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The Cash of the Twenty-First Century

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ESSAY

The Cash of the Twenty-First Century

David D. Friedman[†] and Kerry L. Macintosh^{††}

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I. INTRODUCTION

We live in a world of monopoly monies—in two senses. First, most trade takes place between people who are physically close to each other; thus, money is usually a geographic monopoly. Second, nations have found it profitable to seize control over the money presses. As a result, governments are the primary issuers of money. The end result is familiar to us all: Americans use dollars, Japanese use yen, the British use pounds and so forth.

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As we move into the twenty-first century, on-line commerce and electronic money will grow in importance. These and other technological developments will undermine money monopolies and increase the likelihood that systems of competing monies—both public and private—will emerge.

We begin by outlining the three basic functions of money and the characteristics that suit money to those functions. Next, we discuss whether the monopoly monies that are currently fashionable serve those functions well. We then explore the changes that on-line commerce, electronic cash and other technological developments will bring to trade and money. We evaluate five alternative paths that monetary evolution may take in the future, and conclude that competing public and private monies are the most likely development. Nations may oppose the emergence of private currencies, but will face difficulty in maintaining their monopolies.

II. THE FUNCTIONS OF MONEY

Money serves three basic functions: medium of exchange, unit of account and store of value.

Consider first the primary function of money—as a *medium of exchange*—a way of avoiding the problems of barter. Suppose a contractor who builds houses wants to buy food. In a world without money, he must find someone who wants a house and has food—a lot of food, perhaps a year's worth or more—to offer in exchange. If a law professor wants a car, she must find someone who wants to learn law and has a car to give in exchange. This *double coincidence problem*—the problem of finding someone who has what you want, and wants what you have—makes barter a clumsy form of trade, especially in a complicated society with a wide variety of goods and services.

Money solves the double coincidence problem because it is a single good that everyone will accept in exchange for goods or services. Thus, a contractor or law professor can sell services to one person and use the money to buy food or a car from someone else.

In order to serve as an effective medium of exchange, the money must be widely accepted within the trading community. Our present system of monopoly monies meets that need reasonably well, although not perfectly. For example, if an American wants to make a purchase within the United States, she knows that other Americans will accept her dollars. Indeed, federal law makes dollars legal tender

for all debts, public and private.¹ If, on the other hand, an American travels to Europe on vacation, she quickly learns that dollars are not accepted overseas. She must visit the exchange booth and make the transition to another system of monopoly money.

Most forms of money also have an additional characteristic that is useful in a medium of exchange: anonymity. Traders wish, for a variety of reasons, to control information about their activities.² Commodity monies (*e.g.*, gold coins) and paper currencies (*e.g.*, dollar bills) allow them to do so. Cash is anonymous because it does not create transaction records. One can take down the serial numbers of notes used to make a payment and then attempt to trace them, but few people take the time and effort to do so. By contrast, credit cards and checks are not anonymous because they create a paper trail that can be traced.

The second function of money is as a *unit of account*, a way of stating and comparing prices and values. Here again, monopoly monies have had an advantage until now, since it is easier to compare the prices charged by alternative sellers if they are all expressed in the same units. For example, there is some evidence that the introduction of the Euro is reducing price variance across European markets by making comparison-shopping easier between sellers located in different countries.³

Buyers routinely make comparisons across time or space, judging the price of an item by prices they have seen for similar goods in the past. Hence, an additional desideratum for a unit of account is price stability. If the value of money changes rapidly, it becomes difficult to use information about past prices to judge present prices, raising the information costs of transactions. A further reason for that desideratum is that a unit of account is used not only to measure prices, but to keep track of financial accounts—among other things, to make it more difficult for firms, or the employees of firms, to cheat their stockholders or creditors. That, too, is harder to do if the value of the unit of account is changing rapidly.

Money's third and final function is as a *store of value*. Few people in a modern society hold very much of their wealth as

¹ See The Task Force on Stored-Value Cards, Report, *A Commercial Lawyer's Take on the Electronic Purse: An Analysis of Commercial Law Issues Associated with Stored-Value Cards and Electronic Money*, 52 BUS. LAW. 653, 670 (1997).

² See David Friedman, *Privacy and Technology*, 17 SOC. PHIL. & POL'Y 186, 189 (2000).

³ Kerry Lynn Macintosh, *The New Money*, 14 BERKELEY TECH. L.J. 659, 664 n.33 (1999) [hereinafter Macintosh 1999].

currency since other financial assets pay interest and currency does not. However, in order to use money as a medium of exchange, we must hold some. Moreover, many other financial assets we hold are debts (e.g., bank accounts, or promissory notes) that can be repaid with money. If debtors repay us with devalued currency, our wealth is diminished.

Thus, we desire money that maintains—or better yet increases—its value. Ideally, money should either consist of a commodity with stable or rising value, or be produced by an issuer that has an interest in maintaining stable or rising value. For the same reason, it is also desirable that money be difficult to counterfeit.

III. MONOPOLY GOVERNMENT MONIES: THE CURRENT SYSTEM

Under present conditions, monopoly government monies serve two of the three functions described above. Most transactions, at least in large countries, occur between people using the same medium of exchange. Also, most people observe most prices in units of account they can understand.

Monopoly government monies do not perform the third function as well. Governments are reasonably good at preventing counterfeiting and have the power to regulate money so that its value remains stable. Unfortunately, governments also have the power to inflate their own monies and have done so to cover deficits, redistribute wealth and stimulate the economy, among other goals.⁴ Inflation and hyperinflation are ever-present risks of the current system. Moreover, when government money becomes unstable enough to make price comparisons difficult, its ability to function as a unit of account is also impaired.

Historical evidence indicates that a system of *competing* government monies is more stable. During the Middle Ages and Renaissance, governments issued their own monies, but expressed them in the same standard weight of gold. These 'dollars of the middle ages' served as the medium of exchange for international transactions. Governments were reluctant to debase their gold currencies, fearing that traders would shift to an alternative—from the bezant to the dinar or from the florin to the ducat.⁵ During the same period, however, governments did enrich themselves at the expense of

⁴ Lewis D. Solomon, *Local Currency: A Legal & Policy Analysis*, 5 KAN. J.L. & PUB. POL'Y 59, 65-66 (1996).

⁵ See CARLO M. CIPOLLA, *MONEY, PRICES, AND CIVILIZATION IN THE MEDITERRANEAN WORLD* 13-26 (1967).

citizens by debasing silver coins.⁶ The obvious explanation is that there was no market penalty for debasing silver, which functioned primarily as monopoly money.

A competing system of *private* monies is also possible. Lawrence H. White has documented the positive free banking experience in nineteenth century Scotland. There, free entry and competition yielded a stable banking and monetary system.⁷ However, the stability of a free banking system is constrained by the fact that the notes, though privately issued, are debts denominated in a monopoly money that is subject to government control.

The famous economist Friedrich A. Hayek thought free banking did not go far enough. He proposed a more radical solution: private companies should issue monies based on commodity standards of their own choosing.⁸ He believed competition would give private issuers adequate incentive to maintain the value of their currencies.⁹

IV. ELECTRONIC MONEY AND ON-LINE COMMERCE

Making payments by physically transferring objects, whether gold coins or paper currency, works reasonably well in the physical world, but it encounters serious problems in on-line commerce. There is no practical way to pass a twenty-dollar bill through a modem. Instead, we must transact using intangible claims to payment.

Credit cards allow us to do this. Unfortunately, credit cards pose certain disadvantages for sellers and buyers alike. On every transaction, sellers must pay percentage fees that erode their profit margins. Sellers also face the risk that buyers may attempt to reverse charges after receiving goods or services.¹⁰ Meanwhile, buyers who transmit credit card numbers on-line risk capture of information by interlopers. Even though federal law strictly caps liability for unauthorized charges, a stolen number can give a criminal the foothold he or she needs to commit identity theft. Finally, and perhaps most significantly, credit card transactions leave a paper trail that can result in a loss of privacy for sellers or buyers.

Electronic money can provide the on-line economy with an

⁶ See *id.* at 32-35.

⁷ See LAWRENCE H. WHITE, *FREE BANKING IN BRITAIN: THEORY, EXPERIENCE, AND DEBATE, 1800-1845* at 23-49 (1984).

⁸ FRIEDRICH A. HAYEK, *DENATIONALISATION OF MONEY: AN ANALYSIS OF THE THEORY AND PRACTICE OF CONCURRENT CURRENCIES* 21 (1976).

⁹ See *id.* at 42-44.

¹⁰ Macintosh 1999, *supra* note 3, at 663.

alternative payment system. A government—or a private company—can issue coins or notes in the form of electronic information. Each coin or note represents a claim against the issuer and can be redeemed in exchange for traditional money (*e.g.*, dollars), commodities (*e.g.*, gold) or any other agreed item of value.

Since electronic money is just information, geographical constraints become irrelevant. It is just as easy to transmit electronic cash to someone on the other side of the world as to someone next door. Moreover, once electronic money is loaded onto the computer chips embedded in 'smart' cards, it can be used in real as well as virtual space.

In a world of electronic money, sellers need not fear that buyers might reverse credit card charges after goods have been shipped or services received. Providers of online services can charge for access as it occurs, using automated transaction systems. Buyers can trade free of the worry that credit card numbers may be stolen.

Moreover, unlike credit cards, which leave a paper trail, electronic money can be designed to provide traders with the anonymity they crave. Imagine an electronic currency that is encrypted so securely that the parties—seller, buyer and issuer—cannot identify each other. Such fully anonymous electronic cash surpasses the privacy obtained with paper bills since a properly designed set of encryption protocols do not allow the equivalent of serial number tracing.

Given the advantages, it seems likely that one or more electronic currencies will come into use for online transactions, and having done so, will also become available for real space transactions through payment technologies such as smart cards. But will the currencies be monopolies? And if so, within what boundaries? Will the issuers of the currencies be governments or is the time ripe for private companies to enter the money business?

V. HOW WILL TECHNOLOGY AFFECT MONEY?

The answers to these questions depend on technology. To explain why, we discuss four factors: (1) the Internet and online commerce; (2) computers that can perform complex calculations; (3) electronic currency that is easy to create, manage and redeem and, (4) increased bandwidth leading to real-time audio and video. Each factor will play a role in determining the future of money.

The Internet makes on-line commerce possible and on-line commerce makes it easy to trade with people who are far away. As a result, geography and nationality are becoming less important to trade and traders.

As discussed above, our current system of monopoly monies is based on the premise that most trade takes place within geographic and national boundaries. On-line commerce attacks that premise at its core. Americans trade, not necessarily with other Americans, but with the Japanese, who, in turn, trade with the British and so forth.

Providing electronic money for the on-line environment is a challenge. What medium of exchange will be widely accepted within a *global* trading community? What unit of account will allow *global* traders to compare prices with ease and confidence?

In the absence of effective world government, it is hard to imagine who might issue a global monopoly money. The European Union encountered substantial economic and political difficulties in adopting the Euro, even though its member states had similar economies and cultures. Surely, the United Nations could not manage the same feat for the entire world. Many—perhaps most—nations would balk at granting the United Nations the power to fund activities through the (electronic) printing press and inflation.

A different solution seems likely in the short term. Nations are well aware that they earn seigniorage—that is, interest—on coins and paper bills in circulation. Thus, as trade goes electronic, nations will have ample incentive to issue their own monopoly monies in electronic form.

Once the Internet is flooded with alternative national monies, traders may find that exchanging from one to another is inefficient. Over time, they may come to prefer one currency that seems to enjoy the widest acceptance and greatest stability. Eventually, that one currency will emerge as the *de facto* global monopoly money. For example, dollars may come to dominate on-line commerce just as English has become the language of international trade, travel, journalism and diplomacy.

This development will threaten the seigniorage income and national prestige of other countries. Governments may respond by enacting laws to prevent citizens from using electronic money other than their own. But such restrictions will be difficult to enforce in a world of competing monies and strong encryption.

However, traders from other countries may also resist the electronic dollar. At best, they may view the electronic dollar as an

offensive form of cultural imperialism; at worst, they may find themselves powerless to intervene, as the United States uses its currency to advance its own economic and political agenda.¹¹

To get around such problems, traders may shift to a system of *competing* currencies based on the same commodity.¹² By providing a common unit of account, such a system may obviate the need for a common medium of exchange. To illustrate, suppose multiple issuers (whether public or private) produce electronic cash using gold as the base commodity. The currency of reliable issuers will exchange at par—one Microsoft gold unit for one Netscape gold unit, for example. The currency of unreliable issuers (those unwilling or unable to redeem their own currency) will trade at a discount. Monies trading at a discount will be less convenient and valuable, and will go out of use rapidly.

Computer technology makes it easier to convert from one unit of account to another. Electronic money is easy to store and transmit, reducing the cost of exchange. These developments will lessen the need for money monopolies, whether public or private.

Thus far, we have assumed that a common medium of exchange and unit of account will tend to be the most efficient form of money for the Internet. In other words, we have assumed money monopolies will continue to exist.

However, another path is possible if computers eliminate or reduce the transaction costs of making conversions among different units of account.

Consider how a currency-transparent browser may work in the future. A Japanese seller lists the prices of the goods he sells in yen on his web page. A buyer in the United States accesses the page, seeking information about goods and prices. His browser, noting that the prices are in yen, automatically contacts the web site of his bank, checks the current exchange rate and makes the calculation from yen to dollars. In other words, the seller writes his prices in yen, but the buyer reads them in dollars—thus overcoming the unit of account

¹¹ Kerry Lynn Macintosh, *How to Encourage Global Electronic Commerce: The Case for Private Currencies on the Internet*, 11 HARV. J.L. & TECH. 733, 758-764 (1998) [hereinafter Macintosh 1998].

¹² See George A. Selgin & Lawrence H. White, *How Would the Invisible Hand Handle Money?*, 32 J. ECON. LITERATURE 1718, 1720-21 (1994). Of course, the official money of a powerful country—say, the dollar—could be used as the common base. But this solution is subject to the same objections discussed immediately above. In particular, if the United States government inflates the dollar, dollar-denominated claims will suffer the same fate.

problem.

If our buyer decides to make the purchase, he still must convert his dollars to electronic yen—the requested medium of exchange. His bank will charge for this service. However, since it is relatively easy to store and transmit electronic information, the cost of operating an exchange service for electronic money should be much lower than the cost of running an exchange service for paper money. Presumably, the bank will react by lowering the exchange fee charged to the buyer. A drop in exchange fees may reduce the pressure to use a common medium of exchange.

In this example, both buyer and seller are using government monies. This is the most likely scenario, given that most transactions still take place in real space using paper money. If a consumer has to keep paper dollars in her pocket for everyday purchases, she may be more likely to prefer electronic dollars for on-line purchases.

However, as the years go by, more and more real space transactions will take place using smart cards and other electronic payment systems. This raises the possibility that Americans may one day hold electronic yen for use on-line—and in America.

More radically, electronic money may pave the way for the world Hayek envisioned. Private companies may begin to issue electronic currencies that are based on different commodity standards. Monies designed for general use will compete directly with each other for market share. Meanwhile, *niche currencies* will circulate within particular trades. For example, if an on-line community trades primarily in software, it may prefer currency that maintains a stable purchasing power relative to software.¹³

In either case, private companies will obtain a competitive edge by designing their monies for anonymous use. Many traders will prefer currencies that protect against the prying eyes of both private parties and government officials.¹⁴

How many competing monies, public or private, can commerce accommodate? One of us (Friedman) believes that dozens, hundreds, or even thousands of monies are possible—not only in virtual space, but in real space as well. He points out that the equivalent of a currency transaction browser is harder to produce in a store than on-line, but not impossible. For example, a customer might stroll through Safeway wearing virtual reality goggles that automatically

¹³ Macintosh 1998, *supra* note 11, at 744-50.

¹⁴ See David Friedman, *A World of Strong Privacy: Promises and Perils of Encryption*, 13 SOC. PHIL. & POL'Y 212, 217 (1996) [hereinafter Friedman 1996].

convert prices to the desired units of account.

The other of us (Macintosh) is somewhat more conservative. She speculates that most traders will continue to be human beings—at least in the short term. She believes that, for psychological reasons, the average human being will be more comfortable working with five or six monies than five or six hundred.

How might governments react to such monetary proliferation? As explained above, some may ban competing monies in an effort to protect seigniorage and sovereignty. Moreover, governments are likely to react badly to anonymous monies that make it harder for them to monitor compliance with tax, immigration, employment or other laws that affect trade. Realistically, however, the very feature that makes such monies threatening—encryption—may make it impossible for governments to enforce the ban.

Technology will create conditions that tend to support monetary stability. First, ease of entry into the business of issuing electronic money will promote a healthy competition. Second, improved communication will make it easier to check the reputation of the issuer. Third, the ability to return electronic money for redemption at the speed of light will reduce the ability of issuers to engage successfully in hyperinflationary schemes. As a result of these technological developments, private monies will become more attractive to the public.

Let's return to the third function of money: a store of value. People prefer monies that are stable. As evidence of this, consider what happens in countries where the official local currency is inflated. Traders begin to use foreign money as their preferred medium of exchange. Efforts to outlaw foreign money are often ineffective and tend to create black markets. In some cases, foreign money emerges as a *de facto* unit of account. For example, at one time it was common for long-term rentals in Israel to be priced in dollars rather than Israeli pounds.

A common charge leveled against the idea of private monies is that they will not be stable. Private companies will enrich themselves by accepting value from customers and then inflating the money supply.¹⁵

One way to reduce this risk is through competition among issuers. As explained above, this is how private banks established a stable

¹⁵ See Selgin & White, *supra* note 12, at 1734-35.

monetary and banking system in Scotland during the eighteenth century.

Effective competition is *more* likely in a world of electronic money for two reasons. First, entry into the business is relatively easy and inexpensive. Issuers need not invest in gold or manage bulky paper bills. Second, on-line technology drastically reduces the cost of information and communication. A user on one side of the globe can check the reputation of an issuer on the other side (or have an intelligent software agent check it for him in a fraction of a second while deciding whether to accept a proffered payment).

Another way to reduce the risk of inflation is through contract. An issuer can promise to redeem its money at a minimum level of value expressed in commodities or other currencies.¹⁶ Here again, technology makes the contractual solution work better. If an issuer begins to inflate its electronic money, disgruntled users can return the money for redemption at the speed of light.¹⁷

Increased bandwidth may lead to the rise of virtual communities with their own idiosyncratic currencies.

As bandwidth increases, and most Internet users gain access to real-time audio and video, we may witness the emergence of virtual communities defined by common interests or beliefs.¹⁸ Given the nature of the Internet, these virtual communities will have members from a variety of different countries. Rather than employ the official currency of any one nation, members may prefer to invent their own electronic money for circulation only within the community. Use of the idiosyncratic currency will help the community to form, express and maintain its own identity. Moreover, by encouraging members to trade with each other, the currency will build solidarity.¹⁹

VI. FIVE POSSIBLE FUTURES FOR MONEY

If the foregoing arguments are correct, money faces five possible futures:

1. A world with the same monopoly monies we have now, but in electronic form. Governments will enact laws outlawing the use of alternative currencies in an effort to protect seigniorage revenues,

¹⁶ Macintosh 1998, *supra* note 11, at 751-55.

¹⁷ See F. X. Browne & David Cronin, *Payments Technologies, Financial Innovation, and Laissez-Faire Banking*, 15 CATO J. 101, 105-106 (1995).

¹⁸ See Friedman 1996, *supra* note 14, at 216-17, 222-23.

¹⁹ See Macintosh 1998, *supra* note 11, at 788-94.

bolster national prestige and control the economic lives of their citizens. However, these laws will be hard to enforce.

2. A world with a single electronic money for on-line commerce. This outcome could be difficult to achieve in the absence of effective world government. However, in a competition among different nations, one currency—say, the electronic dollar—may emerge as the victor. The resulting unitary system will be very efficient, but may be perceived as culturally and economically oppressive.

3. A world with a single commodity base for a system of competing electronic monies. This system combines the benefits of competition with the simplicity of a common standard. Its disadvantage is that the single standard may not be the right one—and could be hard to change.

4. A world of multiple competing currencies, some public and some private, with a variety of different bases, exchanging at changing rates. The optimal number of currencies may depend on how effective computers are at reducing or eliminating the costs of conversion and exchange. This system will promote competition not only among monies, but also among monetary standards. If for some reason one standard turns out to have advantages over another, issuers can shift accordingly.

5. A world with multiple currencies and standards, each standard being identified with a virtual community. This outcome is more likely if improved bandwidth fosters the development of strong virtual communities.

Governments anxious to preserve their powers and prerogatives may push for outcome one. Powerful nations or groups of nations, like the United States or the European Union, may push for outcome two. However, we conclude that technological developments, along with the self-interest of users and enforcement difficulties, are going to push us towards outcomes three and four, or possibly, given the appropriate social developments, outcome five.