ELECTRONIC MONEY, ITS IMPLICATIONS FOR CENTRAL BANKS AND MONETARY POLICY, AND THE CASE IN TURKEY

Dr. Mehmet GÜNAL

Ankara, September 2000

This paper was prepared to be presented at V. International Economics Conference, organized by Economic Research Center, Middle East Technical University to be held in Ankara/Turkey on September 11-15, 2000.
CONTENTS

I - INTRODUCTION

II – ELECTRONIC MONEY: DEVELOPMENT, DEFINITION AND APPLICATION

2.1 From Commodity Money to E-money
   2.1.1 Definition of Money
   2.1.2 Development of Money

2.2 Electronic Money and Banking
   2.2.1 Electronic Money Products
      2.2.1.1 Stored-value Cards
      2.2.1.2 Smart Cards
      2.2.1.3 Digital Cash
      2.2.1.4 Examples and Tests of Electronic Money Products
   2.2.2 Electronic Banking Services
      2.2.2.1 ATMs and POS
      2.2.2.2 Direct Payments
      2.2.2.3 Home Banking (or Internet Banking)
   2.2.3 Electronic Checks

III – IMPLICATIONS OF E-MONEY FOR CENTRAL BANKS AND MONETARY POLICY

3.1 Regulatory and Supervisory Implications
   3.1.1 Proper Role (finding right balance)
   3.1.2 Stability of Financial and Monetary System

3.2 Influence of E-money on Income Velocity of Money
3.3 Influence on Taxation and Seniorage Revenue
3.4 Risks Related to E-money and Measures to be Taken
3.5 Consumer Issues: Confidence, Privacy, Security

IV – ELECTRONIC MONEY IN TURKEY

4.1 Use of E-money in Turkey
4.2 The EU Perspective and BIS Efforts
4.3 Influence of E-money on Monetary Policy
4.4 Possible Loss of Seniorage Revenue
4.5 The Role of Government: The Central Bank and the Board of Banking Regulation and Supervision

4.6 The Future of E-money in Turkey: E-money Task Force

4.7 Legal Status and Need for a Law Proposal
ELECTRONIC MONEY, ITS IMPLICATIONS FOR CENTRAL BANKS AND MONETARY POLICY, AND THE CASE IN TURKEY

Dr. Mehmet GÜNAL

I – INTRODUCTION

In the last two-three decades, innovations in information technology and in financial markets have changed the way economies and financial systems function and the way businesses work. There have been several new and innovative products which have led to developments in electronic commerce and electronic banking. As a result of these developments, we have faced with a new kind of payment instrument, namely electronic money or e-money.

Development of e-money has implications for both national and international financial and monetary systems as well as economies as a whole. Even though issues on e-money have not yet been discussed in Turkey, it has been widely discussed in international circles. Within this context, the U.S. Department of Treasury held a conference, in September 1996 on “Toward Electronic Money and Banking: The Role of Government.” On the other hand, the issue of electronic money and its implications was discussed by Bank of International Settlements’ (BIS) member central banks at a meeting in Basle in 1996 and then BIS published a report on the Security for Electronic Money. In 1998, the European Commission, which has already published some Communications on e-money, prepared a proposal for a Directive on “the taking up, the pursuit and the prudential supervision of the business of electronic money institutions.” Later in 1999, the Economic and Social Committee has adapted a positive opinion on the proposal.

E-money, which is still at a relatively early stage of development, has potential to challenge the predominant role of cash for making small-value payments and could make retail transaction easier and cheaper for consumers and merchants. On the other hand, they also raise a number of policy issues for central banks because of the possible
implications for seniorage revenues and monetary policy and because of central banks’
general interest in payment systems.

These challenges and policy issues are the reason for some countries to discuss
and even test use of some kind of electronic money. Despite the fact that electronic
payment system in Turkey is a highly developed and modern one, the use of e-money and
its implications have not come to the agenda of policy makers, the Central Bank and the
regulatory bodies.

In this context, the aim of this paper is to attract attention of related people to the
challenges and policy issues raised by the use of electronic money, and to suggest
solutions for the issues. The paper is organized as follows. In section two, development,
definition and application of electronic money are examined. Section three discusses the
implications of e-money for central banks and monetary policy as well as risk and
consumer issues. In the fourth section, the Turkish case is analyzed and suggestions are
made. The paper concludes with a general evaluation and suggestions on future works in
Turkey.

II – ELECTRONIC MONEY: DEVELOPMENT, DEFINITION AND
APPLICATION

2.1 From Commodity Money to E-money

Money has evolved over the time from commodity money which was first used in
a Greek City-State, Lydia, into its modern form, namely e-money. Now we will review
the development process of money.

2.1.1 Definition of Money

The fundamental purpose of money in an economy is to facilitate the exchange of
goods and services, that is, to lessen the time and effort required to carry on trade. We

* The Central Bank of the Republic of Turkey; and Bilkent University, Department of Banking and
Finance, (part-time Instructor).
define money with its functions. In this sense, money is a medium of exchange, unit of account and store of value. Although we define money for the simplicity with its functions, it is not possible to give a clear-cut definition of money. However, I can give you a poetic definition of money, which was given by Kennet Boulding and which I found very interesting.¹

“We must have a good definition of Money
For if we do not, then what have we got,
But a Quantity Theory of no-one-knows-what,
And this would be almost too true to be funny,
Now, Banks secrete something, as bees secrete honey;
(It sticks to their fingers some, even when hot!)
But what things are liquid and what things are not,
Rests on whether the climate of business is sunny.
For both Stores of Value and Means of Exchange
Include among Assets, a very wide range,
So your definition’s no better than mine.
Still, with credit-card-clever computers, it’s clear
That money as such will one day disappear;
Then, what isn’t there we won’t have to define.”

This poem summarizes very strikingly the question of defining money.

2.1.2 Development of Money

Through the centuries, the objects used as money and the payment mechanisms have evolved considerably. We can identify four main forms of money: (1) commodity money, (2) convertible paper money, (3) fiat money, and (4) deposit money (or credit money).²

Commodity money is a physical commodity that is valued in its own right and also used as means of payment. The most common commodity monies have been coins made from metals such as gold, silver and copper. The first example of coins were made in Lydia, a Greek city-state, at the beginning of seventh century.

¹ See, Kennet Boulding, “A Shakespearean Sonnet, as written by Swinburne and W. S. Gilbert,” Journal of Money, Credit and Banking, August 1969, p.555. (This poem has been quoted from Goldfeld and Chandler (1986), p.39).
² For a detailed information on forms of money, see Parkin et al. (1997), pp.770-772.
Convertible paper money is a paper claim to a commodity circulating as a means of payment. The first known example of convertible paper money occurred in China during the Ming dynasty (1368-1399 AD). It was also used throughout Europe in the Middle Ages.

Fiat money is an intrinsically worthless commodity that serves the functions of money. Here, the term fiat means “by order of the authority.” That is, the value of fiat money comes from power of governments. The notes and coins, which are widely used in the world are examples of fiat money.

Deposit money is a new form of money. It consists of deposits at banks and other financial institutions. This kind of money is an accounting entry in an electronic database of the banks.

Evolution of money continues with electronic money. Electronic money includes e-money products and electronic banking services which will be examined below.

2.2 Electronic Money and Banking

In parallel to developments in electronic payments, new electronic products are being designed to challenge the use of currency and checks in consumer transactions, as well as new payment systems allowing payments or banking instructions to be sent over the Internet.

However, before getting into details, we should make the distinction between wholesale and retail payment systems. In many countries, including Turkey, wholesale payment systems have been electronic for many years. Electronic payments made by electronic funds transfer (EFT) systems increase rapidly. Although EFT systems have been used for wholesale payments for decades in the world and since 1992 in Turkey, in recent years they have been used also for retail payments. Within this context, EFT systems range from ATM’s to virtual banking on the Internet. When we talk about electronic money, we mean not only smart cards or stored value cards but also electronic banking services. Now we will look at different types of EFT systems and then examine some examples of electronic money. Although, it is not classified so in general, I will divide the EFT systems into two: electronic banking and electronic money products.
2.2.1 Electronic Money Products

Electronic money refers to the new ways of storing and transferring value arising out of the advances in microprocessor technology and the emergence of the Internet. The term electronic money is often used to refer to a wide variety of proposed retail payment mechanisms including electronic banking services. However, in this sub-section we will examine electronic money products, since electronic banking services will be analyzed in the next sub-section.

2.2.1.1 Stored-value Cards

Two electronic payment methods that are becoming increasingly popular are stored-value and smart cards. Stored-value cards provide a convenient substitute for cash and checks. The cards contain a magnetic strip that records a dollar balance. The amount is either predetermined or established by the consumer when the card is purchased. The dollar value of each transaction is deducted until the balance reaches zero and the card is discarded.

Most of these cards are referred to as “closed-system” cards. That means the cards can be used only for certain transactions in specific locations. Public transit systems in many large cities use these cards, as do some universities. Consumers can purchase stored-value cards in many locations for use at public telephones. A type of stored-value card is even used on many toll roads and highways to allow cars to quickly pass through toll stations.

2.2.1.2 Smart Cards

Smart cards are similar to stored-value cards, except that they have a computer chip instead of a magnetic strip. The computer chip creates a “rechargeable” card that is more secure and flexible than a stored-value card. The monetary balance is stored on the card's microchip and is accessed through a special reader, which often requires use of a

---

PIN number. When the balance is at zero, a smart card can be “reloaded” with funds by using an ATM, or even a home computer fitted with a special access device. Another feature of a smart card is its ability to carry additional information about the owner, such as medical and financial data or a “voice-print” for security purposes.

A variation of the smart card is the electronic purse. The purse provides more flexibility because it is an “open-system” card. That means that the card has multiple uses in many different locations. It can be used as a credit card, debit card or a stored-value card, depending upon the owner's preference.

Smart cards are beginning to gain a foothold, although there is room for significant growth. Smart cards are being used in a number of ways. A number of government agencies are using them because of their increased flexibility. The ability to provide background on the card owner makes them helpful on military posts.4

2.2.1.3 Digital Cash

Digital cash is digital value that is withdrawn from an account at a financial institution, and stored on an internal hardware device installed in a PC. With a click of the mouse, digital cash is sent over the Internet guaranteeing a secure party-to-party transaction to its destination. Digital cash is just like real money, only digital.

Digital cash is a secure transaction that can be used to make payments to purchase goods and services over the Internet. A secure exchange is made between a customer and a vendor without the need of an intermediary. The real time payment coordinated with real time delivery of electronic merchandise provides digitally signed transaction receipts and ensures delivery of goods. Transactions made with digital cash are easier, faster, cheaper, and more secure than credit cards.5

2.2.1.4 Examples and Tests of Electronic Money Products

eCash: eCash is anonymous digital money whose validity checked online by the

---

corresponding financial institution. eCash is developed by DigiCash and is offered by Mark Twain Bank, St. Louis since 1995. Deutsche Bank AG, Frankfurt offers eCash as a pilot project to its customers since October 1997. In the eCash model, the customer withdraws digital money from his/her eCash account using the so-called blinding method and stores it on the hard disk. The blinding method works as follows. The client encodes a serial number and sends it to the financial institution. The financial institution certifies the coin and transfers it back to the customer. The customer then decodes the serial number. Hence, the serial number is not known to the financial institution, which guarantees anonymity.

Security of eCash is achieved by using asymmetric cryptographic algorithm. Account access may be protected additionally by using personal passwords. The storage of a coin’s serial number does prevent double spending.\(^6\)

Because transactions are required online verification, hence both parties need to have account with the same institution and because the system is software based, use of eCash is limited.

**Millicent:** It is a product, developed by Digital Equipment Corporation and based on a scrip model. Unlike a traditional scrip model in which each merchant sells scrip to each customer, Millicent relies on a scrip broker. The customer buys a broker scrip with a defined value by using his credit card or by debiting a suitable bank or broker account. Such a scrip is like a telephone card. When the customer makes purchases, he exchanges parts of the scrip into a dealer’s scrip. The scrip is then sent to the dealer. The dealer collects all scrips and exchange them into real money. Stewart (1997) states that Millicent sacrifices security to make low-value transactions cost effective. According to him, Millicent was developed as a “lightweight” payment scheme with “lightweight” security for “lightweight” transactions.\(^7\)

**CyberCoin:** CyberCoin is the product of CyberCash and it was developed in October 1996. It relies on a notational system rather than a bearer certificate model. The consumer prepays for CyberCoin, as with any other digital cash scheme. A difference

---


between CyberCoin and other models is that value is not actually transferred to the customers PC, chip card or in this case the CyberCash Wallet. Funds are held in escrow in a proxy account set aside for that consumer at CyberCash’s Bank in Virginia. The consumer need not have an account at that bank. When the consumer makes a transaction with a merchant, CyberCoins are transferred from the consumer’s CyberCash Wallet to the merchant’s CashRegister, using CyberCash as the central processor for the transaction. CyberCash simply keeps track of which consumer is paying which merchant and in what amount.

The system is a book entry transfer system. Neither consumers nor merchants can effectively counterfeit CyberCoins, because the system does not rely on bearer certificates and no one can introduce value into the system. Briefly, CyberCash knows exactly how much CyberCoin has been bought or transferred, and it controls the funds. The greatest risk to the consumer for fraud is that someone gets access to his/her PC and makes CyberCoin purchases. However, the greatest downfall of the CyberCoin model is not its security, but its lack of application to physical world transactions.

**Mondex:** Mondex, launched by a venture of two British banks in July 1995, was a test of stored value cards piloted in Swindon, England.\(^8\) Later on, MasterCard became a majority owner of Mondex. Different from other examples, Mondex was born off-line and is migrating toward the Internet. It is entirely chip card-based and is unique in that it can accommodate card-to-card transfers. Mondex is similar to eCash, because it uses bearer certificates and funds are stored remotely on the user’s actual card. However, unlike eCash, Mondex funds can be transferred from one card to another infinitely without requiring central clearing or verification by a bank or processor. Due to this characteristics, among all digital cash systems, Mondex is the closest one to real cash. The security of Mondex is achieved by the hardware of the card and the value transfer process. In mondex’s system, funds can not go anywhere except another Mondex card and each card is certified by a Mondex digital signature.\(^9\) Stewart (1997) states that, despite the fact that it earns no float, Mondex is the best of the digital cash schemes in terms of long-term viability.

---


**VisaCash:** VisaCash is a chip card-based and bearer certificate product of Visa. Contrary to Mondex, in VisaCash system, the issuing financial institution earns float income. VisaCash was the largest experiment with stored value cards conducted at the 1996 Olympics in Atlanta, Georgia. About 2 million stored value cards were made available in denominations of 10, 20, 50, and 100 dollars. It was reported that 198.000 transactions were made with VisaCash cards in July 1996. VisaCash lacks some of Mondex’s versatility, while it has advantages from a financial perspective. In contrast to Mondex, consumers can transfer money from card to card indefinitely with VisaCash. Consequently, VisaCash is less flexible than Mondex.

**NetCash:** It is a method developed at the University of Southern California, which uses existing accounting systems and procedures in financial institutions, and thus reducing initial investment costs. In contrast to eCash, NetCash is based on a decentralized system consisting of independent distributed currency servers, which are locations to exchange anonymous into non-anonymous money. In NetCash system, clearing is done by the currency server, the integrity of which must be certified. On the NetCash coins, the information on the face value, serial number, address of the issuing server and the expiry date is stored. Security of NetCash is achieved by means of a hybrid cryptographic algorithm.

### 2.2.2 Electronic Banking Services

The level of electronic payments and electronic banking has grown considerably during the 1990s. We will examine some of these electronic banking services such as ATMs and POS terminals, direct depositing and home or Internet banking.

#### 2.2.2.1 ATMs and POS

The most common form of EFT technology is the ATM, which enables us to

---

10 The numbers have been taken from *Payments, Clearance, and Settlement: A Guide to the Systems, Risks, and Issues*, p.76.
12 For further information on working of NetCash system, please see, Seitz and Stickel (1998), p.9.
make deposits, obtain cash, and transfer funds between accounts. Many ATMs also can be used to pay bills and loans and complete other transactions. ATMs are activated by inserting a special access card into a machine. A consumer must enter a personal identification number (PIN) before any account or transaction information appears on the screen. When the transaction is completed, the consumer receives a receipt showing the date, the dollar amount and the type of transaction.

A variation of this system is point-of-sale (POS). With POS, consumers use an access card (sometimes an ATM card) or debit card to transfer funds immediately from their account to a merchant's account. For this reason, a POS transaction is different from a credit card transaction in which payment is postponed. To use POS online, a consumer simply passes a debit card through the terminal to transfer the funds. It is usually also necessary to punch in the proper PIN. The consumer receives a printed receipt after the transaction is completed.

Some POS transactions are “offline.” With an offline transaction, the consumer does not usually have to enter a PIN number, and the sales charge is submitted by the retailer along with charge slips. The amount of the transaction is deducted by the consumer's bank when the sales slip is received and appears on the consumer's bank statement rather than as a charge on a credit card statement. Offline POS transactions may also require the customer's signature on a slip that resembles a charge slip.

During the 1990s, the number of POS outlets has increased dramatically to include such retail outlets as grocery stores, convenience stores, and even movie theaters. In fact, most places that take a major credit card will take a POS access card that carries the proper logo.

POS is a useful payment alternative because it allows an immediate transfer of funds between the buyer and seller. The seller does not have to worry about a bounced check. For the buyer, POS can be more convenient than writing a check, and is safer than carrying cash.

In the U.S., the federal government is planning to take increased advantage of ATM and POS technology through electronic benefits transfer (EBT) programs. These programs allow state and federal agencies to disburse benefits payments through an ATM, POS, or similar system. Among the most common EBT programs are food stamp
programs. However, other payments in the near future also may be distributed through variations of ATM or POS technology.

2.2.2.2 Direct Payments

Another form of electronic banking is direct deposit and preauthorized payments or electronic bill payment. Both are usually cleared through the Automated Clearing Houses (ACH) located at the Federal Reserve Banks and their branches. These payment methods are two sides of the same coin. Direct deposits are automated credits or increases to the consumer's account. Preauthorized bill payments are automated debits or reductions. Unlike ATM and POS transactions, no access card is needed.

Direct deposits are increasingly used by employers, government agencies and other organizations that make regular payments, such as wages and dividends, to individuals. According to 1996 figures from the National Automated Clearing House Association (NACHA), about 60 percent of U.S. households receive their wages via direct deposit.

The U.S. government is the largest single user of direct deposit. More than 95 percent of government workers use direct deposit. And many of the government's benefits are paid electronically. The Social Security Administration alone uses direct deposit to make payments to approximately five million recipients every month. The number of benefit payments made electronically will soon increase because of the Electronic Funds Transfer Act or “EFT’99”. This Act will help the federal government make most of its payments electronically.

It is easy to receive funds by direct deposit. A consumer first must authorize the deposit. The party making the payments, usually an employer, then creates an electronic message. This message specifies the amount of payment and identifies the financial institution and account to be credited. This data is transmitted to the ACH, which collects and sorts the information. The Clearing House then transmits the account and payment information to the consumer's bank. In turn, that institution credits the consumer's account.
In a preauthorized bill payment arrangement, a consumer authorizes a creditor to deduct funds for automatic payment of bills. The consumer first signs a form authorizing the payment. This form indicates when payments are to be made, the dollar amount, and the account from which the funds will be paid. This form is then sent to the creditor, who makes arrangements with the consumer's bank.

Prior to each payment, the firm will send a notification of payment to the consumer, usually a week or two before the payment is to be made. This notification is itemized just like a regular bill. The consumer can check the charges and contact the creditor if there is an error. If the consumer wishes, he or she can stop the electronic payment by notifying the creditor and the bank.

Electronic bill payment is most commonly used for recurring payments such as mortgage or rent, utility bills, loans, and insurance premiums. Electronic bill payment has not been as popular as direct deposit. A Federal Reserve study found that approximately 37 percent of households were using electronic bill payments in 1998. Only 13 percent of billers offered an electronic alternative for their customers. Nevertheless, electronic bill payment is growing in popularity. One study found that the number of such payments increased by 150 percent from 1996 to 1997.

The advantage of this method for businesses is its increased efficiency. Electronic transactions cost less to process because there are no paper checks to be transported, handled, or reconciled. The efficiency of electronics can reduce costs for both businesses and the banks that process the transaction. For the consumer, it means faster processing leading to quick and certain payments and receipts. Another advantage for the consumer is not having to worry about paying a bill “too early” or sending the payment “too late.”

### 2.2.2.3 Home Banking (or Internet Banking)

Home banking, which encompasses several EFT services, is being offered by more financial institutions, often on the Internet. Banks are using various software packages that help consumers make financial transactions. These home banking systems allow customers to debit or credit their accounts, confirm account balances, or even apply

---

for a loan. Many of them will chart spending, develop personal financial statements and reconcile checking accounts. Consumers can access these services using a touch-tone phone or personal computer equipped with a modem.

The Internet is expected to be a major factor in home banking. The number of people using the Internet is expected to increase dramatically in the next few years, providing a large potential market for home banking. There are even “virtual banks” on the Internet that have no physical offices in the traditional sense. All services are provided through the Internet.\(^\text{14}\)

Not many people are using Internet banking thus far. I do not have any information about its use in Turkey and in the world. However, I have internet banking accounts at two different banks, and I do myself online many transactions such as payment of utility bills, EFT transactions, transfers between different accounts, buying and selling securities, repo transactions, etc. I believe that internet banking should gain in more popularity as consumers become familiar with the Internet.

### 2.2.3 Electronic Checks

The electronic check is an electronic payment instrument modeled on the paper check. E-mail based and format-independent e-check works as follows. A digital check is created on a PC or server and digitally signed by the maker. The e-check is then e-mailed directly to the payee via secure Internet e-mail, along with remittance data that is attached to the e-mail. The payee verifies the maker’s signature and endorses the e-check with his or her own digital signature. The remittance data is printed or uploaded into the payee’s accounts receivable system. The endorsed e-check is e-mailed to the bank for deposit. The e-checks are cleared and settled by electronically presenting them to the paying bank.

Financial Management Services of the U.S. Treasury has reported that, in June 1998, it kicked off its first electronic check payment by e-mail transmitting via the Internet a $32,000 check to GTE for work done for the Department of Defense and that it will continue to disburse payments via electronic check to approximately 50 government...

contractors. Recently there has been some updates to this project, and some others are underway.

III – IMPLICATIONS OF E-MONEY FOR CENTRAL BANKS AND MONETARY POLICY

Innovations in electronic payment systems and the development of e-money raise some interrelated policy issues of potential concern to central banks and other public agencies. These issues are supervision and oversight of payment systems, conduct of monetary policy, seniorage revenues, tax evasion, possible financial risks borne by issuers of e-money, consumer protection, competition, access to and standards of electronic payment system.

3.1 Regulatory and Supervisory Implications: Proper Role of Government

Electronic money is still in an early stage of development. However, the use of e-money products and services raises questions for policy-makers in such key areas as consumer protection, law enforcement tools and techniques, stability of financial system, monetary policy, loss of seniorage revenues, government payments, and international cooperation.

Although e-money offers a great opportunity for consumers, markets and the whole economy, realizing this opportunity will depend on both the private sector and the public sector taking appropriate actions that are necessary to provide public confidence and trust and the stability of financial system.

What is the proper role of government to play in the development and deployment of electronic money, or more generally, electronic payment systems? From interventionist point of view, without effective government regulation, there will not be sufficient public confidence in the security, effectiveness and fairness of the electronic payment system, which are very important features for development of the system.

---

However, from a liberal point of view, it can be argued that aggressive government regulation could chill voluntary private arrangements in support of electronic money and, by intervening prematurely, prevent the market from developing optimal solutions.

The solution to this complex question is to “find the right balance”\(^{16}\) with respect to the roles of the private sector, market forces and government. And this right balance can be found both by providing confidence and security with proper regulation and supervision, and, at the same time, by not impeding unduly development of electronic money with improper regulation. Because, as Alan Greenspan, the Governor of the Federal Reserve System, states, “if we wish to foster financial innovation, we must be careful not to impose rules that inhibit it.”\(^{17}\)

As a result, we can say that the proper role for government agencies such as the treasury, central bank, and other regulatory agencies is to find the right balance between providing a secure, stable and confident system and not impeding development of the system. To do this, all these agencies must be prepared in advance for future developments and possible regulations to be required and must cooperate with private sector.\(^{18}\)

### 3.2 Influence of E-money on Monetary Policy

Implications of e-money on monetary policy depends on whether the central bank targets on monetary aggregates. According to Gilbert (1996), if the central bank targets on interest rates rather than on monetary aggregates, information about the activities of new providers of electronic payment services. Thus, the implications of electronic money for the conduct of monetary policy become less important.\(^{19}\)

The development of certain types of electronic money centered on the mobilization of bank deposits has had a relatively minor effect on the central bank’s capacity to control the monetary aggregates. On the other hand, as a result of continuous

---

\(^{16}\) This is the own words of Robert Rubin, the U.S. Secretary of the Treasury. See “Remarks by Robert Rubin” at the Conference on Toward Electronic Money and Banking: The Role of Government, September 19-20, 1996, Washington, DC.

\(^{17}\) See Greenspan (1996).

\(^{18}\) For a detailed discussion on critics of regulators (“regulator’s dilemma”) and the U.S. case, see Solomon (1999), p.648-652.
financial innovation such as that witnessed in recent decades, most central banks have assigned progressively less importance to the strict short term monitoring of the monetary aggregates and, in this respect, the controllability thereof has moved to a lesser plane.\textsuperscript{20}

Another impact of e-money is to cause shifts in the velocity of money which might temporarily reduce the usefulness of the monetary aggregates, especially narrower ones, for countries that rely on them as targets or indicators. The effects of e-money on the implementation of monetary policy will depend upon whether its primary impact is on demand for bank reserves or on the central bank’s capacity to supply these reserves. The effect on demand would result from the substitution of e-money for reservable deposits or from a substantial reduction in banks’ demand for settlement balances. It is conceivable that a very extensive substitution could complicate the operating procedures used by central banks to set money market interest rates. However, since e-money is expected to substitute mostly for cash rather than deposits it is highly unlikely that operating techniques will need to be adjusted significantly.\textsuperscript{21}

This could give rise to uncertainty for some time on the part of the monetary authorities about the implications of the actual growth of the monetary aggregates. On the other hand, the introduction of the new electronic money instruments will not apparently have a relevant impact on the demand for cash or the demand for money in the short to medium run.

Changes in the ratio of cash to other bank liabilities may also affect the size of the money multiplier. Selgin (1996) claims that, financial innovations are the private market’s way of supplying new and improved alternatives to central bank issued payments media. Accordingly, the more such innovations succeed, the less he public has to rely on central banks as a direct sources of exchange media. With his own word, “the development of electronic money, and cash cards especially, means that the public need no longer be hostage tp the Fed. E-money amounts to a technological end-around play, circumventing long-standing restrictions on private bank notes.” And thus the money stock would be fully privatized, with the central banks serving only as a source of bank reserves.

\textsuperscript{20} For a further discussion on the control of monetary aggregates, see Alejano and Penalosa (1998), p.69.
In his case, Selgin continues, the emergence of e-money strengthens the case for a strict monetary base rule by, in effect, setting the stage for removing the currency ratio as a factor in the money multiplier. If we remember the formula for the multiplier, (which is \( m = \frac{1+c}{r+c} \), where the total money stock, \( M \), is equal to \( mB \), and \( B \) stands for the monetary base), \( B \) is the only thing that the central bank controls with any degree of precision. As a result, the multiplier would then be simply \( \frac{1}{r} \) –the reciprocal of the banking system reserve ratio. Therefore, the challenge of monetary control would be simplified: with one less variable to worry about one less reason to improvise.\(^{22}\)

Although the assertions of Selgin are the extreme ones, it supports his idea that financial innovations such as e-money may make managing the monetary policy easier, rather than more difficult.

Another implication of e-money for monetary policy, which is related to fractional banking, hence to the money multiplier, is discussed in Grigg (1996). In almost all of the existing Internet cash emulation systems, the digital dollar floating around the net is backed by a physical dollar held at a bank.\(^{23}\) In this case, a dollar placed into the Internet financial system will result in two dollars, one deposited back into the physical banking system as reserves and one electronic dollar. Whilst the former then becomes subject to fractional banking and increases the sum of dollars in the total system according to the money multiplier, the latter enjoys no such power, resulting in simply one dollar of value. As a consequence, Internet financial system does not engage in fractional banking and it results in an incremental addition to the size of the money supply. Therefore, there might be a small but manageable weakening of the monetary tool, although the size of weakening will depend also on the demand for electronic cash.\(^{24}\)

However, one should keep in mind that the argument of Grigg does not always hold. Because, new electronic money schemes, some of which were discussed in sub-section 2.2.1.4, tend to develop new electronic products not backed by physical currency.

\(^{22}\) See Selgin (1996).

\(^{23}\) eCash is the only unbacked notional currency launched by DigiCash in 1994. For a detailed information on eCash, see Section 2.2.1.4 above.
3.3 Influence on Seniorage Revenue

Seniorage revenue is the interest savings the government earns by issuing non-interest-bearing debt in the form of currency.\textsuperscript{25} Banknotes in circulation represent non-interest-bearing central bank liabilities. Therefore, a substitution of e-money for cash would lead to a accompanying decrease in central bank asset holdings and the interest earned on these assets that constitutes central bank seniorage revenue. If seniorage revenue is large to central bank operating costs, it could fall substantially before they became too small to cover the cost of central bank operations.\textsuperscript{26}

Within this context, Groeneveld and Visser (1997) calculated seniorage revenues and operating costs of the central banks of G-10 countries and stated that, in an extreme scenario, it is conceivable that the central banks’ revenues no longer suffice to cover its operational expenses. A central bank not capable of supporting itself becomes financially dependent on its only or major owner: the government. It may be argued that, at least in principle, a loss of financial independence makes central banks more vulnerable to political pressures to run a monetary policy that jeopardizes the achievement of price stability.\textsuperscript{27}

However, if the spread of e-money were extensive enough, the loss of seniorage could become more dependent on other sources of revenue. Moreover, even a moderate loss of seniorage could be of concern to some governments, particularly in countries with large deficits, such as Turkey.

Working of seniorage can be described as follows. Initially, seniorage revenues accrue to the central bank. Subsequently, these revenues are transferred to the national treasuries in the form of dividend payments to the government - its only or major shareholder.\textsuperscript{28}

\textsuperscript{24} See Grigg (1996), p.5-6. Grigg also tries to estimate the demand for electronic money by using the Baumol-Tobin Model, (Grigg, 1996, pp.8-12).
\textsuperscript{25} See Ely (1996).
\textsuperscript{26} Bank for International Settlements (1996) estimates the seniorage revenues and operational costs of central banks for G-10 countries and states that the former is large relative to the latter, (p.8).
\textsuperscript{27} See Bank for International Settlements (1996) and Groeneveld and Visser (1997).
3.4 Risks Related to E-money and Measures to be Taken

There are tow types of risks involved in e-money. First is systemic and operational risk and second is security risk. Systemic risk entails a serious liquidity shortfall, on the part of one or several participants, that cascades to threaten the stability of all or a large number of the system’s participants. Additionally, default risk caused by insolvency and illiquidity can be considered as systemic risk. To prevent these types of systemic risks, supervisory and regulatory bodies should take precautions and be prepared for timely reactions. On the other hand, operational risk concerns the possibility that breakdowns in the planning or execution of the payments, such as a breakdown in the operation of the central computer, expose the participants to unexpected liquidity shortfalls. This risk can be managed by cooperation of public bodies and private sector by taking precaution.

Electronic money suppliers view transmission of messages between consumers, merchants and central system devices in electronic money system as inherently insecure and open to observation, modification or transmission failure, regardless of whether or not the transmission is effected over an open network such as the Internet or by some other method. Therefore, e-money transactions are open to some security risks, even though all systems include measures to protect the integrity of messages during transmission.

Security risks related to e-money are fraud, counterfeiting, hacking, money laundering. The fraudulent attack may be accomplished by duplication of devices such as smart cards or value stored cards, alteration or duplication of data or software, alteration of messages, and repudiation of transactions.

Of course, electronic money systems have security features that are designed to safeguard the integrity, authenticity and confidentiality of critical data and processes, as well as to protect against losses due to fraudulent duplication or repudiation of transactions. These security measures can be grouped into three categories based on whether the measure is designed primarily to prevent, detect or contain threats. The objective of preventive measures is to ensure that attacks on components of the system

---

will be thwarted before a fraudulent transaction can be executed. Preventive measures are tamper-resistance of devices; cryptographic techniques providing the logical protection of electronic money systems by ensuring the confidentiality, authenticity, and integrity of devices, data and communications used in transactions; online authorization by PIN numbers; and other measures such as verifying expiring dates, numbers of transactions executed with the device and the maximum balance. Detection measures are those taken to alert the issuer or system operator to an occurrence of any fraud and to identify the source of the fraud. The measures taken for detection purpose are transaction traceability and monitoring, interaction with a central system, limits on transferability and statistical comparison analysis. The containment measures, which are intended to limit the extent of any fraud once it has been committed, include time and value limits on devices, registration of devices, hot lists and disabling of devices and system suspension.29

Although we categorized the security measures for electronic money products, there is no single measure or set of measure that can be said to be sufficient for a particular product. Therefore, international standards have been developed for particular aspects of electronic money products, such as the basic functionality of chip cards, certain cryptographic techniques and communication protocols. However, these standards have been themselves are not sufficient to ensure adequate security for a product as a whole. In addition, the development of standards lag behind technological advances, especially in areas of rapidly changing technology. It is the combination of measures, together with the rigour with which they are implemented, that will serve to reduce risk most effectively. Thus, it is more important to focus on the overall security risk management approach for a particular product, rather than on the use of individual measures. In addition, relatively low maximum balance limits on devices may represent one of the simplest yet most effective deterrents to fraudulent attacks.30

---

29 A very excellent discussion on security issues and measures can be found in Security of Electronic Money, pp.14-29.
30 For further information on appropriate measures see, Security of Electronic Money, pp.25-28.
3.5 Consumer Issues

In spite of the fact that electronic money provides greater efficiencies for businesses - such as lower costs, greater safety and security and more value-added services- and new choices for consumers, uncertainties on the part of consumers and merchants about the underlying technology could slow widespread use and acceptance of electronic money systems. Some of these uncertainties focus on how well the technology secures personal transactions information over the Internet from theft and related forms of abuse such as false or non-authentic commitments. Other uncertainties arise from concerns about whether or not competing forms of electronic-money for use outside the Internet will require idiosyncratic computer hardware and software.31

3.5.1 Security

It is widely accepted that the use of electronic payments on the Internet will depend on the development of widely available systems that guarantee the security of credit card numbers and the various forms of electronic money. There are numerous mathematical formulas to code or encrypt such numbers, as well as electronic cash, in a way that seriously complicates the task of stealing them or interfering with the intended use. Experts tend to evaluate methods of encryption in terms of the difficulty knowledgeable parties would face in decoding or decrypting the information.

3.5.2 Authentication

If consumers are to use electronic money over the Internet they must have confidence in the issuers of the electronic money and the merchants who accept it. Consumers may demand that a trusted third party certify or authenticate the legitimacy of both those parties. Confidence is particularly important for the development of Internet

---

31 For a detailed information on consumer issues, see the U.S. Department of the Treasury (1996) and Ludwig (1996).
commerce with its virtual shopkeepers that consumers cannot see and evaluate in the traditional way.

Confidence is a two-way street. Merchants will want assurances that the consumers from whom they receive orders for goods and services are the consumers who really want them and that verified consumers will not refuse to meet their responsibilities as defined by law.

A trustworthy and reliable system of authentication can provide comfort to merchants on both fronts. Merchants could require customers to sign orders with encrypted digital signatures that can be authenticated by trusted and reliable third parties. Such authentication would unambiguously identify the consumer and provide proof that the consumer requested the goods or service.

### 3.5.3 Interoperability

Most observers agree that electronic money will not find widespread use until technical experts solve the problem of interoperability. In the context of electronic money, the term interoperability captures the extent to which debit cards and stored value cards from different issuers use a common set of standards. These standards govern such issues as the size of the cards (length, thickness, and width) the location and size of the magnetic strip or computer chip, and the coding technology manufacturers use to store information on the magnetic strip or computer chip. They also cover other matters such as the design and workings of devices that “read” the cards. The greater the acceptance of common standards, the greater the degree of interoperability.

In sum, the greater the number of merchants accepting electronic money the greater the inclination among consumers to use it; the greater the number of consumers using electronic money, the greater the number of merchants willing to accept. Interoperability made possible the success of credit cards and ATMs.

### 3.5.4 Privacy

As noted previously, electronic commerce and finance creates new opportunities
for unauthorized access to and manipulation of private information. Although the European Parliament has moved to address some of those issues, few federal laws address them. The extension of electronic debit and electronic cash systems to the Internet presents additional risks. Data traveling through the open network of the Internet is more susceptible to interception and can be copied or modified. The extent of the risk to privacy will depend on the design of the systems and the types of information traveling over the Internet.

Protecting individual privacy in the digital world will be at least as complex as it is in the analog world. Finding the right balance between governmental needs for information to combat crime and individual needs for anonymity will be challenging. That is not the only hurdle. Consumer data derived from financial transactions covers a broad spectrum of information, and consumers may be more concerned about the confidentiality of some types of information than others. For example, consumers may object strongly to the public release of data describing their income and net worth, but allow some information describing their spending patterns to be used by direct marketers.

3.5.5 Access

Judging the impact of electronic money on groups of consumers, especially the poor, is difficult. On the one hand, the application of advanced technology to finance and commerce could exacerbate current inequities in the access to financial services. The poor are much less able than others to afford computers or to have access to educational opportunities facilitating computer use. As the cost of computers and associated technologies continues to fall, the availability of financial services from traditional outlets such as branches, and perhaps even ATMs, will decline. That trend could also disadvantage those in rural areas where the infrastructure necessary for electronic money and banking is not now in place.
IV – ELECTRONIC MONEY IN TURKEY

4.1 Electronic Payment System and the Use of E-money in Turkey

As we mentioned in section 2.2 electronic fund transfer systems have been used for wholesale payments for a few decades, and in recent years they have been also used for retail payments. Within this context, EFT system, which has been in operation since 1992, has happened to be used also for retail payments in Turkey. This system is Real Time Gross Settlement System and widely used by Turkish banking sector for many purposes. The number and money volume of transactions realized through the EFT system have increased considerably since 1992, reaching approximately to an annual volume of 2,000 billion dollar in 1998 and 1,700 billion dollar in 1999 from its level of just 267 billion dollar. Average daily transaction volume in 1999 was roughly 5.5 billion dollar.

In addition to this, a new generation EFT system, EFT II, was introduced in 2000. This new system is a product of a long time and successful work by many related people. The EFT II is developed by taking changes in banking and payment systems as well as possible future developments into account.\(^{32}\)

The Central Bank of Turkey is very much interested in the developments taking place in cross-border payments systems as well as in domestic payments system. Within this framework, as Turkey has the majority of her international banking transactions with Europe, the Central Banks follows very closely the developments in the TARGET system, developed as part of the EMU process and it has already applied to European Central Bank for the connection to the system.

Although the payments system is ready for electronic payments and is used very extensively for large volume fund transfers, it is not true for low volume retail transactions. Electronic fund transfer system is used for electronic banking purposes in Turkey. Within this context, home banking or electronic banking is developing very rapidly. Many banks provide electronic banking services, including electronic fund

\(^{32}\) For further information on electronic payment system in Turkey, see Türkiye Cumhuriyet Merkez Bankası (1996).
transfer, transfer between accounts, bill payments, securities trading, etc. To improve the quality and security most banks invest in the Internet and communication technologies.

Despite this favorable environment and forward-looking developments for electronic banking, electronic money is neither used in any sense or any form, nor is discussed among market participants and/or government institutions such as the Treasury and the Central Bank (now the Board of Banking Regulation and Supervision should be included). Briefly, Turkey is behind the developments in electronic money products such as smart cards and stored value cards and in electronic check technology, even though it is ready for electronic banking services and products.

4.2 The EU Perspective and BIS Efforts

The issue of electronic money and its implications was discussed by Bank of International Settlements’ (BIS) member central banks at a meeting in Basle in 1996 and then BIS published a report on the Security of Electronic Money. In 1998, the European Commission, which has already published some Communications on e-money, prepared a proposal for a Directive on “the taking up, the pursuit and the prudential supervision of the business of electronic money institutions.” Later in 1999, the Economic and Social Committee has adapted a positive opinion on the proposal.

On the other hand, the efforts have been put for creating international standards for electronic money products. If one considers that, with the decision held at Helsinki Summit by EU, Turkey was accepted a candidate for a full membership within the EU, it is very clear that Turkey should prepare necessary regulations for e-money and cooperate with European Monetary Institute and the European Central Bank on this subject.

4.3 Influence of E-money on Monetary Policy

As we mentioned in previous subsection, electronic money products are not yet used in Turkey. Electronic banking services depend on a deposit account with a bank. Consequently, in spite of the fact that it makes difficult to control the reserves of banking sector due to lack of information, the relative size of these transactions is very small for
now. Although the electronic money products such as smart cards, stored value cards and network money will have possible influence on conduct of monetary policy, this will take at least five to ten years.

On the other hand, in Turkey, the Central Bank has an accommodative role in monetary policy, since, as the lender of last resort, it accommodates reserves required by banking sector and the Treasury borrowing. It is argued that the money supply is endogenous in Turkey.\(^{33}\) If this is the case, amount of the money supply, hence monetary policy will become less important. Therefore, the issues to be taken into account is who will issue the e-money, whether the central bank will require reserves and liquidity for the issuing banks of e-money, whether it will include the e-money into the definition of monetary aggregates, etc.

### 4.4 Possible Loss of Seniorage Revenue

It is discussed in section 3.3 that, if the spread of e-money were extensive enough, the loss of seniorage could become more dependent on other sources of revenue. Moreover, even a moderate loss of seniorage could be of concern to some governments, particularly in countries with large deficits, such as Turkey. As known, Turkey has large public deficits despite the decrease in public sector borrowing requirement thanks to the stability program implemented. Seniorage revenue is calculated by multiplying base money (or currency in circulation) by the interest rate on government bond.\(^{34}\) When we consider that the interest rate on government paper is still high despite the recent decrease, loss of seniorage revenue may reach to a considerable amount when e-money becomes common and is widely used.

Even though the use of e-money is in the early stage of development and it is not a problem for Turkey now, the Central Bank should follow the developments carefully and be prepared to take timely measures to get rid of negative effects of possible losses of seniorage revenue.

---

\(^{33}\) For the endogeneity of money and the Turkish case, see Günal (1999).

\(^{34}\) See Groeneveld and Visser (1997) for the calculation of seniorage revenues.
4.5 The Role of Government: The Central Bank and the Board of Banking Regulation and Supervision

Electronic money products develop very quickly thanks to technological and financial innovations. Electronic commerce is transforming our behaviors of consumption and our daily life as a whole. Electronic money will also dominate in the next five or ten years. This is an inevitable fact. Therefore, there is a room for the proper role of the government institutions.

In Turkey, the Central Bank is responsible for the operation and conduct of monetary policy as the adviser and fiscal agent of the Treasury. After the establishment of the Board of Banking Supervision and Regulation at the end of last year, some of the duties and responsibilities of the Central Bank and the Treasury were transferred into the Board including the Savings Deposit Insurance Fund. Within this context, the Central Bank, the Board and the Treasury should make preparations for necessary regulation and other measures. The issues to be regulated by these regulatory bodies are standards for electronic money, conditions for issuing banks or other institutions, system integrity and stability, etc.

As we move into the information age of the twenty-first century, Turkey should take its place in electronic money and banking products, and be able to compete internationally. To achieve this, the Central Bank, the Board and the Treasury should cooperate with each other, with private sector and with international institutions.

4.6 The Future of E-money in Turkey: E-money Task Force

The banking sector in Turkey follows technological developments very closely and adapt them as soon as possible. The sector adapted electronic payment technologies very rapidly and become very competitive even though the size of the banks is very small compared to international banks. The banks also invested in Internet banking and communication technologies such as GSM and WAP. On the other hand, the use of Internet is spreading amazingly. Taking into consideration of the developments in electronic payment technology and in the use of Internet, it can be argued that, in the
coming ten years, electronic money will become a fact in Turkey. Therefore, the Central Bank, the Board and the Treasury should get together and constitute a “Electronic Money Task Force” to study all possible aspects of electronic money including implications for monetary policy, consumer issues, security issues and standards.

4.7 Legal Status and Need for a Law Proposal

Although there are some regulations and some proposals for regulations in international sense, there is no such efforts in Turkey. The European Union and the United States have already regulated issues of electronic money to some extent. We have mentioned the efforts by BIS and the EU previously.

In addition, UNCITRAL, the United nations Commission of International Trade Law has prepared a Model Law for Electronic Trade, in order to guide the countries to prepare laws and hence to achieve uniform application in all countries. UNCITRAL works also on a proposal for Model Law for Digital Signature.35

In spite of all these developments in electronic money technology and of efforts to prepare necessary regulation proposals in an international context, there is nothing done yet in Turkey.

Since electronic money will be a fact in a near future and since it raises many questions about consumer issues, security issues, monetary policy issues, regulatory and supervisory issues, it should be regulated somehow. To prepare a national strategy for electronic money and a proposal for a Law on Electronic Commerce, Electronic Money and Digital Signature, “Electronic Money Task Force” suggested above should cooperate with Internet Supreme Board and other related people.

REFERENCES


Günver, Osman Nuri, “Elektronik Ticaretin Hukuksal Yapısı” (Legal Structure of Electronic Commerce), Lira, Nisan 2000, Sayı: 14, s.27-29.


