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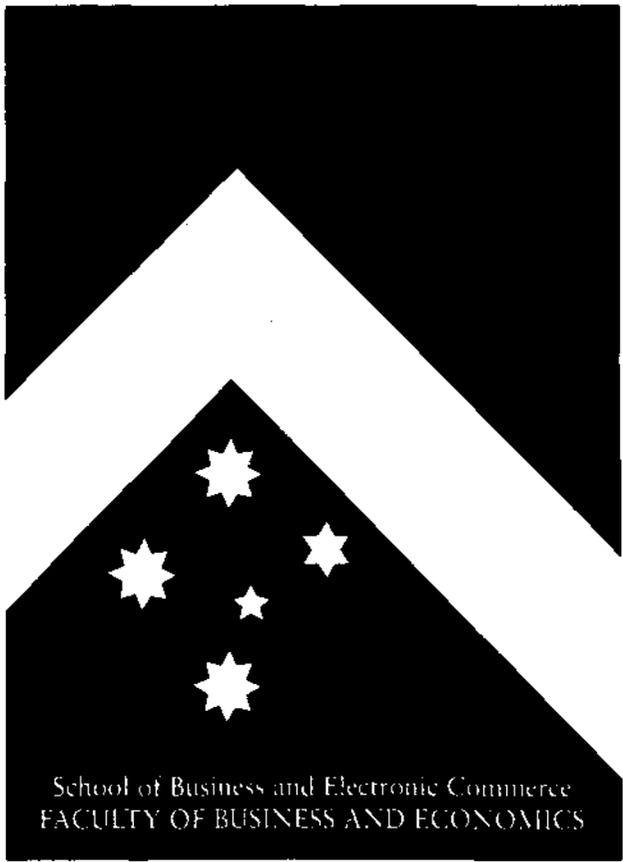
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Stored Value: An Analysis of its
Institutional and Economic
Implications

by
Michael John Crowley

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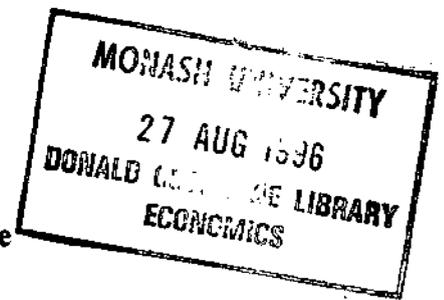
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**STORED VALUE: AN ANALYSIS OF ITS INSTITUTIONAL AND
ECONOMIC IMPLICATIONS**

Michael John Crowley

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ABSTRACT

"Increasingly public attention and the media is focusing on the advent of Smartcards and the move towards the concept of a *cashless society*. Email cash and other means of transactions through the Internet are also gaining media attention; often reflecting a lack of understanding of the institutional arrangements governing the nature of the monetary system and its foundations.

This paper using the concept of *stored value* as a generic term for money accessible and exchangeable through electronic media, inclusive of but not exclusive to Smartcard technology, attempts to remedy this by providing a clear conceptual understanding of what is involved.

In doing so the paper focuses on a number of important issues. In particular, the implications for seigniorage, wealth transfer, and the potential for a less than socially optimal allocation of resources if the incentive to provide a new and innovative retail payment system is not carefully monitored and understood."

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4 December 1995

1.0 STORED VALUE: INTRODUCTION

The concept of stored value value used in this paper is a perfect analogue of currency, having all the properties of currency including privacy, security and minimal risk of default. Whereas the physical manifestation of currency, at present, is paper and metal in the form of notes and coin, it is not too difficult to envisage a situation where currency is transformed, issued and stored as electronic signals. The technology to do so is close at hand.

Paper and metal currency is an outstanding stock, issued through the Reserve Bank and held by the public: it rarely comes home to roost except for destruction and renewal, and partial inflows and outflows through the banking system. Essentially, once issued it remains issued.

With this in mind it is easy to picture electronic transfer replacing hand to hand transfer: from the physical exchange of currency to the exchange of value in electronic form. Electronic purses, wallets and computer storage make this possible, just as they make possible the exchange of value between economic agents: directly between the purses and wallets of economic agents and through the internet or similar electronic network.

To accept this conceptual leap requires little more than an understanding of the present institutional nature of money in a modern society, and a faith in the ability of technology to allow the transition from the physical to the electronic.

2.0 MONEY: CASH, CURRENCY AND TRANSFERABLE DEPOSITS

In an economy with a developed financial system *money* is *what* serves to settle transactions between economic agents. In this respect, it is important to distinguish what is being given and received in settlement of transactions, currency, cash or bank deposits, from the payment mechanism used to facilitate the transfer of value: hand to hand, a cheque, plastic card or electronic signal.

Money essentially takes two forms in Australia, as in most developed financial systems. Currency issued in the form of notes and coin, which is physically exchanged by hand, is the first. The second form is the transferable financial liabilities, issued as book entries known as deposits, of the banking system. Deposits having the characteristic that their ownership is readily transferable, by one means or another, serve the community as money.

The creation and issue of currency in Australia is legally restricted to government agencies. On the other hand, both government and non-government agents can, and do, create and issue transferable deposits. When deposits are created and issued by government they are known as outside money or cash. Deposits created by non-government agents are known as inside money.¹

Australia has had, until now, legislative restrictions governing access by non-government agents to the bank clearing system which allows settlement for deposit switching between banks. This has effectively prohibited other institutions apart from banks from creating transferable deposits which can serve the community as money: the clearing system is the unique mechanism which makes possible the transfer of ownership of bank deposits in exchange for goods and services and the settlement of debt. Legislation is currently in place for this to change, and other financial institutions will shortly be able to issue deposits which can also serve this monetary role.

In the case of government agents, the Reserve Bank has a monopoly on the creation and issue of both deposits, *cash*, and *currency*. The Bank limits the creation and issue of its deposits to a small number of holders: banks, government agencies and some official overseas institutions. This is unlikely to change.²

The traditional and most commonly used means of transferring ownership of deposits has been by the issue of a cheque. This is an instruction to the institution issuing the deposit, by the current owner, to transfer ownership of the deposit to another party as payment for an economic transaction. This paper based system is cumbersome and expensive, requiring a physical lodgement, collection, sorting, distribution and settlement of value between issuers of deposits, until now, primarily banks and the Reserve Bank, through an exchange of assets. The traditional means of transferring currency, as mentioned above, is essentially from hand to hand. This also is cumbersome and has many disadvantages as well as advantages.

¹ Crowley, M.J. & Tennant, J.K. *The Operation of the Banking System and the Creation of Inside Money*. Monash University School of Business and Electronic Commerce, Working Paper Series, March 1995. ISBN 0 909170 63 0

² Crowley, M.J. *Seigniorage, Currency and Cash*. Monash University School of Business and Electronic Commerce, Working Paper Series, February 1994. ISBN 0 909170 64 9

The advent of computer and other electronic technology is hastening a revolution in what is referred to as the payment system: the transfer of ownership of inside and outside money in settlement of economic transactions. This revolution may be broadly thought of in terms of five issues.

First, there is the means by which the ownership of deposits, and possibly other financial liabilities will, and does take place. Increasingly this is through computer technology, rather than cheques, using a variety of plastic card linked on-line to a bank's computer system, or directly between interlinked computer systems.³ Smartcards and other stored value mechanisms currently being developed will allow these transactions to take place off-line, and directly between the computers and electronic purses and wallets of economic agents. In many cases this will mean a by-passing of the banking system.⁴

Second, there is the belief that increasingly deposits and other financial liabilities will substitute for currency: the move towards a *cashless society*. There is little evidence to support this trend in Australia as yet, but advances in computer and electronic technology would suggest that this is likely to change in the future, even though the initial change may be gradual.⁵

Third, there is the question of the integrity of the payment system and the trust that the community can place in the system's monetary liabilities as a safe store of value. At the moment the monetary liabilities of the financial system are considered sound. As will be explained shortly, cash and currency is guaranteed by the Australian government and has its asset backing in Gold and foreign exchange and Commonwealth government securities. Banks are prudentially supervised by the Reserve Bank to ensure that the asset backing for the deposits they issue is sound.⁶

3 Mair, P. 'Consumer Payment Cards'. *AIC Conference. Consumer Payments Systems*. Financial System Department, Reserve Bank of Australia, November, 1995

4 Brown, R. *The Smartcard*. Post News, Somerset, UK, 1994.

5 Crowley.op.cit.

6 Reserve Bank of Australia. Prudential Supervision of Banks. Prudential Statements, Sydney, June 1990.

Reserve Bank of Australia. Prudential Statements. Various. June 1990 to December 1995.

Fourth, the advent of electronic technology has a direct bearing on the payment system in that it makes possible, and creates the financial incentive, for institutions other than banks and the Reserve Bank to create and issue deposits and other financial liabilities of a type which can serve as money in retail and other transactions.⁷ These deposits may not have the quality of asset backing of the banks. In this respect, there is a strong argument for government protection and supervision as very few members of the community really appreciate or understand the nature of money. On the other hand, there is also the argument that economic participants should not be proscribed from creating and issuing inside money if it serves the community more effectively and cost efficiently. That is, by creating and issuing money at a lower cost and facilitating transfer of its ownership, in settlement of economic transactions, in more convenient and less costly ways.

And fifth, there is the question of the wealth redistribution and other effects, within the economy, that logically follow from any substantial change in the nature and constitution of the monetary system. This will be examined shortly.

Any consideration of these issues requires some basic understanding of the institutional arrangements of the current payments system in order to predict the nature, direction and impact of change.

In Australia's case this must start with the Reserve Bank and the banking system. In undertaking this task it is essential to instil in the mind of the reader the reality that all money in a developed financial system is the debt or liability of the issuer.

3.0 THE CURRENT INSTITUTIONAL ARRANGEMENTS OF THE OF THE PAYMENT SYSTEM

3.1 OUTSIDE MONEY: THE RESERVE BANK OF AUSTRALIA

3.1.1 Currency or legal tender issued by the Reserve Bank

Table 1 is introduced to clarify discussion of currency and cash creation through the balance sheet of the Reserve Bank. The table has been simplified to facilitate discussion.

⁷ Crowley & Tennant, op.cit.

Table 1

ASSETS	MS	LIABILITIES	MS
RESERVE BANK			
Gold and foreign exchange	18468	Notes issued (a)	18604
Commonwealth government securities	16358	Deposits issued: (b)	6958
		Overseas Institutions	632
		Banks	3619
		Government	2707
		Total cash issued (a) & (b)	25562
		Capital and reserves (net)	9264
Total	34826	Total	34826

Data Source: RBA Bulletin September 1995

In the Australian payment system the most frequently used monetary liability for the settlement of small value retail transactions is still currency in the form of Australian Notes and Coin, issued throughout Australia and its territories as legal tender. The former is issued by the Note Printing Branch of the Reserve Bank of Australia, the latter by the Royal Australian Mint, through the agency of the Reserve Bank.

The value of Australian Notes and Coin on issue at any time is determined by the level of demand in the community. The Reserve Bank provides the community with whatever level of currency it desires. Australian Notes are issued as a liability of the Bank and are entered in its balance sheet as 'Notes issued (a)'.

Australian Coin is not issued as a liability of any government agency, the face value of any issue being directly paid to the Australian government as revenue. This revenue is immediately available to the government to fund its expenditure, along with its other sources of revenue. Because the government conducts its banking business through the Reserve Bank, and because the Bank issues Australian Coin on behalf of the Government, a new coin issue will initially be reflected in a corresponding deposit to the government's account with the Bank: Refer Deposits issued: (b) - Government.

The Reserve Bank issues the community with Australian Notes in exchange for part of the community's holdings of Gold and foreign exchange and Commonwealth government

securities. This generally takes place, as will be explained later, through the agency of the banking system. These two items appear on the asset side of the Reserve Bank's balance sheet in Table 1.

From the table it can be seen that the currency, Notes issued, is broadly equivalent to the Reserve Bank's holdings of Gold and foreign exchange. Whether or not this is intentional is uncertain, but it has been a general feature of the Bank's balance sheet through time to cover the value of the currency issue in this way. These holdings of Gold and foreign reserves also constitute Australia's official holdings of foreign exchange reserves and the fact that these reserves have almost always been sufficient to cover the currency issue adds support to the thought that this may not be coincidental.

3.1.2 Cash: deposit liabilities issued by the Reserve Bank

In addition to currency, the Bank also issues deposits, *cash*, to government and selected overseas institutions which have normal banking arrangements with the Bank. Interest is payable on these deposits. Deposits are also issued to the banking industry in the form of non-callable deposits and exchange settlement accounts. No interest is payable on the latter, which are of relatively minimal value, and a below market rate of interest is paid on the former which may be regarded as a *tax* for the advantages of holding banking licences.

The covering asset for 'Deposits issued: b' and 'Capital and reserves (net)' - given the previous speculation that Gold and foreign exchange is held primarily to cover the issue of currency - is essentially Commonwealth government securities which are the debt of the Australian government.

'Capital and reserves (net)' is largely derived from historically accumulated valuation effects in the Reserve Bank's portfolio of assets and are held to protect against similar offsetting effects. This item contributes significantly to the Bank's profit, but the net effect on government revenue is minimal as government must pay interest on the portfolio of Commonwealth government securities: what it pays out on the one hand in interest on its debt it receives back in profit from the trading operations of the Reserve Bank.

Valuation effects on the Reserve Bank's portfolio can have significant impacts on its profit and government revenue, however. This occurs when assets are sold. If the assets are held the

valuation effects enter the Bank's balance sheet as reserves. If the assets are sold, say in response to a defence of the Australian dollar in the foreign exchange market, any capital gains or losses are reflected in the Bank's profit and loss account.

The following are the two most significant valuation effects operating on the Bank's portfolio.

A depreciation of the Australian dollar or a fall in nominal domestic interest rates increase, respectively, the Australian dollar value of the Bank's holdings of gold and foreign exchange and its holdings of Commonwealth government securities.

An appreciation of the Australian dollar or a rise in nominal domestic interest rates will extinguish reserves as the Australian dollar value of the Bank's Commonwealth government securities and Gold and foreign exchange portfolios are written down.

3.2 THE IMPLICATIONS FOR THE RESERVE BANK'S BALANCE SHEET OF A MOVE TOWARDS A CASHLESS SOCIETY

With both inflation and real economic growth in the post-war period there has been a continuing upward trend in the stock of currency outstanding and a commensurate increase in seigniorage income flowing to government through the profits of the Reserve Bank. This is largely because no interest is paid on the currency issue which is backed by income earning assets. Until now, apart from seasonal variations, the community's demand for currency has tended to be a constant proportion of the official measure of Final Private Consumption Expenditure. Since decimal currency implementation, in 1966, this has been about \$6.40 of currency for every \$100 of expenditure.⁸

It is important to note that the currency on issue is a constant *stock* held by the community. Apart from the flows between the banks and the Reserve Bank to retire and replace worn and mutilated currency, the community does not exercise its claim against the assets in the Bank's balance sheet which underlie the currency liability. If stored value replaces currency this will remain true: there will be a constant, stable stock of stored value outstanding at any time.

⁸ Crowley, *op.cit.*, p14

In a conceptual sense, the true stored value of the currency lies in the assets of the Reserve Bank's balance sheet. The physical paper in circulation has no tangible worth, other than to transfer ownership of claims against the asset backing in the Bank's balance sheet. However, because of public confidence that the physical paper on issue will be universally accepted in settlement of economic transactions, and because of the utility of the services that the physical paper provides, these claims have until now not been exercised.

The impact of the provision of a superior substitute for currency in storing and transferring value can be described simply as the community returning the physical notes on issue to the Reserve Bank, and in the process reclaiming ownership of an equivalent value of the assets held in trust for the community in the Bank's balance sheet. These assets will then be handed over, to be held in trust, by the institutions or organisations providing the superior mechanism for storing and transferring value.

In conjunction with the transfer of assets will be the transfer of the income flow from these assets. This income flow will, in effect, be transferred from government to the providers of the substitute for currency, although part of the income flow may be paid to the holders of the substitute for currency. In view of the financial incentive involved it is clear that there is considerable interest, on the part of banks and other institutions, in unlocking the assets in the Reserve Bank's balance sheet by providing a superior alternative to currency.

There may also be considerable incentive for government to resist this unlocking of assets. Essentially this can be undertaken either by insisting that those creating and issuing the financial liability substituting for currency back them with cash; or, by increasing the mandatory requirements for holding cash currently placed on the banking system and extending this requirement to other institutions. How this could be achieved and the possible reasons for wanting to do so will be explained later.

One compelling reason is that the Reserve Bank must be able to issue liabilities - currency or cash or other form of borrowing - to support the holding of the nation's foreign exchange reserves in its balance sheet and its holdings of Commonwealth government securities for monetary policy purposes. If stored value was to replace currency the institutional arrangements currently in place would require review and change.

3.3 THE PRIVATE BANKING SYSTEM

3.3.1 Inside money: transferable deposit liabilities

In Australia banks are not allowed to create and issue currency notes and coin although, apart from legal consideration, there is no reason why they could not: banks *have done so* in various countries, including Australia, in the past. The closest thing to currency banks create and issue is negotiable certificates of deposits for large value transactions.

One reason for banks not being allowed to create and issue currency is that a proliferation of bank notes drawn on differing banks could cause public confusion, particularly as individual banks might vary in the level of risk exposed to in their balance sheets. A similar problem would arise if stored value replaced currency: the risk attaching to stored value could vary considerably between issuers. In Australia's case this is not really a compelling reason however, given the stringency of the prudential supervision which governs banks' activities. This could change however if non-banks issuers are allowed to issue stored value.

The main reason is more likely to be historical: governments have traditionally regarded the issue of currency as a prerogative of the crown. In value terms however, bank deposits have long served the community as the major form of money in settlement of economic transactions and they do have the advantage over currency in that they, in most cases, now ensure an interest payment to the owner or holder.

The banking system creates and issues debt in the form of deposits in exchange for the community's assets including, in particular, future income streams and savings in the form of loan repayments. As discussed previously, some of these deposit liabilities have the monetary property that ownership is readily transferable by the issue of a cheque or by other means. For example, a plastic debit card or an electronic funds transfer at point of sale, Eftpos, transaction both involve transfer of ownership of this type of bank deposit liability.

By establishing a clearing system to settle the transfer of ownership of their deposit liabilities, banks are able to create a closed system which essentially enables the transfer between banks of the assets backing the deposits as the community switches its deposit holdings between banks.⁹

⁹ Crowley & Tennant. *op.cit.*

In the absence of a central bank issuing cash as a liability, and insisting that settlement between itself and the banks be undertaken in cash, the net multi-lateral clearing position of the banks must sum to zero.

Transactions between the central bank and the private banking system essentially involve the transfer of select assets - gold and foreign exchange and Commonwealth government securities - accompanied by a resultant variation in the level of inside money as opposed to outside money. The public itself can bring about this change by demanding currency in exchange for bank deposit liabilities: currency will be issued as a liability by the central bank to replace bank deposit liabilities which are extinguished as assets are transferred from bank balance sheets to the Reserve Bank's balance sheet.

This relationship between the Reserve Bank and the banking system enables the former to regulate the growth of the latter by the mandatory requirement that banks hold Reserve Bank frozen deposits, non-callable deposits, as assets in their balance sheets in proportion to the deposit liabilities that the banks create and issue.

Although a simplification of the institutional processes involved, it is essentially true that bank deposits can only grow at a rate determined by the growth in the creation and issue of non-callable deposits by the central bank. Unless the central bank is willing to translate assets held by the banks or public into cash, the banking system cannot expand. A reduced-form statement of the banking system's aggregated balance sheet for August 1995 is given below in Table 2.

Table 2

ASSETS	MS	LIABILITIES	MS
BANKING SYSTEM			
Loans	303516	Bank Deposits issued	262553
Premises & other assets	17864	Other borrowing	24302
Public sector securities	27213	Foreign currency liabilities	47128
Gold & foreign exchange	21266		
Non-callable deposits	3619	Owners equity	41143
Currency & cash	1648		
Total	375126	Total	375126

Data Source: RBA Bulletin September 1995

The asset 'Non-callable deposits' in the aggregated banking system's balance sheet of Table 2 matches the liability 'Deposits issued: Banks' shown in the Reserve bank's balance sheet detailed in Table 1. The essential point to note is, as discussed above, the constraint that this exercises over the size of the banking systems balance sheet. Set currently at 1% of Australian dollar assets less owners equity, banks must be able to access additional cash if they are to expand their balance sheets.

In recent years this constraint has come to mean less as the Reserve Bank now implements monetary policy through short term interest rates to directly target borrowing and spending. This indirectly affects banking system growth, as it does other financial institutions, by restricting loan demand and thus the growth in the creation and issue of financial deposit liabilities to fund loans. However the cash nexus between the Reserve bank and the banking system is still important in this and other respects.¹⁰

3.4 NON-BANK FINANCIAL INSTITUTIONS: NBFIs

3.4.1 Inside money - financial deposit liabilities and other liabilities issued by non-bank financial institutions.

Because of the banking system's control over the payment system's clearing house the economics literature often describes the relationship between banks and NBFIs as follows:

- The banking system creates and issues deposits in settlement of its loans or in settlement of its acquisition of other assets from the public. These deposits are defined as money.
- NBFIs, because they can not directly access the payment system, are unable to issue transferable financial deposit or other liabilities which can serve as money. They also cannot directly compete with the banking system because they too, like the public, use the banking system's deposits as money.

¹⁰ Crowley, M.J. & Tennant, J.K. *Aggregate Supply and Price in an LM-IS-BP Framework*. Monash University School of Business and Electronic Commerce. Working Paper Series, March 1995. ISBN 0 909170 61 4

- When a member of the public seeks to obtain a deposit from a NBFIs the transfer of ownership of a bank deposit takes place, not the extinction of a bank deposit. The NBFIs issues its own deposit liability in exchange for the bank deposit -the change of ownership being recorded in the accounts of the bank- and subsequently transfers ownership of the deposit, once again, in making a loan to a non-bank customer.
- Depending on the proportion of the deposit retained by the NBFIs for liquidity purposes, attracting deposits away from the banking system - a process known as disintermediation of bank deposits - will lead to a multiplied expansion in deposit and loan growth on the part of the NBFIs.

The above is usually stated in terms of banking system growth through the creation of money and NBFIs system growth through increasing the velocity of circulation of money: the latter's activities cannot extinguish bank deposits they simply create their own deposits and additional lending by attracting ownership of bank deposits from the public. This of course has implications for inflation.¹¹

The above analysis and its argument is fundamentally flawed in one important respect. For any given interest rate there will be a fixed demand for loanable funds in the economy. If the Reserve Bank sets short term interest rates to limit the demand for loanable funds then there will also be a fixed volume of loanable funds.

If NBFIs, because they are more cost efficient or have better quality loans, attract both loans and deposits from the banking system, then the competition will be direct. Bank deposits will contract as loans are repaid and refinanced through the NBFIs. Moreover, there need be no inflationary implications in disintermediation of deposits from the banking system. This is an important point to note.

It is also important to appreciate that the above paragraph currently describes the institutional and policy arrangements operating in the Australian financial system. As long as these

¹¹ Crowley, M.J. & Tennant, J.K. *The Operation of the Banking System and the Creation of Inside Money*

arrangements are in place, both banks and NBFIs can be considered to be competing for a fixed common pool of loans. What will determine their relative rates of growth is cost efficiency and product quality. In other words, banks and NBFIs are not distinguishable on conceptual grounds.¹² However, banks remain distinguishable on institutional and certain procedural grounds because of the nature of their existing settlement and banking relationships with the Reserve Bank. The implications of this will now be briefly discussed.

3.5 SETTLEMENT ARRANGEMENTS BETWEEN THE RESERVE BANK, BANKS AND NON-BANK FINANCIAL INSTITUTIONS.

3.5.1 Currency and cash

As discussed previously, when the public demand currency it is usually by seeking to withdraw currency through the agency of a financial institution in exchange for a deposit held with that institution.

When this takes place through the banking system the final effect, if it is an *increase* in the demand for currency, is an extinction of a bank deposit and the transfer of ownership of an asset, either Gold and foreign exchange or Commonwealth government securities, to the Reserve Bank. The Bank enters this asset in its balance sheet with a corresponding increase in the liability: Notes issued. This is accompanied by the physical delivery of currency, first to the banking system, then to the public.

When the currency is demanded from a NBFI the final effect is the extinction of a NBFI deposit, and the removal of an equivalent asset, usually a bank deposit, from the balance sheet. This is accompanied by the extinction of a bank deposit in the accounts of the banking system and the transfer of ownership of an asset to the Reserve Bank where it is matched by an increase in the Note issue liability. Given present institutional and procedural arrangements, any financial transactions between the NBFI and the Reserve Bank will work their way through the banking system's balance sheet.

The currency transaction described above works equally in reverse. A redemption of currency, depending on whether the public seek to hold bank or non-bank deposit liabilities,

¹² *ibid.*

as a substitute for currency, will expand either the banking system's balance sheet or both the banking system's and non-banks balance sheets.

4.0 THE BALANCE SHEET IMPACT OF A STORED VALUE SUBSTITUTE FOR CURRENCY

Table 3 is designed to provide insight into how the provision of a stored value substitute for currency would work its way through the financial system. It is, in effect, a tabular summary and extension of the preceding analysis. To facilitate exposition it is assumed that the economy has undertaken the move to a *cashless society* in a single leap: currency is no longer demanded, having been replaced by what is described, for convenience, as stored value.

The type of instrument used to house the stored value is not important to the analysis in this paper: it could be Smartcards in the form of electronic purses and wallets, or linked computer networks supporting the issue of Email 'cash'. What is important is that instruments are multi-purpose or universal and not restricted to a single purpose or service.

This seemingly indifferent attitude towards a nascent technology might appear strange at first glance: a case of the baby being thrown out with the bath water. It is not! In the context of this paper the attitude reflects the reality that the technology holds little interest from the point of view of *what*, in the future, will constitute *money*.

This aspect is not new. Inside money is simply financial debt issued in a form which can be conveniently transferred between parties in settlement of economic transactions. Money will remain such, even though there may be some concern that the new technology will allow a wider issue of debt in monetary form by less secure borrowers than the banking system including the Reserve Bank. This, in turn has ramifications for the stability of the payment system and *this is* important for economic and social well-being.

What is new is the way in which money *changes hands* and the concept of accessing money and exchanging it in more convenient ways. This has a number of important effects and raises essential social issues which must be faced. As Table 3 illustrates, some of these are:

- The loss of income to government resulting from the reduction in the size of the Reserve Bank's balance sheet.

- The corresponding transfer of income to the issuers of stored value instruments; and, by implication, the increased tax burden on the private sector and/or the necessary cutback in government spending and/or increased government borrowing to offset this loss of revenue.
- A wasteful use of economic resources if the revenue incentive from the asset backing of stored value instruments is the 'price' used to signal a diversion of economic resources to the provision of a new payment system, rather than the 'price' represented by the opportunity cost of the current payment system arrangements.
- An increase in yields on Commonwealth government securities and upward pressure on interest rates in general as the Reserve Bank runs down its portfolio of Commonwealth government securities. (In reality this effect is likely to be gradual and, therefore, weak.)
- An appreciation of the Australian dollar as the Reserve Bank runs down its portfolio of Gold and foreign exchange. (Again, this effect is in reality likely to be weak and gradual.)
- An increase in the supply of loanable funds to the non-government sector, and a decrease in the supply to government, with possible upward pressure on prices.
- Increased risk associated with the asset backing of stored value instruments as opposed to currency which the public may not perceive.
- Increased costs associated with the supervisory and legislative requirements which will inevitably follow the introduction of stored value instruments
- The implications of a highly visible run-down in Australia's official foreign exchange reserves

Table 3

ASSETS	MS	LIABILITIES	MS
RESERVE BANK			
Gold and foreign exchange	(-) 11867	Notes issued (a)	(-) 18604
Commonwealth government securities	(-) 6604	Deposits issued: (b)	
		Overseas Institutions	
		Banks	(+) 133
		Government	
		Total cash issued (a) & (b)	
		Capital and reserves (net)	
Total	(-) 18471	Total	(-) 18471
BANKING SYSTEM			
Loans	(+) 11170	Stored Value issued	(+) 12759
Premises & other assets		Bank Deposits issued	(+) 584
Public sector securities	(+) 840	Other borrowing	
Gold & foreign exchange	(+) 1200	Foreign currency liabilities	
Non-callable deposits	(+) 133	Owners equity	
Currency & cash			
Total	(+) 13343	Total	(+) 13343
NON-BANK FINANCIAL INSTITUTIONS			
Loans	(+) 5261	Stored Value issued	(+) 5845
Premises & other assets		NBFI Deposits issued	
Public sector securities		Owners equity	
Gold & foreign exchange			
Currency & cash			
Bank deposits	(+) 584		
Total	(+) 5845	Total	(+) 5845
PUBLIC			
Bank Deposits			
NBFI Deposits		Loans from Banks	(+) 11170
Currency	(-) 18604	Loans from NBFIs	(+) 5261
Stored value	(+) 18604		
Public sector securities	(+) 5764		
Gold & foreign exchange	(+) 10667		
Total	(+) 16431	Total	(+) 16431

HYPOTHETICAL EXAMPLE ONLY

5.0 A POSSIBLE SOLUTION FOR THE POTENTIAL EFFECTS OF STORED VALUE

Table 4

ASSETS	MS	LIABILITIES	MS
RESERVE BANK		Stored Value issued:	(+ 18604
Gold and foreign exchange		Notes issued (a)	(-) 18604
Commonwealth government securities		Deposits issued: (b)	
		Overseas Institutions	
		Banks	
		Government	
		Total cash issued (a) & (b)	
		Capital and reserves (net)	
Total	(-)	Total	(-)
BANKING SYSTEM			
Stored Value account with Reserve Bank	(+) 12759	Stored Value issued	(+ 12759
Premises & other assets		Bank Deposits issued	
Public sector securities		Other borrowing	
Gold & foreign exchange		Foreign currency liabilities	
Non-callable deposits			
Currency & cash		Owners equity	
Total	(+) 12759	Total	(+ 12759
NON-BANK FINANCIAL INSTITUTIONS			
Stored Value Account with Reserve Bank	(+) 5845	Stored Value issued	(+ 5845
Loans		NBFI Deposits issued	
Premises & other assets		Owners equity	
Public sector securities			
Currency & cash			
Bank deposits			
Total	(+) 5845	Total	(+ 5845
PUBLIC			
Bank Deposits			
NBFI Deposits		Loans from Banks	
Currency	(-) 18604	Loans from NBFIs	
Stored value	(+) 18604		
Public sector securities			
Gold & foreign exchange			
Total	(-)	Total	(-)

HYPOTHETICAL EXAMPLE ONLY

Table 4 illustrates how all these effects and issues can be avoided if stored value instrument issuers are allocated a level playing field in which all stored value is of equal risk standing, having the same status now enjoyed by currency.

Although the suggestion illustrated in Table 4 is contentious and certain to raise controversy, it does seem to offer a viable and practical solution in the context examined in this paper.

The suggestion is that all stored value behind the various instruments issued lie in asset backing in cash. That is, with the central monetary authority: the Reserve Bank of Australia. How this would work is detailed in the table: for banks and for NBFIs.

6.0 THE ECONOMICS OF CURRENCY AND STORED VALUE

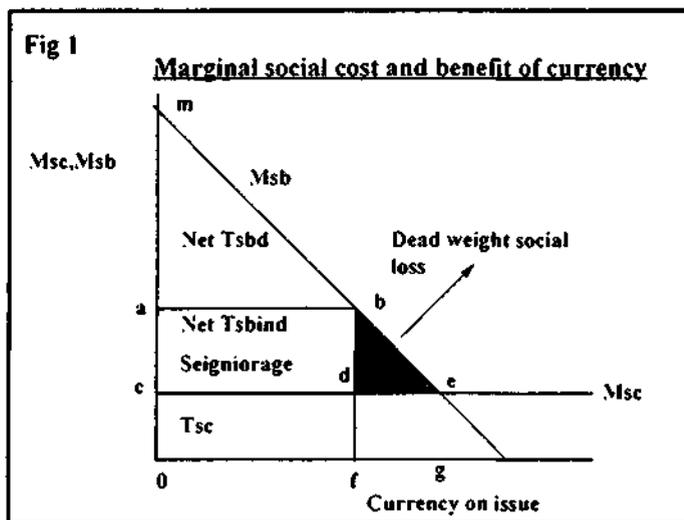
In this section, although each of the issues and potential impacts raised above are important, attention will be directed towards those which are probably less widely understood.

These are the issues of seigniorage, wealth transfer effects, and the potential for resource misallocation in the transition to a retail payment system based on stored value. These aspects are also most amenable to rigorous economic analysis within the context of established theory.

6.1 THE ECONOMICS OF CURRENCY

This can be explained simply in terms of conventional microeconomic analysis, illustrated in Figure 1. The marginal social benefit curve, *Msb*, captures the value to society of currency as an economic commodity: that is as a payment mechanism (medium of exchange) which includes other social, economic and psychological utility society attributes to this form of money.

It is drawn as a straight line for simplicity and downwards sloping to indicate a diminishing marginal utility. This curve also represents the *demand* for currency as a commodity for the *services* currency provides.



The marginal social cost curve for currency, Msc, is drawn to illustrate constant marginal costs of currency production including a normal profit. Costs relate to the actual expense involved in the physical production of currency, $0c$, not its face value, $0a$, which is considerably higher. The total social cost of currency production, Tsc , is the area $0cdf$.

The total net social benefit of currency accruing *directly* to society, $Net Tsbd$, is the area amb . The total net social benefit accruing *indirectly* to society, $Net Tsbind$, is the area $cabd$. This area is also equal to the seigniorage accruing to government. The total net social benefit to society, both direct and indirect, is the total of these two areas, $cmbd$.

The key message from the diagram is that currency issue on the part of the Reserve Bank is not socially efficient. The area dbe represents a net weight social loss to society as a whole and there is underproduction of currency measured by the distance fg . The socially optimal currency production level is $0g$, not the actual production level, $0f$.

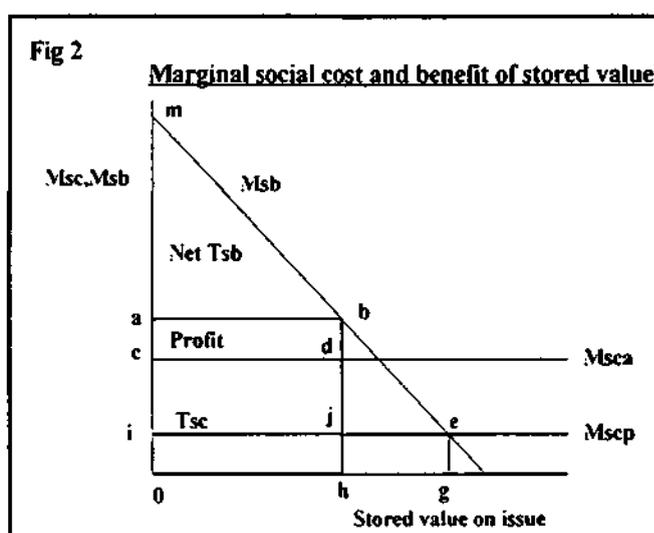
While it is not practical to pay interest on currency it is possible to eliminate the dead weight social loss by issuing currency at a discount to its face value.

The amount of this discount could be calculated by pricing currency at its face value less the income streams attaching to the financial claims (foreign exchange and Commonwealth government securities) exchanged for currency plus the physical cost of currency production.

In conceptual terms this would be equivalent to a situation where some other payment system, such as stored value Smartcards, substituted for currency and the card issuers paid interest on the stored value after deducting the cost of providing the payment system. This is one argument for replacing currency with privately provided stored value.

Figure 1 also has two other important implications. First is the financial incentive facing the card issuer and the opportunity cost facing society in adopting the new technology. Second, is the wealth transfer effect of substituting privately provided stored value cards or other instruments for currency, and the potential for an inefficient allocation of economic resources. This is illustrated in Figure 2 where, to highlight the analysis, the transition is assumed to have been completed.

6.2 THE ECONOMICS OF STORED VALUE



In Figure 2 a situation is described where the opportunity cost to society of stored value is equal to that for currency, $0a$. The marginal social benefit curve for stored value, Msb , has been drawn so that it is equal to that previously drawn for currency.

This time, however, the 'potentially best possible'

marginal social cost curve for actually providing the payment system for stored value, $Mscp$, has been set at a lower level than for the provision of currency, indicating the potential existence of a technologically superior and more cost efficient payment system.

The investment opportunities for issuers of stored value are assumed to be equal to those facing the Reserve Bank under a currency regime and it is assumed that these private issuers pay no interest on the stock of stored value outstanding. That is, stored value is issued at face value, $0a$, as is the case with currency.

In this case the potential revenue to the issuers is the same as that which previously faced the Reserve Bank in the issue of currency, $0abh$.

It is this *float* from the issue of stored value (society exchanges income earning financial claims such as Gold and foreign exchange and Commonwealth government securities for

stored value, much as they do now for currency) which provides the potential for resource misallocation. It does so in the following manner.

6.2.1 The potential resource misallocation of a transition to stored value

First, although M_{scp} represents the most cost efficient and technologically advanced possibility for the payment system which substitutes for currency, it may well be not achieved because of the financial incentive, and support, to provide a less efficient and more fragmented system.

For example, the system represented by a hypothetical marginal social cost curve, M_{sca} , which still allows the opportunity *for above normal profit*, $acdb$. This is conceptually analogous to the banking system which emerged from the regime of official interest rate setting prior to deregulation: competitive strategies focused on extensive branching and other forms of 'implicit interest' to take up the excess in finance margins, rather than allowing competitive forces work towards a more cost efficient payment system.

The potential social opportunity cost can be seen by comparing areas in the two diagrams: under the present currency system, Figure 1, and under a stored value system based on private sector issuers in Figure 2.

Under currency in Figure 1, the net total social benefit accruing to society - including seigniorage which we assume is redistributed as publicly provided goods - is $mbdc$. Under stored value in Figure 2, the net total social benefit is the much smaller value, mab .

In terms of the total social costs under the two payment systems, this has increased from $0cdf$ in the currency system to $0abh$ in the stored value system when the profit area $acdb$ is included.

6.2.2 The potential wealth transfer effect of a move towards stored value

In addition a wealth transfer equal to the seigniorage revenue area $acdb$ has taken place: from society to the stored value issuers. Part of this wealth is used to underwrite the additional *hidden costs* of the stored value issue. the remainder is the profit area $acdb$ in Figure 2. The hidden costs arise because it is not apparent to the community that currency issue underwrites

government spending that must be replaced by increased taxes when seigniorage revenue disappears if the provision of government services is to be maintained.

To the consumer it simply appears that stored value, in the example being illustrated, has the same price as currency: the financial claims (assets) of equal face value given up in exchange. The incentive to switch from a currency based payment system to a stored value system can be explained in a more convenient technology delivered at identical cost.

As discussed previously, one possible mechanism to avoid most if not all of the above issues lies in legislation which forces the issuers of stored value to 'purchase' the stored value in the form of stored value deposit accounts with the Reserve Bank.

6.2.3 The opportunity cost of a stored value retail payment system versus an on-line retail payment system

An important advantage of this approach is that it would protect the public interest by ensuring a retail payment system based on stored value that has the security status and safety of currency. The approach would also ensure that the financial incentive to implement a stored value system would lie in the opportunity cost inherent in the deficiencies of the present payment system in a much broader context than currency versus stored value.

For example, the system that is currently emerging which focuses on ATMs for currency acquisition and Eftpos for the transfer of ownership of bank deposits in settlement of retail transactions is based upon on-line/magnetic strip technology. This is not as cost efficient as off-line/Smartcard technology, although banks are reluctant to develop the cheaper alternative because of the considerable development costs 'sunk' in on-line/magnetic strip technology.

Failure to do so however, could result in other (possibly less prudentially secure institutions) taking the lead in this development to the longer term disadvantage of the banks: stored value is not only a substitute for currency, it is also potentially a substitute for bank deposits the most commonly used medium for larger retail transactions.

7.0 SUMMARY AND CONCLUSION

Present technological advantages, in particular Eftpos and the use of ATMs, provide an opportunity for eliminating the use of currency and moving more towards a retail payment system based on bank transferable deposits and the transferable deposits of other institutions provided with access to the clearing house. The infrastructure to do so is now in place and Australia ranks high in the per capita availability of this technological architecture: even the smallest retailers now have access to on-line swipe card facilities based on magnetic strip technology. This technology is expensive however, and it has shortfalls in terms of security and other aspects.

Smartcards in the form of electronic wallets and purses - and even more potentially important, direct interface through personal computer networks - hold the promise of a more secure and potentially more convenient means of payment at a lower cost. This is essentially because access to money, and the exchange of money in settlement of retail transactions, will be possible without requiring facilitation through the banking system's on-line computer network.

Conceptually, it also means that bank deposits and the financial liabilities that serve the community as money could be exchanged from 'hand to hand', as is the case with currency, without clearance through, or reference to, the banking system or other providers: the stock of stored value on issue could circulate as money within the community much as the stock of currency remains 'outstanding' at the present time. The Reserve Bank can measure the stock of currency on issue, it cannot trace its movement between parties once it is issued.

This 'hand to hand' transfer of ownership of bank deposit and the financial liabilities of other stored value providers is made possible by the transfer of value taking place through electronic rather than physical means: the potential exists for this form of money to take on properties analogous to currency. This has advantages and disadvantages involving a myriad of social, political and legal implications.

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