Towards a Moneyless World?*

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Abstract
The New Monetary Economics predicts that a low-transaction-cost world will be characterised by monetary separation. Current innovations in the payment system seem to bring us closer to such a moneyless world. However, market microstructure theory suggests that transaction costs will not fall to zero. Therefore, a common medium of exchange that serves as unit of account will remain a necessary instrument to reduce transaction costs. While emoney has the potential to replace cash it will be denominated in units of national currencies. Therefore, central banks will remain in control, even if emoney is issued off-shore.

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A central bank basically has two products: bank notes and deposits. Financial innovation seems to have the potential to decrease the demand for both products dramatically. Therefore, increasingly the question is asked, how long there will be a demand for bank notes and central bank deposits. In most countries, deposits with the central bank have already declined dramatically. At the same time, financial innovation threatens to eliminate the demand for bank notes as a medium of exchange and a store of value. According to some economists this will not simply lead to a replacement of one type of money (say banknotes and deposits) by another. They argue that ‘money’ as it is known today will disappear. Instead, people will hold mutual fund shares and similar instruments that will also be used in order to make payments (‘mutual fund banking’).\(^1\) If financial innovation can, indeed, be expected to reduce the demand for bank notes and central bank deposits to zero, central banks would loose control over the short-term interest rate. ‘Central banks would lose their ability to implement monetary policy’ (King 1999).

1. The New Monetary Economics

Is money as we know it today a model that will soon be part of history? The New Monetary Economics seems to deliver the theoretical underpinnings for an affirmative answer. Current innovations in the payment system are often interpreted as bringing us closer to the moneyless world described in the New Monetary Economics. In a first step, the main arguments and predictions of the New Monetary Economics will be simply described. After that it will be shown how the New Monetary Economics has been used to predict the consequences of current financial innovations. Finally, a critical assessment will be given. In particular, it will be discussed whether recent financial innovations will, indeed, bring us closer to the world envisioned in the New Monetary Economics.

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A. The Main Elements of the New Monetary Economics

The subject of the New Monetary Economics is the financial system in a world of falling transaction costs and decreasing public regulation. It is not a homogenous body of theories and it overlaps with other theories such as the ‘legal restrictions theory’ of money. Sometimes the two terms are treated as synonyms. But the main thesis can be summarised as follows. In the Brave New World of low transactions costs and little (if any) public regulation ‘money’, as we know it today, will cease to exist. The term ‘New Monetary Economics’ was coined by Robert Hall (1982b). Hall criticises traditional theories, such as Keynesian and monetarist approaches, and favours a new view. Acknowledging Hall’s as well as Fischer Black’s and Eugene Fama’s contributions Robert Greenfield and Leland B. Yeager have introduced the term ‘BFH system’ for the system that is envisioned by exponents of the New Monetary Economics. What are the main features of the BFH system? In spite of differences in opinion all authors agree that an unregulated monetary system would be characterised by monetary separation. In the current system money (cash and deposits) is used as medium of exchange and unit of account. In the BFH system there would be no common medium of exchange with a fixed nominal value in terms of the unit of account. Instead, assets with variable prices are used. This implies that, in principle, any asset could serve as a medium of exchange. An example that is often used to illustrate ‘moneless’ payments are mutual funds shares. The value of mutual funds’ shares varies with the value of the funds’ assets and within certain limits they can be used for making payments. So, the medium of payment ‘mutual fund share’ has a value that is not fixed in terms of the commonly used unit of account. Eugene Fama (1980) argues that monetary separation is efficient because the financial system (Fama uses the term ‘banks’) serves two functions that are independent of each other: the accounting function and the portfolio management function. Banks could fulfil the accounting function without holding assets or using any medium of payment. It would be sufficient to have a unit of account. As an uninvolved third party, banks could just keep records of transactions. The issue of liabilities and the purchase of assets is derived from the second function, the portfolio management function. In this function banks help individuals to hold their wealth in a

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3 Alternatively, the value of fund shares is fixed but the number of shares in each portfolio varies with the value of the fund’s assets.

4 Therefore, Hoover (1988, 153) refers to Fama’s argument as ‘separation theorem’.
form they desire. Thus, the traditional view of banks as creators of money is replaced by a new view (O’Driscoll 1986, 20).

There is no common opinion as to what should serve as a unit of account. But all authors agree that almost anything can serve as a unit of account: single goods, goods’ baskets, single assets, portfolios, ‘outside’ money (if still in use) or even abstract units. Hall (1982a), for instance, has proposed the following basket of goods (called ‘ANCAP’): 33 cents worth of ammonium nitrogen, 12 cents worth of copper, 36 cents worth of aluminium, 19 cents worth of plywood (1967 prices). These goods were chosen out of a group of standardised, actively traded commodities. The aim was to find a basket that is closely correlated with the consumer price index. Black (1970) uses a unit called ‘dollar’ although in the payment systems he describes, there are no ‘dollars’ circulating as a medium of exchange. Thus, the dollar turns out to be a purely abstract unit of account. Cowen and Kroszner (1994) even think that it is likely that numerous units of account will be used simultaneously. As they point out, this would allow to take heterogeneous preferences into account. The increased transaction costs of multiple units of account are deemed to be negligible. However, most of the other authors maintain that a single unit of account is more efficient.

How are payments made in the BFH system? Fama (1980, 1983) describes a moneyless payment system as a pure accounting system in which banks record transactions. This is, by itself, not much different from the current system with traditional cashless payments methods. Just like today, payments can be made using checks or debits. But in contrast to today’s payment system, the payment system is run by financial intermediaries whose liabilities are not nominally fixed. If somebody wants to make a payment he transfers the corresponding value in the form of shares to the account of the payee. The value of assets and liabilities is always expressed in terms of the unit of account and constantly marked to market. Such a transfer can be brought about with all kinds of assets. Therefore, according to exponents of the New Monetary Economics it does not make sense to single out certain assets as ‘money’. In principle, any agent can use his entire wealth for payments. Additionally, he may draw on open credit lines. Thus, there is no fixed amount of media of payments, but still there is a stream of payments. As Black (1970, 9) puts it:

‘In such a world, it would not be possible to give any reasonable definition of the quantity of money. The payments mechanism in such a world would be very efficient, but money in the usual

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5 According to Niehans (1982, 23) this is the case already in euromarkets.
sense would not exist. Thus neither the quantity theory nor the liquidity preference theory would be applicable.'

Sometimes it is acknowledged that cash may be required for small payments. However, the potential survival of cash is judged in different ways. Fama (1983) argues that the use of cash for payments makes it possible for the central bank to conduct an orthodox policy of base control in order to determine the price level. Black (1970), however, regards the stock of currency as purely passive variable that is determined by the demand for currency and has no significance for price level determination.

The transition into a moneyless world is also seen differently by various authors. Cowen and Kroszner (1994) interpret the transition as a more or less inevitable process. Fama (1980) seems to regard a wide-ranging deregulation as a precondition. Greenfield and Yeager (1983, 305) even deem it necessary to explicitly rule out the issue of small denomination, fixed value government debt in order to safeguard a moneyless payment system against a return to monetary payments.

Abstracting from transaction costs, the exponents of the New Monetary Economics claim that deregulated system with monetary separation offers a number of advantages.

   a. The BFH system is assumed to be more efficient than the current system. In an unregulated, competitive environment there will no longer be a penalty on liquidity (in the form of interest foregone). Agents can use interest earnings assets in order to make payments. Household and firms no longer need to engage in liquidity management. Thus real resources are saved. In other words, the much cited ‘shoe leather costs’ can be avoided. However, if it is more efficient to pay interest on money, the question naturally arises why this does not occur today. After all, the arguments of the New Monetary Economics seem to imply that interest-bearing money would quickly drive out non-interest bearing money. In order to explain the existence of non-interest bearing money the New Monetary Economics resorts to the argument that non-interest-bearing money survives because of government regulation. Since the state forces agents to use money in order to pay taxes and requires banks to hold reserves, there is a need to hold money even if it does not bear interest. In an unregulated environment non-interest-bearing money would be quickly driven out by interest-bearing assets. At this point the New Monetary Economics

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6 Paying a competitive interest rate on money has the same effect for the money holder as a deflation rate which is equal to this interest rate in a regime with non-interest bearing money. The latter is Friedman’s (1969) well-known condition for an optimal quantity of money.
overlaps with the Legal Restrictions Theory. But while the Legal Restrictions Theory predicts that there would be an equality of returns in an unregulated environment (that is interest on money), the New Monetary Economics goes one step further and predicts that there will be no such thing as ‘money’.

b. The BFH system is supposed to be more stable than the current system. In the BFH system, financial intermediaries do not issue liabilities with a fixed nominal value. Rather, they will issue shares, the value of which is going to fluctuate with the market value of their assets. This presupposes that assets as well as liabilities are constantly valued in financial markets. If, for instance, a fund experiences a fall in prices of its assets, this will immediately be reflected in a lower value of its liabilities. The price of the liabilities is going to fall until investors are prepared to hold them. If the loss in confidence is very large, investors may still choose to transfer their capital to another financial intermediary. In this case, the fund will lose assets. If all investors transfer their capital, the fund in question will simply cease to exist. In any case, there will never be a bankruptcy, since liabilities are only claims on assets and have no fixed value. Therefore, the possibility of a bank run can be ruled out. This is why exponents of the New Monetary Theory claim that the moneyless world would be more stable than the current monetary system. The claim that there can not be any bank run in the BFH world is also often used to justify calls for further deregulation of financial services. If there are no bank runs, those regulations that serve to prevent liquidity crisis and aggregate instability are obsolete. This would only leave consumer protection as (controversial) justification of regulation.

c. It is proposed that in a system without compulsory reserves and other regulations there can be no credit creation. Financial intermediaries are becoming passive players with no influence on aggregate activity. Fama refers to such a financial system as a pure accounting system. Banks and funds are record keepers and portfolio managers. If capital markets are perfectly competitive, financial intermediaries cannot create credit because the size of their balance sheets is determined by their customers. Thus there is no influence from the financial sector on the real sectors of the economy. This result has been derived in a similar fashion by James Tobin (1963) already, who claimed that the credit creation abilities of

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8 The connection between bank runs and regulation is also pointed out by economists who do not endorse the New Monetary Economics. See, for instance, Goodhart (1988) and von Weizsäcker (1986).
banks are a ‘myth’. As Fama (1980, 45) points out, this result implies that the Modigliani-Miller (1958) theorem applies to the financial sector - even when considering that financial intermediaries take over information and control functions and allow diversification at lower costs. As long as the market is competitive, according to Fama, it must be neutral with respect to the real economy. Black (1970) and Greenfield and Yeager (1983) derive a similar conclusion.

d. Greenfield and Yeager (1983), in particular, have stressed that monetary separation would help to avoid the painful consequences of inflation and deflation. While today changes in the supply of or the demand for money necessitate changes of millions of prices, a prolonged and painful process, in the BFH system disequilibria can be removed instantaneously by changes of financial market prices. Since medium of exchange and unit of account are separated, the value of the unit of account (in terms of goods) is not affected. For instance, an increase in the demand for money (which is not fully accommodated by monetary policy) would lead to a fall in aggregate demand in the current system. In such a case, a new equilibrium can only be reached by an adjustment of the price level. If many goods’ and factor prices are sticky, unemployment will be the result. In the BFH system an increase in demand for certain assets would only have the effect that the prices of these assets are rising and that prices of other assets are falling. There would be no need for a change in goods’ prices. Thus, the painful side effects of sticky prices could be avoided.

Points c. and d. imply that, in the BFH system, Say’s Law is never violated. Every supply of goods implies that agents wish to demand current or future goods. Any demand is based on a supply of goods and services. Macroeconomic disequilibria, i.e. excess demand or excess supply, is impossible (Neldner 1997, 17). In contrast to a monetary world, in which hoarding is possible, the equality of saving and investment is always fulfilled. This view has been expressed in a pointed manner by Black (1970, 18-9):

‘When an individual decides to spend more, some other individual must decide to spend less. Borrowing must equal lending; an increase in one must be balanced by an increase in the other. Thus an added demand for consumption goods by one individual must be balanced by a reduced demand for consumption goods by another individual. So, aggregate demand is not affected.’

The New Monetary Economics is not a homogenous theoretical system. The authors make use of diverging approaches and focus on different aspects. For instance, Cowen and Kroszner (1994) use an evolutionary approach. They point out that money has allowed for a deeper division of
labour and the formation of a large number of new markets (incl. financial markets). However, financial markets would finally reach a state of efficiency that would allow agents to dispense with money. Thus the development leads to a barter system of higher order. Black (1970) and Fama (1980, 1983) are using the theory of finance. Similar to Modigliani and Miller (1958), they develop their argument within a general equilibrium framework without transaction costs. This framework allows them to derive the neutrality of the financial sector. Furthermore, it leads to the conclusion that an unregulated system would be more efficient. In contrast to Fama and Black who are mainly concerned with efficiency, Greenfield and Yeager (1983) focus on the question of aggregate stability (long term stability and medium term, cyclical stability). They are concerned about the potential of the monetary sector to destabilise the economy.  

While the theoretical ideas of the New Monetary Economics seems to point into the direction of a radically different financial system, the exponents of this approach follow a more gradualist approach when it comes to making economic policy prescriptions. Relatively close to the theoretical approach is the idea that there can be a purely abstract unit of account that is not tied by convertibility to any goods or financial assets. This idea can be found in Black (1970), Cowen and Kroszner (1994), Greenfield and Yeager (1983) and Hall (1982a). While some of the authors (e.g. Cowen and Kroszner) want to leave it to the market to determine the right unit of account, others (e.g. Greenfield and Yeager) think that this remains a task of the state.

Other ideas are more conventional, basically representing modifications of the present system. Black (1970) proposes a kind of adjustable gold standard that has much in common with Irving Fisher’s (1920) ‘compensated dollar’. Fama (1983) proposes a monetary base targeting. Hall (1983) develops the idea of an interest bearing reserve certificate that pays a relative interest rate (relative to other safe assets) which is tied to the inflation rate. Greenfield and Yeager (1986) propose a system of indirect convertibility.

B. Financial Innovation and the New Monetary Economics

Some authors have used the New Monetary Economics in order to analyse the consequences of the financial innovations in the payment system. Thus, Browne and Cronin (1995, 1997) find, that the development and spread of new electronic payment devices may bring the BFH world much

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9 It is interesting to note that Black (1970) interprets the current monetary system quite differently. He thinks that money is widely passive – even under current conditions.

10 The statement in Greenfield and Yeager (1983) is not unambiguous. In later publications, they propose a system
closer ‘enhancing the prospects of laissez-faire banking emerging (endogenously) over time’ (Browne and Cronin 1995, 102).\(^\text{11}\)

‘Laissez-faire’ banking clearly means a state of the world envisioned by the New Monetary Economics. It should not be confused with free banking.\(^\text{12}\) Browne and Cronin clearly see the technical development as decisive step on the way towards monetary separation and ‘share banking’. Just like exponents of the New Monetary Economics they claim that such a world would be more efficient and more stable.

‘In our view, the movement to a situation where the asset that acts as the medium of account (outside money) is not itself used as a medium of exchange, even in interbank payments, conforms to this evolutionary approach to money and would seem to be the preferable route to a much more efficient cashless economy.’ (Browne and Cronin 1995, 102-3)

What Browne and Cronin predict is the substitution of emoney for currency and finally the substitution of direct asset transfers for monetary exchange. The key in this future development is the capacity of financial innovation to reduce transaction costs. Browne and Cronin (1995, 104) predict that falling communication costs will make the use of emoney cheaper. Falling prices and greater convenience of emoney (including interest paid) will reduce the demand for banknotes towards zero. However, the development will not stop at this point. Falling transactions costs will also reduce the demand for emoney because the brokerage fee falls to negligible levels, so that agents can almost instantaneously switch into and out of other assets at hardly any cost (Browne and Cronin 1995, 109).\(^\text{13}\) At the same time, according to these authors, reserves of banks are likely to decline. The main reason for this is, that falling transactions costs will make it possible to settle debts – both in wholesale and in retail transactions - increasingly by real time asset transfers (Browne and Cronin 1995, 108, 111). So, the endpoint of the development is a moneyless world where either the old monetary unit\(^\text{14}\) or a commodity-based unit such as Robert Hall’s (1982a) ANCAP is used as a unit of account. According to Browne and Cronin (1995, 108, 114), practical problems of running a payment system based on claims with variable value will become insignificant as financial innovation proceeds because the transfer of marked-to-market shares is of indirect convertibility. See Greenfield and Yeager (1986).

\(^{11}\) See also King (1999).

\(^{12}\) Free banking theorists such as White (1984) do not think that competition will drive out bank notes or deposits which have a fixed nominal value in terms of the unit of account.

\(^{13}\) A related point is made on page 114, where the authors predict that bid-ask spreads will fall to negligible levels.

\(^{14}\) Banknotes may still have value as a collectors’ item, so that there would be a market demand for banknotes. Therefore, according to the authors, the price level would still be determined. See Browne and Cronin (1995, 110).
supposed to be a cost-competitive alternative to deposit transfers (Browne and Cronin 1997, 162). A similar scenario is envisioned by Mervyn King (1999).

The authors see only very limited possibilities for central banks to stop or retard this process towards a moneyless world. They argue (Browne and Cronin 1997, 157) that regulation would only drive customers to less regulated institutions, possibly incorporated off-shore. Furthermore, they point out (Browne and Cronin 1997, 156) that central banks do not have the expertise in retail banking to enter the emoney market themselves.

Just like other exponents of the New Monetary Economics Browne and Cronin claim that in a share banking system there would be no bank runs and they claim that a moneyless world would be more stable, in general. In their own words:

‘…a pure accounting system of exchange would be more stable and less inflation prone than one based on a monetary system of exchange. ….large asset price collapses would not occur in a pure accounting system of exchange.’ (Browne and Cronin 1995, 112).

Even before the state of a pure accounting system is reached, there would be more stability, because in a system in which emoney is used, any bank that overissues would be affected much faster by adverse clearing than in a paper-based system. Therefore, there would be a strong market discipline on emoney issuers (Browne and Cronin 1995, 105-6).

2. Critical Assessment: The Moneyless World Ante Portas?

This chapter neither attempts to give a comprehensive assessment of the New Monetary Economics nor does it provide a detailed discussion of the advantages of indirect exchange in a world with transaction costs. Rather, it focuses on the question whether technological innovation is likely to reduce transaction costs close to zero. The answer to this question is, of course, speculative in character. Still, empirical and theoretical reasons can be found that strongly suggest that transaction costs will remain well above zero and that a common medium of exchange will also be used in an environment with significantly lower transaction costs.

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A similar argument can be found in Fama (1980, 55-56).

15 See also Browne and Cronin (1997, 163) where they flatly state that ‘changes in the aggregate price level do not arise in an ASE’ [‘accounting system of exchange’, M.K.].
A. On the Nature of Transaction Costs in Financial Markets

Admittedly, in a general equilibrium framework without transaction costs an agent would be indifferent as to which asset he receives in payment (Fama 1983, 9). At the current market price, any amount of a particular asset could be exchanged against another asset. However, many economists doubt that the Walrasian framework is suitable for the analysis of monetary phenomena (Goodhart 1989, Hellwig 1993, Laidler 1984, 1990). The idea of a centralised auction, as useful as it often may be, seems to be too remote from the world as it is to explain real world institutions such as money.

‘If a monetary economy solves the same problems as would a competitive market, it might often be safe to assume that it acts ‘as if’ it were in fact a market economy, and that is why conventional microeconomic analysis is a useful tool for analysing the real world. However, when it comes to analysing the processes of disseminating and processing information themselves, and those of co-ordinating activity, it is important to choose between assuming a monetary economy and a Walrasian market economy. It is a fundamental error to assume the existence of a clearing Walrasian market as the first step of an attempt to understand money.’ (Laidler 1990, 106)

Goodhart (1989, 2) proposes to use the market maker model instead of the Arrow-Debreu Walrasian auctioneer to analyse monetary phenomena. It provides a more realistic view of the organisation of a wide variety of markets – in particular financial markets. Once the Walrasian framework is abandoned, the assumption that agents are indifferent with respect to the type of asset they receive as payment is no longer tenable (Hoover 1988, 152-3, White 1984a, 708). Sales or purchases of assets involve costs, there is a spread between buying and selling prices (bid-ask spread) and when larger quantities are involved, market participants have to take into account that the market price may move against them (‘market impact’). Technical progress can reduce some of the transaction costs but it cannot totally eliminate them.

Transaction costs in financial markets do not just consist of hardware and software costs. An important cost component consists of the costs of market making. Without market makers it could be difficult and time consuming to find a trading partner who is willing to trade at an acceptable price. The price for the services of market makers usually consists of the difference between the bid and the ask price (the ‘spread’). The spread is not just technically determined but
also by considerations of risk. Stoll (1985, 82) enumerates four different factors that have an influence on the spread:

a. processing costs,
b. risk,
c. adverse information and
d. monopoly power

Of these four categories, the first is the one that is most directly affected by technical progress. But that still leaves the other three. Leaving monopoly power aside, the market maker has to be rewarded for the price risk he is taking while holding a position and he has to be compensated for losses incurred in trading with better informed traders. Using NASDAQ data Stoll (1989, 132) finds that order processing costs account for 47 percent of the spread, inverse information for 43 percent and holding costs (incl. risk) for 10 percent. This shows that more than 50 percent of transaction costs are not directly affected by technical progress. These costs can be too high for a market to exist. For instance, the purely technical costs to introduce new futures contracts in Chicago or London are small. However, there are only relatively few futures contracts (compared to the total number of goods and assets) because the costs of market making are too high.16

- Risk

The costs of market making are declining (c.p.) when shocks are less frequent and/or the volume of transactions is increasing. Falling transaction costs can increase the volume of transactions by increasing the number of trades and by integrating formerly separated markets. Thus, to some extent, falling transaction costs can lower risk in financial markets. However, unless risk is reduced to zero, the use of a common medium of exchange can still provide further risk reduction. Suppose there are \( n \) goods. If there is no common medium of exchange, the number of markets \( m \) would be equal to \( \frac{n(n-1)}{2} \). There would be separate markets for bilateral trade in, say, IBM stock and Microsoft stock, IBM stock and Ford stock, Motorola stock and Ford stock etc. Each of these markets would be fairly narrow. Consequently, price fluctuations would be larger and the risk for market makers would be higher. If a common medium of exchange would be used, there would be only \( n-1 \) markets. Thus, the number of markets would be smaller by a factor of \( \frac{2}{n} \). Turnover in each market would be, on average, \( n/2 \) times higher. This would mean that demand and supply in each market were more elastic. Prices would fluctuate less and the risk

16 Black (1986, 1) reports that in the mid-1980s only 45 commodities were actively traded in futures markets. See also Houthakker (1959, 156-8) who raises the question why there are so few futures markets.
for market makers would be smaller, so that they could charge a lower spread. The negative relationship between volume and the size of the spread is empirically well documented.\textsuperscript{17}

- Adverse information

A market maker who is quoting prices at which he is willing to trade is exposed to the risk of trading with insiders (Bagehot 1971, Glosten and Milgrom 1985). In such trades with insiders the market maker is likely to lose money.\textsuperscript{18} Therefore, market makers have to charge a spread. The spread between bid and ask prices yields an income from trades with uninformed traders ('liquidity traders') and reduces the losses in trades with insiders. Formally, the bid and ask prices can be derived for a risk neutral trader in the following way:\textsuperscript{19}

\begin{align}
\text{P}_{\text{ask}} &= E(\text{value}|\text{sale}) \\
\text{P}_{\text{bid}} &= E(\text{value}|\text{purchase})
\end{align}

If there are insiders in the market, market makers will not set just one price at the level of the expected value of the asset. Rather they will set an ask price that is equal to the expected value in the case of a sale. This price is higher than the (unconditional) expected value because a sale could imply that an insider who knows that the asset is undervalued is the buyer. Similarly, the bid price is the expected value – given that there is a purchase. It is lower than the (unconditional) expected value because a purchase might imply that insiders are selling who know that the asset is overvalued. The higher the probability that the next trade is a trade with an insider the higher the spread must be in order for market makers to avoid losses.

One way to reduce this type of risk is specialisation. A specialised trader is well informed and there are only few market participants that are better informed. As Alchian (1977) has pointed out, when there is no common medium of exchange, it is hardly possible for a trader to specialise, because he has to be informed about any good that may be offered as payment.\textsuperscript{20} So, if traders quote a price in terms of the unit of account and has to accept various assets in payments he is more exposed to informed traders. But if a trader can choose the asset that is used as medium of exchange the price quotation alone does not confer enough information to customers. In

\textsuperscript{17} See, for instance the pioneering study by Demsetz (1968), Benston and Hagerman (1974) or Frino, McInish and Toner (1998).

\textsuperscript{18} In a market without designated market makers limit orders perform the same function as a market maker (Stoll 1985, 73). In this case the argument in the text applies to those market participants who place limit orders.

\textsuperscript{19} Compare O’Hara (1997), 61-2.

\textsuperscript{20} See also Brunner and Meltzer (1971) who argue that the cost of information about the quality of goods is important for the explanation of indirect exchange with money.
particular, if they do not own this particular asset at the moment they will not be able to finish the deal even if the price is right. All in all, markets will be less liquid: immediate trading will not always be possible, spreads and market impact will be larger. But if there is one low information cost medium of payment, a trader can specialise in gathering information about a particular good (or a group of goods) that he exchanges against money. This, in turn reduces his risk when trading with informed traders and lowers spreads. Thus, even if, initially, there is no common medium of exchange, there are strong incentives to use one because it expands market volume and reduces transaction costs. In other words, quoting prices in terms of a common medium of exchange makes markets more liquid (O’Driscol 1985, 11).

If there were more than one medium of exchange, there would also be higher negotiation costs because trading partners do not just have to negotiate the price, the quantity, time and place of delivery etc, but also the means of payment. This will make negotiations more costly. Thus, in a world with transaction costs a common medium of exchange is also a tool to reduce negotiation costs. Finally, as markets get smaller, monopoly power in market making becomes an issue because a small market is unlikely to sustain competing market makers.

The fact that transaction costs may make some assets more suitable for the settlement of transactions than others is also acknowledged by Fama (1983, 10):

‘... even in an unrestricted system, cost minimisation may imply that a small subset of securities with common characteristics are generally purchased and sold to settle transactions. These low transactions cost securities could be short-term low risk instruments like current day federal funds, repurchase agreements, and broker loans.’

However, he does not explain why cost minimisation would allow for more than one medium of exchange. After all, negotiation costs and the number of markets could further be reduced if just one medium of exchange were used.

**B. Transaction-Costs: How Far Do They Have To Fall?**

Above, it has been argued that transactions costs are likely to fall but not enough in order to eliminate the economic rational for the use of money. This raises the question what ‘enough’ means. How small can transaction costs get without triggering a shift towards a moneystack economy? While it is almost impossible to provide a definite number to answer this question, a look at currently operating low cost markets may be helpful. Already today, many of the existing
wholesale markets operate with highly sophisticated technical equipment that makes it possible to communicate and deal at extremely low costs. However, the significance of these technical factors should not be overrated. As the example of the foreign exchange market shows, the use of a common medium of exchange has advantages even in a low cost environment. Much of the costs of banks and brokers have fixed cost character, so that marginal communication costs are close to zero. Still, what can be observed in this market is, that one currency, the US$, takes over the role of a common medium of exchange (a ‘vehicle currency’). In 8 out of 10 transactions the US$ can be found on one side. The explanation is simple. It is usually cheaper to exchange, for instance, Japanese Yen into US$ and then US$ into Pound Sterling instead of exchanging Yen and Pound directly. Since the volume of trade is higher in the US$-Yen and the US$-Pound market, the spreads are lower. So, although transaction costs are low in foreign exchange markets, they can be lowered even further when a common medium of exchange is used. Thus there is no ‘foreign exchange barter’ in the foreign exchange market. As the example of the foreign exchange market shows, even if the current technical innovations are carried further, making retail payments as efficient as current wholesale transactions, it can be doubted that this would lead to the demise of the use of a common medium of exchange.

3. Will E-Money Issuers Drive Out Central Banks? The Role of Network Effects

Even if it seems unlikely that the BFH world will become reality soon, current innovations may radically alter the shape of the payment system. Thus, emoney may replace cash and erode the ability of central banks to control the monetary system. In particular, the possibility to make payments via the ‘borderless’ and hardly controllable internet seems to jeopardise central bank control of the monetary sector (Tanaka 1996, Herreiner 1998, 11, 14 and 24). It is argued that monetary control may become impossible if the issuer of electronic money can be based anywhere in the world. However, the position of central banks may be more robust than it seems.

In a classical article, Eugen von Böhm Bawerk (1962/1914) posed the question whether ‘control’ or ‘economic law’ determines prices. His answer was that control has only a temporary influence on prices. In the long run, economic laws are bound to prevail. However, there may be

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21 See BIS (1996, 7-11). In the other 20 percent the DM figures prominently. This can be explained by the fact, that the DM is the anchor currency in the EMS. DM and US$ together can be found in far more than 90 percent of all foreign exchange transactions.
22 The US$ is also used as invoicing currency in a large fraction of international trade and prices of many internationally traded commodities (such as oil) are quoted in US$.
23 Originally, Böhm-Bawerk used the German term ‘Macht’ which could also be translated as ‘power’.
cases in which economic laws work in a way that enhances the power of a single market participant, providing him with discretionary power over prices. One case is a technology that exhibits network externalities.\textsuperscript{24} In such a situation the utility a consumer derives from using a particular network is a positive function of the size of network. In many cases, the ‘size of the network’ can be approximated by the number of users. Telecommunications is a good example to illustrate this point. The usefulness of a phone rises with the number of users. In such a situation ‘economic laws’ will favour a situation with just one network.

Focussing on the unit of account or medium of exchange function money can also be interpreted as a network – a payment network. This idea is also captured in the notion that the use of a particular asset (‘money’) for payments can be interpreted as a convention (Dowd and Greenaway 1993; Menger 1892; Sugden 1986, 52-3; Wärneryd 1989) like a language or the habit to drive on the right hand side. In all these cases, the utility for a single user depends positively on the number of all users.

Dowd and Greenaway (1993) have proposed to formalise this idea by using an utility function such as (3):\textsuperscript{25}

$$u(T) = (a + b \ln N) \int_{T}^{\infty} e^{-r(t-T)} dt = \frac{a + b \ln N}{r}$$

\(u(T)\) is the utility that is derived from adhering to a convention or using a network from time \(T\) onwards, \(r\) is a discount factor, \(a\) captures the network-independent benefits and \(b \ln N\) captures network-related benefits, \(N\) is the number of users. As can be easily seen, utility is rising with the number of people who adhere to the standard. However, the fact that \(\ln N\) is used implies declining marginal utility of a rising number of users.

This view stresses the significance of the general acceptability that becomes a value of its own. As long as most agents are prepared to accept money in exchange with goods, money will be accepted instead of goods because it lowers transaction costs. This holds independently of whether the issuer is prepared to guarantee convertibility or not. As long as the value of the money is not systematically and strongly reduced, it will be accepted.\textsuperscript{26}

\textsuperscript{24} Vaubel (1984, 33-41) discusses network effects under the heading ‘transaction cost externalities’. The relevance of network externalities theory for emoney is discussed by Van Hove (1998).

\textsuperscript{25} They are drawing on work of Farrell and Saloner (1986).

\textsuperscript{26} Laidler (1977, 322 and 1990, 48) argues that the amount of money held by others also involves external benefits. The more money others hold, the less likely an individual is to become illiquid because he can always sell assets or
What makes money acceptable to an individual is the belief or the experience that it is also accepted by others. This belief is self-enforcing and imposes strong limitations on individual choices. As long as others can be expected to accept money there is no incentive for an individual to substitute the money good for something else because such a decision would imply that the individual ceases to participate in the division of labour. Just like in the case of other kinds of conventions, the convention to use a certain good as common medium of exchange has a strong tendency to persist.

Dowd and Greenaway have used their model to show that there can be ‘excess inertia’ when network externalities exist. Suppose, that at time $T^*$ a new monetary standard is offered that provides the following benefits if universally adopted (Dowd and Greenaway 1993, 1182):

$$v(T) = (c + d \ln N) - \frac{e^{-r(T - T)}}{r}$$

Even if this new standard promises higher benefits than the old, it is not certain that it will be adopted. First, there may be switching costs $s$ that have to be incurred when switching from $u$ to $v$. Let $v(T)$, be the utility of $v$ when all others are also adopting $v$, $v(T)_u$ the utility of $v$ when all other users use $u$, $u(T)_u$ be the utility of $u$ when all others are also retaining $u$ and $u(T)_v$, the utility of $u$ when all other users adopt $v$. If $v(T)_v - s < u(T)_u$, it will not be adopted even if $v(T)_v > u(T)_u$.

Second, even if the potential advantages of $v$ are much larger than the switching costs $s$, this does not necessarily mean that $v$ will be adopted. The reason is that the benefits for a single user depend on the number of users. For a single user, the benefit of using $v$ when everybody else is using $u$ is

$$v(T)_u = \frac{c}{r}$$

So, any individual user can be sure to switch to the new standard $v$ only if

$$v(T)_u - s > u(T)_u \iff \frac{c}{r} - s > \frac{(a + b \ln N)}{r}$$

In all cases where

$$v(T)_u - s < u(T)_u < v(T)_v - s \iff \frac{c}{r} - s < \frac{(a + b \ln N)}{r} < \frac{(c + d \ln N)}{r}$$

the outcome depends on the expectation about the behaviour of the other market participants. In this case the superior standard $v$ will only be adopted when potential users expect others to adopt goods to other individuals with money.
it as well.\textsuperscript{27} Thus, money not only solves a co-ordination problem it also creates one when money-users would like to switch to a different kind of money. A change could only be brought about by a co-ordinated effort of all money-users. In the case of fiat money this co-ordination problem is particularly severe. First, the number of money users is very large. Second, the network-independent benefit \((a \text{ or } c)\) is likely to be close to zero. Therefore, the difference between \(v(T)_u\) and \(u(T)_u\) is likely to be very large, providing little incentives for a single user to switch. The fact, that switching out of a particular currency involves high costs is supported by the ‘well-established ‘stylised fact’’ (Dowd and Greenaway 1993, 1184) that it takes extremely high inflation rates in order to induce people to substitute the commonly used currency. This persistence in turn strengthens the expectations that money will also be used in the future.

Chart 1 Illustrating Excess Inertia

As Dowd and Greenaway (1993, 1184-5) point out, excess inertia may imply that competition between currencies will usually not be very intensive. So, monetary authorities have a lot of latitude in monetary policy even when there are no legal restrictions.\textsuperscript{28} Higher inflation does not necessarily mean that money users will substitute into other monies because this would only be beneficial for the individual money user if it occurred simultaneously in one co-ordinated move. Due to high co-ordination costs such a move is almost impossible. According to White (1997, 19)

\textsuperscript{27} The number of users (or expected users) must pass a critical mass. This can be seen in chart 1. The critical mass in the case without switching costs is \(N_2^*\). In the case with switching costs it is \(N_1^*\).

\textsuperscript{28} As Issing (1999, 11) points out, the same argument applies to private issuers. Issing concludes that network externalities may thus provide a rationale for regulation.
the switch of a standard of value requires ‘public debate and deliberate public decision’.
Therefore, persistence of a given medium of exchange also has the consequence that the state can
change the character of money - at least to a certain degree. The state can enhance the quality, for
instance, by standardising and certifying a certain quality and weight (Menger 1892, Gravelle
1988, 394). But the state can also decrease the quality - for example by monopolising money and
abolishing convertibility - without triggering the flight into other monies. In this sense, the monies
currently circulating can be interpreted as the result of both, evolutionary forces and state
interventions. This does not, however, make money a creature of state action as proposed, for

In the framework outlined by Dowd and Greenaway it remains somewhat abstract at what level
network effects are supposed to apply: at the level of the unit of account or at the level of the
medium exchange. After all, even within a currency area there is competition between different
media of exchange, for instance cash and deposits. Clearly, one does not drive out the other.
However, both these types of money are linked by a fixed exchange rate of 1:1 and perfect
convertibility. Therefore, both media of payment are readily accepted and can co-exist. This
suggests that the issuer of a new type of money can connect to the existing payment system by
using a 1:1 exchange rate and pledging full convertibility. Thus there can be different media of
exchange if they are all expressed in the same unit of account. Therefore, it can be argued that
network externalities apply on the level of the unit of account rather than the level of a medium of
exchange.

Thus, the best way to market new monies is to denominate them in the established unit of
account and to make them fully convertible into other forms of money (cash and deposits). This
presupposes an intersection between the ‘old’, established payment system and the new,
spontaneously evolving system (electronic money). As long as locals have an account with local
banks and might wish to convert emoney into local deposits this intersection can only be in their
home country and is consequently under the control of the local authorities. However, White
(1997, 19-20) and England (1997, 144) assume that even in retail banking there may be a shift
towards off-shore banks. As White points out, this presupposes that foreign-based banks can
participate in the local clearing process. As long as central banks are heavily involved in interbank
clearing they can control access to this system. Thus, it is under their discretion to allow direct
involvement of offshore banks in interbank clearing. Currently, most countries seem to rule out
the participation of foreign banks in national clearing systems. This puts offshore banks at a disadvantage compared to onshore banks. Therefore, it cannot be taken for granted that unregulated offshore banks will compete retail business away from onshore banks.

**Chart 2 International Emoney Payments**

Given the payment systems as they are today, it is conceivable that somewhere in the world (i.e. in country 3) a firm issues money that is used in other countries for payments (see chart 2). However, in this case, a customer from another country (country 2) who wants to use this emoney has to pay for it. Supposedly, this will be in ‘normal’ money. So, either the issuer has an account in country 2 or the customer has to make an international transfer from country 2 to country 3. Furthermore, if the payment receiver (say an internet store in country 1) wants to convert the emoney balances he receives into national currency, the issuer has to transfer country 1 money to his account. Again, this presupposes an international transfer or an account with a local bank. So, either the issuer is actually present in the other countries or he has to rely on the inefficient and expensive international retail payment system (involving foreign checks or money orders). This is true, even if the supplier can accept credit cards payments. In this case, the

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29 One reason for this is that participation in interbank clearing usually involves access to central bank credit. See the discussion about the access of UK banks to ECB overnight credit, for instance Deutsche Bundesbank (1997), 37 and Davis (1997).

30 It can be expected that a large portion of electronic money receipts will be converted into deposits because a large portion of payments (wages, taxes etc.) are made with deposits. For instance, if a consumer spends 1 DM in Germany, wages account, on average, for 55 Pfennig and indirect taxes for further 13 Pfennig. Direct taxes and social security contributions account for more than half of the 55 Pfennig for wages. Source: Sachverständigenrat
issuer of internet money could also use a credit card organisation to transfer the money. Again, this would involve a payment to one of the traditional providers of payment services as an extra cost. Thus the efficiency of the whole scheme partly depends on the efficiency of the traditional payment system\(^{31}\). The traditional system, however, is regulated and monitored by government authorities. Even if electronic money can move unhampered past borders the counter-rotating flow of goods and deposits can do this only to a certain degree. As Anderson (1997, 4) has pointed out: ‘Geography has wormed its way back into cyberspace, using tools such as sales tax, credit-card restrictions and shipping.’ Therefore, the hypothesis of Tanaka (1996) that international internet payments will be as cheap as national internet payments has to be doubted.\(^ {32}\)

But even if there are off-shore companies issuing emoney this will not make it impossible for central banks to conduct monetary policy. As long as issuers denominate their products in local currency – and they will if the arguments above are correct – issuers throughout the world would feel a tightening of monetary policy. If, for instance, a central bank increases interest rates and local banks follow suite agents will try to reduce their debts. They will borrow less and pay back more loans. Any bank that would not increase interest rates would experience adverse clearing and would have to borrow in the interbank market at the new, higher rates. Sooner or later the bank would be forced to increase its interest rates in order to reduce its borrowing at the unfavourable rate.\(^ {33}\) The same forces would also influence the behaviour of the off-shore issuers. If they do not change their behaviour there will be a rising demand to exchange their emoney products back into cash and deposits. If they do not want to become illiquid they have to reduce the rate at which they are issuing emoney. Since they do not have access to central bank credit they may be even more sensitive to changes in interest rates than local banks. Thus, monetary policy works – even with off-shore issuers.

\(^{31}\) Cross-border retail payments still are very inefficient. As Hartmann (1998, 2) puts it: ‘European cross-border retail payments could almost be said to be still in the ‘Middle Ages’.’

\(^{32}\) Similarly, it is not realistic to assume that agents will hold a wide array of electronic currencies on their hard drives in the future. Rather it can be expected that one currency will become the ‘world internet currency’ for cross border payments. In all likelihood, this will be the US$ - just like in foreign exchange markets (see above).

\(^{33}\) If, before the interest rate increase, the bank had made loans up to the point where the marginal return equals marginal costs, after the interest rate increase some loans will not be profitable anymore and the bank has no incentive to roll them over or replace them at the old interest rate.
4. Conclusions

While the current pace of financial innovation is clearly remarkable, it should not be overlooked that this innovation has mainly to do with the reduction of communication costs. Of course, this also reduces transactions costs. However, it is erroneous to assume that a reduction of communication costs towards zero reduces overall transaction costs to zero. Transaction costs depend also on many market characteristics such as the size of the market and the volatility of supply and demand. The use of a common medium of exchange that also functions as unit of account is a way to increase the size of the market and make it more liquid. This reduces transaction costs – when communication costs are high and when they are low.

Proponents of the New Monetary Economics basically claim that barter can be more efficient in a low transaction cost environment than monetary exchange. In the BFH world, goods and assets are exchanged without using a common means of payment and the ‘payment system’ is reduced to a mere accounting system that keeps track of the values exchanged. However, the mere fact that transaction costs are falling does not imply that the advantages of monetary exchange are going to vanish (Garcia 1998, 6; Grünärml 1989, 200). A reduction of transaction costs per transaction is likely to increase the number of transactions. Therefore, it is possible that the quantitative significance of transaction costs rises even when costs per transaction are falling. Empirical studies such as North and Wallis (1986) show that the transaction cost sector of the economy has, indeed, been increasing over time.

When analysing the competition between new types of money, such as emoney, and established forms of money such as cash and deposits it is important to consider network effects. Emoney issuers can greatly enhance the acceptance of their products if they denominate them in terms of the existing unit of account and if they guarantee 1:1 convertibility with established forms of money. Such a measure, however, subjects them to central bank influence, no matter whether they are banks or non-banks and no matter whether they operate on-shore or off-shore. Thus central banks will be able to conduct monetary policy even if their products lose market share.
Bibliography


