Money Substitutes and Interest Rate Determination: the Australian Case

This paper describes a test carried out to assess the significance of money substitutes in interest rate determination in Australia in the years 1953-1962. The test involved a comparison of four simple alternative hypotheses (1); these were:

$$[1] \qquad R = A_1 - a\,\frac{M_1 - kY}{P}$$

$$[2] \qquad R = A_2 - b\,\frac{M_1}{Y}$$

$$[3] \qquad R = A_3 - c\,\frac{M_F}{Y}$$

$$[4] \qquad R = A_4 - d\left[\frac{w_2M_2 + w_3M_3 + w_4M_4 \ldots}{Y}\right]$$

where the four independent variables correspond to four alternative indices of liquidity.

R = yield on 2-year government debt
M_1 = (notes + coins) + total deposits (public)
P = consumer price index
Y = Gross National Product
M_F = Constant Price assets (see text)
M_2, M_3 . . . range of liquid assets
w_1, w_2, w_3 . . . weights determined by the liquidity of the relevant assets.

(1) The hypotheses are of course not comprehensive. They exclude other possibly significant variables e.g. expectations, lagged adjustments, the rate of interest on fixed deposits, the rate of price change. However, since we are concerned merely with isolating the significance of money substitutes the tests proposed would appear to be reasonably adequate. Also the number of observations provides little scope for adding to the explanatory variables.

There is now a considerable literature on the rationale of functions [1] and [2], so these may be dealt with very briefly (2). Function [1], which relates the rate of interest to deflated idle balances, assumes the absence of any money illusion in the holding of idle balances (3); k was estimated in the familiar manner: the value of 1/6 which was used corresponds closely to the minimum value reached by the ratio public cash + current deposits/GNP in Australia (in 1930) (4). Total idle balances were then obtained by subtracting active balances from the money supply, as defined. These total balances were then deflated. The formulation in [2] has the advantage that it does not rely on any distinction between active and idle balances (5). (This ratio M_1/Y will henceforth be referred to as the Cambridge ratio.) Table 1 (columns 2-6) sets out annual data for R, Y, M_1, deflated idle balances and the Cambridge ratio.

It is now proposed to examine the Gurley-Shaw thesis that the two tests suggested so far may be inadequate in that they ignore the possible influence of money substitutes on the demand for bank deposits. These writers (6) take the view that if explicit allowance were made for these money substitutes a closer explanation of the

(2) See for example Latane (ref 13), Ball (ref 3).

(3) From [1] it may be seen that doubling both M_1 and P would leave the rate of interest unchanged whereas in the crude Keynesian function, which does not deflate idle balances, this change would *double* the size of idle balances and thus *lower* rates. See Patinkin (ref 18). See also Bronfenbrenner and Mayer (ref 5) for a similar treatment of idle balances. The crude Keynesian function was found unsatisfactory in our study.

(4) Since it is the movement in idle balances that is critical our result is not sensitive to changes in the assumed value of k. Two other methods of estimating idle balances have been suggested in the literature. Eisner (ref 6) suggests adding a minimum constant term to idle balances derived in the above manner. Khusro (ref 12) estimates k from the equation $R = A - bM/L + bkY/L$ where M represents total deposits, Y aggregate income and L liquid assets. Khusro claims that his results are improved by this method of estimation but this claim is not supported by the data he presents. Khusro compares the result of using this technique and taking the net yield on consols as the dependent variable with the result obtained by the cruder technique when the *gross* yield was used. Clearly the comparison should be with the result obtained when the *net* yield was used. On this basis the improvement is negligible from 0.8 to 0.82.

(5) Tobin (ref 25), Khusro (ref 12) Bronfenbrenner and Mayer (ref 5) have used variants of our formulation [1]. Latane (refs 13, 14), Ball (ref 3), Artis (ref 2) have used variants of our formulation [2].

(6) This is implied in many of their writings: see for example ref. 11. The most explicit statement of this hypothesis is found in J. Gurley — 10 —. The Radcliffe Report comes very close to expounding rather similar views, see p. 21 para. 392 (ref 20). See also refs. 2, 9.

TABLE 1

Financial Year	(aver) R	(Y) GNP (£m)	Notes-Coins + total deposits (public), June (M_1) £m	Deflated idle balances	Cambridge ratio 4/3	Constant price assets /GNP	Weighted assets /GNP
1	2	3	4	5	6	7	8
1953	3.03	4177	1691	.995	.405	.531	7.00
1954	3.10	4512	1800	1.027	.399	.525	6.93
1955	3.49	4872	1820	.982	.374	.503	6.66
1956	4.39	5291	1778	.838	.336	.466	6.25
1957	4.71	5739	1886	.821	.329	.464	6.19
1958	4.38	5798	1889	.808	.326	.469	6.30
1959	4.16	6224	1959	.795	.315	.463	6,27
1960	4.01	6892	2084	.786	.302	.456	6.20
1961	5.06	7258	2082	.704	.287	.441	6.02
1962	4.45	7299	2209	.798	.303	.477	6.48

Sources: Australian National Accounts 1948/49 - 1961/62. Reserve Bank of Australia - Financial Suppl. Statist. Bull. - Sep. 1963. For columns 7-8 see text.

behaviour of interest rates might be obtained (7). This line of thought would assume some significance in our context provided two conditions were satisfied. The first is that in the period we propose to cover, between 1953 and 1962, intermediary financing gained in importance, and the second is that the availability of intermediary liabilities, which are substitutes for money, induced some shift out of deposits on the part of the public. The first condition was certainly satisfied, to name only the most important of the financial intermediaries that either emerged for the first time or experienced a period of rapid growth in the period under consideration — finance companies, unit trusts, the official short term money market, new private savings banks, development companies, factoring/leasing companies and credit unions. The main objective of this study will then be to inquire whether the second condition may also have been satisfied.

(7) An entirely different orientation would be the following. B. Sprinkel (ref 23), Friedman and Meiselman (ref 7) had provided evidence to the effect that the money supply was a good predictor of movements in aggregate income. Timberlake (ref 24) extends somewhat this analysis by inquiring whether the addition of money substitutes to the money supply will improve further the prediction of income. In fact he finds that money substitutes do not improve the results.

A new financial intermediary is characterised by some innovation. Financial innovations may be conveniently divided into two groups: those that inhere in the debt offered and those that inhere in the credit being provided. The impact of these innovations on the economy is worth summarising: credit innovations tend to shift the aggregate demand schedule upwards (an availability effect); on the other hand, debt innovations, other things being equal, may shift the liquidity preference schedule downwards. The first produces a direct effect on aggregate demand, the second an indirect effect via a change in the rate of interest. In our context it is clear that it is the second type of effect that is of more direct concern to us and accordingly we will tend to concentrate on the liabilities offered in this period by the new financial intermediaries. Three of these intermediaries — unit trusts, new private savings banks (8), the official short term money market — may be classified as pure debt innovators. Three others, on the other hand — factoring, leasing and development companies — may be treated as pure credit innovators and therefore fall largely outside the scope of this study. The two remaining ones — hire purchase, credit unions — are hybrids in that some contribution was made by them to both debt and credit innovation. Credit unions will, however, be excluded from the study because of the unavailability of data and also the fact that even in 1962 their assets could hardly have exceeded £6m.

One way of representing the possible impact of debt innovation is by way of a shift leftward in a hypothetical schedule relating the Cambridge ratio to the rate of interest. This is shown in Figure 1. Suppose the ratio M_1/Y was as shown at x and suppose a new financial intermediary whose liability was a partial substitute for money entered the system. If the money supply remains unchanged then only a fall in the rate of interest to R_2 will be consistent with the ratio x obtaining (9). Alternatively, we could say that in order to maintain the same rate of interest the ratio M_1/Y would need to fall from x to y. F. Paish (10) in his submission to the Radcliffe

(8) To some extent the inclusion of savings deposits by the newer savings banks in the group of debt innovations seems dubious. This may be justified, however, by the fact that they were differentiated by advertising and also by the fact that the many new branches opened up added to the convenience of the small saver.

(9) It is also suggested that the elasticity of the schedule at C will be greater than at B. See Patinkin (ref 19).

(10) Minutes of evidence 10441. Quoted in Gurley - ref 9.

Committee has described the effects of near money as follows: "I would say that whereas they could get a given rate of interest with a 40% ratio of bank deposits to National income if there was not very much near-money in the system, they might need 35% to get the same rate if there was a lot of near-money in the system. They would have to set off the increased liquidity due to large holdings of near-money by having less real money, in order to get

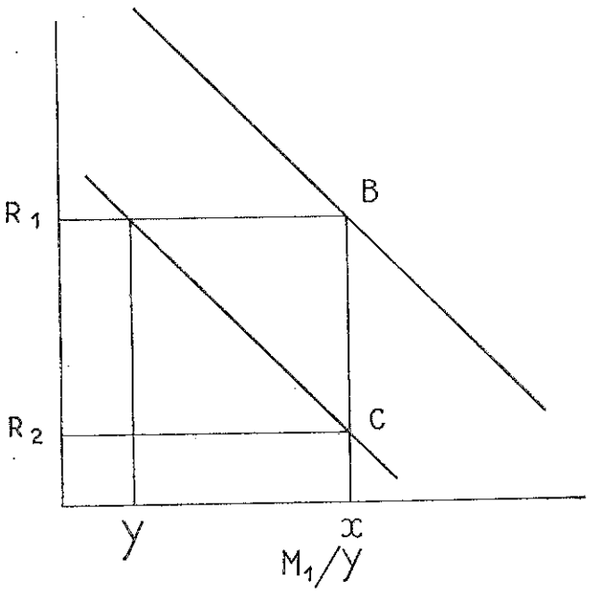

Figure I

the same effect on total liquidity". H. Arndt (11), commenting on the downward trend in the ratio of money to income in the post-war years in Australia suggests that: "there is little doubt that this reflects chiefly the new developments in the capital market, especially the availability of short term notes and other liquid assets. In effect, these developments have brought about a significant increase in the velocity of circulation of money". We should add "at given interest rates" (12).

(11) See ref 1, p. 35

(12) This liquidity effect of the entry of new intermediaries has been given some prominence in the more recent literature. Other things being equal, this effect tends to become progressively weaker as financial markets become more sophisticated. This follows from the fact that a greater variety of financial assets will now be available and therefore more competition would be offered to any new claims being made available by intermediaries.

It is worth briefly reviewing the published evidence for both the U.K. and U.S. on the question of whether it is necessary to allow explicitly for money substitutes in explaining the behaviour of interest rates. Minsky — ref 17 — had suggested that high interest rates in inflationary periods will provoke financial innovations in the subsequent depression (i.e. improve methods of activating idle balances) which will result in a shift to the left of the Cambridge ratio rate of interest schedule. Rousseas (ref 21) and later Bernstein (ref 4) tested this hypothesis for U.S. data. The evidence was suggestive of two possible shifts coinciding with the two depression years of 1954 and 1958. Artis (ref 2), following suggestions by the previous writers, attempts to apply these ideas to U.K. data. His interpretation of the evidence is that during the period 1954-58 (2nd quarter) the economy was roughly on the same Cambridge ratio/rate of interest schedule, shown by the best fit line for the period; however, in 1958 when recessed conditions developed, a shift induced by the availability of money substitutes may have occurred. A few comments on this analysis are appropriate. First, Artis' observations are too few to warrant inference respecting a shift. Second, Artis reasons that since "major bursts of innovation have a long gestation period and tight money policies provide the necessary stimulus, then it would be logical to look to the period when de-control begins for evidence of any shift that may have occurred". This idea that there is some peculiar relationship between recessed conditions and shifts is unconvincing. It is equally reasonable to suppose the shifts to occur in boom conditions. Third, there may be reasons for shifts under depressed conditions which have nothing to do with financial innovations: for example, a switch towards more secure assets. Finally, Artis quotes figures of amounts of increases in deposits with finance houses to support the dating of the shift in late 1958, but these figures are quite misleading: they would, for example, support shifts of even greater intensity in 1954 and 1956.

Gurley's study (ref 10) is of some interest in that it represents the first attempt to take account of money substitutes by weighting these substitutes according to their degree of liquidity. One objective

of Gurley's paper is to explain the movement in interest rates in the U.S. (corporate bonds, government bonds and prime commercial rates) in terms of the ratio of weighted liquid assets in the hands of the non-finance private sector to G.N.P. It seems that he experimented with alternative weights and found that attributing a weight of 1/2 that of money to other liquid assets provided a good fit (13). The relationship, a hyperbolic one, is very close indeed for the period covered 1946-58. Two comments on Gurley's work are worth making. First, Gurley's selection of non-monetary liquid assets is a narrow one: they include time saving deposits, savings and loan shares, credit union shares, savings bonds and policy reserves of the life offices (the latter could hardly be regarded as possessing the same liquidity as the others in the list). Second, and this is very significant, Gurley himself in the appendix to his work presents evidence to show that, taking the period under consideration, the ratio of money/GNP would have produced equally good results, and certainly the relationship between money/GNP and the rate of interest appears equally close (14). This is so according to him because "both the money/GNP ratio and weighted liquidity/GNP were reduced almost hand in hand throughout the period", and again "the use of money instead of weighted liquidity assumes that non-monetary liquid assets move in some stable way with the money supply, an assumption that is roughly true for post-war annual data". The inference is that Gurley considers it *analytically* more legitimate to take account of money substitutes even though, as it happens, in the period examined it does not improve the results.

Latane (ref 13), derived a close relationship for the years 1909-1958 between income velocity and the rate of interest. He finds no evidence of a shift in the schedule as a result of the increasing importance of financial intermediaries (15). He concludes that

(13) This is the inference from page 8. "The best that one can do is to test various hypotheses about these degrees of substitutability with interest rate data", and in a footnote "other weights ... provide equally good explanations of interest rate behaviour ... It is not the very best weight out of an infinite number of possibilities".

(14) No figures are given of the "closeness of fit" in either case.

(15) These results may not be easy to reconcile with the short run analysis offered by Bronfenbrenner and Mayer as to the relationship between the Cambridge ratio and the interest rate. Several shifts are postulated in this study but there is no suggestion that this is consistent with a stable long run function for the period covered, 1914 to 1957.

"there is no significant evidence that financial intermediaries have increased the efficiency of cash balances". A. Meltzer — ref 16 — in an elaborate study obtains a stable long run demand function for money which spans over half a century (1900-1958). He concludes that "the stability of the long run demand function for money denies the necessity for incorporating the liabilities issued by financial intermediaries as a part of the definition of money or as arguments in the long run demand function". Ball's study (16) of the determination of the yield on consols in the U.K. effectively reaches an identical conclusion in respect of the role of money substitutes (17). We may sum up our review of the overseas evidence by saying that the more rigorous of the studies — those by Latane, Meltzer and Ball — suggest that money substitutes have not been significant in the determination of the interest rates.

Two lines of approach are possible for Australian data. One would call for a preliminary dating of the shift or shifts in the schedule; on this basis a best-fit line covering data prior to that date/s may be extended and an examination then made of observations in the later period to see if a majority fell below the extended line. Even if we attempted to date the shift, assuming it occurred, there would be some difficulties involved in isolating a single unambiguous line to be extended. Moreover, shifts due to other possible considerations, e.g. the level of activity, expectations, become confounded in the analysis. It seems preferable on the whole then to follow the second line of approach: that indicated by Gurley, with certain appropriate modifications. First, the range of non-monetary liquid assets included in the analysis will be considerably extended. Second, a more complex weighting pattern will be adopted than the one actually used by Gurley (18). The lack of data unfortunately compels us to confine the analysis to annual observations for the period 1953 to 1962. Holdings of all liquid assets by the private

(16) See ref 3.

(17) See also Friend (ref 8) whose results are somewhat ambiguous. Friend's approach is to treat the ratio of certain money substitutes to gross national product as an additional explanatory variable in a function explaining the behaviour of interest rates in the U.S.

(18) The rationale of weighting liquid assets is fully appreciated by the Radcliffe Report. After presenting a table on p. 171 of certain liquid asset holdings by the personal sector they comment "there is no way of equating one asset to another: the addition of the four columns together to make the fifth is an addition of items that are not quite equivalents".

TABLE 2

LIQUID ASSET HOLDINGS PR[I]ON-FINANCE - as at June (end) (£m.)

Type of Asset / Year		1953	19[5]4	1955	1956	1957	1958	1959	1960	1961	1962
Trading Bank Deposits	(1)	1,218	1,3[0]	1,329	1,275	1,373	1,362	1,412	1,501	1,496	1,601
		(29.1)		(25.6)		(23.7)		(22.2)		(21.3)	
Savings Bank Deposits	(2)	942	1,0[0]	1,067	1,134	1,219	1,288	1,383	1,514	1,569	1,726
		(22.4)		(21.7)		(21.7)		(22.1)		(22.6)	
Deposits with short term money market	(3)	—	-	—	—	—	—	20	51	55	75
								(0.54)		(0.89)	
Deposits + shares mostly Bld. Socs. + deposits with Life Offices	(4)	18	2[0]	22	27	31	39	45	50	57	63
		(.43)		(.48)		(.60)		(.72)		(.82)	
Clients' credit balances with Pastoral Finance Cos.	(5)	40	1[0]	31	29	40	28	24	23	20	19
		(.89)		(.59)		(.59)		(.36)		(.27)	
Unit Trusts, Land Trusts Mutual Funds (Holdings)	(6)	9	[1]2	18	24	32	41	54	80	84	92
		(.24)		(.41)		(.63)		(1.0)		(1.2)	
Commonwealth Government Securities	(7)	853	8[8]0	910	906	892	869	850	818	761	747
		(20.0)		(17.9)		(15.3)		(12.7)		(10.4)	
Local & Semi-Government Securities	(8)	136	1[5]0	172	188	203	212	235	237	244	254
		(3.4)		(3.5)		(3.6)		(3.6)		(3.4)	
Values Life Assoc. Policies	(9)	362	3[9]0	421	458	500	545	597	654	708	781
		(8.7)		(8.7)		(9.1)		(9.5)		(10.2)	
Debentures, Notes and Deposits	(10)	39	[5]0	64	107	161	219	330	498	588	670
		(1.1)		(1.7)		(3.3)		(6.3)		(8.6)	
Equities	(11)	965	1,0[1]2	1,085	1,134	1,166	1,180	1,185	1,160	1,175	N.A.
		(22.7)		(21.8)		(20.3)		(17.9)		(16.2)	

1. *Trading Bank deposits*: Estimated for June 1957 from "classification of bank deposits" and "volume of money" published by the Reserve Bank Statistical Bulletin. Other years obtained by taking changes from A. Holmes, Flow of Funds, Reserve Bank Staff Paper, after adjustment for "notes and coins".
2. *Savings bank deposits*: Savings deposits as at June 1953 from Flow of Funds less deposits by Financial Institutions. Later years from Flow of Funds.
3. *Deposits with the short term money market*: Total deposits less holdings by Trading Banks and Savings Banks from Reserve Bank Statistical Bulletin.
4. *Deposits/shares Building Societies - Deposits Life Offices*: Estimated from Flow of Funds.
5. *Clients' credit balances with Pastoral Finance Companies*: From Flow of Funds.
6. *Holdings of Unit Trusts, Land Trusts and Mutual Funds*: From Flow of Funds.
7. *Commonwealth Government Securities*: June 1960 figures estimated from "Holdings of Government Securities" published by Reserve Bank Statistical Bulletin. Changes from Flow of Funds.
8. *Local and Semi-Govt. Securities*: June 1954 figures estimated from Finance Bulletin (1954-55) State Auditor-General's Reports and Flow of Funds. Changes from Flow of Funds.
9. *Life Assurance Surrender Values*: 70% of reserves of Life Offices less policy loans. From Flow of Funds. The 70% figure was suggested by the Actuary of a large Life Office. In the context of a micro-analysis the figure is probably an understatement.
10. *Debentures, notes and deposits*: June 1957 estimated from Flow of Funds (Finance Companies) and Reserve Bank Company Supplement (Non-Finance Companies). Adjustment for holdings by Financial Institutions. Changes from Flow of Funds.
11. *Equities*: Here there are problems of valuation and of estimating equities of unlisted companies. The figures obtained are little better than guesses and are in fact not used in the analysis. Unlisted equities were "estimated" from raisings by Listed and Unlisted Companies. Figures for Listed Equities for 1953 were estimated from Sydney Stock Exchange Gazette. Certain very rough deductions were made for holdings by Financial Institutions. Although the figures are wildly inaccurate, the changes in the holdings over the period (obtained by noting equiting changes in Flow of Funds) are worthy of some attention.
12. *Flow of Funds*, 1958-62: Figures were kindly made available to me by an officer of the Reserve Bank.

non-finance sector for this period are shown in Table 2 (19). The percentages of the different assets to G.N.P. for two-year periods are shown in brackets. Certain interesting features of this table are worth noting: one is the decline in importance of equity holdings (from about 23% to 16%) possibly due to the availability of substitutes, e.g. unit trusts. Another is the sharp fall from 1955 in the holdings of Commonwealth Government debt by the personal sector (the ratio to G.N.P. falls from 20% in 1953-54 to 10% in 1961-62); this coincides with the increasing availability of substitute assets such as debentures/notes and deposits.

On what bases will the financial assets be weighted in terms of their liquidity? Without attempting a precise definition we can accept D. Rowan's suggestions (ref 22) that the liquidity of any asset depends on three considerations: (a) the speed with which it can be converted into money, (b) the degree of price certainty attaching to the conversion, (c) the capital certainty attaching to the conversion. We may now proceed briefly to examine our liquid assets in terms of this three-fold criteria. Abstracting from considerations of default risk it is possible to isolate in one group those assets which are characterised by price and capital certainty attaching to their conversion. In this group we may include assets numbered 1 (including current and fixed deposits) 2, 3, 4, 5. The ratio of these assets to G.N.P. was computed and the results are shown in column 7 Table 1. The assets in this group will differ only in respect of consideration (a) above. Is consideration (a) measurable in any way? One hint of the "delays", "inconveniences" involved in conversion may be obtained by indices of relative turnovers of these assets (20). Table 3 sets out some rough calculations of the turnovers in this group (1-4, 7, 8). The only mild surprise in this result is the relative ranking of interest

(19) The lack of data makes it necessary to omit unexercised overdrafts. Figures for these are only available from 1960. Unexercised overdrafts are certainly relevant to the overall liquidity position of the private sector. Their absolute size is very large: they amounted to something like £100m in June 1962. More important, the ratio of these overdrafts to total overdraft limits tends to fluctuate between the peaks of booms and recessed conditions, falling in the former and rising in the latter. This would be a factor adding to the liquidity of the private sector when economic activity is slack.

(20) This is by no means an unambiguous test: the rate of use need not correspond closely to the effect on the demand for money. It is conceivable that a low rate of use accompanies a high subjective sense of liquidity.

TABLE 3

Type of Asset	Turnover
1. Non-interest bearing deposits	33
2. Interest bearing deposits	1.6
3. Savings Deposits	1.1
4. Shares in Building Societies	0.29
5. Unit Trust holdings	0.08
6. Life Assurance policies	0.02
7. Deposits short term money market	28
8. Balances with Pastoral Finance Companies	1.2

Sources:

1. $\frac{\text{Debits} \times 52}{\text{Average of deposits}}$ - average 1958/9 - 1963/3, Reserve Bank Statistical Bulletins.
2. Estimated in basis of December 1962 distribution of deposits by interest rates (Reserve Bank Statistical Bulletins). Assumes withdrawals on maturity.
3. $\frac{\text{Withdrawals during year}}{\text{Average deposits in year}}$ - average 1956/57 - 1960/61. Finance Bulletins.
4. Calculated on basis of figures of withdrawals and share values received from 6 N.S.W. Building Societies (representing roughly 25% of the market) for the financial year 1962/63. The figure is a weighted average. Dispersion: 0.19 - 0.35.
5. Estimated from figures published quarterly by the Bureau of Census and Statistics — "Transactions of Trusts and Funds" — (1962).
6. $\frac{\text{Surrenders} + \text{New loans granted}}{\text{Reserves}}$ - (average 1956 - 58). Finance Bulletin, Reserve Bank Statistical Bulletins, Flow of Funds. Advances of premiums omitted: these were not significant.
7. From information obtained from two leading dealers (just under ¼ of market). Simple average (26 - 30).
8. Based on information from one leading company. No other information could be obtained.

bearing deposits and savings deposits (21). All other rankings virtually confirm a priori expectation (22).

(21) But this could well be due to the assumptions implied in the method of calculating fixed deposit turnover. See our sources to Table 3.

(22) The great bulk of deposits with the official short term money market are on call and the turnover here is very high (in fact nearly as high as money). Some building societies protect themselves by stipulating a few weeks' notice before withdrawals but inquiries made revealed that in fact withdrawals are accepted within a week. Clients' credit balances are virtually deposits on call. Note also that default risk which bears some relevance to liquidity is assumed away here, but conceivably it should be explicitly introduced as a further, but very weak, differentiating feature.

Once we move away from this group and examine the other assets in our list, estimation of liquidity becomes more difficult. In addition to (a) considerations (b) and (c) will now assume some importance. The difference between (b) and (c) is basically one of the perfection or otherwise of the market facing the holder of the asset. If an individual holder may sell any number of the asset at a fixed price, other things being equal, we say that he is confronted with a perfect market. In respect of attribute (b) then price certainty would attach to the conversion. If, on the other hand, increasing sales by the holder progressively lower the price of the asset in question then the market is imperfect. Following Rowan, we may also say that attribute (c) will depend on the stability of the prices in the market.

How do our remaining assets stand up to these considerations? Unit trusts are subject to little delay in conversion because the institutions concerned will generally re-purchase the units at quoted prices. In respect of attribute (b) it will also follow that the individual will tend to be in a perfect market. Since, however, the portfolio of these trusts is subject to substantial price variability (equities being prominently featured), the holdings will possess little liquidity in respect of attribute (c). Some of these points at least would be reflected in the turnover figure for these units; this figure is shown in Table 3. It is clear that it stands will below the turnover figures of the assets comprising the first group above. Turning now to Commonwealth Govt. securities, the great bulk of these are listed in stock exchanges and this facilitates shifting. The degree of perfection in the market depends on the value of transactions on the exchange of the maturities concerned. The degree of imperfection would tend overall to be slight. Attribute (c) depends on the maturities of the holdings, the longer maturity, other things being equal, suffering the largest price changes. No information could be collected on the term structure of debt holdings. Operations by public authorities in varying maturities tend to bolster the liquidity of these holdings. Local and semi-government securities are less liquid on the whole. A smaller proportion of these securities is listed and the market is thinner than in the case of Commonwealth Securities. The liquidity of life policies is a matter of some difficulty. Until a policy acquires a surrender value — 2-3 years after its issue — it has virtually no liquidity. When the policy possesses a surrender value, conversion into money is possible in two major ways: by surrender (part or whole) or by borrowing against the policy (generally a maximum of about 90% of the full surrender value) (23). Loss of rights to the policy by surrender is certainly a deterrence to this form of liquidation; on the other hand, a loan on policy, on which interest is paid, involves no loss of rights and represents a quick and effective means of raising cash (generally 3-4 days from application). Nevertheless, it appears to be true that the bulk of policy holders either by intent or ignorance continue to regard their policy holdings as relatively illiquid assets (24). To some extent this appears to be confirmed by the turnover figure given in Table 3 for life policies (25).

The group labelled debentures, notes and deposits (26) contains a range of assets differing widely in the attribute of liquidity. Aggregation of liquidity for this group would call for complete information on private non-finance holdings in respect of the following: the term structure, the proportion of assets listed in stock exchanges, the default risk attaching to the individual components (proportion of assets secured, the financial solidity of the companies concerned), the negotiability or otherwise of the assets, the value of transactions in given periods for individual components. Some data bearing on these points for total holdings (including those by financial institutions (27) was obtained as at June 1961. Roughly 32% of issues by finance companies and 36% by non-finance companies were listed on the Sydney Stock Exchange. About 30% of listed issues were unsecured. As to the term structure

(23) Non-payment of premiums (allowing the policy to be placed under non-forfeiture provisions) is a form of borrowing against the policy.

(24) See, for example, the monograph prepared for the Commission on Money and Credit in the U.S. by the Life Insurance Association of America, published by Prentice Hall, 1962, Chapter 9.

(25) This figure is deficient in that loans (in particular by banks) secured by these policies are not taken into account. No information could be obtained on the proportion of loans to the personal sector by the banks secured in this way. However, some rough calculations suggest that the turnover figure for life policies would be most unlikely to be raised above 0.04.

(26) The contribution by finance companies in the total issues of debentures, notes and deposits was roughly about 50% in 1957 and 1958. Since no information could be obtained of holdings by large financial institutions it is not known what the relative holdings of the personal sector are.

(27) It is safe to say that purchases by financial institutions (life offices, pension funds) would be of the longer term variety (5 years or over). However, with the passage of time their portfolio would contain many short term holdings.

of these listed issues (28) the following differences were noted as between finance and non-finance companies:

	Finance % of issues	Non-Finance % of issues
Maturing within two years	24%	14%
Maturing within three years	46%	24%
Maturing within five years	86%	53%

There appears on this basis to be a substantial difference in the liquidity of finance and non-finance issues. The degree of imperfection of the market will also vary considerably within the group, some having high transactions, others low. The final asset on the list is equities: again there is great diversity within this group. The degree of price dispersion (29), however, is sufficient in this case to place the group below all others on the list (30).

Our crude data and a priori reasoning so far have suggested the following rankings in terms of liquidity (31):

(1) bank deposits, savings deposits, deposits with the short term money market;

(28) Prospectuses of some finance companies provide information with respect to liabilities maturing within one and two years. The term structure of some of the unlisted liabilities may be tracked down in this way. This line of approach did not take us very far, however.

(29) Unit trusts would still remain more liquid than individual equity holdings if only because of the possibilities of diversification in trusts.

(30) It may occur to the reader that since price variability and turnover appear to be the two most relevant considerations bearing on liquidity, liquidity could be made a function of these two "objective" indices. There are tremendous difficulties involved in defining and measuring price variability (e.g. in situations of imperfect markets) and also in defining the relevant asset for turnover measures (e.g. one particular maturity for one company, or all maturities for that company). Also turnover fluctuates sharply with time in a way which could hardly be said to have corresponding implications for liquidity: for example, turnover of savings deposits has consistently risen in the last 7-8 years, yet no one would want to say that savings deposits have become increasingly liquid. Finally, who would want to rate the liquidity of current deposits as roughly 33 times that of savings deposits, as revealed by turnover figures?

(31) The emphasis on the ease of conversion of an asset into money may to some extent be misplaced where the concern is with the possibilities of dishoarding stimulated by the availability of certain liquid assets. Some account may need to be taken of the reverse case: the conversion of money into these assets. Size of minimum units acceptable, provision made for regular payments, degree of advertising may all become relevant.

(2) clients' credit balances, shares with building societies;

(3) Commonwealth Government securities, debentures/notes, unit trusts, local and semi-government securities;

(4) Life policies;

(5) equities.

If we treat these group rankings as rigid, the only element of flexibility (experimentation) left to us is in the possible orderings within a group, e.g. rate unit trusts above Commonwealth Securities and debentures below the latter, always maintaining this group of three above the next group under four. Some experimentation was carried out along these lines, but there was little difference in the results yielded by minor changes in orderings. Equities were excluded from the final results because the method of deriving this category was unreliable. The following weights were finally used:

Asset No.	Weight
1, 2	10
3	9
4, 5	8
6, 7, 10	6
8	5
9	3

The ratio of weighted assets to G.N.P. is shown in column 8 in Table 1.

Correlations between the rate of interest and the four alternative indices of liquidity, for both original values and first differences, are given in Table 4. All correlation coefficients for original values are high but the four hypotheses perform equally well. First differences were taken to eliminate the trends in both series — the correlation coefficients remained fairly high and significant. Although coefficients for the two ratios incorporating money substitutes were higher than the coefficient for the Cambridge ratio the differences were not significant. It is worth noting too that deflated idle balances performed as well as the weighted assets ratio. It would seem to be a reasonable inference from these results that making an explicit allowance for money substitutes does not contribute to

the explanation of the behaviour of the rate of interest. This conclusion parallels the results obtained from the other studies reviewed earlier.

TABLE 4

CORRELATION COEFFICIENTS

	R	Δ R
Deflated Idle	0.92	—
Δ Deflated Idle	—	0.85
Cambridge ratio	0.93	—
Δ Cambridge ratio	—	0.76 (1)
Constant Price assets ratio	0.93	—
Δ Constant Price assets ratio	—	0.80
Weighted assets ratio	0.92	—
Δ Weighted assets ratio	—	0.83

(1) Significant at the 2% level.

To complete the discussion certain limitations attaching to the analysis should be mentioned. First, no account has been taken of the liquidity of financial institutions. The study was confined to the private non-financial sector. Second, the role of debt in the total liquidity position was ignored. Since debt also produces its effects on the demand for money (32), the analysis is correspondingly weakened by this omission. Third, certain possible changes in preferences as between non-monetary liquid assets could upset some of the conclusions of the analysis: for example, a shift in preference under certain conditions towards savings deposits and away from riskier assets would produce a " spurious " rise in liquidity. Fourth, certain changes in the structure of rates offered on non-monetary liquid assets could yield misleading results in terms of our liquidity index. For example, if rates on savings or fixed deposits rise relative to, say, rates on offer by finance companies, any switch towards more liquid assets could again result in a spurious rise in liquidity. Fifth, each asset has been imputed with a certain " fixed " liquidity weight for the whole period under analysis. It may reasonably be objected that the liquidity of an asset may change over time

(32) See R. McKean — ref 15 — for a discussion of this point.

for a variety of reasons (33): the term structure of holdings, e.g. debenture, government securities, may change with the passage of time, the expected range of price variability or the conditions of conversion (e.g. a wider market) in particular assets may also change in time. All these limitations at least should be borne in mind; nevertheless, it is doubtful if they are serious enough to throw complete doubt on our findings.

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(33) See the early discussion by McKean — op. cit. — on this. The Radcliffe Report (ref 20) (p. 171) recognises this point when it says " we cannot even regard any particular asset as making just the same contribution to liquidity as it made before the war: building society shares are certainly regarded as more liquid than they used to be ".

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