that it is legal tender: it cannot be refused as payment for debts. Also, you can pay your taxes with it.

Philosopher: Money as cash is everlasting. It can go round and round in the economy. The gold coins hardly wear out. And if the bills wear out, you can exchange them at the bank for new ones, no questions asked.

Economist: Precisely, but there is another kind of money that gets created by banks, and can be destroyed again. This I call IOU money, or more precisely, spendable IOUs. These are created over and over. My colleague professor Charles Goodhart gives a nice explanation. See www.fractionalreserves.
com.

(Ex-)banker: Goodhart is professor emeritus of banking and finance, London School of Economics. Not precisely your colleague.

Philosopher: Never mind. Can you summarize his explanation for us?

Economist: Goodhart explains it with a story. Mick wants to borrow 10 pounds from Jim. So he writes an IOU (“I owe you”) for 10 pounds, signs it, hands it over to Jim, and receives his 10 pounds. When Mick repays the loan, Jim will hand back the IOU agreement and dispose of it. It has done its job. An IOU gets created, next there is a period of time when it has value, and finally, when the loan gets repaid, the IOU has no further use and expires.

Philosopher: You say that the IOU has value. But the IOU note is not money. If Jim takes it to his local pub to pay for his beer, the note will be refused.

Economist: That depends a bit on whether the publican knows Mick. If not, then it will be refused, yes.

(Ex-)banker: But that situation changes when a bank puts its stamp of approval. Then the bank says that the IOU note is as good as a 10 pound note.

Economist: These are spendable IOUs. When a spendable IOU gets created, it gets created out of nothing. It did not exist before, and it was not created from anything else, nor obtained from anybody else.

(Ex-)banker: See, this is what happens all the time. You go to the bank, sign an agreement that you owe them 200,000 euros, with the house you are going to buy as security against the loan, and you receive 200,000 euros on your account. The snag is that this is not money they have and lend to you.

Computer Scientist: By government regulation they only need to have 20,000 euros themselves against the 200,000 euros they give you. Still, they receive interest from you on 200,000 euros. So Lord Stamp was entirely right.

(Ex-)banker: What you are giving now is the textbook account. This is not exactly how it happens. If you go to the bank and ask for your mortgage, do you really think the desk clerk first looks at her computer to see if the
bank still has ten percent of the money they are going to lend to you? Of course not. She just presses a button, and lo and behold, next time you log in to your bank account you see that you have 200,000 euros extra to your credit. And when you close your deal with the former owner of the house you buy, the 200,000 euros disappear from your bank account and make their appearance on his. Banks operate within an electronic clearing system that nets out multilateral payments at the end of each day. So they need to hold only a tiny proportion of central bank money to meet their payment requirements. Much less, in fact, than the cash reserve ratio.

*Computer Scientist:* The story brings to mind a quote from John Kenneth Galbraith:

> The study of money, above all other fields is one in which complexity is used to disguise truth or to evade truth, not to reveal it. The process by which banks create money is so simple that the mind is repelled. [3]

*Economist:* Next, Goodhart explains the bathtub model of money circulation. If the bank’s seal of approval can change a non-spendable IOU into a spendable IOU, then with every bank loan the bank is effectively creating money. If the bank grants you a loan, the bank gets you to sign an IOU. In return they give you a checkbook, or access to an electronic account by means of a debit card. So the bank loan is effectively an IOU swapping exercise.

*(Ex-)banker:* Money is created when loans are made. Money disappears when loans get repaid. So money is continually being created and destroyed. It flows into the bathtub at the tap, as new loans being made. It flows out at the sink, as repayments of loans. So the supply of money in the system depends critically on the rate of flow in and out of the system. Banks make their money on the difference between what they earn making loans and what they spend in paying interest to depositors.

*Philosopher:* I am shocked. But your story makes lots of things clear. It explains why banks charge no money for taking care of our money, for instance. They lend out our money and earn interest on it as soon as we deposit it.

*Economist:* In the golden age of Dutch banking, in the Seventeenth Century, the Bank of Amsterdam charged a fee for deposits in silver or gold.
(Ex-)banker: Indeed, for a while the Bank of Amsterdam, maybe the first example of a central bank, functioned on a full reserve basis. But that was abandoned in 1657, when the bank started to allow depositors to overdraw their accounts. Also, it was providing large loans to the City of Amsterdam and to the Dutch East India Company. This was initially done in secret, and when it became public knowledge the bank got in trouble and had to be taken over by the City of Amsterdam, in 1791.

Philosopher: Well, it seems to me that this system where banks can lend out money they don’t have is dangerous.

Economist: There have been well argued proposals to go back to a system of full reserve banking, as opposed to fractional reserve banking. A lucid explanation is at https://www.khanacademy.org/science/macroeconomics/monetary-system-topic. Full reserve banking was the original system. Ironically, this is how most people think banking still works. Under this system, the bank has to keep my deposit in its vaults, if I want to have it on demand. I can agree with them that I deposit a fraction on demand, and lend the rest to the bank as a time deposit. Then this second fraction can be loaned out, and earn interest. The bank pays me interest on the time deposit, but charges me for the on-demand deposit. If I write a check, I can not write it against my time deposit, but only against my on-demand deposit, that being the fraction of my capital that I can immediately dispose of.

Philosopher: And going back to such a system is not a fringe idea?

Economist: Not at all. This was seriously proposed by a group of leading American economists during the Great Depression. Look up “A program for monetary reform”, written in 1939. The full text is available on internet. Another relevant text is Irving Fisher’s [2].

(Ex-)banker: It is a serious proposal, but it will not happen. This would make an end of the bankers’ power to create deposits and thereby enslave us, to use the phrasing of Lord Stamp. They will never give that up.

Philosopher: Then we must force them to give it up. Otherwise, sooner or later the whole system will collapse. And when the music ends, there will not be enough chairs for all of us to sit on.

(Ex-)banker: Well, you are in very good company. This is what Thomas
Jefferson had to say about it:

If the American People ever allow the banks to control the issuance of their currency, first by inflation and then by deflation, the banks and corporations that will grow up around them will deprive the people of all property until their children will wake up homeless on the continent their fathers occupied. The issuing power of money should be taken from the banks and restored to Congress and the people to whom it belongs. I sincerely believe the banking institutions having the issuing power of money are more dangerous to liberty than standing armies.

And here is Benjamin Franklin on the same topic, no less fierce:

The refusal of King George to allow the colonies to operate an honest, colonial money system, which freed the ordinary man from the clutches of the manipulators, was probably the prime cause of the Revolution.

If you do not exclude them from these United States, in this Constitution, in less than 200 years our descendants will be working in the fields to furnish them substance, while they will be in the counting houses rubbing their hands.

I warn you gentlemen, if you do not exclude them (from Government) for all time, your children will curse you in their graves.

The founding fathers of the United States surely understood the dangers of giving the bankers free range.

*Philosopher:* Let me ask you an important question. *(Takes a 10 euro bill from his wallet.)* Does this 10 euro bill represent wealth, or would it be more accurate to say that it represents debt?

*(Ex-)banker:* Well, this is cash. You can keep it indefinitely, but it will lose its value by inflation. Or you can deposit it in a bank. And the instant you deposit your money, the bank starts playing musical chairs with about nine tenths of it.
Philosopher: In itself, that is not a problem. For if the bank creates money, the created money always gets exchanged for an IOU of the lender, isn’t that right?

Economist: That is exactly right. And the big problem right now is that nobody knows what all these IOUs are really worth.
Bibliography


