

ELECTRONIC MONEY AND MONETARY POLICY

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ABSTRACT

Electronic money takes a variety of forms both online and offline, with the possibility of true digital cash looming in the future. Views of the impact of electronic money on monetary policy are as varied. With the amount of electronic money still small compared to other forms, the effect on monetary policy is not yet fully determinable. However, central banks and economists must try to anticipate the effects before it becomes more significant. This paper contributes to that effort by summarizing the range of views and the likely effect various forms of electronic money will have.

INTRODUCTION

Electronic money takes a variety of forms both online and offline, with the possibility of true digital cash looming in the future. Views of the impact of electronic money on monetary policy are as varied. At one extreme is the opinion that the monetary policy implications of electronic money are nil. At the other is the possibility of a substantial effect, even to the elimination of monetary policy. Yet, even if their currencies are unlikely to be wholly replaced by digital creations, central banks cannot afford to ignore the effects of such technology.

With the amount of electronic money still very small compared to other forms, the effect on monetary policy is not yet absolutely determinable. However, the central banks and economists must try to anticipate the effects before it becomes more significant. This article contributes to that effort by examining various forms of electronic money, summarizing the range of views, and discussing the likely effects of electronic money on several aspects of monetary policy.

WHAT IS ELECTRONIC MONEY?

The European Central Bank provides a good concise definition of electronic money: "electronic money is broadly defined as an electronic store of monetary value on a technical device that may be widely used for making payments to undertakings other than the issuer without necessarily involving bank accounts in the transaction, but acting as a prepaid bearer instrument". [European Central Bank, 2000] We should note that "technical device" does not necessarily mean physical device. While some, such as smart cards, are physical, it includes internet based systems as well. A key element is that payments using it must be accepted by entities other than the issuer. Thus, prepaid phone cards, for example, would not be considered electronic money.

Electronic funds transfer systems are already in common use. When a customer pays for a purchase with a debit card, the amount may be electronically taken from the customer's account and transferred to the merchant's account. In other

situations electronic transfers may also be used. Does this mean that the use of electronic money is already widespread? Do these qualify as electronic money? Some writers would say so:

"Electronic cash" is the digital replacement for banknotes and coins, in other words, electronic money for small transactions.

"Electronic money" includes electronic cash, as well as the immense torrents of digital funds that zip through international and national payments networks, such as SWIFT, Fedwire, and CHIPS." [Bernkopf, 1996]

However, a committee of the Bank for International Settlements makes the distinction as follows:

"Electronic money products are defined here as stored value or prepaid products in which a record of the funds or value available to the consumer is stored on a device in the consumer's possession. This definition includes both prepaid cards (sometimes called electronic purses) and prepaid software products that use computer networks such as the internet (sometimes called digital cash). These products differ from so-called access products that allow consumers to use electronic means of communication to access otherwise conventional payment services (for example, use of the internet to make a credit card payment or for general "online banking")." [CPSS, 2000]

"In the consumer's possession" may be unnecessarily limiting, implying either a physical device or storage on the consumer's computer. Clearly though, merely allowing electronic access to ordinary checking accounts (e.g. through debit cards) does not turn the checking account into electronic money. We might suggest a definition which makes the distinction clear as follows: electronic money is a means of payment created exclusively for the purpose of being transferred through an electronic medium. Thus, it brings the potential for implications for monetary policy beyond that of EFT.

FORMS OF ELECTRONIC MONEY

Offline Electronic Payment Systems. One form of electronic money is offline electronic systems such as pre-payment cards or smart cards. Prepayment cards store value on magnetic, electronic, or optical media, often in appearance much like a credit card. When used, e.g. in a pay phone, the accepting device erases the proper portion of the value. They have not yet been widely used in the United States, but have been elsewhere. One estimate is that by the late 1990s there were over 1.8 billion prepayment cards in the world. [Smart, 1998] Most of these, however, are single purpose cards (e.g. issued by phone companies) and thus not true electronic money.

Smart cards are in a sense an extension of the prepayment cards. Like the prepayment cards, they can store value for future use, but they also include an internal microchip based processing capability. Smart cards have been little used in the United States, but are common in Europe. According to Business Week, analysts estimate that only 2% of all smart cards are used in the Americas, while Europe claims 90%. [Cortease, 1997]

In the United States, the Visa credit card association has been working to gain acceptance for its smart card, which it calls a cash card. It explains to potential users that:

"Visa Cash cards work like "electronic money". A microchip embedded in each plastic card stores monetary value. Each time you use Visa Cash to pay for

something, your purchase amount is automatically deducted from the balance. It's fast, convenient, and easy!" [Visa, <http://www.visa.com/pd/cash/main.html>]

Online Systems. Online systems do not require a device separate from the users regular computer and Internet connection. Here's a description from an internet.com review of one online payment system:

"Ecount can be used directly for consumer-to-consumer transactions, such as auctions, and have no expiration dates associated with them. As such, ecount is the only C2C payment method that can be spent instantly with a merchant. If a consumer receives an ecount in payment for an auction, then he can turn around and spend it just as he does with a Webcertificate." [Gutzman, 2000]

The ecount system is actually an online debit card (a physical card is also available) with the feature of being able to send amounts to others by email. Because it uses the Mastercard payment system, it meets the criteria of being widely acceptable. It can pass from person to person, but only among those who have email and are willing to open an ecount account.

PayPal is another online payment system. It describes itself as follows: "PayPal provides the world's first instant and secure online payment service. With PayPal, individuals and businesses can send and receive payments through the Internet. This revolutionary new service provides a safer, faster, easier, and cheaper way to move money in today's digital economy. ...PayPal is the world's largest Internet-based payment network." [PayPal, <http://www.paypal.com>]

PayPal is similar to the ecounts system. It is not as widely acceptable by merchants, but has more individual users (claiming more than 12 million individual and business users). There are other similar services, including ProPay [<http://www.propay.com>], e-gold (which provides gold denominated accounts [<http://www.e-gold.com/>], c2it from Citibank, [<https://www.c2it.com/bannerD/>] and Yahoo! PayDirect [<http://paydirect.yahoo.com>].

Digital Cash. Webopedia ("the #1 online encyclopedia dedicated to computer technology") defines digital cash as follows

"A system that allows a person to pay for goods or services by transmitting a number from one computer to another. Like the serial numbers on real dollar bills, the digital cash numbers are unique. Each one is issued by a bank and represents a specified sum of real money. One of the key features of digital cash is that, like real cash, it is anonymous and reusable. That is, when a digital cash amount is sent from a buyer to a vendor, there is no way to obtain information about the buyer. This is one of the key differences between digital cash and credit card systems. Another key difference is that a digital cash certificate can be reused." [Webopedia, http://webopedia.internet.com/TERM/d/digital_cash.html]

This definition incorporates two essential characteristics, comparable to physical cash, for electronic money to be cash: its use should be anonymous and it should be able to circulate from person to person. In spite of several attempts to introduce it and some mislabeling, digital cash is not an actuality yet. [Griffith, 2001]

In spite of the past failures, not everyone has given up on the idea of digital cash. The Economist observed:

" Digital currencies are sprouting all over the Internet. But virtual money does not yet pose a serious threat to the real thing.... electronic cash has flopped badly.... On the Internet, almost all payments are still made by unsexy credit cards. In fact, digital cash was always a long shot.... Despite that sobering experience, a second

generation of financial firms is now giving e-cash another go, online." [Economist, 2000]

One of these is Mondex. On its web page, it claims:

"Mondex offers the most technologically advanced electronic cash system in existence and its unique security architecture enables a range of functionality not offered by any other electronic cash scheme. ... Mondex electronic cash can be transferred directly to a retailer, merchant or other outlet to pay for goods or services, and like cash, Mondex enables transactions between individuals, without the need for banks or other third parties." [Mondex, <http://www.mondex.com/>]

Mondex is offering its card through regional franchises, but has no significant presence in the United States yet. It remains to be seen whether it will qualify as true digital cash.

MONETARY POLICY IMPLICATIONS

Views of the impact of electronic money on monetary policy are quite varied. At one extreme is the opinion that: "Fundamentally, electronic money is no different than all other forms of money that exist today. Consequently, the monetary policy implications of electronic money are nil." [Ely, 1996] At the other is the possibility of a substantial effect, even to the elimination of monetary policy:

"Yet, even if their currencies are unlikely to be wholly replaced by digital creations, central banks cannot afford to ignore other threats posed by technology. It is, for example, making foreign-exchange transactions much cheaper. Services such as PayPal or e-gold might make it easier for residents of a country with a weak currency to shift their savings into a stronger one. The dollarisation of a country might one day become a mere matter of mouse clicks. Ultimately information technology could, in theory, lead to a pure exchange economy with real-time electronic transactions. And then central bankers' nightmares about their own obsolescence might finally come true." [Economist, 2000]

The European Central Bank suggests three implications of electronic money for monetary policy:

- First, there is a need to safeguard the role of money as the *unit of account* for economic transactions. ...
- Second, the effectiveness of monetary policy instruments might be affected by a widespread adoption of electronic money....
- Third, the emergence of electronic money might have repercussions on the information content of monetary indicator variables with regard to the primary objective of price stability." [European Central Bank, 2000]

In regard to the first, the ECB is concerned that "Over time, there may be a change in market views about the creditworthiness of electronic money issuers engaging in excessively risky investment activities, which could lead to electronic money instruments being traded at variable exchange rates." [European Central Bank, 2000] It proposes requiring that electronic money be required to be redeemed with central bank money. This ignores the case of non-domestic issuers discussed below.

It also does not consider the possibility of persons in a particular area choosing to use a monetary unit other than the official one in that area. We have seen this with physical currency with the U.S. dollar circulating in other countries.

The second effect - on monetary policy instruments - has received the most attention. Monetary policy through open market operations requires central bank assets to be purchased or sold. These assets require offsetting liabilities. In the present these offsetting liabilities are either central bank issued currency or deposits by banks, whether of required reserves or settlement balances. Freedman stresses this element:

"What is crucial for monetary policy implementation is the combination of the monopoly power of the central bank over the supply of reserves or settlement balances and its ability to impose terms and conditions related to the excess or shortfall of reserves or settlement balances. Together, these determine the incentives faced by banks in various circumstances and result in banks adjusting their balance sheets in response to central bank actions."

After an extended discussion of various scenarios involving stored value cards, he closes with:

"I would conclude that the scenario envisaged in which SVCs entirely supplant bank notes and in which settlement on the books of the central bank is replaced by another mechanism is unlikely in the extreme. And even if it should ever come to pass, the central bank could very likely continue to influence the very short-term rate of interest, albeit employing different techniques from those in use today." [Freedman,2000]

Woodford also emphasizes the effect of monetary policy on short-term rates and is more explicit about how this impact could be maintained:

"As the crucial monetary policy decision would continue to be the adjustment of the central bank's operating target for an overnight interest rate (such as the U.S. federal funds rate), this would still require no fundamental change in the way in which monetary policy is conceived, and would imply no reduction in a central bank's ability to stabilize either economic activity or inflation. Thus there is every reason to expect that in the coming century the role of central banks in the control of inflation will be essentially the same as it is now.

...There are a variety of reasons why clearing payments through the central bank ought to remain attractive, even in the absence of a legal requirement to do so... These include the fact that the creditworthiness of the central bank cannot be doubted, and the fact that banks will need to clear at least some payments through the central bank if the government maintains its own account with the central bank. But even if many payments came to be cleared through some independent mechanism, and indeed even if a settlement account at the central bank ceased to be of any interest whatsoever as a convenient way of clearing payments arising out of private transactions, there should still be no reason why the central bank could not continue to determine the level of overnight interest rates with a high degree of precision." [Woodford,2000]:

He points out that this could be done through the central bank setting a rate it would pay on deposits and a rate at which it would lend to banks.

Berentsen [1997] emphasizes more the direct impact on money supply and bank reserves:

" Eventually, digital money is expected to replace central bank currency, thereby affecting the narrowly defined stock of money. This paper suggests that a conversion of central bank currency into digital money balances would permanently increase the supply of bank reserves and, therefore, the effect on the narrowly defined stock of money would be equivalent to an open market operation that provides permanent additional reserves to the banking system. The precise change of the narrow defined stock of money would depend on the institutional arrangements prevailing in a country, in particular, whether binding reserve requirements are in place."

He assumes issuance of electronic money by domestic banks and replacing central bank currency. However, electronic money could also substitute for ordinary bank deposits. In this case, there would be no monetary policy effect of bank issues unless the electronic money had different reserve requirements than ordinary deposits.

If the electronic money is issued by a non-bank entity, then the effect requires further analysis. When the non-bank issuer receives a bank deposit in exchange for its electronic money, there is an initial increase in the money supply - a change in who holds the deposit plus the new electronic money. When the issuer then uses the deposit to buy interest bearing securities, the effect depends on who is on the other side of the transaction. If it is a non-bank holder of the securities, there is no further effect - again just a change in who holds the deposit. If the counter-party is a bank, deposits disappear, offsetting the increase in the money supply, but freeing reserves for the creation of additional money. If the counter-party is the central bank, then it both eliminates the deposits and soaks up the reserves, completely offsetting the creation of the new electronic money.

A key element in determining the effect on monetary policy is who will issue electronic money. If domestic banks, it will be no different from existing deposits or the bank notes of the 19th century. It can be measured and regulated easily by the banking authorities. If provided by domestic non-bank issuers, it can be treated like travelers checks today and at least measured as part of the money supply (the third concern of the ECB). Thus, the growth of electronic money would indeed have little impact on monetary policy.

But what if electronic money supplied by issuers outside its jurisdiction circulates in a central bank's realm? This would affect both the measurement of the money supply as a monetary policy indicator and the effectiveness of monetary policy instruments. This will be like the situation already faced in countries where the dollar circulates as an alternative medium of exchange.

Tanaka [1996] recognized this extra-territorial issuance as a key element:

"The most important characteristic of digital cash is its transnationality; digital cash has no national borders--that is, it is not controlled by any central bank of any nation-state. If digital cash circulated only within a traditional national border and was controlled under a central money authority, there would be no economic implications... But in reality, digital cash has no national borders--a fact that will bring both new benefits and new problems to the economy as a whole. The main benefit will be an unprecedented efficiency of international payments. The problem will be that digital cash's transnationality will tend to increase

the instability of the monetary system. This problem has the potential to cause conflict between digital cash providers/users and the central banks of nation-states."

This is where the form of electronic money may make a difference in the effect on monetary policy. It appears that the offline forms would be easier for central banks to track and regulate. Local merchants are more likely to participate in domestically based systems. Users' choices of cards are probably strongly influenced by local acceptability. Online systems, including digital cash, require no special equipment or other physical contact. Thus, domestic users are more likely to choose issuers outside of the central bank jurisdiction for online payments than for offline. So far, the smart card systems predominate, but with the growth of ecommerce this may not continue to be true. Person to person transfers are practical with online electronic money. The growth of mobile phone email access may increase this use as well.

CENTRAL BANK RESPONSE

To meet the challenge of electronic money, the European Central Bank proposes extensive regulation, including:

- "i) issuers of electronic money must be subject to prudential supervision;
- ii) electronic money schemes must have solid and transparent legal arrangements; ...
- v) electronic money schemes must supply the central bank with whatever information may be required for the purpose of monetary policy;
- vi) issuers of electronic money must be legally obliged to redeem it at par value; and
- vii) the possibility must exist for the ECB to impose reserve requirements on all issuers of electronic money." [European Central Bank, 2000]

This, of course, does not deal with the problems raised by issuers outside its jurisdiction. It is possible that issuers domiciled where there is less severe regulation, particularly an absence of reserve requirements, might have a competitive advantage over those regulated by the ECB.

However, it is also possible that the effect of regulation, and particularly deposit insurance, on the acceptability of emoney might offset such an advantage. In any case, the acceptability of non-bank issued electronic money will depend partly on users' perception of the financial stability of the issuer. At this point, data to judge that may not be easily available to the ordinary user. I inquired of PayPal whether they provided audited financial statements. The response to the inquiry was: "Thank you for contacting PayPal. PayPal do not [sic] provide any type of financial statement." Perusal of their statements filed with the SEC in preparation for their public offering suggested why they would not disclose them on request. Common equity was a negative \$186 million as of September 30, 2001. While this was offset by preferred stock, it would likely prove disconcerting to users. On the other hand, this unease might not have a significant impact currently since the average user's account is under \$20. However, for consumers and merchants to carry balances to facilitate larger transactions would seem to require greater transparency and confidence by users.

CONCLUSION

A key element in determining the effect on monetary policy is who will issue electronic money. If domestic banks, it can be measured and regulated easily by the

banking authorities. If provided by domestic non-bank issuers, it can be at least measured as part of the money supply. Thus, the growth of electronic money would indeed have little impact on monetary policy. Electronic money supplied by issuers outside its jurisdiction can circulate in a central bank's realm. As online systems increase in importance, this is likely to be a growing proportion of the effective money supply. This will affect both the measurement of the money supply as a monetary policy indicator and the effectiveness of monetary policy instruments.

Fortunately for the central banks, the shift to electronic money appears to be a slow process. This gives them ample time to develop ways to meet the challenge to monetary policy it poses.

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