Monetary Policy Implications of Digital Money: A Comment

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When digital money replaces currency there will be an inflow of currency into the commercial banking system which may lead to an expansionary credit creation. This is one of the arguments put forward in an article by Aleksander Berentsen (1998) published in this journal. Berentsen is not the only one supporting this hypothesis. Others are Herreiner (1998), Söllner and Wilfert (1996) and Worms (1995). However, the effect of an increasing substitution for cash depends on the institutional set up. In particular, the effect depends on whether a central bank pursues a strategy of money supply targeting or interest rate targeting. If central banks target interest rates there will be no effect on credit creation. Furthermore, even if they target the money supply, the multipliers would be smaller than in Berentsen’s calculations.

Berentsen (1998, pp. 108-113) distinguishes two different scenarios, one with binding reserve requirements and one with non-binding reserve requirements. If reserve requirements are binding any inflow of cash would increase the reserves of commercial banks and induce them to lend more1. Thus there would be credit creation. If reserve requirements are non-binding the marginal return on loans should equal the marginal costs of deposits. Therefore, an inflow of currency would not trigger additional lending because this would marginally reduce the return on loans making it unprofitable. However, banks would not want to hold currency as vault cash but invest it in reserve assets. This would lead to a reduction in the interest rate on reserves, decreasing the costs of making deposits. This cost reduction, in turn, would make additional lending profitable. Thus even when reserve requirements are non-binding there would be credit creation.

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1. This is also the scenario analysed in Söllner and Wilfert (1996, pp. 397-399).
Berentsen’s distinction between situations with binding and non-binding reserve requirements is interesting but for practical policy, it is not very helpful. In the short term, almost all central banks pursue a strategy of interest rate targeting. Even central banks, such as the Bundesbank, which announce a monetary target, do not set the money supply in the short run. Rather, they periodically review monetary indicators in order to determine the interest rates of central bank loans. This has two implications:

a. reserve requirements are hardly ever binding (in the sense that banks can nearly always borrow more reserves),

b. changes in the demand for reserves lead to changes in the supply of reserves – leaving the interest rate on reserves unaffected.

So, in the short term, any change in the demand for currency can be expected to lead to a corresponding change in the supply of currency (or reserves) with little or no effect on interest rates and the real economy. This is the very reason why central banks choose to target interest rates in the first place. The insulating properties of such a policy against monetary shocks (or ‘LM shocks’) are well known.

What happens when there is an influx of currency into the commercial banking system? Banks will exchange currency for deposits with the central bank. By doing so they increase their reserves above the desired quantities. In this situation they have two possibilities. They can either buy more assets (make more loans) from non-banks or they can buy assets from the central bank (borrow less from the central bank). Since an increased demand for assets in capital and money markets would lead to a reduction of interest rates, the latter would be the preferred alternative. As long as the central bank keeps the interest rate on certain short-term instruments pegged banks will rather buy back assets from the central bank. Thus, banks simply use incoming currency to reduce liabilities vis-à-vis the central bank and there is no credit creation whatsoever.

German and US monetary policy can be used as evidence supporting this conclusion. When the German government planned to introduce a source tax on capital income many Germans converted part of their savings into cash and took it into other countries (mainly Luxembourg). This led to a temporary increase of the currency in circulation. However, this outflow of cash did not trigger any interest rate hikes and reductions in bank lending (deposit destruction). Rather, the banking system accommodated the increased demand for currency. The same happened in the US in the early 1990s when currency crisis in Argentina and Russia strongly increased the demand for US$ bills (Porter and Judson 1996).

2. The ‘classic’ source is Poole (1970).
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Again this was accommodated and no interest rate increases or lending reductions were necessary.

Admittedly, the result that bank lending will not be affected at all is derived from an oversimplified model. If it is taken into account that a switch towards digital money may imply an increased demand for deposits because issuers of digital money need to own shadow accounts, banking will become more profitable and banks can reduce the spread between lending and borrowing rates. This could lead to additional credit creation. Furthermore, in a world with many different assets, banks are not only concerned about relative returns but also about the composition of their portfolio. A reduction of borrowing from the central bank would increase holdings of liquid assets (those assets central banks accept as collateral for their loans). If banks wish to maintain a certain ratio of liquid and less liquid assets they would finally increase purchases of less liquid assets even if this causes a downward shift of interest rates on these assets. Thus there may be some credit creation after all. However, this effect is likely to be very small because a reduction of currency in circulation of a few billion DM would hardly have any effect on the balance sheets of commercial banks. At the end of 1997 German banks owned assets of non-banks of about 5.5 trillion: roughly 4.7 trillion DM in loans and about 800 billion DM in securities. In order to have a noticeable effect on the asset composition, the substitution of currency would have to be fairly large.

In the derivation of deposit multipliers Berentsen (1998) simply overlooks that any expansion of credit will not just require a certain fraction of reserves to be held with the central bank. Credit creation also leads to an outflow of currency – even if the initial disturbance is an inflow of currency into the banking system. Since Berentsen’s multipliers do not take this effect into account the derived multipliers are far too high. For instance, if the outflow of currency is taken into account, the deposit multiplier becomes

\[ dD = \frac{1}{(r+c)}dVC \]  

where \( D \) are deposits, \( r \) is the reserve ratio for deposits, \( c \) is the cash to deposit ratio and \( dVC \) is the increase in vault cash of the commercial banks. In Berentsen’s calculation \( c \) is missing. However, the effect of \( c \) is far from trivial.

3. For instance, Poole (1970) uses the IS/LM framework which only includes money and bonds.
4. This effect has been repeatedly stressed by Brunner and Meltzer. See, for instance, Brunner and Meltzer (1993).
5. Currency in circulation was about 250 billion DM in 1997.
6. To simplify the multiplier, the possibility that banks will not only create deposits but also digital money is not included.
Using average ratios as indicators of marginal ratios the above multiplier is of the magnitude of 2.5 in Germany (in 1997 the cash to deposits ratio is about 40% and \( r \) is 2%). Neglecting \( c \), the multiplier becomes 50. For Canada, the difference is even more striking. The multiplier falls from about 100 to 1.7 (in 1997 the cash to deposit ratio was 58% and the reserve ratio was about 1%). So, even if there were binding reserve constraints, the multiplier would be far lower than implied by Berentsen's calculation.

On the whole, it is not necessarily the potential of credit creation for commercial banks which may pose a problem for central banks. Rather it is the reduced informational content of monetary aggregates due to financial innovation which will make monetary policy more difficult. But when innovation is evolutionary rather than fast and erratic even this problem may be of limited significance. After all, it has been customary for a long time for central banks to take long-run changes of velocity into account when setting monetary targets.

REFERENCES