

DOES ELECTRONIC MONEY INCREASE THE FREEDOM OF CHOICE?

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Money and Electronic Money

First we have to define the term money. The common definition of money is that money is a *generally accepted means of payment*. Such a concept of money is not very suitable for our purpose, therefore we will define other three interrelated terms: currency, monetary asset, and transaction media.

Currency is a *symbolic brand name*, like US dollars or Czech crown. There is just one *base money* for each currency. It may be some quantity of gold in the case of the gold standard or it can be bank notes and coins issued by a central bank. The brand name guarantees that all monetary assets denominated in the currency are convertible on the demand to the currency's base money at par.

Monetary asset is what is commonly called money. It is *any liquid asset denominated in some currency that is either generally accepted at par as a compensation in a transaction or can be simply translated to it at par*. The words “generally accepted” do not mean that everyone is willing to accept it, but rather that it is accepted by a large share of economic agents. (Moreover, we have to distinguish between the promptness to accept the monetary asset, and the promptness to hold it.) Typical forms of monetary assets are coins, bank notes, demand deposits, traveler's checks etc.

The transaction media is *any tool used to make a payment*. Some transaction media are monetary assets at the same time (e. g. coins, bank notes, or traveler's checks), some of them are not (e. g. credit cards). Some of them are uniquely linked to some currency, other ones not.

Now, where into our picture does electronic money fit? In a broad sense, electronic money is *any type of money not existing in a physical but only in an electronic form and transferred as electronic impulses*. If this definition holds, most of the money is already

electronic nowadays. For example, demand deposits are held as zeros and ones in computers in banks and are transferred mostly by electronic wire.

Moreover, each existing (or possibly existing) electronic money fits to one of three major categories defined above. Most electronic money is just a transaction media (e. g. a smart card for making payments on Internet from one's demand deposit). Some of them are even monetary assets (e. g. prepaid smart cards, called electronic wallets, or electronic accounts held with some non-bank institution that are expected to come into existence soon). The smallest category of electronic money constitutes even a new private currency, fully independent of any governmental currency (e. g. e-gold system).

The term “electronic money” might be thus misleading. It seems to be something very new and fashionable (it is connected with the modern progress in computer science, cryptography, networking etc.), but from the economic point of view, it is just an enhancement of principles used for centuries. There is no need for changes in economic *theory*—electronic transaction media and electronic monetary assets can be handled properly with the standard monetary theory; even new private electronic currencies can be interpreted with the *free banking theory*, going back to the British Monetary Controversy of the first half or the nineteenth century, and even back to Adam Smith.

Nonetheless, new technology linked with the electronic money can change the *economic reality* a lot. Before we address this question, we have to say how money is chosen.

How Money Is Chosen

Every economic agent holds some money balances, or, more precisely, a portfolio of monetary assets (denominated possibly in various currencies) and a portfolio of transaction media. The structure and the size of these two portfolios are optimized so that the agent could accomplish all his or her transactions with an expected minimal cost. The word *expected* is important since the amount and timing of transactions is not known precisely in advance. An agent would restructure his or her portfolios if and only if it lowers his or her expected transaction costs. (Of course, the possibility of choice is constrained; the most important constraint is the legal tender law—a duty to accept governmental currency in any transaction, to pay taxes in this currency, and to use it in accounting. It boldly limits the possible usage of alternative currencies.)

The transaction cost consist of the following major components: 1) the interest cost (opportunity cost of holding money), 2) transaction fees paid for the transaction and for the

use of the transaction media, 3) the cost of instability of the purchasing power of a currency, 4) the costs of other risks associated with the use and holding of money. Let us discuss the individual costs briefly.

The interest cost is an inevitable result of the fact that money is more liquid and less risky than other assets. Therefore the interest rate on monetary assets is lower than on other assets. Because of a high cost of the paying interest on the associated media, some types of monetary assets bear a zero nominal interest rate (e. g. coins, bank notes, or probably even prepaid smart cards). The cost can be decreased either with holding lower money balances or with holding monetary assets bearing positive nominal interest (e. g. demand deposits and debit card).

Transaction fees are paid for using the transaction media—partially it is a cost of using the media and partially it is paid for every single transaction. The cost can be reduced either with holding cheaper transaction media (there is no fee paid on bank notes), or with the lower frequency of payments or conversions (i. e. with larger scale payments). The transaction fees cost and the interest cost are contradictory (optimal setting has been independently derived by Baumol and Tobin). The transaction cost also increases if an agent uses a not-widely used currency or transaction media since he or she must pay additional conversion fees for the conversion to a better-accepted currency or media.

There are two types of the cost of instability of purchasing power of a currency. The first one is connected with *trend changes* in its purchasing power (i. e. *anticipated* inflation or deflation). The cost can be handled as a special case of the interest rate cost. Every agent prefers to hold monetary assets denominated in a currency with a stable purchasing power to an inflationary one, and the deflationary currency to the stable one (in paying debts he or she prefers the opposite). The second cost of instability is a result of the *volatility* of the purchasing power around its anticipated trend. The volatility is always ineligible. Every agent tries to minimize the cost. If it is possible to switch to a different currency, he or she does it; if it is not possible, he or she can lower his or her money balances.

The rest risk cost is associated with a possibility that agent's currency, monetary asset or transaction media fails as a result of its provider's bankruptcy, forgery or any other cause.

We have to keep in mind that almost no agent can diversify well his or her portfolio of monetary assets and transaction media properly. CAPM theory is therefore *not applicable*, the individual (i. e. non-market) risk is undesirable, and the agent tries to avoid it if possible.

What Changes Electronic Money

As we have already mentioned, electronic money does not change monetary principles. On the other hand, it does *change* the *efficiency* of transactions. In other words, the technology associated with electronic money can considerably lower the transaction cost mentioned above. It is certainly desirable for individuals, but what consequences does it have for the society as a whole? The major change we can expect is the increase of a *competition among currencies*.

In most countries, it is legal to hold monetary assets denominated in a foreign currency. But until lately it was not possible to use it directly for payments since the transaction cost was huge (it was mainly the fees for conversion to local currency). Now electronic cards can be used to pay US dollars from an account held in Czech crowns with a (relatively) very small transaction cost. The same can be true for other monetary assets and transaction media as well, maybe even with a lower cost. This allows to abandon inflationary currency in favor of some more stable currency as soon as the instability cost prevails the transaction fees cost.

This competition cannot be perfect because governmental currencies are not convertible to any commodity or asset at par. Therefore it is not possible to abandon the currency completely without its last holders suffering a great loss.

Let us explain it in more detail. Demand deposits are convertible to a base money (e. g. bank notes of a central bank). Therefore everyone who wants to relocate his or her deposits from one commercial bank to another can withdraw his or her deposits in cash (i. e. to sell his or her demand deposits at par) and put them to another bank (i. e. to buy there demand deposits). All people can do it at the same time.

The departure from one governmental currency to another is quite different nowadays. Governmental bank notes are *not convertible* to any asset at par. Everyone who wants to sell his or her bank notes for bank notes denominated in another currency must sell them in the open market for the current market price. Every single money holder can do that, but the society as a whole *cannot* do that since there would be no buyer. (There is an obligation to pay taxes and to receive transfers in governmental currency too.) Therefore the competition between governmental currencies can increase as a consequence of a technological progress associated with electronic money, but it would be still far from perfect. It is also possible for private companies to issue private currency that would compete with the governmental ones too. Such currencies already exists (e. g. e-gold or LET System).

Conclusion

Electronic money, or, more precisely said, the advance of financial technology, lowers the transaction cost of currency conversions and in this way it spreads the freedom of choice between the currencies. This starts competition between governmental currencies and governmental and private currencies. We can expect that such a competition will be either outlawed or it will effectively discipline governmental central banks—the active monetary policy (and inflation) would disappear in such a case.

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