Government Control of Money in the Digital World

Submitted by:
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Government Control of Money in the Digital World

by Ken-Ying Tseng

Introduction

Advances in technological innovation have led to the recent upsurge in payment tools. After the victory of Visa’s smart card trial during the Atlanta Olympics, 1996¹, Manhattan, New York, is currently testing the potential of stored-value products for the United States². In the meantime, on the other side of the Atlantic Ocean, smart cards are now a common payment tool in Europe, and “e-cash” has already been deemed a threat to the success of the European Union’s attempt to establish a single European currency by January 1, 1999³. In cyberspace, messages transmitted from server to server now include “cyber-value” that could be converted into “hard currency”. People with adventurous spirits and faith in the current encryption and security technology can enjoy their new economic life in cyberspace.

Numerous issues regarding the economic and social impact of the new electronic payments instruments, and their legal implications have been raised by the various players, who include, consumers and regulatory authorities. Governments are busy responding to requests from those who wish to start their cybermoney business, and are evaluating the development of the electronic payments industry, and its possible consequences. Of the many concerns raised by these new electronic payments products, the

government's control of money in this brave new digital world poses the greatest challenge, and would be the most instrumental in provoking a governmental response.

Governments regulate their financial systems heavily. Not only do they set up numerous policy goals to encourage economic growth, but they also try to control the circulation of money within the economy. In order to maintain the stability of the financial system, the government issues money as legal tender to provide a standard medium for the exchange of value, and tries to control its supply, circulation, and usage. The development of digital technology and the emergence of cyberspace provide people with more choices with regard to the form of "money" they can use. This endangers government control over money supply, and raises the very important question as to the manner in which, and to what extent the government should change its monetary policy and regulations.

Part I of this paper discusses different models of new electronic payments instruments. The author emphasises the distinction between systems that will only facilitate consumer access to bank accounts or their use of credit cards in cyberspace, and systems that are independent from accounts and could trigger money creation. Part II of the paper addresses the challenges posed to government control of money by the emergence of electronic money, referred to in the paper as medium replacement products, and analyses possible future developments. In Part III, before suggesting a strategy for governments to shape their monetary systems in the digital world, the author reviews the justifications for governmental control of digital money, and asserts that the government's responsibility to establish a new payment system, with the least possible disruption to the existing financial system, is justification enough. Taking into consideration the uncertainty of technological development, the author examines the feasibility of government monopoly on the issuance of electronic money, and concludes that continued promotion of private competition through the regulation of players, as opposed to architecture, is the best strategy for governments to adopt at the current stage in the development of new electronic payments systems.

In this paper, unless otherwise indicated, the author uses "government" in a general sense, and does not refer to a specific government. When predicting the future development of electronic payments systems and proposing governmental action, the author will focus on the situation in the United States, and compare it to countries with different levels of economic development, regulatory systems, and ideologies.
I. Models of Emerging Electronic Payments Products

A. Electronic Payments Systems Overview

1. Existing Traditional Electronic Payments Systems

Electronic payments systems are not a new development; for example, wire transfers have been utilised by banks all over the world to move funds from account to account or country to country for decades. Generally, there are settlement systems for both wholesale and retail payments, with the latter being mainly card-based. These payment systems act as the underlying settlement or payments system for the new electronic payments products that this paper will discuss in the later sections.

Wholesale electronic payment systems deal with large value transactions among banks or financial institutions. They have been used for both domestic and cross-border transactions. In the United States, the Clearing House Interbank Payments System ("CHIPS") and Fedwire act as the intermediary clearing and settlement system between banks for wholesale payments. CHIPS, owned and operated by the New York Clearing House Association, functions as a communications and net settlement system for payments by and to two classes of participant banks located in New York City\(^4\). Fedwire is a communication and settlement system owned by the twelve United States Federal Reserve Banks. It facilitates funds transfers among banks in the U.S. because a large number of United States banks maintain Federal Reserve accounts. Fedwire can also be used for overseas transactions\(^5\). For international wholesale transactions, the Society for World-wide Interbank Financial Telecommunication ("SWIFT"), a mutually-owned organisation founded in 1973, has been playing the major role of a settlement system for cross-border funds transfer. SWIFT is a standard message transmission system. Funds transfer instructions are sent over the SWIFT network, but the funds are transferred through local clearing systems\(^6\).

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\(^5\) Id. at 837.

In the case of retail electronic payment systems, the "Automated Clearing House (ACH)" has been operating as an electronic alternative for paper checks in the United States since 1972. It is an interbank payments system used primarily to handle small-dollar funds transfers for consumers, businesses and the government. ACH saves time and costs for processing paper checks, and has been a growing industry in the U.S.

Credit cards and debit cards are the most typical examples of electronic retail payments systems. These products are used as cash substitutes, and not only eliminate the risks associated with carrying cash, but also reduce the inconvenience of carrying "coins" or "change". Most of the on-line stores accept credit cards as payments, and consumers can choose to transmit their credit card information over the Internet or over the phone.

In addition, there are some single purpose card products which have been part of our daily life for some time. The common examples are fare cards used in mass transportation systems, prepaid phone card, and photocopy cards used in the library.

2. New Products Featuring Small-Value Retail Payments

New electronic payment instruments relate to the retail payments system and aim at providing more efficient payment methods for small-dollar payments. With these products, consumers can avoid the inconvenience of bringing coins or small bills for daily and repetitive transactions. Some of them facilitate the payments in cyberspace by enhancing the security of data transmission over the Internet. "Low cost" is one of the reasons why these new electronic payments products are able to compete with those "developed" traditional electronic retail payments products such as credit cards and debit cards. Some of the new

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9 The organization of ACH in the US, see supra note 7 at 105, 108, 109.
10 For example, the Metro fare card in Washington D.C., the MetroCard in New York City, and the cardboard coupons in Metro in Paris.
electronic payments products enable cashless small-dollar transactions by eliminating the audit trial produced during the process of credit cards or debit cards transactions.

B. Models of New Electronic Payments Products—— Access Facilitation vs. Medium Replacement

The emerging new electronic products exist in a number of different forms and operate in different ways. Sometimes, terms like “cybermoney” or “e-cash” would be loosely used to refer generally to all types of new payment products that transmit payments information in digital form. Whether these products have given rise to a new money form is what concerns governments and the public most. This distinction helps us evaluate the implications of new payments products and outline a regulatory framework for them. A careful observation from this perspective shows that not every one of these emerging products generates a new money form. Their models are discussed in the ensuing section.

1. Access Facilitation Products

A number of technological innovations in payments methods which were called “e-cash” or “e-money” have only invented bizarre systems to move the money that we kept in banks, but have not created a new form of value. Thus several researches have asserted that these products should be differentiated from value creating products and referred to as “access products”. Basically, products belonging to this category were designed to improve the use of existing non-cash payments methods. Normally, traditional non-cash payments methods are structured in a triangular relationship which involves three parties, a payer, a payee, and an intermediary financial institution. Payers instruct intermediary financial institutions to make payments to payees on their behalf and settle these payments with those institutions thereafter. The difference between those traditional products and the current ones is in the way the payer delivers the

12 E-cash has been trade marked by Digicash but it is widely used to refer to new electronic payments products in most of the articles.
instructions to the intermediary; for example, in debit card transactions, the plastic cards are the key for the payers to instruct their banks to transfer money from their accounts to the payees' accounts, whereas in paper check transactions, the pieces of paper function as proof of instructions. These instructions provide direct or indirect “access” to payers accounts in banks or to their previous contractual relationships with financial institutions. Thus new electronic payments products that assist payers to utilise these traditional non-cash payments instruments could be referred to as “access facilitation” products.

The models of “access facilitation” products depend on the underlying payments methods that a particular product is facilitating. In a broad sense, new methods which build up connections between banks and their consumers could be one of these products. Products that enable consumers to access their bank accounts from the Internet and provide funds transfer or bill paying features could also be grouped under this category. They either break the geographical barriers by shrinking the physical distance between banks and their clients through provision of more convenient communication channels or increase consumer confidence in conducting electronic commerce in cyberspace with their traditional payment tools. The development of this type of product was inspired by the Internet's fundamental architecture—an open-network system. While the Internet's open nature allows consumers to access their accounts from virtually any location in the world enabling the digitalisation of traditional non-cash payments methods, the open network system raises security concerns with regard to the electronic transmission of private financial information.

2. Medium Replacement Products

a) Overview

The second group of new electronic payments products provided a new medium to store value or to exchange value thereby creating a new digitalised money form. A number of different terms were used to refer those products such as “cyberpayments”

[T]he term “Cyberpayments” is just one of many used to describe a system which facilitates the transfer of financial value (i.e. digital currency, e-money). This new technology will change many of the fundamental principles associated with a “cash” oriented society. Such transactions may occur via the Internet or through the use of “smart cards” which unlike debit
“electronic money”\(^{15}\), or “electronic stored-value products”\(^{19}\). While currently there is no generally accepted definition of these new payments products, these terms intended to describe two types of payments products, namely, card or software based, and transferred value or data though electronic devices according to their physical appearance. Regardless of their physical existence, the area of focus should be the electronic signals, bits, serial numbers, or electronic tokens which represent value and are therefore a substitute for the traditional medium of value.

or credit cards, actually contain a microchip, which stores value on the card. Some Cyberpayments systems use both.


\(^{17}\) “Electronic cash is a claim on a party, most commonly, the issuer, stored in the form of a computer code on a card about the size of a credit card or on the hard drive of a computer. Consumers purchase the claim with traditional money. Consumers exchange the claims for goods and services with merchants who are willing to accept the claim as payment.” See, Julie L. Williams, James F.E. Gillespie, *An Introduction to Electronic Money Issues Toward Electronic Money and Banking: The Role of Government*, prepared for the United States Department of the Treasury Conference, September 19-20, 1996 Washington, DC, 966 Pl/Corp 75, 75, 84 (1996). Also available in the official web pages of Office of the Comptroller of the Currency (visited March 6, 1998) <http://www.occ.treas.gov/emoney/paper.pdf>.

\(^{18}\) [*Electronic money (e-money)*]: monetary value measured in currency units stored in electronic form on an electronic device in the consumer’s possession. This electronic value can be purchased by the consumer and held on the device and is reduced whenever the consumer uses the device to make purchases. This contrasts with traditional electronic payment transactions such as those with debit or credit cards which typically require on-line authorisation and involve the debiting of the consumer’s bank account after the transaction. There are two different types of electronic devices: prepaid card and prepaid software products....


\(^{19}\) In the recent report of the Board of Governors of the Federal Reserve System, in the United States, it defined “electronic stored-value products” as “a set of retail payment products intended primarily for consumer payments that generally have some or all of the following characteristics:

* A card or other device electronically stores or provides access to a specified amount of funds selected by the holder of the device and available for making payments to others.
* The device is the only means of routine access to the funds.
* The issuer does not record the funds associated with the device as an account in the name of (or credited to) the holder.

One could argue that our money currently already exists in digital form as most of people deposit their money in banks, and these deposits are only numbers recorded in a bank’s computer system. It would therefore be pointless for us to lay too much emphasis on the emergence of a new form of electronic money. Moreover, one could even argue that the “independent” electronic value created by medium replacement products can still be regarded as “within” the existing financial and banking system in a broad sense, because people might still need to utilise the existing financial system to “purchase” and “redeem” the electronic value, for example, to exchange electronic value by transferring funds or credit-card transactions.

However, instead of merely transferring instructions to change the numbers recorded in our banking accounts, medium replacement products further create electronic value that could circulate outside the existing banking system and complete payments without spontaneously triggering settlement between accounts every time when conducting transactions. This feature enables us to hold the electronic value “with our hands” just like we might hide coins under our beds. Unlike the products belonging to the previous category which only provide further access or create more channels to connect merchants, consumers and banks, medium replacement products represent a certain amount of face value similar to that represented by cash or coins during the period between issuance and redemption. If the design of the product permits, the electronic value could be circulated over and over, and never need to be redeemed to hard currency. This e-money could circle around the earth forever and never go back to the banking system again.

Medium replacement products allow consumers and merchants to exchange value without leaving an audit trail resulting in less transaction costs than the traditional non-cash payments such as paper checks, credit cards or debit cards. This feature makes small value electronic funds transfer financially feasible so that these products can substitute the “change” people use for daily small-dollar transactions. “Anonymity”, a by-product generated from the efforts to erase the cost of keeping records of transactions, has aroused law enforcement authorities’ concerns with respect to money laundering and also become part of the

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21 For a detailed discussion with respect to how electronic money product would facilitate the “money laundering business”, see R. Mark Bortner, *Cyber Laundering: Anonymous Digital Cash and Money Laundering*, presented as final paper requirement for Law & the Internet (LAW 745), a seminar at the
discussion regarding “privacy” in cyberspace. However, a recent field survey on consumer attitudes towards electronic commerce showed that consumers consider anonymity less important than security.

b) Model of Medium Replacement Products

The of “medium replacement products” model can be divided to three steps: “Issuance, Circulation, and Redemption.”

The first step in the model is “Issuance” of the electronic value, hereinafter referred to as “e-money”. There are usually three parties involved in the issuance process: consumers, issuers, and banks. Consumers pay the money we use in the real world to issuers in exchange for e-money, for example, they can pay “cash”, “checks”, “credit cards”, or “funds transfer” in order to “purchase” e-money. With the exception of cash, the rest of the payment tools would still involve banking transactions for the first exchange. Issuers could also co-operate with banks and require consumers who wish to “buy” e-money to maintain a special “e-money” account with the banks. If banks themselves issue e-money, then there will only be two parties involved in the process of issuance.

The next step is “Circulation” of e-money. There must be merchants or billers who agree to accept e-money as payments. When consumers pay “e-money” to merchants or billers, they can transfer only the digital signals that stand for the value they want to pay to the payee without triggering any instructions to move the real money in their bank accounts. Circulation of e-money requires a general and broad acceptance of e-money as a payment tool. The more widely e-money is accepted, the more value that e-

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23 According to an on-line survey conducted by the students at the Management School, Imperial College, U.K., August 1995, out of the eight attributes of money, security is the fourth important one for the Internet users and anonymity is the last one; in fact, 20.7% of the respondents classified anonymity as “not at all important” or “not important”. See Survey on Internet Money (last updated September 1, 1995) <http://graph.ms.ic.ac.uk/analysis>.

money would create as a medium of exchange. Not only could e-money be circulated among consumers and merchants, but it could also be used by merchants to buy their supplies. However, to establish whether the electronic value is genuine, and to ensure that the value has only been used once by the holder, procedures such as automatically reporting the serial numbers of the electronic value to the issuer for verification before the value's acceptance could be taken during the process of circulation.

The last step is "Redemption", which is the process of exchanging electronic value back to hard currency. The ideal redemption process shall only require the e-money holders to represent the electronic value to the issuers in exchange for the real money. Redemption takes place when the e-money holders want to switch between different payment tools or when the e-money holders need the underlying value of e-money. Banks could also be involved in redemption if issuers use payment tools other than cash to complete redemption or if the issuers retain banks to redeem the value for them. When there is more than one version of e-money circulating in the market, a settlement mechanism would be developed to enlarge the acceptance of different versions of e-money. In that multiple issuers model, there would be correspondent institutions, which accept and distribute different versions of e-money, and clearing institutions, which clear different versions of e-money and settle accounts.

The basic process could be illustrated as follows.

Model of Medium Replacement Products

E-S$: e-money

$: real money

<……>: banking transactions
C. Examples of Emerging Payments Products

1. Access Facilitation Products

a) Internet Banking—Funds Transfer Feature

Many banks all over the world now open their virtual door to the public in cyberspace. In the United States, there already exist three banks which provide full services from the Internet, namely, Security First Net Bank, Atlanta Internet Bank and Compubank. Other brick and mortar banks also moved their homebanking services to the Internet or added the Internet as one of the access mechanisms for their homebanking services. Both Internet banking and homebanking provide consumers 24-hour access to their bank account. The on-line funds transfer services, Internet banking or homebanking products enable their customers to move their money between accounts without being constrained by their physical locations and business hours. This function has replaced the traditional tangible payment tools such as cash or checks. However, as mentioned above, this new type of financial service did not create any value existing outside the consumer’s banking account but only facilitates the consumer’s use of the existing payment system. The underlying deposits still remain in depository institutions, but can be accessed in a novel and potentially very fast way.

b) Credit Card Based Cyberpayments

Some of the products were designed to encourage consumers to use their credit cards to complete their transactions over the Internet. These products pool consumer credit-card numbers and keep track accounts which are later transmitted to the card companies who do the actual billing in the usual way.

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32 See Solomon supra note 13 at 12.

33 Id.
motivation behind the development of this type of product was to prevent the risk of losses caused by computer hackers or by "merchant fraud".

"CyberCash" is one of the leading products in this area. The basic idea behind CyberCash is to protect consumer credit-card numbers by encryption technology. The transaction process is the same as normal on-line transactions except that the consumer's credit-card number is always encrypted before it reaches the banking network. The rest of the message is also encrypted by different parties during the process. In this way, the merchant never knows the consumer's credit-card number preventing "merchant fraud". CyberCash also provides debit and cash transactions on-line. There is no value being created outside the consumer debit cards or bank accounts, and only an encrypted information transmission model is being adopted to protect the financial secrets of consumers and to prevent fraud.

First Virtual is another famous example. E-mail, and not specialised client software, plays a vital role in First Virtual's transaction model. First Virtual acts as an intermediary between consumers and merchants to verify and protect consumer credit-card numbers when consumers are using credit cards to "shop" on-line. The whole process is completed by e-mail. First Virtual also protects a consumer's personal identity. The most sensitive parts of the transaction, involving the settlement and clearing of

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34 CyberCash homepage (visited March 20, 1998) <http://www.cybercash.com>
35 The founder of CyberCash was also the one who invented the credit card slide. See supra note 16 at 26.
36 When a consumer is making a credit card purchase on-line by CyberCash, the merchant sends the consumer an electronic invoice over the web. The consumer reviews the invoice, appends the credit-card number to the invoice, uses CyberCash's software module to encrypt the credit card portion of the invoice and then returns the invoice back to the merchant. After receiving the invoice, the merchant forwards the entire encrypted invoice information appended with the merchant's confirmation number to a CyberCash server which reformats and encrypts the information in banking formats and then sends it to the banking network. When the message gets to the banking network, the transaction will be treated like a normal credit-card one. Id. at 27.
37 Id. at 28.
38 First Virtual homepage (visited March 21, 1998) <http://www.fv.com>
39 New customer opens an account with First Virtual and obtains a confidential identification number from it. When making a purchase on the Internet, the consumer sends the identification number to the merchant. The merchant will in turn e-mail the identification number to First Virtual for verification and identification of the customer. First Virtual will confirm with the consumer by e-mail about the purchase. See supra note 16 at 31.
40 Id.
funds, are performed "off-line" in First Virtual's system\(^\text{41}\). Technically, this model only uses the Internet as a tool to place orders and confirm transactions\(^\text{42}\).

**c) Electronic Bill Paying**

Another variation of products under this category is electronic bill paying. The basic idea is to pay the bill through a closed-banking network such as homebanking or to move the deposit money over the open Internet by "electronic check"\(^\text{43}\).

One example is the "E-Bill"\(^\text{44}\) a bill payments service provided by "CheckFree"\(^\text{45}\). CheckFree solicits consumers to join their system by signing up major retailers and other billers across the country. It is basically playing the role of matching payers and payees together, and facilitating their funds transfers by forwarding the payer's instructions electronically and providing automatic bill payment service\(^\text{46}\). As CheckFree itself does not pay the bill after receiving instructions from the consumer; it is only a gateway between merchants, banks, retailers, and consumers.

\(^\text{41}\) First Virtual utilizes Electronic Data Systems Corp. (EDS), a division of General Motors, to transfer the account information from the purchaser to the merchant over its own private network; processes debit transactions of its U.S. merchants through the Automated Clearing House (ACH) network; and handles credit-card transactions again off-line through First USA Merchant Services, Inc., a fast-growing credit-card company in Dallas. *Id.* at 33.

\(^\text{42}\) *Id.*

\(^\text{43}\) See Solomon supra note 13 at 65.

\(^\text{44}\) Launched in pilot form in October, 1995, it is said to be the world's "first" electronic bill delivery system. See, CheckFree E-Bill, (visited March 21, 1998) <http://www.checkfree.com/products/cps/ebill.html>.

\(^\text{45}\) CheckFree is a corporation that has been processing on-line credit-card and bill-payment transactions since 1983. It handles payments for major on-line services, such as AOL and CompuServe, and for major access providers such as Netcom. See supra note 16 at 25. CheckFree not only provides bill paying services but also homebanking and electronic commerce services to business and corporate clients. See CheckFree web site (visited March 21, 1998) <http://www.checkfree.com/index.html>.

\(^\text{46}\) Customers of Checkfree can choose to access "E-bill" via the Internet by the software downloadable from its web site. See CheckFree Web Billpay, (visited March 21, 1998) <http://www.checkfree.com/products/cps/cf_web.html>, CheckFree Via Software, (visited March 21, 1998) <http://www.checkfree.com/products/cps/cf_pc.html>. Usually, the consumer is the payer, who will add the payee to E-Bill Payee, and into the system; these payees then send the billing information to CheckFree. Under the instruction of payers, CheckFree transfers their payments electronically through the existing U.S. Federal Reserve or MasterCard RPS system. For small businesses that do not accept electronic payment, CheckFree sends laser-printed paper checks through U.S. Postal Service see supra note 16 at 25. Consumers can also set up a dollar limit to instruct the system to automatically pay a bill that is less than that limit. See "AutoPay", CheckFree E-Bill, (visited March 21, 1998) <http://www.checkfree.com/products/cps/ebill.html>.
2. Medium Replacement Products

Medium replacement products create electronic value that exists in digital form. Transmission can be over the Internet or other electronic devices. However, the electronic value needs to be stored in a tangible medium in order for people to use it. As previously mentioned, two basic forms have been invented: card-based products and software-based products.

a) Card-based Products

Card-based products were designed for people to have easy and handy tools to carry their electronic value. Most of them are pocket-size plastic cards with a chip or stripe embedded in it. Value was stored in the cards so that consumers could carry e-money with them for their purchases in stores, news-stands, restaurants, or any other places where e-money is accepted. The card and card reader could also be connected to the Internet, and be used in on-line transactions. This type of product is called a “stored-value card” or “smart card”. Card-based products are considered handy for small-dollar purchases and more secure for large dollar purchases47. The chip embedded in the card can also store other information such as personal identification or medical history, making the use of the card as an electronic ID, a possibility.

(1) University Prepaid Card Program

An example is the student ID of University of Michigan, which is called “Mcard”. It contains “a cash chip” which provides access to the university facilities and could also store electronic value. Students can add value to their cards in CashChip stations located all over the campus by inserting cash into the stations, and then making purchases in numerous stores and restaurants around the campus. The card also works in campus vending machines, copier machines, bookstores, laundry services and fast food outlets48.

47 See Robert J. Egan, Smart Cards May Test Significant Questions in Cyberbanking Law, 15 No. 5 BANKING POL’Y REP. 18, 19 (1996).
The payment is deducted directly from the chips at the point of sale without accessing the students' bank account.49.

(2) Mondex Card

Mondex Card is developed by Mondex International, a UK corporation owned by Mastercard International and 28 major organisations worldwide.50 The first Mondex pilot program was launched in Swindon, England in July, 1995, and is currently used in over fifty countries worldwide, for example, in Australia, Canada, Hong Kong, New Zealand, Philippines, UK and USA.51 Recently, Mastercard International and Mondex International co-operated with Chase Manhattan Corp., Visa, and Citibank in a six-month smart card trial in New York City starting from October 6th, 1997.52

A Mondex Card is a plastic card with a microcomputer, the “chip”, which functions as an “electronic purse”. The electronic purse can be loaded with value and locked using a personal code ensuring that only the card owner can access the value on it.53 The electronic value54 is stored in the “electronic purse” until it is used as payment for goods or services at retail or service outlets, or transferred to another

49 It also works as an ATM card in cirrus machines and as a photo ID when students are writing checks. See The University of Michigan’s Mcard (visited March 22)<http://www.umich.edu/~busfin/mcard.htm>. Other examples of university “card plans” are Seminole Access Card program at Florida State University (FSU) and the debit cards plan in public and private universities in Texas. The plan at FSU was criticised by the Office of the Comptroller of Florida as a violation of Florida statutes regarding the unauthorised business of banking. In 1995, the Attorney General of Texas reached a different conclusion with regard to debit card plans of universities in Texas stating that these card schemes should not be considered banking business by any court. See Thomas P. Vartanian and Robert H. Ledig, The Business of Banking in the Age of the Internet: Fortress or Prison? 15 No.5 BANKING POL’S REP. 7,8 (1996). However it appears that these card plans are only debit card plans issued by the universities but not smart card plans.


52 Supra note 2.


Mondex Card by inserting the Card into a card reader\textsuperscript{55}. Consumers can use a "Mondex Wallet", a pocket-sized gadget that has a keypad similar to an ordinary electronic calculator to transfer money between cards, check the balance, view the last ten transactions, or store value\textsuperscript{56}.

Mondex Cards enable retailers to accept immediate and direct payments without requiring authorisation. The card payment can be immediately accepted and recirculated by retailers, without the cost or delay involved in "going on-line" to check the availability of funds\textsuperscript{57}. Retailers use point-of-sale terminals that are compatible with the Mondex system to accomplish the transfer of value from consumer cards. Each merchant has a "purse" to store value and can later use a Mondex compatible phone to deposit its Mondex value in the bank\textsuperscript{58}, where the redemption of the electronic value is consummated. Acting as the exclusive licensor to the intellectual property rights and being responsible for the inter-operability of its technology world-wide, Mondex International structures its franchise in such a way that only banks can be the issuers in countries all over the world. This ensures that Mondex Electronic Cash is introduced by strongly committed national banks\textsuperscript{59}. Thus in this model, the issuer of e-money could be the same bank that redeems the electronic value.

(3) Visa Cash

Visa Cash is developed by Visa International\textsuperscript{60}, once considered one of the world's largest credit card organisations. Similar to Mondex Card, Visa Cash cards are embedded with microchips\textsuperscript{61} storing

\textsuperscript{55} Id.
\textsuperscript{58} Id.
\textsuperscript{59} Supra note 50.
\textsuperscript{60} Co-operating with Bank of America, Visa is now conducting a six-month pilot program to test the ability to use Visa Cash for purchases over the Internet. See Visa Cash on the Internet (visited March 23, 1998) <http://www.visa.com/cgi-bin/vee/nt/chip/vcashint.html?2+0>. To promote electronic commerce, Visa also devoted itself to the exploitation of a security standard that could be used for transactions over the Internet, Secure Electronic Transaction (SET) protocol. SET technology protects individuals' credit card information and reduces various frauds that could take place during the on-line transaction. See The World of Visa Secure Electronic Commerce, (visited March 23, 1998) <http://www.visa.com/cgi-bin/vee/nt/sec/no_shock/entry_L.html?2+0>. A detailed analysis of SET's model, risks and legal issues, see FRIED, FRANK, HARRIS, SHRIVER & JACOBSON ARTHUR ANDERSEN AND PETER WAYNER, THE INTERNET COUNCIL OF THE NATIONAL AUTOMATED CLEARING
monetary value, and also work like "electronic money". In participating areas, consumers can obtain Visa Cash cards at local financial institutions, special Card Dispensing Machines, and kiosks, and then make purchases at retailers equipped with special Visa Cash terminals. Card holders can view the balance via Visa Cash card readers before or after they make purchases. The balance can also be viewed using a special Visa Viewer in participating financial institutions. Visa Cash is just like cash and can't be replaced if lost or stolen.

After its pilot program during the Atlanta Olympic, 1996, Visa Cash is currently participating in the smart card trial in New York City with Mondex International. Visa Cash is available in 15 countries in Europe, Asia, Australia, and America. Visa Cash expands their worldwide presence by cooperating with local financial institutions and merchants. Most of the participating financial institutions where consumers can purchase Visa Cash are banks.

b) Software-based Products

Software-based products enable the circulation of e-money in Cyberspace. Consumers can install special software into their personal computers, acquire electronic value on-line, store value in their hard drive, or other hardware devices attached to their personal computers and transfer e-money when shopping on-line. To prevent counterfeiting, each e-coin is individually created and can be used only once. Digital signatures, a legal analog to written signatures, are also affixed to e-money to prevent unauthorised use.

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65 Id.

66 Supra note 2 and see also New York Smart Card Program (visited March 23, 1998) <http://www.visa.com/cgi-bin/vee/pd/cash/newyork.html?2+0>.

67 Id.

68 See Solomon supra note 13 at 66.
(1) DigiCash’s Ecash

DigiCash’s “ecash” is a software-based payments product which enables electronic value to be transferred over computer networks. It was invented and patented by Dr. David Chaum, the founder of DigiCash. Dr. Chaum’s encryption technology protects the ecash issuer against fraud, and at the same time retains the anonymity of the ecash holder. The company itself does not issue ecash but provides the technology to ecash issuers, most of whom are banks, to issue ecash, and supports issuers in integrating the ecash system and localizing the user interface. The Mark Twain Bank of St. Louis, Missouri, U.S.A was the first bank to issue ecash on October 23, 1995.

To use ecash, both users and merchants have to maintain ecash accounts with the ecash issuance bank. The bank will provide the ecash purse software, account ID and set-up password to users and merchants. Before enjoying the convenience of shopping in cyberspace, users need to install ecash purse software, open ecash accounts on-line and transfer ecash from the bank to their “purses”.

To protect the privacy of users, ecash is “minted” by the users themselves. Users instruct their purse software to generate e-coins, which are very long strings of characters, each of which is unique, append their digital signature with the coins, and then send them to the bank over the Internet to withdraw ecash from their accounts. The “blind signature” technology is employed in this process to encrypt the serial number of each coin so that the bank cannot link a particular coin to a certain account. Upon

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69 Apart from the Internet, ecash can also be used on other closed or open computer networks. See An Introduction to Ecash (visited March 23, 1998) <http://www.digicash.com/ecash/intro/index.html>.
Being the leading pioneer in the development of e-money, DigiCash produces smart cards with different functions as well. DigiCash also participates in the Conditional Access For Europe (CAFE), an electronic payment project of the European Commission, founded by Dr. Chaum. See Smart Cards (visited March 23, 1998) <http://www.digicash.com/index_s.html>.
71 Except EU Net in Finland, current ecash issuers world-wide are: Deutsche Bank (Germany), Mark Twain Bank (USA), Advance Bank (Australia), Den norske Bank (Norway) and Bank Austria (Austria). See Current ecash Issuers and Other Licensees (visited March 23, 1998) <http://www.digicash.com/ecash/issuers/index.html>.
receiving the withdrawal instruction, the bank removes the users' digital signature and validates the e-coins by affixing its signature to the e-coins and then sends the coins back to the users. Users can then pay these coins to merchants in exchange for the goods or services they want. Merchants have to deposit the e-coins received as payment to their ecash account in the bank for verification. Neither the bank nor the merchant know the identity of the users because the bank does not know their serial numbers when they send their coins for verification.

Banks play an essential role in ecash transactions. Before shipping the goods and sending the receipts, merchants send the e-coins received from the users to banks for verification. Banks check the serial numbers on the coins with their spent coin number record. If the serial number of a coin has been recorded, it means the coin has been used and someone was using a copy of the coin. Banks will then notify the merchant that it received a worthless coin.

One of the unique features that ecash provides is that it protects users from losses when their personal computer crashes. DigiCash claims that the ecash recovery procedure "will ensure that, even if the coins and other files on the local hard disk are corrupted or destroyed, the user will still be able to retrieve the full value of his or her ecash coins."

(2) NetCash

NetCash is claimed by its operator, Netbank, a new communication service in Cyberspace. As explained in its web pages, the idea of using NetCash in cyberspace is just like using the Deutsche Mark when we travel in Germany.

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75 Id.

76 See supra note 69.

77 Is NetBank a Bank? According NetBank's homepage, it is "an electronic payment system for merchants on the information superhighway". See Welcome to the NetBank Introduction to the NetBank (visited March 23, 1998) <http://www.teleport.com/~netcash/inintro1.html>. According to the information with respect to the operations of the "payment system", and the elusive language used to describe what the NetBank is, even though it bears the name "bank", it is not a bank as defined by banking laws and regulations.
The way NetCash works is by sending encrypted serial numbers of the electronic coupon via e-mail. There are also three parties involved: users, merchants and the e-value issuer, Netbank. Both users and merchants need to open an account with Netbank as well. To exchange the e-value, which is called the NetCash coupon, users have to pay real money to Netbank\textsuperscript{79}. The issuance, transfer, and redemption of NetCash coupons are all completed by e-mail. When users want to exchange large dollar bills for small change, users can exchange their “big dollar” NetCash coupons to obtain small value ones\textsuperscript{80}.

II. Medium Replacement Products and the Challenge Posed to Government Control of Money

In the twentieth century, governments all over the world are the sole issuers of the legal tender in their countries. Not only is the government the sole money issuer, but it also regulates and controls its circulation through monetary policy and law enforcement. In a digital world, medium replacement products brought a new regulatory issue for the government because they created a new money prototype. The existence of “private money” floating around would result in the government being uncertain about the control over money which it maintains in the analog world.

A. Creation of New Regulatory Subject

1. The Meaning of Money

Lavish efforts have been made to explain what money is. Observers from different perspectives have provided varying responses to this question as outlined below.

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\textsuperscript{78} See Welcome to the NetBank Introduction to the Net Bank (visited March 23, 1998) \texttt{<http://www.teleport.com/~netcash/nceintro1.html>}.  

\textsuperscript{79} Users need to have a U.S. banking account to complete payments on-line and to exchange for NetCash coupons. See NetCash Request Forms (visited March 23, 1998) \texttt{<http://www.teleport.com/~netcash/ncform.html>}. For users that do not have a U.S. banking account, they have to mail money orders, checks drawn on U.S. banks, American Express Traveller’s Cheques (in U.S. dollars) or U.S. cash (dollar bills). See NetCash By Mail (visited March 23, 1998) \texttt{<http://www.teleport.com/~netcash/ncbymail.html>}.  

a) Sociologists' Money

Sociologists emphasise the "value" that money represents for different classes of people in the society, rather than its nominal value; for example, writing in the classical work on money, *Philosophie des geldes* (The Philosophy of Money), Gerog Simmel did not offer a formal definition of money but expressly conceptualised money as an institution, and inspired his readers to explore how this "institution" and the framework of social theory affect each other. Another viewer stresses that people of different social classes measure the same currency differently and earmark their own "social monies" despite the fact that the nominal value of a currency bestowed by the authorities has turned money into a numerical phenomenon.

b) Economist Money

Economists maintain that money includes currency and deposits. Arguments have been made with respect to what currency or deposit means, but they generally focus on what we can use to exchange for goods and services. Basically, they agree that money has three functions: medium of exchange, standard of value and deferred payments, and store of wealth.

c) Lawyers’ Money

For lawyers, money in whatever form, is the liability of the issuer. By issuing "money", the issuer promises to "pay" the holder "value" when the holder presents the "money" to the issuer for redemption. Money can actually be deemed an "I-owe-you" undersigned by the issuer. The little piece of paper we are now using as cash constitutes proof that the government owes us some value.

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83 See George G. Kaufman, Proposed Experiment In Monetary Policy, in John T. Boorman, Thomas M. Havrilesky, Money Supply, Money Demand, and Macroeconomic Models, 83-84 (1972), and also, Thomas Mayer, James S. Duesenberry, Robert Z. Aliber, Money, Banking, and the Economy 5-6 (1996).
84 See Mayer id. at 6-10; supra note 4 at 46; and Solomon supra note 13 at 11. These functions were deemed as the empirical definition of money, see Donald A. Walker, Money and Markets 107-110 (1984).
Money is different from a pure “I-owe-you” because it is ready to be circulated. Under a simple debt structure, the creditor usually has to follow a certain procedure in order to transfer the right to a third party. To transfer the right that money represents, people can only simply hand over the physical medium of money. Unlike cashing a check which requires endorsement, none is needed in the case of cash. Even though we write our name on paper cash, this only proves that the piece of paper was once in our possession. Thus we cannot claim the value that the money represents unless we actually hold the piece of paper. These attributes originally came from an agreement between the money issuers and money holders. By separating the value that money represents from its holders, law has made money or cash money the most popular method of payment.

In sum, the law of money basically attempted to design an instrument that can be readily transferred between parties without incurring extra costs. The law made people deem the medium representing value as the value itself by cutting off or disconnecting the ownership of the antecedent holder upon transference. For lawyers, the medium does not matter as long as it can function as standard proof that the right was issued by a certain issuer.

d) Government Money—Legal Tender

Legal tender is in fact a concept, and not a form of money. It is a payment presumed by law that can settle debts. Once a form of money has been chosen as legal tender, it has to be accepted as payment with finality, unless another is explicitly agreed upon. Usually, legal tender is used to pay taxes to the government. The form of money which constitutes legal tender is stipulated by law, for example, the legal tender in the United States is “United States coins and currency (including Federal reserve notes and circulating notes for Federal reserve banks and national banks).” The legal tender law has been used to compel the acceptance of certain currency whose acceptability is impaired. We learn from history that

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85 Under the continental legal system, a creditor has to notify the debtor when he or she wants to transfer the right to a third party. It is not necessary to obtain the consent of the debtor but the transfer is not valid to the debtor before the notification. See, R.O.C. Civil Code Art 297.
86 See supra note 4 at 73.
when the government took over the issuance of money, legal tender law helped drive out the other existing money from the market.\textsuperscript{88}

From the other viewpoints mentioned above, we note that it is not only the kind of payment methods chosen by the government as legal tender that function as “money”. However, in terms of government control of money, legal tender is a very powerful tool because it has tremendous influence on the acceptance of payment methods.\textsuperscript{89} The government has the power to confer legal tender status on certain forms of money.\textsuperscript{90} If the government insists that only a certain type of money can be used as “tax money”, that type of money will get acceptance by the public, and will most probably be the most popular form in society. However, it is not necessary for the government to grant only government-issued money the status of legal tender.

\textit{e) Sustainable Capitalists}\textsuperscript{91} Money

Money is “information” for those who are dissatisfied with the damage caused by the modern monetary system. They think that modern money tends to extract value out of the local community and exhaust local resources. They claim that money should only be a measuring device for us to measure the value of our real exchange. Under their local money reform scheme, additional community money which addresses this scarcity of information in the community should be provided.\textsuperscript{92} “Local money”, a system that promotes barter transactions within the community, would help the community to preserve the value

\textsuperscript{88} See supra note 4 at 74.

\textsuperscript{89} Id.

\textsuperscript{90} See 31 U.S.C. §5103.

\textsuperscript{91} One of the academics who is advocating for this sustainable money theory used the term “sustainable capitalism” in his forth coming work. Thus, the author refers to them generally as “sustainable capitalists”. See Bernard A. Lietaer, The Future of Money: Beyond Greed and Scarcity Toward a Sustainable Capitalism, First Draft (September 1996) (visited March 24, 1998) <http://www.transaction.net/money/book/index.html>.

\textsuperscript{92} See Michael Linton, Money and the Sustainable Economy (visited March 24, 1998) <http://www.gmlets.u-net.com/explore/sustain.html>. This article presents a background for LETSystems, which provides a new type of money circulated only within the local community. The developer of the system proposed that new local money which can support a sustainable economy in the local community should “exist in sufficient supply, be only used within a community and be created by its users”. With respect to the introduction of LETSystems, see Michael Linton, LETSystems--new money (visited March 24, 1998) <http://www.gmlets.u-net.com/explore/home.html>.
exchanged within it and to develop sustainable local resources. The Internet would provide a cheap tool for the community to assemble information about the exchangeable value inside the community.

3) Money's Attributes in Sum

Two major points can be drawn from the above to explain what exactly money is, namely, the value that money represents, and secondly, the exchange that we can make with money. Everyone in the world likes money because of the value it represents. The desire to possess it not only brought us many stories of adventures arising from treasure hunts, but also caused numerous savage crimes. With respect to this attribute of money, assets such as real estate could also be deemed as "money" in a broad sense because of their value. However, money is more than value. It is a medium of exchange which distinguishes it from assets with less liquidity. To facilitate its exchange function, money needs to be accepted generally, and to act as a standard unit of account in order to avoid the tough evaluation problem. When people obtained extra money, they would request that the medium used be everlasting so that they could store the value for a future exchange transaction, or simply for accumulation of their wealth. In conclusion, money is a constantly existing generally accepted value, measured by a standard unit, which people can exchange for goods or services.

2. Electronic Money—Everyone's Money

Have the new electronic payments products created a new money prototype? There is no new form of money being generated by access facilitation products because they are affiliated to traditional payments instruments. However, medium replacement products have given birth to a new money prototype. Electronic money, the electronic value created by medium replacement products, has almost all the attributes of money.

94 Id.
95 Supra note 13.
96 Some researchers on digital cash held the opinion that "digital cash = speech". They claimed that "spending money is often a matter of communicating orders to others to transfer funds, to release funds, etc." Therefore, restricting digital cash may impinge on free speech. See, May, supra note 22.
Electronic money is definitely the economists’ money because the electronic value created by medium replacement product itself can be used in exchange for goods or services. The digital signals represent the unit of value and indicate how much of the value can be stored in plastic cards or computer hardware so that we can store the value. The only distinction between electronic money and traditional money is that it exists in electronic form rather than in paper or metal form. 97.

It is also the sociologists’ money because the value these products represent also interact within the social framework and institutions. Sociologists could even start to explore the meaning of electronic money for different social classes since the technology needed to use electronic money is only possessed by certain groups of people in a few countries in the world.

It does not, however, constitute the “information” that sustainable capitalists are pursuing, but it can be thought of as the modern money that they are fighting because electronic money is designed to substitute the money that they are criticising.

Lawyers would deem electronic money as money. For lawyers, money is only proof of the liabilities of the issuer. As long as the medium of the value can be readily exchanged, the form of the medium does not matter. Electronic money can be designed as standard information that represents the obligation of the issuer, thus acting as proof of the value it represents. The holder can transfer the value to others without performing legal procedures, such as notification or consent. In some current models, the only reason that the merchant has to contact the issuer or the bank upon receiving the electronic value is for verification98, a destined technological procedure, that has to be performed due to the effortlessness of copying electronic messages.

Electronic money is not government money in the sense that it has not been granted legal tender status, that is, the finality of government currency. However, whether electronic money is legal tender or not would only affect the acceptance of electronic money by the public or the tax collectors, but would not detract from the fact that it could be readily circulated as a medium to exchange values, goods, or services. Thus when evaluating the implications of electronic money, the government has to consider it as “money”.

97 See supra note 11 at 1078.
98 For example, the model of Digital Cash’s e-cash requires the payee to confirm with the bank when receiving the e-coins in order to prevent double spending, see supra note 75.
B. New Tasks for Government

1. Implications on Monetary Policy

a) Losing Control on Money Supply

Money supply is the monetary theory measuring how much of the “value” that can be used for purchase there is in a society or within an economic entity. In a society where banks exist, both currency and check deposits have purchasing power. Hence, currency and deposits are included in money supply. Economists use M-1, M-2, M-3 to stand for currency and deposits of different kinds. The basic reason for the government to control money supply is to control price. If the increase in money supply exceeds the growth in production of goods or services, the only thing that increases is the price, but not the total value we have. We could deem money as what we use to slice our economy. Irrespective of whether we slice a pie into 8 or 12 pieces, the size of the pie still remains the same. We need to be careful not to inflate the value per unit by inputting too much money.

Through the taking of deposits and lending of money, banks play a very important role in the creation of money. The typical example recounted in economics textbooks of using one dollar to obtain one million dollars explains banking’s amazing power to create money. To prevent banks from creating either too much or too little money, governments control their money creation by forcing them to reserve a certain amount of money in the central bank. In the United States, the Federal Reserve is the central bank which controls the value of money.

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99 M-1: currency, traveller’s checks, demand deposits, other checkable deposits  
M-2: M-1, small time deposits, savings deposits and money-market deposit accounts, money-market mutual funds, overnight repurchase agreements and overnight Eurodollars  
M-3: M-2, large time deposits, money-market mutual funds(institutions only), term repurchase agreements and term Eurodollars, technical adjustment.


100 A similar example is a story regarding a moron buying pizza. When asked if the pizza should be sliced into 6 pieces or 8 pieces, the moron answered “6” because he thought he would never finish “8” pieces of pizza. See LORETTA GRAZIANO, INTERPRETING THE MONEY SUPPLY HUMAN AND INSTITUTIONAL FACTORS 3 (1987).

101 For the basic theory of money creation, see JOHN T. BOORMAN, THOMAS M. HARVILESKY, MONEY SUPPLY, MONEY DEMAND, AND MACROECONOMIC MODELS 3-46 (1972). See also Mayer supra note 83 at 222-247.
The emergence of e-money would effect government control over money supply. This conclusion is easily reached by merely looking at the formula\textsuperscript{102} that economists use to measure money supply technically. Money supply depends on two variables, the public's desired currency-to-deposit ratio, and the bank's desired reserves-to-deposits ratio. If either of the ratios increase, the money supply decreases meaning that there would be fewer deposits for banks to loan freely to the public, and consequently, less money created.

Whether the public's desired currency-to-deposit ratio would dramatically change with the use of e-money is not so clear because the current private e-money issuance scheme aims at substituting the coins and cash we are using everyday, especially for small value transactions. The electronic value is separated from the deposit account and is readily transferable at any time, that is, it works almost exactly the same as cash. Consequently, people would only exchange e-money with "real money" in situations where they need to use cash. In this sense, electronic money would mostly compete with "cash" or "currency" but not "deposits". The desired currency-to-deposit ratio would therefore remain more or less the same. The ratio could be slightly bigger if the public have to "store" a certain amount of money in another account which works differently from the normal checking or savings account in order to exchange for e-money, and the amount of the value deposited in this kind of account was not calculated as a "deposit".

However, the ratio could become zero if technology drastically shrinks the transaction costs and the time of transformation of e-money. If the public can load their e-money form their bank deposit\textsuperscript{103} to their hard drives or smart cards almost at the same time as making a purchase without incurring extra costs, e-money would encourage people to leave almost all their money in their deposit account and make the

\textsuperscript{102}Total money stock: \(M = nB\). Letter "\(m\)" is the money multiplier--the ratio of total public deposits and currency holdings to the monetary base. \(B\) is the amount of money that government issued. The formula to calculate "\(m\)" is \(m = (1+c)/(r+c)\). "\(c\)" is the public's desired currency-to-deposit ratio and "\(r\)" is the bank's desired reserves-to-deposit ratio. See George Selgin, E-money: Friend or Foe of Monetarism, a paper presented for the "The Future of Money in the Information Age", Cato Institute's 14th Annual Monetary Conference, May 23, 1996 (visited March 24, 1998) <http://www.cato.org/moneyconf/14mc-5.html>.

\textsuperscript{103}The "deposit" here refer to the saving or checking account but not to those accounts that are specifically set up to transfer true money to e-money.
currency-to-deposit ratio become zero\textsuperscript{104}. If the other variables remain the same, money creation would be greater\textsuperscript{105}.

The bank's desired reserves-to-deposit ratio could also be influenced by e-money. Under the current e-money issuance scheme, there would be a time difference before the public redeem the electronic value to real money. Banks would have extra float to make loans or other investments which would increase money creation. If this extra capital was not subject to reserve requirements, or if banks did not maintain the same ratio of reserves on this capital, the desired reserves-to-deposit ratio would be smaller. Thus the money supply would be larger than usual\textsuperscript{106}.

If electronic money is issued by non-banking institutions, the government could lose its control on money supply completely. The creation of money would be outside the control of the government if these e-money issuing institutions are not subject to reserve or reporting requirements. In addition, if banks or other institutions also make electronic money loans in cyberspace, some money will be circulated in cyberspace and never return to the existing banking system. The existing money aggregates that the government is using currently to measure money supply would not be able to reflect the actual number of units that could be used to "slice" our economy. In the extreme case, if electronic money succeeds, and government money becomes merely the accounting unit for private money settlement, the government would not be able to control money supply in the digital world as they did in the real world. The only tool left for the government to operate its monetary policy would be the signalling of interest rates\textsuperscript{107}.

Some commentators indicated that Federal Reserve, the central bank of the United States, has been losing its influence on the growth of the money supply. One reason for this is the increasingly large fraction of money held outside depository institutions, for example, in money market mutual funds\textsuperscript{108}, and the

\textsuperscript{104} Supra note 102.
\textsuperscript{105} If c is zero and r remains the same, m would be larger, and therefore mB would be larger. The formula, see supra note 102.
\textsuperscript{106} If c remains the same and r becomes smaller, m would be larger thus mB would be larger. The formula, see supra note 102.
globalisation of the U.S. dollar\textsuperscript{109}. It has also been asserted that the Federal Reserve can only play a passive role in the supply of the required money, but not actively control how much it should be\textsuperscript{110}. If electronic money issuers were not subject to reserve or report requirements, the central bank’s ability to measure and influence the money supply would be further weakened\textsuperscript{111}. While admitting that major shifts in the different forms of money held by consumers as a result of technological innovation in the past twenty years have resulted in monetary aggregates now playing a lesser role in monetary policy formulation, the Federal Reserve nonetheless carefully monitors monetary aggregates, and emphasises their importance in accurately measuring the various instruments that are being used as money\textsuperscript{112}.

Regardless of whether or not the government currently has the ability to actively control money supply, money aggregates are the index for it to measure both the size and kind of monetary "pie" it is regulating. Thus money aggregates provide a starting point for the government to evaluate the impact of its monetary policy. Electronic money currently does not fall within any categories of money aggregates defined by the government\textsuperscript{111}, and the government would have difficulty obtaining information from issuers if they are outside the banking system. In this sense, the emergence of electronic money would undoubtedly continually impair the government’s regulatory role.

\textit{b) Increase of Income Velocity}

Income velocity is the turn-over rate of money, that is, the number of times one dollar changes hands during a given period\textsuperscript{114}. Innovations in payment technology would increase income velocity as the public obtains an easier and cheaper way to spend money. In the payment system’s development history, the checking account’s substitution of gold or silver coins, the overwhelming competitiveness of thrifts in issuing monetary assets without holding significant reserves of central bank money, and the efficiency and speed of money movement brought by the electronic funds transfer system, all provoked discussions.

\textsuperscript{109} See \textsc{Joel Kurtzman}, \textit{The Death of Money}, 87-88 (1993).
\textsuperscript{110} Supra note 107.
\textsuperscript{111} Supra note 108.
\textsuperscript{113} For example, the money aggregates that the U.S. Federal Reserve defined, see supra note 99.
\textsuperscript{114} See Mayer supra note 83 at 264.
regarding the increase of income velocity\textsuperscript{115}. Like traditional electronic payments methods, e-money is a more convenient payment tool which could also generate faster money flow between banks, merchants and consumers, resulting in an increase in income velocity\textsuperscript{116}.

Income velocity will influence financial stability. When velocity increases, but the total value of goods and services remains the same, the only thing that in effect increases would be the price\textsuperscript{117}. Moreover, the greater the speed with which money changes "face", the more difficult it is to define monetary targets. If income velocity is higher, central banks need to be more certain of how much monetary liability they supply in order to have better control of its supply and maintain financial stability\textsuperscript{118}. Some economists hold the opinion that income velocity would approach "infinity" in the future if e-money prevails over paper cash\textsuperscript{119}.

c) Reserves Operation

Governments attain their monetary policy objectives by maintaining central bank reserves.\textsuperscript{120} Whether electronic money will affect monetary policy will depend on whether its primary impact is on the demand for bank reserves or on the central bank’s capacity to supply these reserves\textsuperscript{121}. The substitution of electronic money for reserve deposits or substantial reduction in a bank's demand for settlement balances would cause changes in the demand for bank reserves\textsuperscript{122}. If true money was moved from reservable deposits in exchange for electronic money, and the issuing or holding of electronic money was not subject to any reserve requirements, the demand for reserves would be reduced. As a result, adjusting reserve requirement ratios would not control the supply of electronic money. If an extensive substitution occurs, it

\textsuperscript{116} Id.
\textsuperscript{117} See Mayer supra note 83 at 266.
\textsuperscript{118} Id.
\textsuperscript{119} Id.
\textsuperscript{120} In the United States, the central bank operates its reserve through three basic tools: open market operations, changing its terms and conditions for borrowing at the discount window; and adjusting reserve requirement ratios. See Federal Reserve Open Market Operations (visited March 6, 1998) <http://www.banx.com/banx/heymkt/openmkt.htm>.
\textsuperscript{121} See Bank For International Settlement supra note 13 at 7.
\textsuperscript{122} Id.
is therefore predictable that the operating procedures used by central banks in setting money market interest rates would almost be voided\textsuperscript{123}.

2. Threatening Monetary Sovereignty

\textit{a) Privatising the Power to Control Wealth}

In the twentieth century, governments are the sole issuers of the currency that circulates in their countries. In the Gold Coin Standard age, the government was the largest gold possessor because banks had to purchase the money it issued with gold. After the gold standard was abolished, government money is now a reflection of nothing other than the liabilities of the government. Money became an abstract concept whose “buying power” was controlled by the government\textsuperscript{124}. If government money does not have the trust of its people, the government can restrict foreign currency exchange to entrench the power of its currency within its territory. In this way, even if the government does not own most of the wealth in its country, it still controls the wealth by controlling money. The phenomenon of privately issued electronic money sharing in the government’s power to control wealth can be demonstrated as follows:

(1) Contraction of Government Money

If the electronic money issued by private issuers succeeds, the monetary system would become a dual system in which government money competes with private money. We can envisage a situation where privately issued electronic money is so successful that government money exists only for accounting purposes. People would buy newspapers as well as securities with e-money, deposit e-money to their e-money accounts, and also borrow e-money from banks or non-bank financial institutions. Nobody would worry about redemption. At first, the private issuers would have to carefully record how much “real money” they receive and how much “virtual” money they issue. Later, private banks would have to decide how much e-money they have to “mint” to fulfil the demand for e-money, which is the same monetary problem that is now faced by central banks. Government money would only be the number that backs up e-money, and serves as the standard unit for settlements between privately issued e-money. If government

\textsuperscript{123} \textit{Supra} note 121.
\textsuperscript{124} \textit{Supra} note 109 at 92-93.
money cannot compete with privately issued money, e-money issuers will give up using government money as a back-up, and the government money would meet the same fate as the abolished gold coin standard. Money would merely be the obligation that the issuer owes us eventually.

(2) Loss of Seigniorage

Seigniorage is the profit that governments or central banks gain from issuing currency. In the past, it existed in the form of tax or fees. After paper bills became the main form of currency, the issuance of the currency itself would generate enormous profits\textsuperscript{125}. Seigniorage has become one of the primary income resources of central banks in many countries and sometimes influences government deficits\textsuperscript{126}. If e-money successfully replaces “cash”, the government would lose the income gained from “coining” money.

\textit{b) Cross-border Issues}

Through the Internet, electronic money threatens national monetary sovereignty in the following ways:

(1) National Currency Competition

Electronic money issued and circulated over the Internet would intensify the competition of national currencies. In the real world, trade in the foreign exchange market has been one of the tools for private sector risk diversification. For people who are not confident of their national currency, holding of “strong” currency such as the U.S. dollar would often be their first choice. Arbitrage opportunities in government money existed even before the birth of the Internet\textsuperscript{127}. Governments have already been competing based on the power of their money. Some of them maintain serious restrictions on domestic and

\textsuperscript{125}In ancient times when coins were the main form of money, the seignior would levy tax or fees for the expenses of coinage and for profit. When paper currency prevailed, the “paper” itself cost much less than its face value, and the so-called currency became the liability of the issuers. Governments and central banks could gain lots of profits by not paying the interest for the full value that the public paid for the paper money (their liability) they issued. See Bank For International Settlement, supra note 13 at 15.

\textsuperscript{126}Id. at 7.

foreign currency exchange. Electronic money that could be purchased and circulated on-line would provide one regulatory loophole for the people in these countries. In this sense, electronic money enhances the power of prevailing national currencies and impairs weaker ones.

(2) Local Money vs. Global Unit

There exists also another possibility that a global unit could emerge as a result of the development of electronic commerce. While activities in cyberspace are not confined by geographical boundaries, national currency systems form one of the practical barriers that zone the cyberspace. If local currency could be transmitted in electronic form, it is also possible that cyber-merchants could develop an electronic global unit that could be converted into local currency for transactions in cyberspace avoiding the problem of foreign currency exchange. Cyberbanks that not only issue the global unit, but also loan its value to the public, would also emerge in the future, establishing an independent "monetary" system operating in the cyberspace. Again, if the global value system is so successful that the public does not worry about redemption, the local currency system, whether existing in electronic or traditional form, will face a great challenge from cyberspace.

3. Supervision of Financial Activities

a) Free Banking Revival

The success of privately issued electronic money would bring us to a new free banking era that resembles the one which existed from 1830 to 1860 in American history. Various "electronic bank notes" would be issued and circulated in the payment instruments market. Private issuers would compete fiercely for consumer trust and market share. It is also possible that the "wildcat" electronic bank notes would enter into the market as it develops since the Internet provides unlimited access to the whole world irrespective of the physical location of the user. The wildcat bankers in cyberspace could have some

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129 Derived from the American banking history, the nickname “wildcat” referred to banks in mountainous and other remote regions that were said to be more accessible to wildcats than customers, making it difficult for people to redeem the notes the banks issued. Id.
advantage in the beginning, but later consumers would be more cautious in choosing private monies. It would be harder and harder to “cheat” in the competition after consumers get greater awareness.

Private electronic money issuers will have to figure out how much “real money” has to be “in stock” just like the gold smith in the 16th century measured how much gold had to be reserved to fulfil the public’s request for redemption. It is also possible that a reserve system between banks or issuers would evolve as a situation could arise where a New York bank would be holding the reserves of a computer software company that would also be issuing electronic money. To build the brand name of their e-monies, private issuers would have to be very cautious on how many value units they issued, and whether the money they issued could be settled at par value.

The trading of the electronic value would be affected by “trust”. When more than one version of private money is being circulated in the market, trade and exchange of notes issued by different issuers would take place. Lack of trust could incur additional costs for electronic money “trading”. During the American free banking era when private bank notes were the primary payments instruments for trading, some bank notes were traded under their par value because no sufficient information regarding the issuer’s financial situation could be obtained in the market. On the other hand, some bank notes would trade at a premium because of the reputation of the issuing bank. There were private organisations providing lists of the “domestic exchange rate” of different bank notes. Domestic exchange in itself involved higher clearing and settlement costs, and also incurred social costs from investigating the financial situation of bank note issuers. The same situation could also occur in the new electronic banking era if the public’s level of trust in electronic money issuers differs. The competitive measures taken by private electronic

130 See Solomon supra note 13 at 77.
131 See A Brief History of Competing Currencies supra note 127.
133 Id.
134 During the U.S. Free Banking Era, there were “Bank Note Reporters”, who monitored the prices of the numerous notes in circulation and reported on types of counterfeits as well. See JAMES J. MCANDREWS, BANKING AND PAYMENT SYSTEM STABILITY IN AN ELECTRONIC MONEY WORLD, WORKING PAPERS NO.97-9, ECONOMIC RESEARCH DIVISION, FEDERAL RESERVE BANK OF PHILADELPHIA 15 (1997).
135 See supra note 132 at 6.
money issuers to promote their e-money, such as providing merchant discount coupons or free flying miles, would complicate the exchange rate even further.

b) Supervision and Regulation Issues

If most of the electronic money is still issued by existing banking or financial institutions, the government could still utilise current banking regulations to supervise the safety and soundness of the institutions. However, private issuers are going to compete with each other, and how to establish a standard system to settle privately issued money would be a new task for the government. If electronic money could be issued by non-banks, then the government would need to design new safety and soundness regulations for them. One question which arises is whether or not the discount windows available for institutions within the existing banking framework should be applied to non-bank electronic money issuers if they are not subject to regulatory requirements on their assets.  

4. Difficulty in Perception of Money’s Whereabouts

E-money added at least two new physical forms of money, the microchip in plastic cards and in the memory of computer hardware. The basic design of these new electronic payment products aims at facilitating the way people make payments; hence, most of the e-money would not rest in one place for long because it would be subject to rapid and frequent value transformation. We can think of e-money in the digital world as money “in motion”, comprising bits transferred over a network system. Numerous messages that represent the gold our ancestors were using are travelling with the speed of light all over the earth. Money would exist as a concept with physical presence in that digital world.

Paper, coins or the audit trail left in credit card or debit card transactions are indications of money’s whereabouts. The government utilises these to both investigate and prevent crimes. We can trace a person’s physical location using his credit card record. When tracing drug dealers, the target would often be the one carrying a suitcase of $100 bills in the airport. The trouble and difficulty that arises in hiding the physical existence of cash and eliminating the audit trail makes the life of a criminal much harder.

Although the anonymity of cash contributed to the creation of the “money laundering industry”, the cost and risks in transporting the cash is still one of the barriers that slow down this industry’s growth capacity. In the digital world, when money can be “e-mailed” to the other half of the globe within seconds and still retain its anonymity, the life of the law enforcement department will no longer be easy.\textsuperscript{137}

C. Uncertain Future Development

The above situations were mainly based on the assumption that electronic money would succeed in the future and replace a large percentage of the payments instruments market. However, the future development of the electronic money market is still uncertain.

1. Current Market Evaluation

a) Competition Among Payments Systems in the Digital World

New electronic payment products are competing with traditional payment instruments especially from the following two perspectives.

(1) Value vs. Credit

The major target of electronic money is the daily small-value cash transactions. For these small-dollar payments, the other non-cash payment instruments such as credit cards, debit cards, or checks would incur very high costs. However, unlike credit cards or checks which allow the payers to enjoy the float, electronic money provides a “real time” value that merchants can hold on to and is ready to be exchanged for value upon the payments being made. Neither the merchant nor the issuer would need to worry about the credit risks of the consumer; hence, the merchant should be more willing to accept electronic money than credit cards or checks. On the other hand, consumers would prefer to pay using credit cards or checks because of the float. In addition, consumers also think that paying by credit cards or checks provides better control of their payments because they can cancel or stop the payments later if the merchants do not provide the services or goods that they promised.

\textsuperscript{137}The fact that the privacy that digital cash provides would allow some new channels for criminal activity was referred to as the “price of digital cash.” See, May supra note 22.
Not only does electronic money have to compete with traditional non-cash payments methods which provide credit and float to the user, such as credit cards or checks, but it also has to compete with access facilitation products which assist in the utilisation of the traditional non-cash payments methods on the Internet. It was estimated that credit cards would still be the major payments method for on-line transactions in the next ten years. Access facilitation products that use credit cards as the underlying payments system would enhance the competitiveness of credit cards in electronic commerce.

It would be a battle between “value” and “credit” in the new digital world. If electronic money cannot beat credit type products, electronic money would only be limited to “small-value” “retail” transactions.

(2) Cash vs. Bits

While cash is dirty, obsolete, weighty, and dangerous, bits are light, fast-moving, and safe, and arguably the perfect replacement for cash. However, in some ways, cash is irreplaceable. Illegal or tax evasion activities are better conducted through cash transactions. In case of emergencies, or storage of wealth, people probably would still bury cash in their back yard instead of burying smart cards or computer hard drives. Even though electronic money could be used for all the cash transactions we are conducting now, cash would not die out completely. It might simply stop moving because it will merely become an instrument with which to store wealth.

b) The Value of Cash Transaction

As e-money is a direct threat to cash, arguments have been made with respect to the value of cash transactions. If compared to the value of other forms of transactions the value of cash transactions is actually not that great, the implications that e-money has would not be very.

In the United States, the world’s leading economic power, for example, the value of cash transactions was $2.2 trillion, which accounted for only 3% of the total value of U.S. payments transactions.

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139 See Bank For International Settlement supra note 13 at 10, see also supra note 107.
in 1996; on the contrary, the volume of cash transactions accounted for 87% of the total volume of U.S. payments transactions \(^{140}\), which is much higher than other types of transactions. The reason for this is that unlike high value wholesale payments which have been conducted electronically for many years, cash is still the primary payment tool especially for low value retail transactions \(^{141}\).

To digitalise real money for retail payment systems, the telecommunications infrastructure should be capable of processing high volumes of transactions. For the e-money flow into cyberspace, there should exist sufficient numbers of Internet users. In countries that fulfil these conditions, such as the United States, the European Union or Japan, the banking industry has already turned the wholesale payment systems to an electronic funds transfer system. Moreover, in these countries, checks, credit cards, or debit cards are almost necessities to their residents. Hence, the value of cash transactions would be relatively lower than other types of payments instruments in these countries, for example, the percentage of cash in M-1 in the United States, Europe, and Japan was 11%, 14%, and 27% in 1993, and the percentage of cash in the GDP was 2%, 4%, and 8% respectively in the same year \(^{142}\). Theses figures, however, indicate that within different countries, even from the perspective of retail payments, the value of cash transactions still differs. If the statistics could quantify with precision the relative magnitude of the problems governments would face, we could say that Europe would have twice those of the US, and Japan four times as much.

It can therefore be argued that in those countries where the cash transactions do not account for a large portion of the total transactions, the substitution of cash by e-money should not be a major concern for the government. Even though all the cash is replaced by privately issued e-money, this would be only a small proportion of their economy \(^{143}\). Furthermore, since e-money will not compete with deposits, most of

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\(^{142}\) See \textit{supra} note 8 at 5.

\(^{143}\) This was one of the reasons that Chairman of the Federal Reserve Board, Alan Greenspan, held the opinion the government shall take the wait-and-see attitude to the development of e-money. See \textit{supra} note 141.
the monetary value would still be kept in bank accounts, which means that the reserve operation pattern
would not need to be subject to significant changes.144

The counter argument for this assertion is the future possibility that e-money could also substitute
deposits. One way to substitute deposits is to induce the public to exchange more e-money by paying
interest or giving discounts. People might then be willing to carry more e-money than cash thereby
reducing the value of deposits. The other possibility depends on the success of electronic money. If the
public has enough confidence in electronic money, and does not redeem it back to real money, electronic
money could itself evolve its own banking system, substituting not only cash but also deposits.

c) The Growth of Electronic Commerce

The growth of electronic commerce could be the other indicator of the future development of
electronic money. Observers made different predictions on the future growth of electronic commerce.
Generally, their predictions are increasing in size daily. In early 1997, Jupiter Communications released a
report indicating that by the year 2000, the figure for on-line sales could reach $7.3 billion and half of them
would be paid for with digital money.145 The private sector's prediction jumped from $200 billion146 to $1
trillion within one month in 1998, while the U.S. government's estimation was only $375 billion by the
year 2000.148 These figures were estimates of electronic commerce world-wide and also include the value of
transactions that would be paid for with payments other than electronic money.

144See Bank For International Settlement, supra note 13 at 7.
145The term, "digital money", included access facilitation products, such as electronic-checks. See supra
note 138.
146IBM Chief Executive Louis Gerstner predicted the market for Internet commerce would hit $200 billion a
year by the end of the century in the opening of the world's largest technology trade show held in
147Nicholas Negroponte, founder and director of the Massachusetts Institute of Technology's Innovative
Media Laboratory, estimated that the stakes could reach $1 trillion in E-commerce activity annually by
the year 2000. See Edward F. Moltzen, E-commerce underestimated?, TechWeb News Computer
148Id.
**d) Special Situation for U.S. Government**

The U.S. government is facing a different situation from any other country in the world for there are significant amounts of outstanding U.S. dollars held by foreigners outside the United States. After World War II, the world economy was governed by Bretton Woods Agreements, which rigidly linked the world’s major trading currencies to the dollar in a system of fixed-exchange rates. The Treasury Department was obligated by law to redeem foreign-held dollars for gold at the official rate of $35 an ounce. Before Nixon declared the abolishment of gold coin standard of the dollar, there had been about $300 billion U.S. dollars circulating outside the U.S. The Federal Reserve Board estimated that about $200 to $250 billion of U.S. currency was held abroad at the end of 1995, or more than half the roughly $375 billion then in circulation outside banks. In terms of percentage, it is estimated that between 55 percent and 70 percent of the U.S. currency stock is currently held outside the country. The demand of foreign held dollars has been in recent years.

The U.S. dollar has been used as a major cross-border trading currency in the area outside Europe. It is also the most popular currency for tourists. U.S. dollars are used to pay the salaries of personnel overseas. For countries that suffered instability, the dollar was sometimes chosen to be the currency of use. The former U.S.S.R. was one of the largest buyers of U.S. dollars.

The implications of electronic money to the U.S. government would be different from other countries. First, even though all the U.S. dollars circulating within the United States were replaced by electronic money, almost two thirds of its outstanding currency would be held by foreigners. Thus it would still enjoy great amounts of revenue from seigniorage. Secondly, the U.S. dollar is the chosen mode of payment in most international trade transactions. It is also possible that cross-border trading over the

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149 See supra note 109 at 52-53.
150 Id., at 59.
152 Id., at 899.
153 See supra note 151.
154 Id.
155 Id.
156 Id. at 885.
Internet would also choose the U.S. dollar as the major payment method. Thus even though the value of domestic cash transactions is relatively smaller than the other types of payments transactions within the U.S., there could still exist a significant amount of trading over the Internet paid for by electronic money denominated in U.S. dollars. The U.S. government would still have an interest in regulating electronic money denominated in U.S. dollars from this perspective.

2. Factors Causing Uncertainty

The death of money was declared when electronic funds transfer took over the wholesale payments market, and when credit cards, debit cards, and ATMs became part of our life. However, payments with tangible forms such as cash or paper checks have still not been extinguished. In the future digital world, competition among all kinds of payments methods will continuously be going on. Whether these emerging new electronic payments products will be accepted by the consumer and further help to replace cash or other non-electronic payments methods entirely is still uncertain. The factors that will decide the market acceptance of e-money are trust in the issuers and the technology. Unfortunately, the evolutionary path of both factors is unpredictable.

a) Issuer Trust

Trust in the issuer decides the acceptability of electronic money and whether it will prevail over the other payments tools or not. As mentioned above, electronic money is in fact a digital form of proof of the liabilities owed by the issuers. The coupon we use for grocery shopping could be used as an analogy to how electronic money functions. The trust involved in the process of exchanging goods or services for electronic money is almost the same as that in a discount payment with manufacturer coupons in a supermarket. Obtaining the coupons needs consumer trust in the manufacturer. Accepting the coupon as one part of the payments shows the merchant’s belief in the manufacturer’s promise for redemption. In electronic money transactions, both the consumer and the merchant have to “trust” the issuer’s ability to redeem the value as well. If electronic money cannot gain enough trust from the public, it cannot be the prevailing payment method.
Will consumers trust privately issued e-money? In this century, most of the time money was issued exclusively by government. Private money has not an opportunity to compete with the government money. People are used to the concept of government money and currently rely on the government monetary system. At this moment, the question as to whether or not consumers will feel comfortable about the idea of private e-money in the future is difficult to be evaluate, particularly when private e-money is issued by start-up high-tech venturers. However, one of the possible approaches to answering this question would be to look at the market.

b) Technology

Technology is another essential factor for the survival of e-money. Failure to provide adequate and reliable technology would impede the development of electronic money in two respects, firstly, it will deter consumer acceptance of the new products and secondly, e-money would only be used for small value payments in order to avoid the losses caused by technology. This can be best illustrated by security technology. The possibility of e-money being counterfeited or captured over the Internet would affect the consumer’s decision whether or not to embrace e-money. Few would accept e-money products if the security problem cannot be improved or solved, and even if e-money were still to be accepted under “insecure” conditions, people would only hold a small amount of e-money in order to avoid the risk of loss.

However, although we are certain that technology will play a major part in determining the market acceptance of e-money, and whether or not it becomes the major payments method, we cannot be sure that the development and innovation of technology will deliver this success. As technology is constantly improving, it becomes impossible to determine whether the emerging technology is the best. This would lead potential e-money issuers and consumers to adopt a wait-and-see attitude. Yet another concern is that we are not sure if technological advancement has any limitations, for example, no one can answer the question whether or not technology providing absolute security for Internet communication can be developed.

157 Supra note 23.
III. Shaping Monetary System in the Digital World

In the near future, government money will still be the main currency circulated in the market and the government will still be the sole controller of money. The rapid innovation of computer science and technology could enhance e-money's feasibility and market acceptability thus encroaching on the government's control of money in the future. The competition for technological innovation and the level of consumer trust are the key factors that decide whether e-money will succeed or not. Government intervention would direct how the e-money technology evolves and shape the e-money world by restricting its architecture. However, as described in the previous section, the government is in this respect currently faced with great uncertainty, which makes the decision making process complicated and risky. Thus the government will undoubtedly have to rise up to the challenges posed by the e-money world with imagination and foresight.

A. Justifications For Government to Control Money in the Digital World

1. Monetary Tasks of Government in the Real World

a) Building the Payment Infrastructure

The government in the real world is responsible for providing infrastructure to the people. Money is the vehicle for the public to pay and settle debts. People need money for transactions just as people need highways for transportation or telephones for communication. In this sense, "money" is also one of the forms of infrastructure that the government has to provide.

To provide a better quality payment instrument, the government while performing its regulatory duty, provides money that has a standard accounting unit\(^{158}\), ready acceptance\(^{159}\), and a physical medium that is lasting and hard to counterfeit. In addition to setting up a standard unit for people to calculate how much wealth they possess, the modern government unified its domestic monetary system to avoid disputes and costs arising from the conversion of different versions of currency and the fluctuation of prices.

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\(^{158}\) See supra note 11 at 1078,1079.

\(^{159}\) Id. at 1080.
Government money gained its power by being made the legal tender and the payment form for tax money\textsuperscript{160}. The government also offers protection against the possible misuse and counterfeiting of money\textsuperscript{161} in order to maintain its monetary system and the value of its currency.

Most basic infrastructure, such as highways or telephone lines, are network systems whose value would be greatly raised once the number of users reached the critical mass. Thus the larger the number of users, the greater the value of the network, and calls for standardisation of infrastructure will often be made during the early stages of development. As one of these network systems, the value of a certain form of money will also depend on how widely it is circulated.

However, the question as to whether the infrastructure should be provided or run by the government has been subject to serious debate. Societies with different ideologies would have different decisions in this respect. Some of them prefer the infrastructure to be operated by governments\textsuperscript{162}; while others prefer private competition\textsuperscript{163}. It is argued that the issuance of money is a natural monopoly, and the government should therefore control the power to coin money\textsuperscript{164}. A study also indicated that government intervention and the establishment of national currency could eliminate the social costs associated with the settlement of private monies\textsuperscript{165}. In history, money was first issued privately and then controlled by the government\textsuperscript{166}. China had maintained a dual government and private monetary system for a long time\textsuperscript{167}. In

\textsuperscript{160}Id. at 1081, 1082.

\textsuperscript{161}Id. at 1084, 1085.

\textsuperscript{162}For example, in Taiwan, electricity is provided by a government owned enterprise. The history of private banks has been in existence for no longer than ten years. The provision of telecommunication services were the monopoly of a government agency which was incorporated as a government owned company in only in 1996 in order to compete with private companies after the government opened up the market to the private sector. \textit{See} the homepage of Chunghwa Telecom Co., Ltd (visited April 25, 1998) <http://www.cht.com.tw/ea1.html>.

\textsuperscript{163}For example, in the United States, the telecommunication industry is run by private corporations and is subject to strict scrutiny by the anti-trust agency. \textit{See supra} Note 25 at 725-726.

\textsuperscript{164}\textit{See supra} note 26 at 335-337.

\textsuperscript{165}In the United States, prior to the National Currency Act of 1863, individual state-chartered banks issued currency denominated in dollars but traded at values ranking above and below par value. In a recent study on this issue by the Comptroller of the Currency Administrator of National Banks, the United States, indicated that the National Banking System was working towards par clearance of private bank notes but raised the question as to whether shifting of payment systems costs from the private sector to the Federal Reserve System was necessary. \textit{See, supra} note 132 at 2.

\textsuperscript{166}For example, the earliest money in Libya was issued by private bankers and the government later took over the control of money in the name of sovereignty. \textit{See THOMAS WILSON, THE POWER "TO COIN" MONEY: THE EXERCISE OF MONETARY POWERS BY THE CONGRESS 18 (1991)}.

\textsuperscript{167}Id. at 7-8.
the United States, the free banking era resulted from the inability of government money to serve the needs of the private sector\(^{168}\). Financial crisis or market failure were some of the reasons that led the government to take over currency issuance, but it was also shown that the government was greatly financed during war time by taking over the power to mint money\(^{169}\). There also exists theories attributing issuance of money to government sovereignty\(^{170}\), which further assert that the government should control money during peacetime to reserve its ability to survive in the war time\(^{171}\). What was hidden inside the analysis of the efficiency of government money and private money was the power and wealth of the money issuer and the subsequent moral hazard, which is the actual reason why the government is reluctant to give up its minting business.

Recently, spurred on by the poor performance of central banking, many researchers followed Hayek and conducted studies on unregulated free banking with decentralised currency\(^{172}\). Free banking models, such as the pre-civil war era in the United States\(^{173}\) or the Scottish free banking before 1845 \(^{174}\), were rediscovered from the annals of history, and used as evidence to support free banking. Studies indicate that central banks are vulnerable to external influences, particularly political pressure, and are not always able to adjust money supply according to the market causing inflation or instability in the financial system. On the other hand, private banks would tend to keep the monetary system stable because of the rewards to the entrepreneur who makes decisions that are consistent with the maintenance of monetary equilibrium and minimisation of costs\(^{175}\). The surveys support the opinion that the financial system with private e-money would probably be more efficient and stable because the cautious competing private

\(^{168}\)For example, The Bank of the United States and the Second Bank of the United States were not popular with those wanting easy credit, primarily the westerners, and in 1832 Andrew Jackson vetoed the recharter of the Second Bank. Thus followed the "Free Banking Era". See supra note 128.

\(^{169}\)For example, the United States government was greatly financed when it started to issue national bank notes during the Civil War. For a discussion about the war finance and the state monopoly over money, see DAVID GLASNER, FREE BANKING AND MONETARY REFORM 36 (1989).

\(^{170}\)See supra note 166.

\(^{171}\)See supra note 169 at 39.


\(^{174}\)For a historical background contrasting the central banking in England and the free banking in Scotland, see supra note 16 at 104-107.

\(^{175}\)For an analysis of the stability and efficiency of free banking, see supra note 172 at 126-143.
bankers would care more about their long-term reputation than about short-term profits. These studies support the view that money does not have to be issued by the government.

In sum, the government has a responsibility to provide payment infrastructure and is justified in regulating money and intervening in the construction of the infrastructure to fulfill this obligation. However, this does not exclude participation of other stakeholders in the construction and operation of the system. The government could still select different approaches such as fostering private competition or co-operating with the private sector in order to complete the payment infrastructure. In the absence of market failure or a financial crisis, the only other plausible reason for the government to take over money issuance would be to monopolise the power and wealth associated with issuance.

**b) Controlling Economic Growth and Maintaining Financial Stability**

Economic growth is one of the important policy goals of modern countries. By manipulating monetary policy through such activities as the monitoring of money supply, signalling interest rates, and the operation of the government bond market\(^{176}\), the government hopes to maintain the country's macroeconomic health\(^{177}\) and induce economic growth.

A sound and stable financial system is the basis of all modern economic activities. However, the high moral risk concealed when people are dealing "cash", and the chance that a private business is improperly run influence the irrational side of human beings invalidating the presumption of the "free market" theory promoted by economists. Furthermore, the panic associated with redemption of value, the disputes arising when converting different versions of currency, and the distrust surrounding the transfer of funds among different financial institutions would also result in the instability of the financial system. Consequently, for a "safe and sound" financial system, government intervention in the operations of financial markets through monetary regulation is justified.

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\(^{176}\)For example, the central bank of U.S., the Federal Reserve, uses three basic tools to reach its monetary policy objectives: Open Market Operations, conditions for borrowing at the discount window, and adjusting reserve requirement ratios. See Federal Reserve Open Market Operations (visited March 6, 1998) <http://www.banx.com/banx/keymkt/openmkt.htm>.

\(^{177}\)See *supra* note 11 at 1086-1087.
c) Using Money as a Regulatory Tool

Government money can be used as a regulatory tool for other policy goals, for example, exempting duties or taxes levied on a particular industry could distort resource allocation and invoke exportation. The government could also use its money to subsidise particular groups or activities in the society in order to achieve its policy goals, such as assisting research and development, environmental protection, or education in less-developed areas. However, governmental subsidisation of groups or activities could result in inefficient resource allocation, and has therefore historically been considered an unfavourable rationale for financial regulation.

2. The Role of Government in the Digital World

In a world where we can digitalise money, the monetary tasks of the government should still be the same. Although we can use virtual money in the virtual world, the only difference between that world and the real world we actually live in is the “form” of money. The function of the electronic signals representing economic value and purchasing power is the same as that of the traditional paper bill we use in the real world. If developments in society require a new cashless payment instrument, the government should not only be responsible for promoting its emergence, but should also deal with its effects on economic growth and financial stability.

The same rationale should also be applied to cyberspace. The open-network nature of the Internet built a virtual world “out there” and formed a “virtual” society separate from the brick and mortar one that we live in. This “global realm” appears not to be subject to any jurisdictions in the real world, and it has therefore been argued that only “netizens”, the participants of cyberspace, have the legitimate right to regulate it. The virtual activities conducted in the cyberspace, nevertheless, effect netizens’ life in the

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178 This is the reason why International Trade Regulations tend to be against governmental subsidies granted only to specific industries; for example, the specificity test of the World Trade Organisation, see Art. 2, Agreement on Subsidies and Countervailing Measures, Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations, Marrakech Apr. 15, 1994.
179 See supra note 11 at 1091.
180 Id.
real world and most of the time affect other people who seldom visit cyberspace as well. The word, “virtual”, blurred the vision of most of the Internet users and illusively induced the idea that cyberspace could be totally separated from the real world. Although digital data and electronic signals transmitted over the Internet build a colorful and interesting wonderland in cyberspace which appears to be an independent realm, it is the real people clicking on the mouse and sending data that make cyberspace meaningful. Without the connection to the real world, cyberspace is nothing but a huge collection of “0” and “1” permutations. The word “virtual” is an actual indication that life in cyberspace is an imitation of life in the real world. As long as the activities in cyberspace affect life in the real world, there is no reason why the jurisdiction in the real world should not be the legitimate power to regulate it. Rules of conduct for cyberspace may be developed by netizen participation through a majority democratic process. However, laws and regulations should still be applied to “cyber-activities” that effect the real world. From this perspective, the government would in effect still be regulating the real life of people without intruding in the holy realm of cyberspace. If electronic signals smuggle value in and out cyberspace affecting the monetary system in the real world, the government should have the power to regulate them. If the society favours the development of electronic commerce and needs a new payment system in cyberspace, the government is still responsible for facilitating the development of e-money.

As the twentieth century draws to a close, the Internet has gradually become indispensable. The growth of electronic commerce is foreseeable and has been promoted by various countries in the world. The emergence of electronic payment products is in itself an indication that society needs to build a new payment system. Thus a new task of constructing a new payment system has befallen the government, and it should take any necessary measures to facilitate its development. Moreover, to ensure financial stability both in the real and in the digital world, it should have the power to monitor and supervise the monetary system in the digital world. The above provides ample justification for government regulation.

182 For example, the privacy of a person in the real world would be infringed because of a netizen's communication over the Internet, although that person has never been to cyberspace.
B. Government E-money——A Dilemma of Timing

The issuing of government e-money\textsuperscript{184} would provide a clear-cut solution that would effectively shape the future e-money world, without the risk of failure that would exist if private e-money arrangements did not succeed\textsuperscript{185} or if market failure occurred. The government would remain not only the central monetary power, but also the sole monetary power. However, this approach involves a complex timing issue as enunciated below:

1. Virtues of Government E-money

Government e-money is the strongest way to control money in the digital world. In this way, the electronic currency would still be within the existing monetary system. The government would not need to worry about losing control on money supply, adjusting its reserve operations, the privatisation of its power to coin money, or the loss of seigniorage. To the government, e-money would be merely another form of cash. There would be less financial supervision and regulation issues than the private e-money approach because the distribution and circulation of e-money would still be controlled solely by government and the existing banking system. Hence there would be no need for the government to design a new regulatory framework to stabilise the private e-money market\textsuperscript{186}. The government could even design or adopt architecture that enables it to trace and record the movement and whereabouts of e-money enabling it to monitor income velocity, and prevent money laundering, bribes, tax evasion, or other illegal activities. This approach simply maintains government control of money in the digital world without much change to the

\textsuperscript{184}There are at least two e-money issuance schemes for government: First, the government could issue e-money by itself and grant it as legal tender. This government e-money would have the most ready acceptance as cash unless technically there are not enough hardware devices to transmit the electronic value. The government need not prohibit private issued e-monies in this scheme because private monies, which lack “finality”, cannot compete with the “hard” government e-money in the market. If there is an official version of e-money, merchants will not bother to set up another private e-money system and consumers will not risk their true money on private e-money. Secondly, the government could also issue a “government version” of e-money but not grant it legal tender status. The acceptance of e-money issued by the government would not be the final settlement of debt. However, it would still prevail other private competitors in the market because government e-money would be \textit{de facto} legal tender to the public.

\textsuperscript{185}A few European central banks believe that government e-money would be a definite possibility in case e-money arrangements did not work properly. Finland and New Zealand are now conducting government-sponsored e-money issuance schemes, see Solomon \textit{supra} note 13, at 79.

\textsuperscript{186}See \textit{supra} note 26 at 333
existing financial regulatory framework, and the government's main task relates to the technological aspects of e-money issuance.

From the perspective of building a new payment system for cyberspace or electronic commerce, government e-money would promote the acceptance of e-money greatly because of consumer trust in the government. One of the reasons that e-money has not yet gained significant market acceptance is that the public does not trust the private e-money issuers. If there is U.S. official e-money in the market, that e-money could be deemed as more trustworthy than any other private e-money because of the power of U.S. dollars. As a result, the payment system for commerce on the Internet would be established and electronic commerce would be greatly promoted\textsuperscript{187}.

It has also been argued that e-money issued by the government would be more efficient than private e-money\textsuperscript{188}. If the government monopolises e-money issuance, government e-money would be the only e-money standard or system. The costs for the private sector to integrate or unify different e-money systems would be eliminated, and society would not suffer the waste associated with changing systems, or the cost of negotiating a more acceptable system\textsuperscript{189}. The result would be increased usage of e-money and the promotion of electronic commerce.

2. Technological Barriers

As concise and succinct as the approach outlined above is, another view has been advanced that it is not yet time for the government to issue e-money.

First, security technology issues could affect the government's willingness to issue e-money. Security is a serious concern for both the e-money issuers and the users. If the government takes over e-money issuance, the burden to ensure the security of e-money would lie squarely on its shoulders. The same rationale applies to consumer protection costs from such activities as smart cards counterfeiting or computer hacking, which the government would have to bear. Without enough incentives to induce private sector participation, the government would have to deal with the issue of security technology alone. Thus

\textsuperscript{187} Id., at 333-335.
\textsuperscript{188} Id., at 335-336.
\textsuperscript{189} Id.
without the development of better security technology, very few governments in the world, if any, would be brave enough to issue legal tender e-money.

Secondly, the love and hate of encryption technology is the government's nightmare. The government loves encryption technology because it can protect national security, but hates it because it is afraid of the transmission of secret messages that it cannot monitor. If the government takes over the "minting" of e-money, it would face a dilemma. Not only would it have to adopt state-of-art technology to protect the transfer of official government e-money from hackers, but this very technology would probably be released to the public in this way.

In addition, governments would have great difficulty in selecting the e-money technology that they should adopt when issuing official versions of e-money. This is probably the most difficult decision for governments to make. Currently, with the exception of the widely used smart cards in some European countries, none of the e-money products have gained enough consumer trust or market acceptance. The e-money market and technological development are deemed to be premature to date. The question as to what criterion the government should use in choosing e-money technology would arouse serious debate. Governments would be afraid that the official e-money they choose would not be successful in the payments market if the technology they choose is not efficient and will not be accepted by the public even if the public has more faith in government issued liabilities than in privately issued liabilities. For countries with leading technology and economic power, such as the United States, they would be hesitant to support one of the e-money technologies because they would be afraid that they will lose the their status as market leaders if they make the wrong choice. Although it is less complicated to set up a governmental e-money system in smaller countries with more trade-oriented development, these countries would worry about the ability of their e-money to survive in the global competition of electronic commerce in cyberspace.

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190 For example, the government tends to restrict the exportation of encryption technology, see John Markoff, White House May Tighten Data Exports, The New York Times on The Web, Cybertimes Section, November 24, 1997 (visited April 10, 1998) <http://search.nytimes.com/search/daily/bin/fastweb?getdoc+cyber-lib+cyber-lib+18132+2+wAAA+Security%7Eand%7EVisa>.

191 See supra note 3.
The other technological perspective is the lock-up of technology caused by standardisation. The architecture that a government designs for e-money will become a standard for future e-money technological development. As a result, the private sector would shift the direction of technological innovation and development. Although the private sector would not completely stop the development of other technologies other than that chosen by the government, most of its resources would be spent on the development of the standard that has been adopted by the government. In the event that the government choice is inappropriate, the public would end up using less efficient e-money products. The effect of technology lock-up would vary a lot among countries in different stages of development. For countries like the United States, the decision of its government would probably lock up most of the technological innovation in the world because the standard it adopts would soon be copied by other countries using the U.S. dollar as a payment instrument in cross-border electronic commerce. The effect of technology lock-up would be less significant in countries with less influence internationally, because it would probably merely lock-up innovation within that country, and the cost of lock-up would be the price the country has to pay in the future for technology transfer if the technology it has adopted is proved to be less efficient.

Furthermore, the innovation and development of Internet technology is rapid and somewhat unpredictable. Even relatively mature technologies can develop in wholly unanticipated ways. If the government sets up an e-money system based on the current cyberspace architecture, it would not be flexible enough to keep pace with technological changes in the Internet.

3. Timing Dilemma

The question then arises as to when would be the best time for the government to issue e-money. This represents the difficult timing dilemma that government's are facing with respect to the issuance of government e-money. There are two scenarios in which the government need not intervene in e-money issuance. The first one is when both technology and private competition work well. In this scenario, since private e-money has already been proved to be successful through market competition, the government has no excuse to take over the issuance of e-money except for the power and wealth of “minting” money. The

192 See supra note 141.
second scenario is when e-money cannot gain market acceptance and cannot compete with other payment instruments whether they are in digital or traditional form. In this case, e-money is proved to be of no use and so the government need not issue it either. From the above, we can come up with a third scenario where the government could be justified in taking over e-money issuance or intervening in the private e-money market when there exists potential e-money technology and market acceptance, and there is a possibility that in the future the private sector would need the government's assistance to establish a new form of electronic payments system. While it is quite clear that the current development of e-money is not under the second scenario because a private market already exists, and electronic commerce appears to be growing, it is unfortunate that the uncertainty of technological development and market competition would make the government have a hard time in evaluating whether they are in the first or the third scenario in order to decide whether or not to issue government e-money.

We can also put this dilemma in a second way. If the government decides not to issue official e-money, it will only act as a monitor and facilitate private competition. If the government decides to issue official e-money in the future, but currently is unsure which e-money technology to choose, it can facilitate private competition temporarily in order to observe the development of e-money. Theoretically, the government can then take up any measure that would help the private e-money market succeed. Consequently, the government would no longer need to issue official e-money because the private e-money market would be working well. It would end up being in the same situation as the government which decides not to issue official e-money. Unless the government is brave enough to take the risk of locking up technology now, making the decision as to whether or not to issue e-money is undoubtedly a difficult one.

**C. Regulation Of Players Versus Architecture**

In this approach, faced with the uncertainties of technological development and market acceptance of e-money, the government shall avoid intervention in the architecture of e-money, but allow e-money to be issued privately and focus on regulating the players in the e-money market instead.

\[^{193}\text{See supra note 145-148 and the accompanied text.}\]
1. New Free Banking Era in Cyberspace

a) Proposed Private E-money Regulatory Framework

The government would always be faced with the timing dilemma in deciding whether or not to issue government e-money. Thus the government has no alternative but to allow e-money to be issued privately, and a private e-money regulatory framework would actually be the best and most flexible solution for the government under the current situation. However, this private e-money regulatory framework, would not be completely laissez-faire. Private e-money issuers would be subject to restrictions that aim at ensuring safety and soundness; consumers would be fully informed and protected. Any measures taken by the government should cause the least impact on the innovation of e-money technology.

The goal of this framework is to find a balance between the development of e-money and government control. While the government is justified in controlling money to promote financial stability, it has to be careful not to hinder the development of e-money. Recently, a call for the development of a payment system for electronic commerce has arisen. The substantial growth of electronic commerce has been recorded and predicted. The government is not only responsible for facilitating its development and the establishment of new payment infrastructure, but it must also supervise e-money activities to avoid any negative impacts on the existing monetary and financial system. The uncertainty of technological development hinders government action stemming from the fear of an e-money crisis or failure. The only solution is focusing on the regulation of the players, particularly the issuers, instead of the architecture.

This approach can in the meantime promote the market acceptance of e-money and facilitate its development. As analyzed in the previous chapter, consumer trust in the e-money issuers\(^\text{194}\) is one of the two vital factors deciding the fate of e-money. After the abolition of the gold coin standard, the acceptance of government money is merely trust in the government’s ability to pay out its debts. Similarly, the acceptance of private e-money is also based on consumer trust in the issuers. Under the private e-money framework, the qualifications of issuers will be subject to scrutiny and monitoring raising the

\(^{194}\) Another author, Catherine Lee Wilson also insisted that “consumer confidence is a key objective for the regulation of electronic money systems”. See Catherine Lee Wilson, Bank on the Net: Extending Bank Regulation to Electronic Money and Beyond, 30 Creighton L. Rev. 671, 723 (1997).
trustworthiness of the issuers and encouraging the usage of e-money. Other measures to enhance consumer protection in e-money transactions will not promote the credibility of the issuers but will make e-money more acceptable to consumers. Once the trust problem has been resolved, e-money will be more equipped to compete with other payments products.

b) Underlying Rationales

The first rationale underlying this framework is that technological innovation shall prevail. As discussed in the previous section, e-money development is still in its infancy. Although e-money products have entered into the payment instruments market and started their life cycle, the models or designs of these products have not been generally accepted, and there remain basic technological barriers facing its development, such as, the reliability of current security or encryption technology. Technological innovation should therefore have priority over other policy considerations within any regulatory framework that attempts to shape the e-money world at the current stage of development. The government should let the technologies compete in the market and encourage their development by not setting any premature standard.

A second proposition is the testing of market acceptance of e-money by competition. Even if we assume that the current e-money technologies are stable enough to establish a broad framework, none of the e-money products have reached their critical mass in the market. It is still difficult for us to determine which technologies would be favoured by consumers in the near future, or whether or not e-money will have a comparative advantage over the traditional non-cash payments instruments or the access facilitation products, whose concepts and transaction models consumers are more familiar with. If the government has any doubts in making the choice, the best solution is to let the market decide which e-money technology should survive.

In addition, unlike the situation in the historic free banking era, most of the countries in the world have developed a monetary and payment system based on the national currency, making government money the main form of currency. While people will still choose government money as a medium to store or to calculate their wealth, and only exchange e-money with their government money when they need to make retail payments, this should not have a negative impact as e-money is currently targetted at retail payments. Further, the retail payment market only accounts for a small proportion of the economy, which reduces the
impact on society caused by the fluctuation of private competition. Indeed the free banking theory indicates that a financial system in which private bankers issue money and control money supply would not necessarily be more unstable than the central banking system. To maintain their reputation and credibility, the private money issuers would be more cautious than the politically motivated central bank. Therefore, e-money could be issued by the private sector, and market competition would ensure the quality of the privately issued money. In sum, although e-money has all the attributes of money, allowing private e-money to compete in the payments system market would have only a limited impact on the current monetary system, and the current financial system provides a conducive environment for private entrepreneurs to experiment in e-money invention.

c) Government Control of Money in the Framework

The framework also passes part of the burden of controlling money supply to the private sector. As shown in the previous sections, controlling money supply becomes tougher with the introduction of e-money, and it is more efficient for private issuers to control how much money they mint than for the government to do so. While allowing private e-money issuers to control the supply of e-money would greatly reduce the government’s work, the government would nonetheless have to develop new methods of determining target monetary aggregates in order to measure the movement of the economy. Private e-money will form a different money base because it will have a different circulation pattern from traditional cash or check deposits, and its efficiency in completing payments made between parties who are geographically apart will unavoidably raise income velocity. Furthermore, by regulating the issuers, the supervision of the financial system would be less complicated and more predictable because the players would be under the control of the government.

This framework would not resolve the government’s difficulty in tracing e-money’s whereabouts. The best solution to this problem would be to regulate the technology of e-money, for example, by removing the anonymity requirements for e-money products or reconstructing the audit trail. Technologically, e-money could lose its anonymity by appending the holder’s personal identification data to the electronic signals that represent the value. However, the costs of e-money transactions will be raised and e-money products will lose their comparative advantage in small-value transactions. If e-money
becomes a relatively expensive payment product, compared to access facilitation products or traditional non-cash payment products, its chances of survival would be slim, and the value of its existence would disappear. The government should let the private sector work out the technological solution for a cheap method to trace e-money. Although tracing e-money could assist crime investigation and also prevent crimes, the proper scope of tracing needs to be defined taking into account issues of privacy and data protection. The other solution is to require e-money issuers to report transactions whose value is over a certain amount. This is in fact the traditional anti-money laundering regulation in most countries. The impact of the reporting requirement on e-money technology needs to be evaluated, for example, the design of smart cards could have a cap on the maximum value that a chip can download.

The framework will foster global unit competition by not locking up technology. Market competition will ensure the development of the most efficient e-money technology. A country will not be bound by its current choice in the future if it is proved to be wrong when new technology emerges.

The question that is difficult to answer is whether money shall be issued solely by governments. Under this framework, e-money can still be deemed as a payment product at the present stage. Most of the e-money architectures were focusing on facilitating the movement of money, particularly small-dollar payments. Consumers will tend to exchange the electronic value only when it is necessary. The other attributes of money such as a medium to store wealth or unit of accounting would temporarily not be featured. In addition, e-money would only replace retail cash payments in the beginning, and cash transactions in effect only account for a relatively small proportion of the total transactions in an economy. The other contributory factor is that people will tend to hold only a small amount of e-money because of the risk of loss making the total value of e-money transactions small. These factors will ensure that the holy regime of government money will not be invaded in the early development of this framework. If private e-money cannot compete with other payments products in the market, money will still be controlled by government. If there happens to be an e-money crisis, the government would have an excuse to recover its power to mint money from the private sector just as in the old times. However, under this framework, if the

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195 For example, financial institutions in the United States are subject to a transaction filing requirement of cash transactions over $10,000, see 31 C.F.R. sect. 103.22(a)(1) (1998).
government continues to foster consumer trust in the issuers and also to facilitate technological
development, it is possible that e-money will gradually replace government money in the future. Shall the
government give up its power to mint money at that time? The question as to whether the government shall
be the sole issuer of money was at the heart of the debate on central banking and free banking. The
question we are facing now is different from the old one because it involves the way of life in the digital
world. At that time, it will become a question of a choice of lifestyle. We have to make a choice between
living in the digital world or in the real world, and what kind of institutions we need to maintain order in the
society in either world. The high-tech digital world is fragile and more vulnerable to natural forces. Shall
we preserve the life style in the real world as a back-up? If the private e-money issuers are more efficient
than the government, why don’t we allow them to issue paper money? It is still too early to predict the
interaction between life in the two worlds or to make a conclusion as to what choice we shall make. At least
in the foreseeable future, the government will not be justified in taking over e-money issuance if the private
e-money issuers prove their efficiency.

d) Costs of the Framework

There still exist some disadvantages in this framework, which should be seen as the price we have
to pay to maintain a flexible environment for technological innovation. Firstly, the private sector will have
to sort out how to choose a standard through competition when building the e-money network.196 If the
government does not help the private sector to negotiate a unified standard, resources could be wasted in the
process.197 Another factor is the loss incurred by the errors of high-tech entrepreneurs. Even the
shrewdest banker will sometimes make mistakes or wrong choices. Thus the economy could be affected if
one of the private issuers makes some mistakes. Thirdly, the start up costs for the e-money venturer would
be raised by restricting their qualifications and imposing on them the cost of consumer protection. It could
be argued that the result of this approach will be merely levelling the playing ground for access facilitation
products and medium replacement products because most of the players of the payment system that underlie

196 For a detailed discussion of building money networks through market competition, see supra note 134, at
17-24.
197 Some argued that the establishment of ATM network in the United States was actually inefficient and the
government should have intervened in its early development, see supra note 26 at 335-337.

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access facilitation products are banks or financial institutions which bear high start-up and operational costs under the strict safety and soundness control regimes of governments.

2. Proposed Regulatory Schemes

a) Licensing Plus Disclosure

The first scheme is to set up a licensing and disclosure system for e-money issuers. The idea of licensing the e-money issuers is similar to some of the state "money transmitter" laws of the United States\(^\text{198}\) which require the organisations operating as money transmitters to be subject to the approval of the government. Under this scheme, private e-money issuers have to be licensed by the government before they issue their electronic value to the public and also disclose certain information to them relating to their business operations. Both the approval procedure and the disclosure requirements shall focus on the safety and soundness of the issuers and consumer protection.

The safety and soundness of the issuers could be controlled by regulating their organisations and monitoring their financial condition. With respect to the organisation, the government can restrict their forms of business and the way they are organised, for example, the government could require that the e-money issuer shall be a corporation with at least 10 stockholders. The government can also limit the qualifications of the natural persons who actually manage the issuance business, for example, it could require that one of the officers of the corporate issuers should be a professional, such as a Certified Public Accountant (CPA), or an attorney or require the issuer to retain professional consultants. The aim of controlling the organisation is to ensure that it is able to meet its liabilities, and that the managers of the issuers are capable of making informed decisions.

With regard to the monitoring of the issuer's financial condition, the government could set a minimum level of assets for the issuers to start their business, and require that a specified asset-liability ratio be maintained. The amount could differ in accordance with the form of business organisation. The government could review the financial structure of issuers, and evaluate the relationship between their business plan and structure, and its financial feasibility.

\(^{198}\)See, e.g., GA. CODE ANN. §7-1-241(1997); and N.Y. BANKING LAW §641 (1997).
Although the framework is based on the free banking theory and believes that private e-money issuers would not over-issue their electronic value in order to build their brand name, for purposes of fostering consumer trust in issuers, it is still necessary to require an adequate balance between the outstanding e-money and the backup government money during the beginning of their business. The balance restriction could be removed after a few years subject to the performance of the issuers. To help the government to develop or modify the measurement of monetary aggregates, the government could also require the issuers to report the outstanding amounts of e-money.

Another way of ensuring the “safety and soundness” of issuers is “disclosure”. The mandatory disclosure system was originally adopted by securities laws to enable the small investor to identify and invest in higher quality and lower risk securities. The rationale is that disclosure could facilitate the circulation of information in the market and help the investor make the right choice. The proposed regulatory scheme also suggests that the government establish a disclosure system for e-money issuers. The government could require the e-money issuers to disclose their financial statements, the names and credentials of persons managing the organisation, such as, the Chief Executive Officer, and the Board of Directors, if they are in the form of a corporation. This disclosure system does not necessarily have to be as complicated as the one for securities regulation. The point is not to require the issuers to file a certain format of documents to the authorities, but to ensure that the issuers make the above information available to consumers. The issuer can merely post this information on their website in order to fulfil this requirement. Not only will disclosure assist consumers to make informed decisions when choosing e-money products, but it will also make the issuers more cautious when operating their business because their customers have direct access to information which they can use to judge their performance and potential. It is particularly important at the time when the market acceptance of e-money is still uncertain to allow consumers to be exposed to the credentials of an issuer to enable them to build their trust. A centralised credit rating system could serve the consumers’ needs better and also reduce the information publication...

costs for individual issuers. The government could therefore consider establishing such a system to effect this dual purpose.

b) Bank E-money

The second regulatory scheme is to allow only banks to issue e-money. This scheme has at least two advantages over the previous one. Not only will it not incur additional costs in establishing a new agency, laws and regulations to implement the licensing requirements, but in addition, issuers will be subject to the existing banking regulatory structure. However, it can be criticised on the grounds that this scheme will block market access to e-money, and prevent business opportunities for non-bank entrepreneurs.

The scheme will not need to establish any new system to ensure the safety and soundness of the issuers because banks are already heavily regulated in this respect. There is therefore no need to evaluate the organisation of banks or to establish a mandatory disclosure system. The requirement of an adequate balance of outstanding e-money and the underlying government money may not even be necessary at the beginning of the issuance either. However, the government still needs to review its existing banking regulations in order to remove inadequate restrictions on the technology of e-money. The government will still need to require banks to report the amount of e-money outstanding in order to measure the money stock. In addition, banks will still need to provide information with respect to the description of their product, rights and liabilities, and how to avoid loss, etc., in order to protect consumers.

c) Applicability of Existing Laws and Regulations

There are some existing regulations that could either hinder or foster the above regulatory schemes. The following section will be mainly based on the laws and regulations in the United States as an illustration.

(1) Legal Restriction on Money Issuance

The two schemes would not be feasible if the laws prohibit private issuance of money. Theoretically, the government has the power to constitute certain forms of money as legal tender but it does not necessarily make itself the only issuer of money within its territory. For example, the United States
constitution granted congress the power to coin money and regulate the value thereof and to provide the punishment for counterfeiting securities and current coins in the United States. Although the constitution prohibited the states from coining money, the wording of the constitution merely conferred upon congress the power to coin money and did not stipulate that the federal government was the sole legitimate money issuer in the United States. It is claimed that the constitution is silent on the question of private money, whether issued by bank or nonbank financial institutions. However, this constitutional provision could also be interpreted as saying that the federal government was not granted the monopoly power to issue coins, but was granted the power to regulate the coins it issues and to prevent counterfeiting. In other words, the government can make itself the sole issuer of “US” coins and grant “US” coins as legal tender, but it is not authorised by the constitution to prohibit the private sector from issuing “private” money. In addition, some state laws prohibit the issuance of currency, but these could be preempted by the National Bank Act or by the dormant Commerce Clause of the U.S. Constitution.

Because private e-money issuers will not declare that they are issuing legal tender or government money, private e-money issuance shall not be prohibited by laws that aim at protecting the issuance or circulation of legal tender. The laws that consolidate the position of government money will nevertheless tend to be interpreted as restraining any other form of payments instruments that could replace the

200. The Congress shall have power... To borrow money on the credit of the United States, ... To coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures....” See U.S. CONST. art. I. §8.
201. To provide for the punishment of counterfeiting the securities and current coins of the United States....” See U.S. CONST. art. I. §8.
202. No state shall... .coin money; emit bills of credit; make any thing but gold and silver coin a tender in payment of debts; pass any bill of attainder, ex post facto law, or law impairing the obligation of contracts....” See U.S. CONST. art. I. §10.
203. See supra note 166 at 20.
204. Id., at 87.
205. For example, the New York Banking law prohibits the issuance of private money: § 131. Prohibitions against encroachments upon certain powers of banks and trust companies 1. No person unauthorised by law shall subscribe to or become a member of, or be in any way interested in any association, institution or company formed or to be formed for the purpose of issuing notes or other evidence of debt to be loaned or put in circulation as money; nor shall any such person subscribe to or become in any way interested in any bank or trust company or fund created or to be created for the like purposes or either of them.......

NEW YORK BANKING LAW §131 (MCKINNEY'S BANKING LAW § 131)
206. See supra note 17 at 132.
government, including private e-money. The second category of laws therefore needs to be modified under the framework.

(2) Banking Business

If the issuance of e-money will be deemed banking business, and the law prohibits non-banks from conducting banking business, then private e-money will have to be issued by banks. In fact, the issuance of e-money greatly resembles the most common aspects of banking business, that of deposits, particularly, check deposits. Both deposit taking and e-money issuance will involve taking funds from the customers and could be deemed the liability of the bank or the issuer. Both the bank and the e-money issuer enjoy the float generated by the funds that they take from the customers. The bank could be instructed by the depositor to pay a third party by funds transfer or by cashing checks. The redemption of e-money by the payee could also be seen as the issuer receiving instructions from the e-money purchaser to complete the payments.

However, as indicated in the previous discussion about the distinction between access facilitation products and medium replacement products, e-money is different from deposits in the sense that e-money issuers do not hold a certain amount of money in an account when e-money is purchased; after the electronic value is minted, the value is independent of the issuer, and the issuer is only responsible to the person who holds the e-money whether he is the original purchaser or not. The connection between the purchaser and the money that he has paid for the exchange of the electronic value has been cut off. The parties who bear the liability in the deposit taking and in e-money issuance are also different. For example, in the check deposit setting, the one who has the liability to pay is the depositor, and what in effect has been transferred along with the paper check is the liability of the depositor; however, in the e-money issuance setting, what has been transferred with the electronic value is the liability of the issuers and the bank bears the liability to redeem the value. What makes this distinction obscure is e-money's lack of finality, which requires the e-money user to still be responsible for the debt he paid out when the issuer failed to redeem the value.

Section 21 of the Glass Steagall Act, in the United States, prohibits nonbanks form accepting deposits "subject to check or to repayment upon presentation of a pass book, certificate of deposit, or other
evidence of debt, or upon request of the depositor." 207 The issuance of e-money could be deemed to be deposit taking because the issuer is subject to repayment upon presentation of the electronic value, which could be deemed as other evidence of debt. If this statute were to be interpreted in this way, only banks would engage in the issuance of electronic cash. Nonbanks that violate this restriction would be subject to criminal sanctions. 208 As a result of this narrow construction of the law. The U.S. Department of Justice has not issued its opinion on this question but has issued an opinion to distinguish between mutual funds and deposits. 209 The question as to how to interpret this statute would depend upon the rationale and purpose behind the prohibition of non-banks from receiving deposits. One rationale could that the legislators intended to protect the depositors by only allowing entities which are subject to heavy "safety and soundness" control, such as "banks". However, there is no apparent reason why the holder of mutual funds should not be granted the same protection. This statute is ambiguous because its wording only describes the withdrawal of deposits, which happens to be almost exactly the same as redemption of e-money. If the underlying rationale is to protect deposits through the safety and soundness control, then the issuance of e-

207 "(2) For any person, firm, corporation, association, business trust, or other similar organisation to engage, to any extent whatever with others than his or its officers, agents or employees, in the business of receiving deposits subject to checks or to repayment upon presentation of a pass book, certificate of deposit, or other evidence of debt, or upon request of the depositor, unless such person, firm, corporation, association, business trust, or other similar organisation (A) shall be incorporated under, and authorised to engage in such business by, the laws of the United States or of any State, Territory, or District, and subjected, by the laws of the United States, or of the State, Territory, or District wherein located, to examination and regulation, or (B) shall be permitted by the United States, any State, territory, or district to engage in such business and shall be subjected by the laws of the United States, or such State, territory, or district to examination and regulations or, (C) shall submit to periodic examination by the banking authority of the State, Territory, or District where such business is carried on and shall make and publish periodic reports of its condition, exhibiting in detail its resources and liabilities, such examination and reports to be made and published at the same times and in the same manner and under the same conditions as required by the law of such State, Territory, or District in the case of incorporated banking institutions engaged in such business in the same locality." See 12 USCA §378.

208 "(b) Whoever shall wilfully violate any of the provisions of this section shall upon conviction be fined not more than $5,000 or imprisoned not more than five years, or both, and any officer, director, employee, or agent of any person, firm, corporation, association, business trust, or other similar organisation who knowingly participates in any such violation shall be punished by a like fine or imprisonment or both." See 12 USCA §378

209 U.S. Department of Justice issued an opinion to distinguish the difference between money market mutual funds offered by brokerage firms and deposits. The rationale of its interpretation was that the purchaser of mutual fund is the owner of the fund but the holder is only the creditor of the deposits. This opinion could not be used to support the view that the issuance of e-money does not amount to receiving deposits.
money shall not necessarily be deemed as deposit taking when there exists other regulatory schemes to ensure its financial adequacy.

(3) Availability of Deposit Insurance

The bank e-money issuance scheme could be more favourable to consumers because of the availability of deposit insurance. However, a careful examination of the rules and design of deposit insurance would lead to the conclusion that e-money products are not available to deposit insurance even though they are issued by banks. In fact, the U.S. Federal Deposit Insurance Corporation (FDIC) held a similar opinion on the question whether federal deposit insurance should be available to electronic payments products issued by banks. The applicability of deposit insurance requires that the underlying funds remain in the accounts of the customers until the value is transferred to a third party. The e-money created by medium replacement products does not need its underlying funds to remain in the e-money purchasers’ account, even if the purchaser maintains an account with the issuing bank. To purchase the e-money, funds will be withdrawn from that account only upon the minting of the electronic value. As a result, federal deposit insurance will not cover the funds that have been transformed to electronic value.

Moreover, despite the fact that the policy concern of deposit insurance is to protect individuals from the loss caused by bank failure or to control monetary policy, the design of deposit insurance is aimed at protecting the “savings” of individuals. The legal opinion of FDIC shows that the deposit insurance targets for protection money that is “resting” in an account, but not that in motion. E-money was designed to facilitate the movement of money by replacing tangible cash with digital signals that could travel with the speed of light. Therefore, deposit insurance will not be available to e-money products.

However, by interpreting U.S. banking law in another way, there exists the possibility that e-money could be insured by FDIC. The definition of the deposit covered by federal deposit insurance includes a “cashier’s check,” whose attributes are similar to e-money. A cashier’s check draws directly on

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because the e-money purchaser is also merely the creditor of the issuer but not the owner of some investment. See supra note 17 at 134.

211The debates on deposit insurance’s underlying policy, see supra note 169 at 188-190.
212See 12 USCA § 1813 (l)(4).
customers’ accounts and the bank becomes the main obligor. The customer has to “purchase” the check and
the bank will then issue a check to a third party named by the customer. If the customer does not instruct
the bank to pay to a certain third party, the check would become quasi-cash because the bank has to pay the
amount shown on the check to anyone who presents the check to it. This bearer cashier’s check is almost
exactly the same with e-money with the exception that it exists in tangible form. If the cashier check
described in this statute was not required to bear the name of the payee, and e-money could be analogised to
the bearer cashier’s check, then under this definition, the e-money issued by a bank could be insured by
federal deposit insurance.

Availability of deposit insurance will increase the cost for banks to issue e-money. Thus it is
possible that consumers would have to pay a higher service fee to banks in order to exchange e-money
covered by the protection of deposit insurance. On the other hand, consumers would probably tend to
choose bank e-money because it provides better protection against the credit risks of the issuer than the e-
money issued by start-up venture.

d) Evaluation

As long as both schemes are constructed in such a way that technological innovation will not be
restricted, they shall enable the government to both control money and promote the development of e-
money. However, the costs of implementing the two schemes will differ. Licensing non-banks to issue e-
money could necessitate the setting up of a new agency; and the establishment of standards or procedures
for the granting and review of licenses. This could entail the passing of legislation if the administrative
agency’s authority cannot be discerned from the current financial laws or regulations. These issues would
obviously not arise, however, if the issuance of e-money was restricted to banks, and as illustrated in the
case of the United States, the authority to restrict e-money issuance could be found in the existing legal
system. The government, would nevertheless, have to modify the banking regulations in order to repeal
those that could restrict technological development or incur heavy costs on e-money issuers.
e) Choice of Government

The government could choose one of the regulatory schemes or a mix of both according to its regulatory ability and the existing legal system. For example, in most European countries where the banking and payment industry was operated by the government-owned "giro-system" and subjected to the supervision of central bank,\textsuperscript{213} it would be more appropriate to prohibit non-banks from issuing e-money because the mechanisms to efficiently supervise or regulate private competition are missing from their legal system and institutional framework. In fact, these countries tend to interpret the issuance of e-money as deposit taking\textsuperscript{214} and claim that only banks shall issue e-money\textsuperscript{215}. For countries where a wide range of laws and regulatory and supervisory agencies that could be utilised to regulate private financial competition exist, such as the United States\textsuperscript{216}, allowing non-banks to issue e-money by setting up a new licensing system would not be an additional burden. No matter which scheme the government chooses, it should ensure that it has a minimal impact on technological development.

3. Consumer Protection

The second mechanism the framework proposes is consumer protection. However, this should not be viewed as an end in itself, but as merely aimed at strengthening consumer faith in e-money products.

a) The Proposed Scheme

Regardless of whether or not the e-money issuer is a bank, the framework proposes that all e-money issuers shall be subject to mandatory disclosure requirements to protect the consumer. Issuers have to provide at the minimum, detailed and easy-to-understand information regarding the use of their products, how to prevent loss, and what their rights and liabilities are. This disclosure requirement can again be fulfilled by posting the information on the web page that provides consumers on-line access to purchase e-money products, or printing this information on the smart cards. The government should carefully assess the technical feasibility of these requirements.

\textsuperscript{214} \textit{Id. and see also, supra} note 25 at 721.
\textsuperscript{215} See \textit{supra} note 17 at 111 and \textit{also supra} note 213.
\textsuperscript{216} \textit{supra} note 213 at 1171-1172.
b) Difficulty in Protecting Consumers From Risks of Loss

The protection of consumers from risks of loss in e-money transactions would further enhance their trust and acceptance of e-money products. However, it is difficult to employ traditional legal doctrines to allocate losses to issuers because of the nature of e-money's architecture.

There exists several different kinds of risks of loss in e-money transactions. First, consumers could lose their smart cards or other hardware devices, or the cards or devices could be stolen. Secondly, the electronic value could be captured by hackers, and lastly, losses could arise from computer errors.

The first category of risks of loss should be treated no differently from losing cash. In the real world, when cash is lost or stolen, the issuer, who is the government, does not compensate the loss. One of the reasons is that the cash holder is in the best position to protect the cash. In the case of the smart cards or other hardware devices, such as laptops\textsuperscript{217}, the consumer is still in the best position to protect them. Therefore, the risk allocation here should not be distinguished from holding cash. Even if we impose upon the issuer the responsibility of absorbing the loss, it is almost impossible for the consumer to prove that the e-money was not spent, but lost, because of the anonymous nature of e-money. To attract more consumers, the e-money issuer could add security features to reduce the incentive to steal e-money, for example, making the smart cards or hardware devices more tamper-proof. However, it would still not be possible for the consumer to ask the issuer to reimburse the loss if the issuer does not maintain a record of which card is held by whom.

The second category of risk could be called theft in cyberspace, which could be analogised to theft in the real world. Similar to the risk in the first category, it is actually no different from the situation where cash is stolen, except that it happens in cyberspace. We could argue that because the consumer is technologically not competent to prevent these risks from happening, the loss should be allocated to the issuer. However, because of the issue of anonymity, there exists the same difficulty for the consumer to prove that the electronic value was stolen by people from cyberspace. The issuers could, however, improve

\textsuperscript{217}Imagine what the next target of low-tech crime is: a laptop whose hard drive has been loaded with a huge amount of anonymous e-cash.
architecture to make their e-coin less attractive to hackers, for example, by allowing the users to append the identity of the payee with the e-coins thus limiting usage by persons other than the payee.\textsuperscript{218}

The third category of risks could happen, for example, when the consumer accidentally deletes their e-money files, or as a result of a computer systems error, or other malfunction. Usually, the risk of loss will be allocated to the party who is in the best position to prevent the loss from happening. With this in mind, we could decide to allocate the risk of loss to the issuer, who is arguably more technologically capable to prevent this type of loss than the consumer. Again, there exists the difficulty of proving that the e-money was actually destroyed by the system or even establishing how much the consumer lost. Technologically, the issuer could improve their ability to recover their e-money from computer errors\textsuperscript{219}.

The difficulties in allocation of risks of loss all result from the architecture of e-money, and could all be resolved by improving the security technology, or adjusting the architecture of e-money. If we require that the issuer unconditionally reimburses the losses to consumers even when the consumer cannot prove it, consumers would be more willing to accept e-money products, but issuers would be hesitant to enter the market. It would therefore be unwise for the government to try and solve this issue by imposing such a burden on the issuers. However, this issue would be gradually solved by the market. Security is the consumer’s greatest concern regarding e-money products\textsuperscript{220}. The issuer will focus on improving technology or designing risk control procedures\textsuperscript{221} to prevent losses from occurring in the process of transactions in a bid to gain market share. Alternatively, the government could promote consumer education programs to teach consumers how to prevent risks\textsuperscript{222}.

\textsuperscript{218}For example, this technology is one of the security feature of Digicash’s e-cash. See supra note 69.
\textsuperscript{219}Again, this is another security feature if Digicash’s e-cash, see supra note 76 and the accompanied text.
\textsuperscript{220}Supra note 23.
\textsuperscript{221}For example, to limit the value of each transaction.
\textsuperscript{222}For a detailed suggestion of private-sector measures to address consumer risks on electronic money products, see GROUP OF TEN, ELECTRONIC MONEY CONSUMER PROTECTION, LAW ENFORCEMENT, SUPERVISORY AND CROSS BORDER ISSUES, REPORT OF THE WORKING PARTY ON ELECTRONIC MONEY 8-10, April, 1997. Also available in the web site of Bank for International Settlement (visited February 28, 1998) <http://www.bis.org>.
c) Applicability of Existing Consumer Protection Laws

While other countries in the world have not established the basic legal framework for electronic funds transfer\textsuperscript{223}, the United States has complex and detailed regulations to protect consumers in electronic funds transfer transactions, embodied in the Electronic Funds Transfer Act (EFTA). The Act protects consumers by requiring purveyors of electronic funds transfer to disclose terms and supply transaction records, imposing caps on consumer liability, and creating dispute resolution procedures\textsuperscript{224}. The act authorised the Federal Reserve Board (FRB) to determine issues of coverage. FRB promulgated Regulation E to implement the Act.

With regard to the issue of whether or not EFTA was applicable to stored-value transactions, in 1996, the Board of Governors of the Federal Reserve published its proposed amendment opinion that the applicability should depend on how the stored-value products are categorised\textsuperscript{225}. Congress directed the Federal Reserve to hold off regulating stored-value products for at least nine months in the following year\textsuperscript{226}. The approach was criticised as too technical appearance oriented, confusing, and not flexible enough to accommodate future technological changes\textsuperscript{227}. Following instructions from Congress, the FRB conducted a study to evaluate the costs imposed on the stored-value products providers if Regulation E was applied to them, and the alternatives to Regulation E\textsuperscript{228}. In this report, the FRB concluded that full application of Regulation E was likely to impose substantial operating and opportunity costs of compliance, and the partial application of the same would also inhibit the development of new technology, albeit to a different extent\textsuperscript{229}.

\textsuperscript{223}For example, in Taiwan, the banking system and payment system has been computerised and conducted electronically, however, the Electronic Funds Transfer Law has not been adopted by the Legislative Yuan.
\textsuperscript{225}FRB classified stored-value systems into three categories: off-line unaccountable, off-line accountable and on-line. Only products under the first category could be exempted from the application of EFTA. See 61 Federal Register 19, 696 (May 2, 1996).
\textsuperscript{226}Notice of FDIC General Counsel’s Opinion No. 8, 61 Fed. Reg. 40, 490 (1996)
\textsuperscript{227}Supra note 213 at 1169.
\textsuperscript{228}See supra note 19 at 1.
\textsuperscript{229}Ibid., at 75.
Under FRB’s approach, the determination of the applicability of Regulation E on e-money would depend on whether or not e-money transactions involve a consumer’s account\textsuperscript{230}. As indicated above, e-money products resemble the concept of an “account”, and e-money issuance would be deemed a deposit or account under many financial regulations. In this case, however, the question as to whether e-money can be distinguished from an “account” shall not be the focus in deciding the applicability of Regulation E. What is more important here is the feasibility of the EFTA requirements to e-money products. Some of the requirements such as transaction receipts and periodic account statements, are not feasible. The limited consumer liability for unauthorised transfers would benefit consumers most if they lose their stored-value cards or electronic purses. However, as discussed above, there exists great difficulty for consumers to prove how much they have lost. A more feasible protection mechanism is the initial disclosure requirement and the notice of subsequent changes, but this requirement would impose substantial costs on e-money issuers as indicated in the FRB report. Therefore, applying EFTA to e-money products would be inappropriate. The consumer protection concepts embedded in EFTA could, nevertheless, be examples for the development of future consumer protection laws for e-money products.

4. Hybrid Products and Innovative Products

The future e-money world will be a brave new world for adventurers. Not only will there be fierce competition in technological innovation, but there will also be a grand presentation of new financial products. Products that are neither access facilitation products nor medium replacement products could be invented. These hybrid products or innovative products could pose new regulatory issues. The following section addresses issues with respect to these products.

a) Hybrid Products

Hybrid products are those which would mix the attributes of access facilitation products and medium replacement products. One typical example is the products that attempt to reconstruct the traceability of the electronic value.

\textsuperscript{230} 12 CFR §205.2(g) (1994)
In this paper, "anonymity" is included in the definition of medium replacement products based on the architecture of the existing electronic payments products. The author does not, however, exclude the possibility that in the future this feature could change. The fundamental distinction between medium replacement products and access facilitation products shall be whether or not the electronic value can be separated from a banking account. If the transfer of the value itself does not involve the transfer of funds between accounts, the product creates independent value that shall be treated the same as money. Anonymity appears not to be a decisive factor in this distinction because it will not effect whether the value is separated from an account or not. However, when the identity of the user is added on back to e-coins, the operation of the model itself would be closer to the one of checking accounts. Thus, it could be argued that these products are access facilitation products or hybrid products.

For example, under the model of digicash’s e-cash, if the bank receives the coins minted by the consumer and does not remove the consumer’s appended digital signature, then the coins will become traceable during the circulation process again. The bank will know who generated which coins and to whom the coins have been paid. Since the bank now has the records of who generated which coins, the user now has an opportunity to claim that certain coins were used without authorisation, and to instruct the bank to stop redemption. This is similar to the situation where a check is lost or stolen. Thus, this type of products could be perceived as a form of checking account because of the similarities, and all the financial regulations that are based on the concept of the “account” would become applicable to them.

How shall this hybrid product be treated? The distinction would be crucial if the government chooses the regulatory scheme that allows nonbanks to issue e-money. If these products are categorised as access facilitation products because they create an electronic version of a checking account, then only banks can issue these type of products, and the whole set of consumer protection regulations with respect to electronic funds transfer would be applied to them. These products would be as heavily regulated as other traditional payments products. From the consumers’ perspective, the result of subjecting these products to heavy regulation would be to provide them with the option of a better protected non-anonymous e-money product. However, consumers have to pay for this benefit because in order to fulfil the regulatory requirements, the start-up and operational costs of this product would be higher. This could distort the
consumer's choice between anonymity and non-anonymity e-money products because the additional costs do not result from the technology and the operations of the business, but from the regulations. At present, it is better to treat this traceable e-money product in the same way as other e-money products to avoid prematurely affecting the competition of e-money products based on their architecture when there are technically still unlimited development possibilities in this regard.

b) Innovative Products

The application of technology is not limited to the traditional way of life in the real world. Although most cyber-activities are copied from our life in the real world, there also exist new activities created for cyberspace. To resolve the payments problem in the digital world, a pure form of value exchange is not necessarily the only solution for some adventurer. Thus a product which not only aims at financing the vendors in cyberspace, but also serves as a payment tool for their transactions with consumers has emerged.

MilliCent, a product for “microcommerce” transactions over the Internet, has commenced its operation in cyberspace. It enables value-added content providers in cyberspace to charge netizens at cent-value for the content they provided, such as information, music, video, or games\textsuperscript{231}. It attempts to provide a new business model to content providers, whose current options are three profitless business models: free content, subscriptions, and advertising. Wide acceptance of MilliCent will encourage more and more content providers to post their work or information onto web sites\textsuperscript{232}.

The electronic value in MilliCent system is “scrip”, an electronic coupon that represents pre-paid value and is only valid with a specific vendor\textsuperscript{233}. MilliCent is different from the medium replacement model in that it limits the coupons to a particular content provider, and the value is initiated from the vendor but not the user. Vendors issue their own electronic coupons and sell them to brokers at a discount price. Brokers in turn sell the coupons to their customers. Brokers also issue broker coupons that can be traded

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\textsuperscript{233} \textit{Id.}
for any kind of vendor-specific coupon. Customers first buy the broker coupon, and then exchange them with the coupon of the vendor whose content they want to view. Customers can only use the coupon issued by a particular vendor in the vendor’s web site.\textsuperscript{234}

Under the MillCent business model, the vendor is financed by selling their vendor-specific scrip to the broker, the broker then promotes the vendor’s business by selling the scrip to the customer, and the customer can then obtain better content services in vendor’s web site because the vendor is financially more capable of improving the quality of the content they provide\textsuperscript{235}. The broker solves the vendor’s problem in collecting cent-value payments from the customer over the Internet. The value of the virtual society which consists of the content provider and the viewer could be increased in this model not only with respect to the profit created in this business, but also to value created during the interaction of the viewer and the provider.

The legal analysis of this model would conclude that the “scrip” could be seen as the ticket that we purchase for a movie, a concert, an art exhibition in the museum, entering an amusement park, or any other certificates which we can exchange for certain services. The broker issuing scrip is selling the tickets that could be used to exchange for the services of vendor, which is distinguishable from e-money products. However, it could be argued that the scrip stands for independent value and shall also be subject to the regulation of payment instruments, or to the regulatory framework for medium replacement products.

The policy concerns for this model shall be the solicitation of money from consumers by the brokers and the possible disputes which may arise when the vendor is not able to provide the services after the scrip is issued. The first concern is in fact similar to the one raised with respect to medium replacement products, and could make this product be regulated as one of them. Again, here the innovation of the high-tech entrepreneur shall prevail. The question as to how the payments in cyberspace shall evolve shall be left to the market to answer. It is not necessary for the government to regulate this product in the same way it regulates money or other similar prototypes. With regard to the second concern, there shall already exist enough consumer disputes resolution mechanisms that could be utilised.

\textsuperscript{234} \textit{id.} \\
\textsuperscript{235} \textit{id.}
Conclusion

Sometime in the future, before leaving a restaurant, we will not be waiting for credit card receipts, but for the waiter to come and collect his tips using a smart card reader. After coming home, the friend that forgot to bring money at dinner could pay you back by sending an e-mail. Money in the digital world would not show us the picture of our forefather's, but would be the twinkling message of "0" and "1" moving at the speed of light.

The emerging new electronic payment products provide us with various options when making payments both in the real world and in cyberspace. Access facilitation products such as Internet banking, on-line credit cards, or electronic bill payment, either provide access to our banking accounts or facilitate the usage of traditional non-cash payment instruments on-line. However, medium replacement products, create value independent from our banking accounts, and can be circulated separately.

The value that medium replacement products create is in fact a new form of money. This e-money has all the attributes of money except the finality of legal tender. This poses a challenge to government control of money supply, and formulation of monetary policy. The government's monetary sovereignty would be threatened by ambitious private e-bankers and by the powerful foreign e-currency or global e-value. The work of financial officers in the government would increase because there will be more financial supervision issues, and the law enforcement department will have to learn new techniques to detect the whereabouts of money. However, what will happen in the future is still in a state of great uncertainty because the direction technological developments will take, and whether or not private e-money will gain the full trust of consumers, cannot be determined at this moment.

Faced with these challenges and uncertainties, how should the government shape the monetary system in the digital world? The government is justified in controlling money in order to maintain the stability of its financial system; moreover, it is responsible for the provision of payment infrastructure to its people, and the call to develop electronic commerce has generated the need to build a new payments system for the digital world. However, the doubts and fears regarding whether the financial system in the real world would be affected by e-money still exist. While the government could issue its official version of e-
money, e-money technology is still very immature, and the rapid and unpredictable technological innovation would result in government e-money facing a constant timing dilemma.

In light of the above, the author concludes that the best solution for the government would be to regulate the players, without restricting the architecture of e-money. To achieve this, the government would only need to supervise the safety and soundness of e-money issuers and protect consumers. By regulating the e-money issuers, the stability of the financial system would be ensured, and at the same time consumer trust in e-money would be fostered. Through the promotion of private issuer competition, the best and most efficient e-money architecture will emerge or be selected in the future by the market. Laws or regulations that would restrict the development of technology would be inappropriate at this moment, and would prove obsolete within no time. This follows logically from the fact that law by its very nature develops as a response to advances in society, and would therefore be unable to keep up with the rapid pace of technological innovation.

The challenges posed by e-money will remain an important issue for governments to grapple with. While emerging e-money products compete in the market, the government will play the very important role of monitoring the developments in e-money. Hopefully, this new form of money will survive beyond its infancy, and will be smoothly incorporated into the existing system without unduly destabilising it.
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