

# Some Thoughts on Money

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## 1. Introduction

Money can be defined as any object that circulates as a means of payment. Historically, commodities such as gold and silver coins (specie) served as important forms of money. With the development of deposit banking, simple book-entries on individual accounts (transferable across accounts by way of instructions submitted by cheque or other method) have evolved into the predominant form of money. Along the way, paper money also developed into an important form of money. In most countries today, the supply of paper money is determined by government monopoly. In the past, however, paper money was issued primarily by private agencies (although, almost never free from some type of government regulation). What explains the emergence of government monopoly in note issue? How might a competitive market for private monies function? What features would competitive monies possess? Could a government compete away private monies? Or would a government likely have to legislate away private monies? What role do legal tender laws have in the theory of money?

In order to answer these questions, I would like to abstract from the intermediation activities that seem to go hand-in-hand with note-issuing activities. To me, note-issuing and intermediating (between borrowers and lenders) seem to be two logically distinct activities. But given that one hardly ever finds one without the other (absent legal restrictions), it may be inappropriate at some level to separate these two activities.

## 2. Private Money

The primary function of money is to serve as a record-keeping device. If one sells a day's labour in exchange for an ounce of gold, then that gold represents a historical record of the value of the labour that one has sacrificed in somebody's service. In some future exchange, one might expect to purchase a given amount of bread with this gold; the bread sacrificed by the baker in such an exchange is recorded in the gold acquired in the purchase. In a sense, gold is serving as some sort of 'communal IOU'; it passes from hand to hand, facilitating short-run intertemporal trades of different forms of goods and services across individuals.

In principle, one could imagine replacing gold with any other type of centralized accounting system that records the history of trades across people and time in an appropriate manner. For example, if private contracts could be costlessly enforced, then gold could be replaced with a system of circulating private IOUs, representing claims to the capital or output of the debt-issuer; this is the basic idea underlying the emergence of private paper money. The primary benefit of paper money appears to be in economizing on the costs of settling payments

in specie. Of course, since private debt contracts are in reality not costlessly enforceable, insisting on payment in specie may also prove economical under certain circumstances.<sup>1</sup>

Originally, paper money took the form of privately-issued debt instruments (notes) representing claims against specie residing in some secure depository. Initially, these notes were simply the receipts for gold deposited by nervous merchants in the vaults of goldsmiths. For some reason, these gold-backed notes began to circulate as paper money.<sup>2</sup> Why did these types of debt instruments circulate when, in principle, many other types of debt instruments could have served the same purpose? In other words, what are the properties of debt instruments that encourage their circulation—what makes ‘good’ money? One can think of this question as a contract-design problem; i.e., how might an entrepreneur go about designing a ‘high-velocity’ debt instrument that will be in demand as a general payment instrument? Here is a list of things that are probably important:

1. *Backing.* Any debt instrument represents a promise or claim to something of value. The value of the debt instrument will depend on the credibility of the issuer to make good on promises and on the value of any collateral backing the debt (should promises not be delivered). Of course, backing is important for all forms of debt (including equity) and so is only a necessary, but not sufficient, condition for private money.
2. *Bearer Bond Status.* In other words, the debtor must be able to make ‘multilateral commitments’; otherwise, the debt instrument would not circulate. One potential problem in abandoning bilateral debt arrangements is the increased likelihood of counterfeiting.
3. *Redemption on Demand (Putable Debt).* This contractual term is likely to be of value in environments where individuals cannot predict the timing of their demand for the object backing the debt (and where insurance is not available). Note that, to the extent that redemption is expected to occur, it will be important for the note-issuer to keep at least a part of the capital backing the note in some easily divisible form. This is why equity shares (claims to future dividends) do not make good money when redemption is a feature of behavior. Furthermore, it makes little sense to back the notes with most forms of physical capital, since redemption would likely mean destroying capital value beyond that which is delivered to the note holder (imagine redeeming your share in General Motors by removing equipment from a production site). For these reasons, high-velocity notes need to be

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<sup>1</sup>Apparently, *in specie* is derived from the Latin phrase *in kind*. To insist on payment for a good or service in specie (over a personal IOU) suggests a basic lack of trust or enforceability of contracts, since one is essentially insisting on a *quid pro quo* exchange of goods.

<sup>2</sup>I am still not sure as to the precise terms of the contractual arrangements entered upon between the merchants and goldsmiths. In particular, were the goldsmiths obliged to keep 100% reserves?

backed by easily divisible objects of value, like specie, or various forms of output (e.g., Canadian Tire notes, gas coupons, Airmiles are all debt instruments that are redeemable in output).

4. *No fixed term and Noninterest Bearing Debt.* Fixed term debt would be inconvenient as a medium of exchange because its price varies with the date to maturity. Likewise, a note that paid interest at various dates would see its value fluctuate with the timing of interest payments. (Note: this will be less of a problem with electronic forms of money).
5. *Noncallable Debt.* Callable debt does not give the debt holder the desired flexibility in redemption timing and also adds inconvenience (the note holder will have to be aware of call notices).
6. *Small Denomination Debt.* Goes without saying.

This list is nothing more than a description of properties that seem to have characterized successful private money issues in the past. (Do we have a model that delivers equilibrium debt issue with all these features?) Now, let's try to imagine a world where specie is the only form of money and all debt is settled bilaterally either in specie or in output (tough to do properly without a formal model, but let's be brave). Let us abstract from government note issue and private clearinghouses.

The type of debt in the economy I am imagining here likely violates properties (2)-(6) above, making it ill-suited for transactions purposes. However, what on earth might prevent any well-capitalized and/or well-known firm in the economy to suddenly issue notes with all six of the properties described above? Individuals demand 'liquid' forms of wealth to facilitate numerous everyday transactions without the bother of paying in specie. It seems to me that entrepreneurs would capitalize on this need by creating the desired liquidity (i.e., by creating debt instruments with the properties described above).<sup>3</sup> Viewed in this light, I fail to see any obvious source of 'social' concern (i.e., social costs that issuers of private money would not internalize), at least, no concern beyond that which is typically afforded debt/equity issues. In particular, what would it mean, in the present context, to 'overissue' money? What would it mean to have a 'run' on a particular type of money? Presumably, it would mean the same thing it means when non-money-issuing firms issue 'too much' debt or find their shares subject to a run (i.e., the price of company stock and debt depreciate in value, reflecting bad behaviour/decisions/outcomes). People know how to protect themselves against such events (diversification)—why should things not work the same way for money-issuing firms?<sup>4</sup>

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<sup>3</sup>Even today, we see all sorts of firms trying to organize their own private money systems where firm-issued 'points' are redeemable in the merchandise of cooperating businesses. I am not sure whether such points are circulating, but I do not see why they cannot (might be legally restricted).

<sup>4</sup>For most people, the need to diversity across different monies would likely not be too

## 2.1 Redemption Behavior

There is a sense in which I find the notion of redemption (for specie) puzzling. Why would individuals ever wish to hold specie, when transactions can be undertaken with paper? One reason, which I have alluded to above, might be that paper transactions require some degree of trust (the note issuer must be perceived to have commitment power). One could imagine a situation where locally-issued monies are readily accepted in local exchanges, but are not readily accepted in inter-regional exchanges, so that a person interested in importing some good from afar might have to first redeem local currency for specie with which to pay for the incoming shipment.

But the consideration above does not fully explain why a money-debt instrument should feature a redemption clause. In particular, why could individuals simply not purchase specie on the open market with nonredeemable (but well-backed) notes? On the other hand, it seems that little is lost for the note-issuer to allow for redemption in specie and something might be gained in terms of increasing the general acceptability of such notes. I'll have to think about this.

Historically, the main reason for the redemption feature of bank notes likely resided in government regulation; i.e., governments often stipulated that privately-issued notes had to be redeemable in specie (or government-issued paper). Actually, it could well have been the case that private-money issuers welcomed such a 'restriction', since it may have added some credibility to their note issues (people might be more willing to accept the notes if they knew that the note-issuer was legally obliged to redeem them in specie).

Still, just because private money featured a redemption clause, this does not explain why such an option would ever be exercised. Once again, I believe that government regulation explains why individuals often redeemed their notes for specie. In particular, it seems to have been the case that since the very beginning of private money issues, governments imposed restrictions on the minimum denomination of bank notes. These restrictions on small denomination notes essentially forced people to undertake small transactions with specie (which was typically minted by the government treasury).

In the absence of government restrictions, one could imagine a situation in which notes might never be redeemed; i.e., they could remain in circulation indefinitely. When such a circumstance arises, is there not an incentive for the note-issuer to expand the supply of notes 'excessively'? This depends. Whether or not the note-issuer has an incentive to 'overissue' depends on the nature of the debt contract and how well the terms of the contract are enforced. In a system of competitive monies, I am guessing that in order for any money to be competitive, it will have to be fully collateralized (not necessarily with specie). If full collateralization is a part of the contractual terms, then 'overissuing' notes (on

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important, given that only a very small fraction of wealth is typically held in this form. Diversification of monies poses more of a problem for the poor, who are more likely to hold wealth in the form of money.

the grounds that they will likely never be redeemed) would seem to constitute fraudulent behaviour. If fraud is punished severely enough, then one would not expect overissue of notes in a competitive economy. Another possibility is that the debt contract anticipates zero redemption and hence allows for ‘overissue’. In order to attract people to hold these notes, the note-issuer would have to offer the notes on better terms (allowing the noteholders to somehow share in the seigniorage), for example, by paying interest (violates property 4 above). Actually, I’m not sure about this latter scenario; it does not seem ‘stable’ to me.

### 3. Government Money

Let us begin by imagining a well-functioning private money system (there are episodes in economic history where they seem to have existed). Why and how might a government impose itself on such a system? The ‘why’ seems obvious enough; i.e., in order to finance state expenditure. The ‘how’ seems to have a systematic component in economic history: (1) issue ‘unbacked’ government paper in various denominations and declare such paper ‘legal tender’; (2) inhibit competition by making it illegal for private agencies to issue their own circulating paper.

In principle, a government monopoly in paper money could work every bit as well, if not better, than a well-functioning system of competitive monies. Such a system might be superior based on the reasons that one often hears in favour of common-currency areas. On the other hand, the incentives to abuse the power of monopoly can at times prove irresistible (there are enough examples of such abuse to fill a large book). Whether or not one prefers one system over another depends, I think, on the extent to which citizens prefer to be subjected to the potential transgressions of opportunistic government officials (punishable by the law or by the vote); or the potential transgressions of opportunistic private agents (punishable by the law or by the market).

#### 3.1 Is Government Fiat Money Unbacked?

Fiat money is defined in the dictionary (Merriam-Webster) as paper money that is not convertible to specie. Textbooks on monetary theory often go further by defining fiat money as paper that is ‘unbacked’ in any way by the issuer (the note does not represent a claim to anything of intrinsic value). Given that fiat money is unbacked, the natural puzzle addressed by monetary theorists is how such intrinsically useless pieces of paper might nevertheless be valued by individuals. While I think that such a question is appealing on theoretical grounds, I do not believe that it is relevant for understanding the primary reason why fiat money is valued in reality (this is a rather strong statement and I’m not entirely sure whether I believe it yet).

Most paper money today is in the form of government-issued fiat. I think that by ‘fiat’, what should be understood here is the dictionary definition; i.e.,

not the textbook definition of an ‘unbacked’ financial instrument. Historically, when governments have issued paper money, they invariably passed laws that made these notes legal tender. This is important because as far as I know, individual tax obligations are ultimately payable in the legal tender. What I am suggesting here is that the demand for fiat does not come about for the reasons highlighted in a Townsend-turnpike or OLG models, but rather comes about because people are legally obliged to acquire government-issued fiat in order to pay their taxes. To the extent that this is true, it follows (I think) that it would be improper to consider government-issued fiat as an ‘unbacked’ debt instrument. In fact, what a U.S. dollar bill represents is a promise on the part of the federal government to lower the bill-holder’s tax obligation by one dollar (i.e., the bill holder can redeem the bill for a credit on his tax account—or, he can sell the bill to someone else who might need the bill for the same purpose).

## 4. A Model of Inside and Outside Money

### 4.1 Kiyotaki and Moore (2000)

Kiyotaki and Moore consider a model of inside money that is based on an intertemporal version of Wicksell’s triangle. There are three dates and a single nonstorable good available at each date:  $y_1, y_2, y_3$ . There are three types of agents:  $A, B, C$ . Agent  $A$  wants to consume goods at date 1, but is endowed with  $y_3$ . Agent  $B$  wants to consume goods at date 2, but is endowed with  $y_1$ . Agent  $C$  wants to consume goods at date 3, but is endowed with  $y_2$ .

The Pareto optimal allocation has each person consuming their preferred time-dated good. The lack of double coincidence of wants can be overcome in a number of ways. Notice that, as of date 1,  $A$  and  $C$  agents must offer *promises* in exchange for the goods that they wish to consume. In particular,  $A$  must promise to deliver  $y_3$  to whomever buys his paper at date 1. Likewise,  $C$  must promise to deliver  $y_2$  to whomever buys his paper at date 1. Suppose that  $A$  and  $C$  can make *bilateral* commitments to honour their promises. In this case, the optimal allocation can be achieved with the following sequence of exchanges occurring at date 1:  $A$  passes his  $A$ -paper to  $C$ , who passes his  $C$ -paper to  $B$ , who passes his  $B$ -output  $y_1$  to  $A$ . No further trades occur following date 1.

In the situation described above, if either  $A$  or  $C$  are unable to make a bilateral commitment, then the equilibrium collapses to autarky. For example, if  $C$  cannot commit, then he will renege on his promise to deliver  $y_2$ . Anticipating this,  $B$  will not be willing to supply his  $y_1$  to  $A$ , whose paper is of no value to  $B$  (we are assuming that everyone gets a small benefit from consuming their own endowment).

As Kiyotaki and Moore demonstrate, the situation can be rescued if  $A$  is able to make *multilateral* commitments (i.e., can commit to honouring bearer-bonds). Markets must now open at date 1 and 2. At date 1,  $A$  acquires  $y_1$  by selling his paper to  $B$  (which now entitles the bearer to  $y_3$ ). At date 2,  $B$  can

purchase  $y_2$  from  $C$  by offering  $A$ 's paper in exchange. Notice that this latter exchange does not rely on  $C$ 's ability to commit, since  $C$  is making no promises. Finally, at date 3,  $A$ 's paper is redeemed by  $C$  for  $y_3$ .

## 4.2 Prices

What do prices look like in this economy? As a benchmark, let us consider the equilibrium price-system that would prevail if Arrow-Debreu securities were available. Let  $q_t$  denote the price of date  $t$  output measured in units of date 1 output (i.e., let  $q_1 \equiv 1$ ). Then, it is easy to verify that:

$$\begin{aligned} q_2^* &= \frac{y_1}{y_2}; \\ q_3^* &= \frac{y_1}{y_3}. \end{aligned}$$

If output is growing at some constant rate  $\gamma$ , then  $q_2^* = (1 + \gamma)^{-1}$  and  $q_3^* = (1 + \gamma)^{-2}$ ; i.e.,  $\gamma$  is the equilibrium one-period real rate of interest.

Of course, the A-D securities market described above does not exist in this model (if it did, there would be no need for money). In our model, there is a sequence of spot markets where money trades for goods. Let  $p_t$  denote the price of output at date  $t$  measured in units of money. Consider some price-system  $(p_1, p_2, p_3)$ , which is viewed parametrically by agents. An  $A$  agent wishes to make purchases equal to  $p_1 y_1$  and so will have to create an amount of money sufficient for this purpose; i.e.,  $M = p_1 y_1$ . Each unit of  $A$ -money represents a claim against  $1/p_3$  units of  $y_3$ , so that  $M = p_3 y_3$ . So one restriction on the price-system is given by  $p_1 y_1 = p_3 y_3 = M$ . Also, since the  $B$  agent uses his  $M$  units of money to purchase  $y_2$  at price  $p_2$ , we must also have the restriction  $p_2 y_2 = M$ . Assume that  $p_1$  is exogenous.<sup>5</sup> Then the equilibrium is given by:

$$\begin{aligned} M^* &= p_1 y_1; \\ p_2^* &= \frac{M^*}{y_2}; \\ p_3^* &= \frac{M^*}{y_3}. \end{aligned}$$

## 4.3 Noncirculating Government Fiat

Imagine now that there is a government with an exogenous expenditure plan  $(g_1, g_2, g_3)$ . For simplicity, assume that  $g_1 = k y_1$  (where  $k$  is a positive fraction) and  $g_2 = g_3 = 0$ . As usual, we will assume that the government has the power to appropriate resources (tax). In this example, the government will end up taking a fraction  $k$  of agent  $B$ 's output. While this sounds like a tax on  $B$ , it

<sup>5</sup>Alternatively, one could imagine that  $M$  is exogenous and that the price level must adjust to ensure market clearing. This indeterminacy is attributable to the fact that the choice of the units of measurement is arbitrary.

is in fact a tax on  $A$ , since  $A$  is the private agent that values  $B$ 's output. If the government was simply to appropriate resources from  $B$ , the latter would not be harmed since there would be a compensating increase in the price of his good (the real rate of interest would rise). The A-D security prices would be given by:

$$q_2^e = \frac{(1-k)y_1}{y_2};$$

$$q_3^e = \frac{(1-k)y_1}{y_3}.$$

The one-period real rate of interest in period 1 now given by  $r_1^e = (\gamma+k)/(1-k)$ , while the one-period real rate of interest in period 2 remains equal to  $r_2^e = \gamma$ .

Instead of physically taking  $y_1$  from agent  $B$ , the government may instead try to 'pay' for it with its own paper. There are a couple of different ways that this might be accomplished with each method having several variations. The first method is to declare government fiat to be *legal tender*, which means that it must be accepted as a means of payment in any private or public transaction. For example, if a merchant has goods for sale priced at  $p$  dollars (the standard unit of account), then the merchant is legally obliged to accept  $p$  dollars of government fiat as payment for these goods. Of course, enforcing such an obligation between two private parties might prove difficult (e.g., the merchant may refuse payment in the government fiat by alleging the notes to be counterfeit). However, enforcing such an obligation between a government agency and a private agency is likely no more difficult than enforcing the act of tax collection. Since economic models regularly assume that tax collection is feasible, let us make an entirely analogous assumption and assume that government-issued fiat is *lawful money*, which means that it must be accepted as a means of payment in any public transaction (i.e., any private obligation to the government can be legally settled with the government presenting lawful tender for payment).

The government has an exogenous expenditure plan in place, which is announced at the beginning of date 1. Assume that the government announces zero taxes (seigniorage is the only source of revenue). Both agent  $A$  and agent  $G$  (the government agent) arrive at agent  $B$ 's door with the intent of purchasing  $y_1$  (which is selling for  $p_1$ ) in exchange for their own money. As before, agent  $B$  gladly accepts  $A$ 's money, but accepts government money only out of a legal obligation. Essentially,  $B$  is paying taxes to the government in exchange for a (worthless) receipt. Alternatively, one might assume that the government announces a tax  $T_1$  payable by agent  $B$  in lawful money. In this case, agent  $B$  *willingly* accepts the government fiat (receipt) as it can now be presented back to the government in order to expunge the debt obligation imposed upon him. Either assumption yields the same economics, but the latter assumption seems more realistic, so let's go with that.

How will this fiscal policy affect the economy? Consider a price system  $(p_1, p_2, p_3)$ , which I continue to assume as being viewed parametrically by all

parties (this may not be an appropriate assumption for the government, but let's worry about this later). As before, there is an indeterminacy; i.e., the model only pins down the purchasing power of money and not the level of money and prices independently, so let us simply assume that  $p_1$  is exogenous. The government's desired nominal expenditure in period 1 is given by  $p_1 g_1$ , which is financed with a tax  $T_1 = p_1 g_1$ , payable in lawful money. Agent  $A$ 's desired nominal expenditure is given by  $p_1 c_1$ , which is financed with a new money issue  $M = p_1 c_1$ . This private money issue is backed by a promise to the third period output; i.e.,  $M = p_3 y_3$ , so that  $p_1 c_1 = p_3 y_3$ . Agent  $B$  sells a part of his output ( $c_1$ ) to agent  $A$  in exchange for  $M$  and sells the remainder ( $g_1$ ) to the government in exchange for fiat money  $X = p_1 g_1$ . This latter amount is just sufficient to settle  $B$ 's tax obligation  $T_1 = X$ , while the amount  $M$  is spent on  $y_2$ , so that  $p_2 y_2 = M$ .

Since market-clearing must be consistent with aggregate feasibility, the equilibrium consumption allocations must be given by:  $c_1^e = y_1 - g_1$ ;  $c_2^e = y_2$ ; and  $c_3^e = y_3$ . Consequently, the equilibrium volume of note-issue for agent  $A$  is given by  $M^e = p_1(y_1 - g_1)$ , while the volume of note-issue for the government is given by  $X^e = p_1 g_1$ . Notice that the effect of the government's fiscal/monetary policy here leaves the first-period price-level unchanged (by assumption) but crowds out private-money issue dollar for dollar; i.e.,  $M^e + X^e = M^*$  (where  $M^*$  is the volume of note-issue associated with  $g_1 = 0$ ). The note-issue  $X^e$  is used by agent  $B$  to pay his taxes and is therefore removed from circulation (under the current set-up, these notes would not circulate in any case). Consequently, this 'expansionary' fiscal policy has the effect of permanently *lowering* future price-levels; i.e.,

$$p_2^e = \frac{M^e}{y_2} < p_2^*$$

$$p_3^e = \frac{M^e}{y_3} < p_3^*.$$

#### 4.4 Circulating Government Fiat

Imagine now that the government levies the tax obligation on agent  $C$ , instead of  $A$ . As before,  $A$  sells output  $p_1(y_1 - g_1)$  to  $C$  in exchange for  $M$  and sells output  $p_1 g_1$  to  $G$  in exchange for  $X$ . But unlike before, agent  $A$  can now use both his private and government notes  $M + X$  to purchase  $y_2$  from  $B$ ; i.e., agent  $B$  willingly accepts government fiat with the understanding that he will be able to spend these notes on a future purchase with some other agent who will willingly accept them. In the third period,  $B$  spends all of his notes on  $y_3$ . Agent  $C$  accepts his own notes out of contractual obligation and accepts the government notes since these will be necessary to satisfy his tax obligation. The total money supply that circulates in this economy is given by  $M^* = M^e + X^e$ ,

so that nominal prices are as they were in Section 4.2; i.e.,

$$\begin{aligned} p_2^* &= p_1 \frac{y_1}{y_2}; \\ p_3^* &= p_1 \frac{y_1}{y_3}. \end{aligned}$$

Note, however, that A-D prices (real interest rates) are as in Section 4.3; i.e.,

$$\begin{aligned} q_2^* &= \frac{(1-k)y_1}{y_2}; \\ q_3^* &= \frac{(1-k)y_1}{y_3}. \end{aligned}$$

Notice that  $(p_2^*/p_1) > q_2^*$ , while  $(p_3^*/p_2^*) = (q_3^*/q_2^*)$ . I am not sure at the moment how to interpret this result.