



Digicash Convertibility - a look into the future

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The recent announcement by the Swedish Mail (SM) of being ready to start issuing Digicash poses a few interesting questions. Will Mark Twain (MT) Digicash be convertible into SM Digicash? How will the conversion take place? Will merchants have to open accounts with both institutions? In general, how will conversion between e-cash issued by different institutions take place?

In order to answer these questions, one must first ask: what is e-cash? Is it really cash? What people normally refer to with the word "cash" is a piece of paper or a metallic coin, issued by some Central Bank. Cash is a liability, a debt, of the Central Bank itself. Only the liabilities of the Central bank have a unique property, that of being legal tender. A payment made with a liability of the Central Bank is final: it cannot be reverted, nor it is affected by failure of the payer. I am referring to liabilities instead of cash because cash is not the only form of legal tender. There are also reserves. Reserves are accounts held by banks with the Central Bank. When a bank needs to pay another bank, it does so by using its accounts with the Central Bank. Payments done in this way are final as well. Economists refer to the sum of reserves and cash as base money, or high potential money.

By contrast, a bank deposit is not base money, because it is a liability of a commercial bank. It differs from base money under two respects:

- if the bank fails, deposits are not redeemable at par
- a payment made with a commercial bank liability (as an example, by check) is not final until the bank regulates the payment using base money. This normally takes a time span ranging from a few hours to a few days, depending on the country and where the check is cashed in.

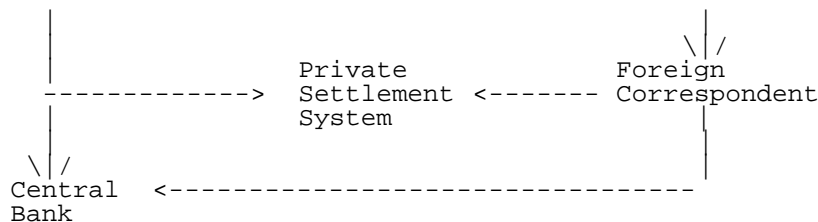
How does Digicash work? You open an account with MT. When you want to get some e-cash, you move money from your MT bank account to an account called "mint". MT issues some e-coins, which really are digital certificates representing the property of a fixed amount of funds in the mint. When you send 1\$ worth of e-cash to someone, he becomes the owner of 1\$ worth of funds deposited in the mint. This is not the same as getting a 1\$ note in an envelope, because the mint is a MT liability, not a FED liability. This has no practical consequences, though, unless MT fails, an event which is quite unlikely. Anyway, all deposits are commercial bank liabilities, and payments by check are payments using commercial bank liabilities.

However, when we get to convertibility, it has important consequences. If you can safely accept a check, and presume that the payer's bank is going to honor it, for banks, which handle thousands of checks worth billions of Dollars, the question is more complex. In order to understand how banks deal with each other's liabilities, one must first have an insight of how banks settle and regulate payments.

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NATIONAL PAYMENT
=====
Payer (national)
|
\ /
Bank
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INTERNATIONAL PAYMENT
=====
Payer (foreigner)
|
\ /
Foreign Bank
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The above picture is the representation of the payment system. There is an important difference between national payments and international ones. National payments are normally settled using either a private clearing house, or a public one. Credits and debits of banks are normally netted (not in all countries, though), and each bank subsequently pays only the difference between all its credits and all its debits to the clearing house. Such payments are final, because they are made using the accounts with the Central Bank.

Nationally, banks accept each other's liabilities, for several reasons:

- banks know each other better on a national level
- payments are quite fast, and the time lag before final regulation is short
- banks know that the Central Bank overlooks the payment system, supplying liquidity when necessary.
- in some countries, there are insurance schemes which guarantee settlement

However, there is no such system internationally. Payments are normally handled through foreign correspondents, banks which have branches abroad.

If Bob, in the US, wants to send 1\$ to Alice, in the UK, his bank has to pay the UK correspondent 1\$, and the UK correspondent's UK branch pays Alice's bank 1\$. This process can be fast for large value payments. For small value payments, however, it is usually very slow, requiring sometimes weeks.

Which brings us back to e-cash. Let us suppose that there are several issuers in different countries. We can imagine the following different scenarios:

A) payment within a country. Within the same country, e-cash payments could be settled and regulated in the same way as checks, or, even better, ATM payments. The procedure is fast and works smoothly. Bob sends 1 e\$ to Alice. Alice sends the \$ to her bank, which checks that it has not been double spent. If not, it immediately sends to Alice a new Dollar which it issues, and it stores the Dollar issued by Bob's bank. It then asks Bob's bank to settle its debit, using the normal procedure.

B) payments between countries. Let us suppose, again, that Bob wants to send 1 e\$ to Alice, in the UK. It is unlikely that Alice's bank will accept to issue coins in exchange for the 1 e\$ issued by Bob's bank. There are several reasons:

- Alice's bank could not have information on the solvency of Bob's bank. Bob's bank could have less than a triple A, or it could be located in a financially unstable country.
- Even if Alice's bank knew that Bob's bank is solvent, and in a stable country, settlement for low value payments can easily take more than 10 days. In the meantime, Alice's bank could accumulate millions of \$ worth of coins issued by Bob's bank, and see its risk exposure rise.
- internationally, there are no loss-sharing agreements or insurance schemes

Therefore, Alice's bank could do one of the following:

- collect the 1 e\$ from Alice, and wait until settlement before crediting Alice's account or sending her new e-Pounds, basically moving the risk on her. If Alice is a merchant, she would be faced with the question of

whether to deliver the goods immediately, or wait settlement.

- refuse to accept the e\$ issued by Bob's bank. Alice would then have to verify the e\$ herself with Bob's bank, which would issue new e\$ to her. She could then transfer back the e\$ from the mint to a new bank account with Bob's bank, and then order a transfer to her own bank. This would practically force all merchants to open accounts with all banks.

Of course, the above argument assumes that the international payment system is unchanged, and that many banks start issuing their own e-cash. In fact, digital payment instruments such as e-cash and e-checks could spur change in the international payment system, taking full advantage of the opportunities offered by the advances in information technology. Alternatively, what could happen is that only a few big banks, with a triple A, start issuing e-cash. These banks could bilaterally agree to accept each other's money. However, it would handle control of the e-money supply to a handful of institutions, turning the industry into an oligopoly.