

The e-Money Revolution: Challenges and Implications for Monetary Policy

Abstract

The e-revolution promises to introduce new e-monies that may ultimately displace existing money. e-money poses a challenge to central banks' ability to control interest rates, and it may also increase endogenous financial instability. The challenge to interest rate control stems from the possibility that e-money may diminish the financial system's demand for central bank liabilities, rendering central banks unable to conduct meaningful open market operations. Increased financial instability could emerge from the increased elasticity of private money production, and from periodic runs out of e-money into central bank money that generate liquidity crises.

Key words: e-money, demand for central bank liabilities, monetary policy

JEL ref.: E5

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July 2000
Third Revision May 2001
Fourth Revision June 2001

I e-money: the challenge to theory and policy

Economies everywhere are in the midst of an e-commerce revolution. This revolution is ushering in new methods of transacting and payment, and in doing so it promises to introduce new monies (e-monies) that may ultimately come to displace existing money - both currency and bank deposits. In assessing the possible future impact of e-money, it is useful to distinguish between two types. The first is e-tail money, and the second is e-settlement money. e-tail money stands to replace currency and demand deposits for traditional transaction purposes. e-settlement money stands to replace use of demand deposits for purposes of discharge of private debts, and it also stands to replace use of central bank reserves for purposes of settlement of clearing balances amongst banks.

The e-money revolution fits naturally into the history of money as told by Austrian economists.¹ The Austrian approach emphasizes the endogeneity of the “form” of money which changes in response to technical innovations and market competition. However, not only does the e-money revolution promise to change the form of money, it also stands to change the workings of the banking system, and in doing so may undermine the monetary authority’s ability to set interest rates and stabilize financial markets.

The e-money revolution also has implications for Post Keynesian monetary theory which emphasizes the central bank’s control over the short-term costs of funds. In the simplest of accounts (Rousseas, 1985), commercial banks set their loan rate as a mark-up over the central bank determined short-term cost of funds. Given this horizontal loan supply schedule, the

¹. The German economist Karl Menger (1892) is widely viewed as the father of the Austrian approach to money. A modern statement of the Austrian approach is provided by Selgin and White (1987).

quantity of bank lending is then set by the demand for bank loans, which in turn determines the quantity of bank deposits. In effect, causation is reversed relative to the conventional money multiplier story, so that loans create deposits rather than deposits creating loans. More complicated Post Keynesian models (Palley, 1987) allow for bi-directional causality. Rather than being a fixed mark-up over the cost of short-term funds, commercial bank loan rates are influenced by the composition of bank assets and liabilities. This in turn means that interest rates and the quantity of lending are influenced by wealth holders' willingness to hold bank liabilities and banks' willingness to hold different types of loans.²

In both cases the central bank plays a critical role by setting the short term cost of funds (in the U.S. this is the federal funds rate), and in doing so it exerts a powerful influence over interest rates. e-money poses a challenge to this Post Keynesian description of the credit money creation process by challenging the central bank's ability to control interest rates (Friedman, 1999). The foundation of this challenge is the possibility that e-money may eliminate the financial system's demand for liabilities of the central bank so that the central bank is unable to control the supply price of liquidity through meaningful open market operations.

This paper explores how e-money stands to impact monetary policy. It does so by decomposing the demand for reserves into different components, and then exploring how each component might be impacted by e-money. The conclusion is that monetary policy will still matter, but it will do so because of demand for central bank liabilities to pay taxes and to pay any

². Palley (1994) provides a survey of the Post Keynesian theory of endogenous credit money. Models with a horizontal loan supply are commonly referred to as "accommodationist": those in which bank and wealth holder preferences matter are referred to as "structuralist." The structuralist approach has been adopted implicitly by neo-Keynesian economists in their explanation of the credit channel (See Bernanke and Blinder, 1988).

agents who choose to opt out of the e-money circuit for whatever reasons. This will fundamentally change the character of the monetary control mechanism, which at the moment works principally via the banking and financial system's demand for settlement balances.

Most importantly, the spread of e-settlement money stands to potentially destabilize the financial system. This is because agents will retain the option of demanding central bank money in settlement, which means that there will always be the risk that agents will switch and demand payment in such form. If this happens it will create a massive destabilizing liquidity shortage. This "instability" risk poses a significant problem, and policy makers should be directing their attention toward it.

II The demand for central bank liabilities and the threat from e-money

The root change associated with the introduction of e-money concerns the demand for the liabilities of the central bank. The argument that is explored below is that this demand could become so reduced, and its composition so disconnected from the sources of macroeconomic activity, that central banks become irrelevant for purposes of influencing economic activity.

Traditionally, the demand for liabilities of the central bank has arisen from five sources:

- (1) reserve requirements on banks,
- (2) the non-bank public's demand for liquidity, especially in the form of currency,
- (3) banks' demand for settlement balances,
- (4) payment of tax obligations, and
- (5) international interbank settlements.

The introduction of e-money threatens to dramatically impact all five components of demand.

Required reserves. Reserve requirements on the liabilities of banks (principally demand and

time deposits) have traditionally been viewed as the main source of demand for the liabilities of central banks. This legally constructed demand obliges banks to hold the central bank's liabilities in order to do business, and it in turn gives central banks a window through which to affect bank operations. Under current arrangements central banks announce an overnight interest rate and then provide the banking system with exactly the amount of reserves consistent with that target.

Over the last twenty years there has been a significant decline in the importance of reserve requirements. This decline has occurred for two reasons. First, monetary authorities have in many instances lowered reserve requirement ratios. Second, financial innovation has produced portfolio shifts marked by reduced holdings of bank liabilities subject to reserve requirements. The e-money revolution promises to continue this portfolio shift process, and thereby further reduce the required reserve component of demand for reserves.

However, in of itself, declining reserve requirements do not mean the end of monetary policy. This is evidenced by the fact that a number of countries - Canada, the United Kingdom, and New Zealand - have effectively done away with required reserves by setting the requirement ratio equal to zero, yet these countries have still been able to continue effective monetary policy (Sellin and Weiner, 1997). The reason is that though the overall demand for reserves has been reduced, remaining transactions and settlement sources of demand for reserves have been

sufficiently large and connected to economic activity that central banks have still been able to control short-term interest rates through open market operations. The challenge of e-money is that this may also change.

Non-bank currency demand. The non-bank public's demand for currency represents a

second important source of demand for reserves. Indeed, in most economies, it represents the largest source of demand.³ The demand for currency per dollar transacted within the legal economy has been steadily declining for many years, with currency being displaced by other methods of payment. Balancing this has been an expansion of demand coming from increased activity in the underground and illegal economies.⁴ The e-tail money revolution, with its introduction of electronic cash, threatens to further erode currency demand in the legal economy. However, Goodhart (2000) points out there will likely always be some demand for currency because of its unique properties, which include anonymity.

Though receiving much attention, e-tail money is probably a red herring when it comes to assessing the impact of the e-money revolution on monetary policy. The reduction of the demand for currency undoubtedly poses significant implications for seigniorage, and stands to worsen trends unleashed by the credit card revolution - but this is a fiscal issue. With regard to the conduct of monetary policy, the demand for currency has not been important for a considerable while. This is because currency demand is determined by slow moving state variables such as existing transactions technologies and the size of the underground and illegal economies. Open market operations, which accommodate the demand for reserves at the margin, are not primarily driven by fluctuations in the demand for currency. Instead, they are driven by fluctuations in the banking and financial sector's demand for settlement balances.

Bank settlement balances. This consideration leads to the third source of demand for

³. Woodford (2000, footnote 4) reports that it constitutes 84% of central bank liabilities in countries such as the U.S., Canada, and Japan.

⁴. The underground economy refers to unrecorded (for tax purposes) but legal economic activity. The illegal economy refers to illegal economic activity.

reserves, namely the demand for bank settlement balances. It is here that the e-money revolution, in the form of the introduction of new e-settlement balances, threatens to have the largest impact. Financial systems with inside money require a means of settlement between banks. Today these balances are settled with transfers of central bank money, and the power of monetary policy derives from the central banks ability to alter the relative scarcity of these settlement balances and change the interest rate associated with borrowing such balances. e-money threatens to undermine the existing system by introducing new means of inter-bank settlement, and thereby reduce the settlement balance component of the demand for reserves currently held by banks.

In the current system, the central bank sets the effective price of reserves by targeting the overnight interest rate and then adjusting the supply of reserves to a level consistent with this target. This rate then represents the opportunity cost of funds to banks, and when the central bank raises the price of reserves (i.e. raises its overnight interest rate target), banks pass on the increase to their borrowers.⁵ Since banks need reserves for settlement purposes, the central bank can in principle reach any target rate by suitably adjusting the supply of reserves such that the overnight rate is bid up or down to the desired target. However, if banks had no need for reserves for settlement purposes, it might not be possible to bid the overnight rate in this fashion.⁶

⁵. Making a loan involves a leaching of reserves out of each individual bank, and hence the pass through. Thus, rates rise even though the reserves remain in the banking system as a whole.

⁶. In a system without reserve requirements banks have no “stock” demand for reserves, defined as reserves that they permanently hold on their balance sheets. However, they still have a “flow” demand, defined as reserves that they must have access to at the end of each business day for purposes of settling clearing balances with other banks. The elimination of reserve requirements has eliminated the stock demand. Shifting to private e-settlement monies threatens to eliminate the flow demand.

Fama (1980) examines the economics of a completely unregulated banking system.⁷ In such a system, banks become a form of mutual fund, with their assets (loans, etc.) providing the backing for their deposits. This mutual fund conception of banks leads to the notion of “mutual fund e-settlement money”. The e-money revolution promises to operationalize such a system. In this new system, banks would still make loans by issuing claims upon themselves - just as in the existing system. And just as in the current system, the dollar would serve as the unit of account (i.e. the metric for prices) and these claims would be settled through a clearing house system. However, when claims are presented for redemption, banks would transfer title to real underlying assets valued at current prices. This contrasts with the current system where banks settle amongst themselves by transferring claims against the central bank (i.e. reserves).

The key to the emergence of such a system is the ability of banks to value assets to market in real time. The IT revolution may be the final development necessary for this. Over the past two decades the growth of markets for securitized bank loans has meant that bank assets have become much more liquid. Securitization combined with the IT-technology revolution means that banks and financial intermediaries (FIs) may be approaching the point where the bulk of bank assets can be valued in real time, thereby making it possible to settle debts between banks by transfer of title to these assets.⁸ The combination of securitization and IT-technology therefore creates the prospect of a new form of settlement - call it “mutual fund e-settlement money”. Once this happens, bank settlement demand for reserves could decline dramatically,

⁷. Fama’s article builds upon the earlier insights of Johnson (1968) and Black (1970).

⁸. In a world of mutual fund banking, banks would hold a variety of assets - including perhaps equities. Some of these assets would be extremely liquid (e.g. equities); others would be less liquid. Though a market would exist for these less liquid assets, prices for them would be more volatile, and they would be priced to include a liquidity discount.

thereby diminishing the ability of central banks to control the overnight interest rate. Instead, rates would be set in a “loanable funds” style asset market.

In addition, not only could banks settle transactions among themselves by transfer of bank assets valued in real time, but other agents may also reduce their reliance on banking firms. Non-bank agents could settle their debts by transfer of title to equities valued in real time. In effect, there would be an increasing blurring of distinctions amongst financial intermediaries, with all coming to provide transactions services traditionally been provided by banks. This pattern is visible in the growing use of money market mutual funds for transactions purposes, with many non-bank financial intermediaries already allowing customers to write checks and use debit cards against money market mutual funds.

Such a system does not stand to completely eliminate the existing “money” based system of settlement, but it does stand to reduce it. Some transactors may still insist on payment in central bank money which will still possess a special place as legal tender for purposes of debt settlement. Debtors holding both traditional bank deposit balances and e-mutual fund may also wish to settle their debts using deposit account balances rather than transferring e-mutual fund assets which they may believe to be under-valued owing to temporary market conditions.

It is this feature that potentially renders an e-settlement system unstable. Under normal conditions agents will be content to accept e-mutual fund money in settlement. However, under even slightly abnormal conditions agents could decide to switch en masse to wanting payment in traditional central bank money, and at this stage the financial system would find itself subject to a huge liquidity shortage which could cause the value of e-settlement balances to crash. Such a switch could even occur on the basis of rumors and herd instincts. In effect, the co-existence of

e-settlement and central bank money opens the possibility of a return of old fashioned bank runs.

These observations lead to the larger point that agents will still have a demand for liquidity, defined as demand for an asset that is subject to zero nominal price fluctuation and is perfectly acceptable. How this demand might be met is discussed later in connection with the possible emergence of 100% money deposit accounts. However, in a world with e-settlement money the demand for liquidity relative to total assets and liabilities is likely to shrink further because of the higher return on e-mutual fund money. This shrinkage represents a continuation of a long-standing trend. Thus, the ratio of high-powered money to assets and liabilities and the ratio of M1 balances to assets and liabilities, have both fallen consistently over time. The emergence of e-settlement balances stands to continue this pattern.

Tax payment balances. The fourth and final source of demand for reserves is for balances to pay taxes. Under the current system, taxes are largely paid by writing checks drawn against banks. However, this automatically results in a debit of bank reserves when the check is deposited in the Treasury's account at the Fed. Piercing the veil of check writing, the reality is that taxes are paid using liabilities drawn against the central bank which creates a demand for reserves for purposes of tax payments. This last source of demand is likely to prove very important in the event of the emergence of a private e-settlement mechanism. It resonates with the legal restrictions theory of money (Wallace, 1983), and the Chartalist theory of money recently resurrected by Wray (1998). Thus, Wray writes:

“In the Chartalist approach, the public demands the government's money because that is the form in which taxes are paid (p.37).”⁹

⁹. This has the interesting implication that “taxes are required not to finance government spending, but rather to maintain demand for government fiat money (Wray, 1998, p.75).” Of course taxes may also serve *both* purposes.

Tax settlement represents a significant source of demand, and one that is also linked to the level of economic activity. As such, it can give the central bank an important point of entry for impacting financial market prices. However, for this to be an effective channel for monetary policy, governments must require that tax settlement payments use the liabilities of the central bank. Ironically, this means that the power of central banks in a future e-money world may derive from their earliest function - namely, acting as the government's banker.

An interesting feature stemming from the enhanced importance of the demand for tax settlement balances is that fiscal policy could have a greater impact on interest rates, and this impact would differ from that predicted by the naive ISLM model. Increased government spending would still be expansionary, but rather than raising interest rates and crowding out private investment, it could lower rates. This is because spending results in an injection of liquidity into the financial system, and this injection would be proportionately larger given the diminished overall demand for reserves. Conversely, increased taxes would still be contractionary in goods market, and would also be contractionary in the financial sector. This is because tax increases drain liquidity from the financial sector.¹⁰

International interbank settlements. The fifth and final component of demand for reserves relates to international interbank settlements. The impact on this component will depend importantly on the extent to which e-money arrangements are adopted in other countries, and the extent to which there is a seamless trading of e-mutual fund money across borders. In this regard, foreign exchange markets will continue to exist but they will now determine the relative price of

¹⁰. These results indicate the limitations of ISLM models that fail to take account of how government is financed. This issue was raised by Christ (1968), and it suggests using a modeling framework such as that developed by Tobin (1982).

country e-mutual fund bank money deposits. These effects can be understood through consideration of a standard international trade transaction. U.S. importers of Japanese goods will offer U.S. dollar e-deposits for sale and demand Japanese yen e-deposits, while the reverse holds for Japanese importers of U.S. goods. In combination with offers to buy and sell e-mutual deposits arising from portfolio transactions, foreign exchange markets will then determine the relative price of country e-deposits.

It is also easy to see how impacts could be asymmetric across countries. Thus, in economies with sophisticated financial markets the spread of mutual fund e-money could be extensive, while in less developed economies traditional inside bank money may continue to rule the roost. In this event, foreign exchange markets will implicitly determine the relative price of e-bank deposits in advanced countries and traditional inside money bank deposits in less financially advanced countries.

Finally, the impact of e-mutual fund money on demand for central bank liabilities will also depend on how central banks choose to hold their foreign reserves. Thus, they may choose to hold foreign reserves in the form of flex price e-mutual fund deposits or in the form of traditional fix price inside money bank deposits. This source of demand for central bank liabilities is likely to remain considerable as national policy makers are unlikely to gamble with national welfare by holding their foreign reserves as flex price money.

III Distinguishing between the quantity and composition of demand for reserves

The introduction of mutual fund e-settlement money stands to impact total demand for reserves. However, for purposes of conducting monetary policy, an even more important impact stands to come from changed composition of demand.

When it comes to the conduct of effective monetary policy, the composition of the demand for reserves is as important as the total demand. Consideration of this point helps answer the puzzle raised by Friedman (1999, p.323) as to why central banks have such a large influence on economic activity despite “their small size, and even smaller size of their monetary policy operations, relative to the economies they influence.” The answer lies in the fact that though banks’ demand for reserves is a small component of total demand, this component is relatively interest inelastic. At the same time, the activities of banks matter for level of economic activity through the bank credit channel. The e-settlement money revolution threatens to disrupt the linkage between central banks, commercial banks, and the financial sector.

The central bank - commercial bank nexus can be described by the following simple equations:

$$(1) R = C^d + B^d$$

$$(2) C^d = C^{\wedge}$$

$$(3) B^d = kL(i, \dots)$$

where R = total supply of reserves, C^d = non-bank public’s existing holdings of reserves, B^d = banking sector’s demand for reserves, L = demand for loans, i = interest rate, and k = parameter.

Equation (1) describes the total demand for reserves: equation (2) gives the non-bank public’s existing holding of reserves which is fixed reflecting its slow evolving character; equation (3) yields banks’ derived demand for reserves as determined by their lending which creates deposits.

In the model C^{\wedge} is instantaneously exogenous, i is a policy variable, and R is endogenous.

The graphical analogue of these equations is contained in figure 1. The non-bank public’s existing holdings of reserves dwarf banks’ demand, and these holdings are segmented - being

held in cash tills and wallets. Moreover, banks' demand is relatively interest insensitive as they need reserves to service transactions arising from their existing deposit base (itself created by bank lending activities) and to meet loan pre-commitments. The deposit base can be reduced by repayment of bank loans, but at any moment in time households and firms have only limited ability to reconfigure their financial positions to do so. However, over time, agents can gradually repay their loans by changing their spending plans, and in doing so they lower economic activity and extinguish deposits.¹¹ As a result, bank demand for reserves exhibits extreme short run interest inelasticity, and this inelasticity in turn explains why only small changes in the quantity of reserves (via open market operations) are needed to make changes in the monetary authority's target interest rate stick. This is the answer to Friedman's (1999) puzzle.

From figure 1 it can also be seen that complete elimination of the non-bank public's demand for currency would hugely reduce total demand for reserves, yet the central bank would still retain the power to engage in effective open market operations by impacting the banking system's holdings of reserves. Conversely, the elimination of banks' demand for reserves (say because of adoption of a mutual fund e-settlement system) would only have a small impact on the total demand for reserves, yet it would undo the ability to target interest rates by managing the supply of reserves relative to bank demand for reserves.

IV Why e-settlement money is qualitatively different from earlier financial innovations

The above considerations help illustrate why the emergence of mutual fund e-settlement money is qualitatively different nature of past financial innovations. The traditional neo-Keynesian approach to financial innovation emphasizes increased cross- interest rate sensitivity

¹¹. As a result the medium run interest elasticity of demand for reserves greatly exceeds the short run elasticity.

of asset demands (i.e. increased substitutability between financial assets). In terms of the IS-LM model, this results in a flattening of the LM schedule. In principle the LM could even become horizontal to the extent that financial intermediaries face no restraint on the assets and liabilities that they can create other than ultimate demand for those assets and liabilities at the going interest rate set by the central bank.¹²

The qualitative difference posed by the e-settlement revolution is that it threatens the central banks' ability to alter interest rates. Within the existing financial innovation paradigm the central bank can still shift the LM schedule up or down even if it is horizontal. However, were the e-money revolution to completely eliminate private sector demand for liabilities of the central bank, then central banks would lose the power to impact interest rates. That power ultimately derives from the fact that central banks control the supply of reserves, and private sector agents have a demand for reserves.

In practice, such complete elimination of demand is unlikely. Though the financial sector's demand for reserves could be considerably reduced, there will still remain a demand for tax settlement balances (assuming governments insist on being paid with the liabilities of the central bank), and this demand opens another channel through which central banks can influence asset prices. The process would work as follows. Tax payers would write checks to the government drawn on their banks. Banks would have to obtain reserves to settle these checks, and this would be done by trading mutual fund e-money for reserves held by other banks. In effect, a new federal funds market (for purposes of obtaining tax settlement balances) would emerge, and the central bank could conduct open market operations in this market. However, an open question is

¹². This is the pure "horizontalist" position of Rousseas (1984).

what the central bank would accept as payment for open market sales of reserves. Thus, it might only accept e-settlements backed by government bonds, or alternatively it could accept e-settlements backed by a range of private sector assets.¹³

Though giving the central bank a window through which to influence asset prices, relying on the demand for tax settlement balances as the means of conducting monetary policy is also likely to be associated with increased interest rate volatility. This is because tax payments are highly seasonal, and taxes are also paid in arrears. Consequently, the central bank would have to engage in significant seasonal open market operations, and this would have the effect of returning the central bank to one of its earliest functions which was to smooth interest rate spikes associated with the agricultural planting season.

Another source of instability could come from asset price bubbles. The quantity of mutual fund e-settlement money will depend directly on the nominal value of assets held by FIs. Increases in the value of these assets will increase the abilities of FIs to make loans, and this increases the possibility of self-fulfilling asset price bubbles that ripple through the economy.¹⁴

¹³. Interestingly, this same issue is emerging in the U.S. under the existing system, where repayment of the national debt threatens to take away the central bank's power to conduct open market operations. In this latter instance, it is not a matter of the disappearance of bank demand for reserves, but rather a disappearance of the means (private sector holdings of government bonds) with which to purchase reserves. This problem of dwindling bond supplies can be addressed by transforming the system of monetary control from one based on OMOs into a Lombard lending system such as that used by the Bundesbank. In a Lombard lending system the central bank makes reserves available through its discount window to authorized borrowers at a pre-announced rate.

¹⁴. In traditional monetary systems the price of money is fixed, and increases in the nominal money supply are brought about by expanding the quantity of money. In a mutual fund e-money system increases in the nominal money supply can be brought about by increasing the price of assets backing mutual fund money.

In effect e-mutual fund money will be characterized by an increased pro-cyclical elasticity of production. With only the demand for tax settlement balances to act on, the central bank might have great difficulty in reining in such a bubble. This difficulty would be compounded to the extent that the central bank only accepted mutual fund money backed by government bonds as payment since this would require having the control mechanism work through bond prices on to other asset prices.¹⁵

Equally important is the possibility of asset price collapses which could happen if agents suddenly wish to hold central bank money instead of e-mutual fund money. In this case economies could be marked by rapidly contracting money supplies that generate spirals of debt - deflation. With the value of bank deposits depending on the market value of bank assets, changes in asset market prices could quickly wipe out deposits.

Lastly, Post Keynesians emphasize the problematic of fundamental uncertainty which generates a demand for perfect liquidity. Deposit insurance has historically been the way in which public policy has enabled private bank deposits to provide for this demand. However, as noted earlier, e-mutual fund money systems promise to be more prone to bank runs which will make deposit insurance much more costly. Indeed, it is not even clear what the insured value of the deposit would be given that the value of the deposit is fluctuating as the market value of the assets backing the asset fluctuate. Given this, an alternative private sector solution to the problem of providing liquidity in a convenient form might be the creation of 100% money

¹⁵. This also applies to monetary policy and asset price bubbles today. The Fed has a harder time influencing Wall Street and equity prices because it does not intervene directly in equity markets. However, the equity effect is restricted to work through wealth and collateral effects. In future, it would also work through an e-money supply channel.

deposit accounts in which the bank asset backing these deposits is central bank money.¹⁶

V Policies for restoring stability and control in an e-money world

On hearing an announcement of his death, Mark Twain responded “The reports of my death are greatly exaggerated.” The same is probably true for reports that the e-money revolution augurs the death of central banking. However, that said, the introduction of mutual fund e-settlement money does promise to dramatically alter the financial landscape. In doing so it stands to (1) undermine the central bank’s ability to control interest rates by breaking the link between current economic activity and the demand for reserves, (2) create greater endogenous financial instability by contributing to more elastic pro-cyclical production of private inside money, and (3) expose the system to periodic liquidity crunches resulting from sudden shifts out of e-settlement money into central bank money.

One possible policy response is to try and suppress the emergence of mutual fund e-money. However, if traditional banks are prevented from adopting these new settlement mechanisms they will inevitably be placed at a competitive disadvantage vis-a-vis other FIs. Banks would then be increasingly displaced by other FIs, and they would ultimately become marginalized relative to the financial sector and the economy as a whole. As such, the central bank might still lose its capacity to use the tail of open market operations to wag the economic dog.

A superior response is to recreate the demand for liabilities of the central bank, only doing so in a manner that spreads demand across the entire spectrum of the financial system and links that demand to underlying economic activity. This avoids the problem of penalizing banks relative to other FIs, and it has the twin advantages of being good for seigniorage and good for

¹⁶. The workings of a system of 100% reserves has been explored by Phillips (1994).

monetary policy control.

The traditional approach to reserve requirements imposes them on bank liabilities, and it would certainly be possible to extend such a liabilities based reserve requirement (LBRR) system across the entire financial sector. However, other than creating a demand for reserves there are few other economic benefits. The LBRR approach was driven by an earlier history of bank runs. That history was largely associated with the use of a commodity standard of settlement (gold and silver), but in banking systems where the central bank's liabilities are the means of bank settlement this problem can be solved by deposit insurance.

An alternative approach suggested by Palley (1999) is to impose asset based reserve requirements (ABRR) across the entire financial system. In essence, ABRR constitute a flexible unified financial "sin tax", levied through reserve requirements, aimed at reducing undesirable asset allocations. ABRR possess a range of significant benefits, including allowing the central bank to target over-heated sectors instead of the blunderbuss of higher interest rates which inflicts large scale collateral damage on the rest of the economy. This is an attribute that is of increasing value given that monetary control problems have become more associated with sectoral imbalances (e.g. equity and property price bubbles).

However, the biggest advantage of ABRR concerns their efficacy as a system of counter-cyclical monetary control. Monetary policy works best when it is tightly coupled to the expansion and contraction of economic activity. The expansion and contraction of FI assets is tightly linked to changes in economic activity, and tying the instruments of monetary control to this margin would therefore tie monetary control to the underlying pattern of real economic activity. Moreover, ABRR act as automatic stabilizers. When asset values rise or when FIs

endogenously create new assets, ABRR generate an automatic monetary tightening: when asset values or quantities fall, ABRR generate an automatic loosening. These advantages hold for ABRR in the existing system of reserve based bank settlements. They will hold with even greater force in a system of mutual fund e-money in which asset price fluctuations stand to be more pronounced.

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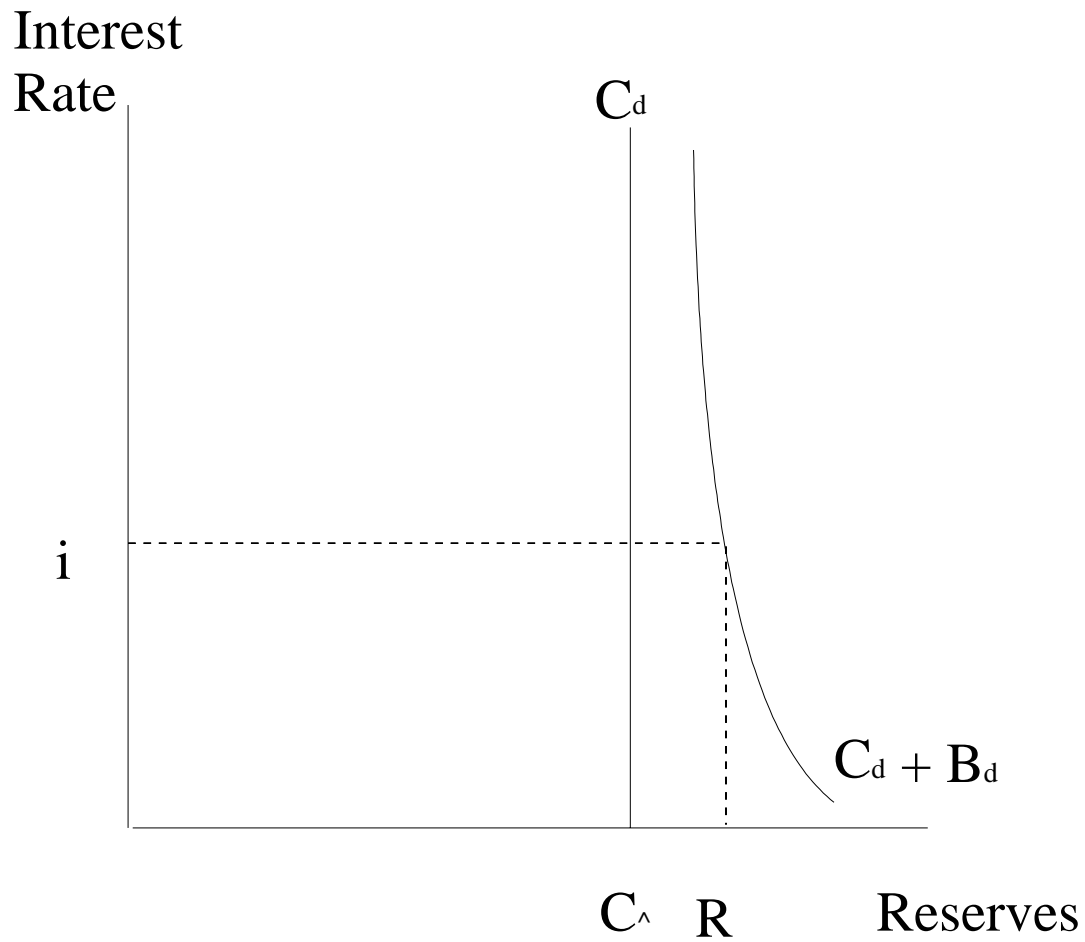


Figure 1 The determination of the quantity of reserves.