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Direct Controls and the Relationship
Between the Monetary Base,
Secondary Reserves and the Money Supply
by
IAN G. SHARPE
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AUSTRALIAN MONEY SUPPLY ANALYSIS - DIRECT CONTROLS

AND THE RELATIONSHIP BETWEEN THE MONETARY BASE,
SECONDARY RESERVES AND THE MONEY SUPPLY

ABSTRACT

A comparison of the standard deviation of the difference in growth rates of the monetary base and money for the U.S. and Australia indicates much larger variation in the latter case. The larger Australian deviation is explained by differing institutional frameworks within and through which monetary policy functions in the two countries and by the somewhat greater reliance on direct controls as monetary policy instruments in Australia. When allowance is made for the unique Australian institutional context, reasonably close and stable relationships are found between the monetary base and money and between a liquidity augmented monetary base and money.
1. INTRODUCTION

In a recent paper [4] Burger examined the difference between the growth rates of the U.S. monetary base adjusted for reserve requirement changes and the money supply from 1954-1973. Using moving periods varying from one month to two years and utilizing the finding that the differences were approximately normally distributed, confidence intervals were established for the differential growth rates. He concluded that in the short-run the growth of money diverges substantially from the growth of the adjusted monetary base but for periods of one to two years the relationship is quite close.

The corresponding Australian differentials, for both the narrow M1 and broad M3\(^1\) definitions of the money supply, are shown in Table 1. It is evident that the standard deviations of the Australian differentials are 3\(\frac{1}{2}\) to 4 times greater than their U.S. counterparts suggesting a somewhat loose relationship between these monetary aggregates in the Australian context. In the yearly case the 95% confidence interval is a range of \(\pm 8\%\) compared with \(\pm 12\%\) for the U.S.

In the remainder of the paper we attempt to ascertain why the standard deviations of the simple Australian differentials are so large relative to their U.S. counterparts. The thesis which is examined is that the differing U.S. and Australian experience results from somewhat different institutional frameworks.

2. AUSTRALIAN INSTITUTIONAL FRAMEWORK

As in many British Commonwealth countries, the primary form of Trading (Commercial) Bank lending in Australia is the overdraft loan (see [1]). In an overdraft system, a borrower firstly establishes an overdraft limit with
the bank, thereby permitting him to overdraw his account to this limit.
Unlike the fixed loan system in which the loan is immediately credited to
the borrower's current or checking account, in an overdraft system borrowing
only takes place when the account is overdrawn while the amount of the loan
is equal to the actual amount overdrawn. The timing of the takedown of
the overdraft is, to a considerable extent, at the borrower's discretion.
This is particularly so in the Australian context where the existence of an
unused overdraft limit has been almost costless to the borrower. It is
conceivable then that, in Australia, a somewhat longer lag could exist
between changes in the monetary base and money than in the fixed loan system
of the U.S.

Also, under the Australian Banking Act the Reserve Bank of Australia
possesses extensive powers over all aspects of banking business. These
include controls over interest rates which the limited number of Trading
and Savings Banks may pay on deposits and may charge on loans, and controls
over investment policy of the banks through direct lending controls and
various liquid asset and government security requirements. These direct
banking controls were rigidly applied in the 1950's and resulted in the
decline of the Banking Industry relative to the uncontrolled non-bank
financial intermediaries (see [2]). In the period encompassed in this
study the Reserve Bank issued lending directives to the Banks in the
1974(2), instructing them in each case to reduce their new lending.
Presumably the objective of such a directive is to restrict the rate at
which high powered money is converted into money. Thus to the extent that
such controls are effective one would expect a complicated lag relationship
between growth of the monetary base and growth of the money supply in the
Australian context.
In addition to lending controls the Reserve Bank has imposed interest ceilings on Bank deposits and loans, the deposit ceilings being equivalent to Regulation Q in the U.S.. Such deposit ceilings result in a shift of deposits out of Banks when the ceilings are binding and an inflow of deposits when the ceilings are no longer binding. In terms of the traditional money supply analysis these deposit shifts are reflected in changes in the money multiplier but their cause is clearly Central Bank policy. A relatively greater dependence on such ceilings in the Australian context could explain, in part, the large Australian differentials observed in Table 1.

Another characteristic of Australian monetary policy during the 1960's and 1970's has been the frequent alteration of statutory cash reserve requirements. Unlike open market operations of a central bank which have an immediate impact on the money supply, a change in the statutory cash reserve requirement alters the volume of free reserves and the money supply does not change until the Banks adjust their portfolios of securities or loans by means of transactions with the non-bank private sector. This suggests the possibility that the conversion of the monetary base into money may not follow the same pattern as the relationship between statutory reserve requirement changes and the money supply. Furthermore in the Australian institutional context the incentive for Banks to adjust their free reserve holdings by trading with the non-bank private sector is reduced to the extent that the Reserve Bank remains a willing buyer or seller of government securities at its policy determined interest rate. Consequently the effect of a reserve requirement change is likely to be offset initially by a corresponding change in the monetary base with little impact on the money supply. Thus in the Australian context one would not expect to observe an identical relationship between the monetary base and the money supply supply as between SRD changes and the money supply as is implied by the simple difference analysis of Table 1.
In addition to the SRD requirement, Australian banks observe a secondary reserve or liquid assets convention which is referred to as the LGS convention. It requires Trading Banks to hold a proportion of their deposits in LGS assets (currency, deposits at the Reserve Bank excluding SRD accounts, or government securities). Also, until recently, the Reserve Bank has not regarded the monetary base or the money supply as a target variable but has instead set interest rates. Under such a system the monetary base and the money supply are permitted to vary substantially on a short-run basis. Thus Banks may convert their excess LGS assets into base money (or excess cash reserves into LGS assets) and the non-bank private sector may convert government debt into currency at the pegged interest rate. In the following section it is argued that the traditional money supply analysis focusing on the monetary base and cash reserve requirements may be somewhat inadequate as it ignores the "buffer" stock role of excess LGS assets in Banks' portfolios.

3. THE USEFULNESS OF THE MONETARY BASE CONCEPT IN THE AUSTRALIAN CONTEXT

The usefulness of the monetary base as an indicator of the current stance of monetary policy in Australia has been questioned by Purvis [11] and Sharpe [16]. Suppose the Australian Government finances a deficit of $100m by writing cheques on its account at the Reserve Bank. If the cheques are deposited in the Trading Banks, the monetary base and money supply increase by $100m, SRD deposits increase by \( r \cdot 100m \) and excess cash reserves increase by \( (1-r) \cdot 100m \) where \( r \) is the required cash reserve ratio. In terms of the traditional money supply analysis the description of this set of transactions is that the increase in the monetary base increases the money supply but this positive effect is partially offset by the effect of an increase in the Trading Bank excess reserve ratio \( 'e' \). As the Trading Banks subsequently reduce their excess reserves to normal levels by extending
loans or purchasing securities from the private sector 'e' declines thereby contributing positively to growth of the money supply. It should be noted however that in this example the full expansionary impact on the monetary base is recorded at the time the Government's cheques are deposited in the Trading Banks.

Alternatively let us suppose that the Trading Banks use the increase in excess cash reserves of \((1-r)\). $100m to purchase government securities (LGS assets) from the Reserve Bank so that the Reserve Bank's portfolio of government securities declines by \((1-r)\). $100m. The total change in the monetary base is therefore $100m - \((1-r)\). $100m = r. $100m. If subsequently the Trading Banks desire to satisfy a demand for loans from the private sector, the banks will convert some of their excess LGS assets into cash reserves by selling bonds to the Reserve Bank at the pegged yield in order to satisfy SRD requirements. At this time the monetary base increases but note that the increase is at the discretion of the banks or private sector. In other words, the traditional money supply analysis focusing on the monetary base, assigns a monetary impact only at the time excess LGS assets are converted into base money (or vice versa) and may provide a misleading signal as to the current stance of monetary policy. As Purvis (11) argues there is an element of endogeneity in the monetary base given the willingness of the Reserve Bank to buy and sell LGS assets at the policy determined interest rate for such a policy strategy increases the substitutability of government securities for base money. However Purvis does not suggest any alternative to the monetary base.

If there were very little substitutability between base money and government securities then the monetary base would be a reasonable indicator of monetary policy. However if there were perfect substitution, then a more reliable indicator would be total Government and Reserve Bank debt outstanding.
Although Dewald [7] acknowledges that neither of these two extremes is reasonable in the Australian context he argues that each (with appropriate adjustments for reserve requirement changes) is a more reliable indicator than other traditional indicators such as the free LGS assets ratio, interest rates and the money supply.

In a recent paper, Sharpe [16] has suggested a liquidity augmented monetary base, denoted AB and defined as the traditional monetary base plus government securities held by the Trading Banks, as an alternative to the monetary base in the Australian context. Obviously the liquidity augmented monetary base is only one of many possible indicators lying between the two extremes suggested by Dewald. Its selection follows from the assumption that there is a high degree of substitutability between base money and government securities in Trading Bank portfolios but little substitution in Savings Bank and non-bank private sector portfolios.

Consider again the example described earlier in which a government deficit is financed by drawing on the government's cash balance at the Reserve Bank. When the cheques are deposited in the Trading Banks, AB increases by $100m. while excess LGS assets increase by $(1-r-g) \cdot 100m. where g is the required LGS ratio. Whether the Trading Banks hold their LGS assets in the form of base money or government securities is irrelevant in terms of the liquidity augmented monetary base. Furthermore the example suggests that there may be a considerable lag between changes in the liquidity augmented monetary base and changes in the money supply whereas the lag between the monetary base and money supply could be much shorter. The longer lag in the former case arises from the buffer stock role played by excess LGS assets. In the following section of the paper regression analysis is applied to ascertain the nature of the relationship between the respective base concepts and the money supply.
4. EMPIRICAL ANALYSIS OF THE MONETARY BASE/MONEY SUPPLY AND LIQUIDITY
AUGMENTED MONETARY BASE/MONEY SUPPLY RELATIONSHIPS

The basic estimating equations are

\[ MS = a_0 + b_0 \text{DC} + \sum_{i=0}^{n} c_{i1} B_{-i} + \sum_{j=0}^{m} d_{0j} (r + z)_{-j} \]  

or

\[ MS = a_1 + b_1 \text{DC} + \sum_{i=0}^{n} c_{11} A_{-i} + \sum_{j=0}^{m} d_{1j} (\text{Ar} + \text{Ag} + \text{Az})_{-j} \]  

where MS is the percentage rate of change in the money supply defined as either M1 or M3.

DC is a dummy variable to capture the effect of the conversion to decimal currency. It takes the value of +1 in 1966(1) and -1 in 1966(2).

B is the percentage contribution of growth of the money base to growth of the money supply as defined in Sharpe [16].

(r + z) is the percentage contribution to growth of the money supply of changes in required cash reserve ratios of Trading and Savings Banks as defined in Sharpe [16].

AB is the percentage contribution of growth of the liquidity augmented monetary base to growth of the money supply as defined in Sharpe [16].

(\text{Ar} + \text{Ag} + \text{Az}) is the percentage contribution to growth of the money supply of changes in the required cash reserve and LGS ratios of Trading and Savings Banks as defined in Sharpe [16].

In contrast to the simple differential analysis of Table 1 equations (1) and (2) permit lag relationships between reserve requirement and monetary base changes and changes in the money supply, different relationships are permitted between reserve requirement changes and money changes than between base money changes and money supply changes,
and $E_{0i}$, $E_{0j}$, $E_{1i}$ and $E_{1j}$ are not constrained to sum individually to unity. Also allowance is made for the conversion to decimal currency in 1966, and constant terms are included to account for any long-run trend in the money multiplier.

Equations (1) and (2) also assume that the lag weights $c_0$, $d_0$, $c_1$ and $d_1$, which indicate the rate at which reserves are converted into money, are independent of the size of the initial injection or withdrawal of reserves. It is conceivable that Banks may behave differently in response to very large (sudden) changes in the rate of growth of the adjusted base than to smaller (or more gradual) changes. This hypothesis may be tested by allowing each of the constant lags $c_0$, $d_0$, $c_1$ and $d_1$ to be variable but this would add significantly to the number of estimated coefficients. Consequently, it was decided to experiment with an alternative approach which would involve the addition of a single variable of the form

$$10^{-3} [(B + r + z)^3 - (B + r + z)_{-1}^3] = \text{NSYM 1}$$

or

$$10^{-3} [(B + r + z)^3 - \frac{1}{2}(B + r + z)_{-1}^3 - \frac{1}{2}(B + r + z)_{-2}^3] = \text{NSYM 2}$$

for the monetary base formulations and

$$10^{-3} [(AB + Ar + Ag + Az)^3 - (AB + Ar + Ag + Az)_{-1}^3] = \text{NSYM 3}$$

or

$$10^{-3} [(AB + Ar + Ag + Az)^3 - \frac{1}{2}(AB + Ar + Ag + Az)_{-1}^3$$

$$- \frac{1}{2}(AB + Ar + Ag + Az)_{-2}^3] = \text{NSYM 4}$$

for the liquidity augmented monetary base formulations. A negative coefficient is expected in each case. Variables (4) and (6) have been constructed with a longer lag than variables (3) and (5).

The evidence in Table 2 strongly suggests a significant lagged relationship between the base money concepts and reserve requirement changes and the money supply with some evidence of a longer lag for the broad M3
definition of the money supply than for M1. Also the lag coefficients indicate a somewhat different timing pattern of the effects of reserve requirement changes than base money changes. Reserve requirement changes appear to take one quarter before they influence the money supply but their full impact is expended three quarters after the policy change. On the other hand changes in each of the base concepts have significant effects on the money supply in the current quarter and continue to influence the money supply for a further three to six quarters. But only in the case of the M3 definition of the money supply does there appear to be any evidence of a longer lag on the liquidity augmented monetary base than for the traditional monetary base.

However, multicollinearity creates problems in interpreting the length of the respective lags. Because of the policy of pegging bond yields, any change in SRD requirements is likely to be offset initially by a corresponding change in the monetary base, B. This interdependence is reflected in a simple correlation of -.76 between B_t and (r + z)_t so that the 't' statistics in regressions with these variables will be accordingly quite small. Furthermore forecasting the effects of changes in SRD requirements with these equations is complicated by the need to specifically incorporate the interdependence between (r + z) and B. On the other hand, the liquidity augmented monetary base, AB, was constructed in such a way as to overcome this interdependence problem so that regression estimates using AB and (Ar + Ag + Az) should have a greater degree of precision. The simple correlation between AB_t and (Ar + Ag + Az)_t was -.37, a not surprising result given the tendency of the authorities to utilize SRD policy to absorb excess liquidity of the Banking System.

A further interesting result is the finding that a significant negative coefficient on the NONSYM variables could only be found in REG1D which is
the liquidity augmented monetary base form. This is not surprising given
the institutional factors described earlier whereby variations in the
monetary base are modified because of the Reserve Bank's willingness to buy
or sell government securities at the policy determined interest rate. Given
such an institutional framework variations in the augmented monetary base
are likely to be significantly greater than variations in the monetary base

5. STABILITY ANALYSIS

Brown, Durbin and Evans [3] have recently suggested various techniques
for examining the constancy of regression relationships over time. These
include the cusum test and the cusum of squares test. The cusum test
involves the computation of the standardised sum of the recursive one period
prediction errors. A test is available (see[3]) to ascertain whether this
statistic differs significantly from its expected value of zero. Generally
the cusum statistic indicates instability when one period prediction errors
are consistently positive (or negative) over a significant portion of the
sample. Brown, Durbin and Evans [3, p.154] assert that the cusum of squares
test "provides a useful complement to the cusum test, particularly when
departure from constancy of the betas is haphazard rather than systematic".
It also is useful in detecting whether the variance of a relationship is
constant over time. Essentially the cusum of squares test ascertains whether
the errors are evenly distributed throughout the sample period, a change in
variance being evident in a concentration of large errors within a portion
of the sample.

The cusum and cusum of squares tests were applied to regressions 1A, 1B,
1C and 1D. On the basis of the cusum test, the null hypothesis of stability
could not be rejected at the 90% confidence level in any of the four cases.
But the cusum of squares test resulted in the null hypothesis being rejected in all four cases at the 95% level. The M1 regressions were only marginally unstable at the 95% level and passed the test at the 99% level while the M3 regressions were clearly unstable at the 99% level.

For space reasons we include only the cusum of squares plots corresponding to the liquidity augmented monetary base M1 and M3 REG 1C and 1D as Figures 1 and 2. Examination of the plots indicates that the instability in the M1 regression is largely confined to observations 32 to 36, corresponding to the period 1969(4) to 1970(4), while the instability in the M3 regression is more extensive encompassing observations 34 through 52 or 1970(2) to 1974(4).

In order to test the hypothesis that direct bank lending controls and/or interest ceilings on bank deposits contributed to the observed instability of the money supply relationships, experiments were conducted with two types of dummy variables to reflect the impact of such controls. The first, which we denote DLEND, takes the value of unity in quarters when lending directives were in effect and zero otherwise. The second dummy, which we denote DCEIL, attempts to capture the effect of interest ceilings. Because of the extensive control over financial markets exerted by the monetary authorities in Australia there is no available series of interest rates, encompassing the sample period 1962-1975, which one may presume is a reasonable "market" yield. This means that there is no other alternative than the adoption of somewhat ad hoc dummies to capture the impact of bank interest ceilings. The procedure adopted involved an analysis of the interest differentials between the policy imposed ceiling on Trading Bank fixed deposits of twelve months term and the three month treasury note yield, the redemption yield on two year government securities, and the weighted average yield on deposits with short term money market dealers.
In each case a "normal" differential was established and when the differential declined substantially below this level it was assumed the ceiling became effective so that the dummy variable takes a positive value in such quarters. As the differential returns to "normal" levels, the dummy takes a negative value.

There were four periods in which interest ceilings were likely to influence monetary growth: 1965-6, 1970-1, 1973 and 1974. Accordingly the ceiling dummy was defined: DCEIL = 1 in 1965(2) and (3), = -1 in 1966(3) and (4), = 2 in 1970(2), = -\frac{1}{2} in 1970(3) to 1971(2), = \frac{1}{2} in 1973(3) and (4), =-1 in 1974(1), = 1 in 1974(2) and (3), =-1 in 1974(4) and 1975(1), and = 0 elsewhere.

Because of the high correlation between DLEND and DCEIL the former was found to have insignificant coefficients so that regression results in Table 3 only include the DCEIL variable. In each of the regressions the interest ceiling dummy is highly significant and consistent with the hypothesis that direct controls have had a substantial impact on the money supply function in Australia. Furthermore with the addition of DCEIL, the M1 regressions easily pass all stability tests at the 95% confidence level. However each of the M3 regressions required the addition of a further dummy variable, D66 for the monetary base formulation and D71 for the liquidity augmented monetary base formulation. With the respective dummy variables added, each of the M3 equations marginally fail the cusum of squares test at the 95% level but pass at the 99% level.

To summarise, the results of Sections 4 and 5 are consistent with the hypothesis that, when account is taken of the distinctive Australian institutional framework, reasonably close and stable relationships exist between both the narrow and broad definitions of money and the monetary
base and the liquidity augmented monetary base. The relationship between M3 and each of the base concepts is much closer than that of M1 with the SEE of the former approximately half of the latter. Furthermore the SEE of the M3 equations compare quite favourably with results from Burger's simple differential analysis. However when we turn to the criteria of stability, the M1 equations appear less susceptible to structural change than the M3 regressions. In each of the M3 regressions an ad hoc dummy variable (D66 or D71) had to be included to derive a stable relationship.

A further interesting result is that, in terms of stability and goodness of fit, the liquidity augmented monetary base formulations perform no better than the traditional monetary base formulations. While in the existing Australian institutional context, on theoretical grounds, the liquidity augmented monetary base adjusted for reserve requirement changes may provide a more appropriate indication of the current stance of monetary policy than the adjusted monetary base, if we assume that the error in predicting the current growth of each of the base concepts is similar then predictions of monetary growth based on the monetary base are likely to be as accurate as those utilizing the liquidity augmented monetary base.

6. A FURTHER U.S. COMPARISON AND CONCLUSION

The finding of a significant lagged relationship between changes in the base definitions and money in the Australian context contrasts with U.S. studies utilizing a similar methodology. Laufenberg [9], in a monthly seasonally unadjusted U.S. study for the period 1969-73, found a maximum lag of two months between growth in the adjusted source base and growth of M2 and a one month lag for M1. Davis [5], using quarterly seasonally adjusted data for 1960-67, could not find a significant lagged relationship between nonborrowed reserves and either demand deposits or the sum of demand
and time deposits. On the other hand, Davis and Schadrack [6], in a reduced form study using monthly seasonally adjusted data 1965-69, found a lag relationship extending seven months between changes in nonborrowed reserves and changes in demand deposits. However this study utilized a second degree Almon distributed lag to estimate the lagged coefficients. In each of the three studies, stability analysis was limited to an analysis of ex-post forecasting errors.

Because of the obvious difficulties in comparing the results from these studies with our Australian results, the author obtained the following regression results using U.S. quarterly seasonally adjusted data for the period 1962(1) to 1975(4)

\[
\frac{\Delta M_1}{M_1 - 1} = 0.53 + 0.527\frac{\Delta B}{B - 1} + 0.243\left(\frac{\Delta B}{B - 1}\right)^2 \quad R^2 = 0.280 \quad \text{SEE} = 2.49 \quad \text{DW} = 2.05
\]

\[
\frac{\Delta M_2}{M_2 - 1} = 2.47 + 0.689\frac{\Delta B}{B - 1} + 0.226\left(\frac{\Delta B}{B - 1}\right)^2 \quad R^2 = 0.378 \quad \text{SEE} = 2.46 \quad \text{DW} = 1.48
\]

where \( B \) is the Federal Reserve Bank of St. Louis series for the adjusted monetary base. Neither relationship suggests a particularly significant lagged relationship between the monetary base and money for the U.S. while the poor DW statistic in the \( M_2 \) regression suggests an important explanatory variable may have been omitted. Stability tests were applied to the \( M_1 \) regression resulting in rejection of the null hypothesis of stability at the 99% confidence level in the case of the cusum of squares test.

Furthermore the instability appears largely confined to two quarters, 1973(1) and 1973(2). This was confirmed by rerunning the stability tests for the \( M_1 \) relationship while excluding these two observations.
Turning to the M2 relationship, the poor D-W statistic may be explained by the omission of a variable which would take account of the effect of Regulation Q on time deposits. In the following regression we include current and lagged values of the differential between R, the rate on 4 to 6 month commercial paper, and Q, the regulation Q ceiling for 90 to 179 day time deposits greater than $100,000: 11

\[
\frac{\Delta M_2}{M_{2-1}} = 3.49 + 0.539\frac{\Delta B}{\Delta B} + 0.179\left(\frac{\Delta B}{\Delta B}\right) - 1.251\Delta (R-Q) - 1.500\Delta (R-Q) - 1.013\Delta (R-Q) - 2
\]

\[
(3.70) (4.35) (1.47) (2.67) (3.03) (2.04)
\]

\[R^2 = 0.583\]
\[\text{SEE} = 2.07\]
\[\text{D-W} = 1.63\]

The interest differential is clearly significant and the equation passed the cusum squares test at the 99% level but was borderline at the 95% level. Furthermore the results suggest that a somewhat more 'refined' regulation Q variable, which takes account of Regulation Q rates on smaller deposits and different maturities, could improve the results.

Clearly the lag between base money changes and the money supply in Australia is considerably longer than that existing in the U.S., a fact which partly explains the relatively large standard deviation of the simple difference in growth rates between money and base money in Australia found in Table 1. On the other hand the existence of Regulation Q interest ceilings in the U.S. and direct lending and interest controls in Australia have each influenced the relationship between the monetary base and (the broader definitions of) money. The greater reliance on such direct controls in the Australian context, together with the econometric difficulties in adequately capturing their impact, could further contribute to the somewhat looser Australian money supply relationships found in this study.
From a policy point of view, the existence of a long lag between base money changes and money supply changes in Australia suggests the possibility of instrument instability (see [8]). That is to say, in order to attain a money supply target in a short period of time, very large changes in the instrument may be required. In subsequent periods, there could be overshooting of the target so that large destabilizing changes in the instrument may well be required to maintain the target. This suggests that unless the institutional framework is altered in such a way as to substantially reduce the length of the lag between the monetary base and money, then the Australian monetary authorities would need to adopt a gradual approach in their attempt to achieve a monetary growth target.
FOOTNOTES

1. In addition to M1, which includes currency and current (demand) deposits, M3 includes fixed (time) deposits at the Trading Banks and savings deposits at the Savings Banks. These are the most frequently utilized definitions of the money supply in Australia.

2. The Australian Government banks with its Central Bank, the Reserve Bank of Australia.

3. Some of the effect on the money supply may be offset by changes in interest rates which could affect currency and excess reserve ratios.

4. This is analytically equivalent to the offsetting changes in borrowed reserves which often accompany exogenous increases in the monetary base in the U.S. system.

5. That is, currency of the public plus required and excess cash reserves of Trading and Savings Banks. Term and Farm Development Loan Funds are included as excess Trading Bank reserves while in the case of Savings Banks we assume that their required reserve ratio calls for the holding of cash reserves whereas they are in fact permitted to hold Treasury Notes to satisfy the requirement.

6. The assumption is consistent with the Reserve Bank's econometric model of the Australian monetary sector in which the banking sector's stock of government securities is determined as the "residual" asset in the banking sector's balance sheet identity whereas the non-bank private sector's demand for government securities is determined by a behavioural equation (see [10]). Secondly, a study of the portfolio adjustment mechanism of Australian Trading Banks, Savings Banks and the non-bank private sector by Sharpe [14 and 15] found that: (a) the short-run portfolio adjustment of Trading Banks in response to variations in
deposits or advances largely involves a simultaneous change in their government securities; (b) the initial portfolio adjustment of Savings Banks in response to deposit variation is largely in terms of cash reserves held at the Reserve Bank on which a yield approximately equal to the Trading Bank fixed deposit rate is paid; and (c) it appears to be Trading Bank current deposits and advances (overdrafts), rather than government securities, which perform the short-run adjustment function in the non-bank private sector's portfolio. Thirdly, long-run interest elasticities of demand for components of the monetary base and government debt in Australia by Savings Banks and the non-Bank private sector appear to be quite small (see [10, 14 and 15]).

7. Suppose that for moderate changes in the monetary base, 60% of the change in money occurs in the current quarter and 40% in the following quarter. A very large one quarter increase in the growth rate of B would result in NONSYM 1 taking a very large positive value in the quarter of the increase and a large negative value in the following quarter.

8. For evidence supporting such an hypothesis see [16, p.106].


10. \( D66 = 1 \) from 1966(3) to 1972(1) and zero otherwise while \( D71 = 1 \) from 1971(1) to 1971(4) and zero otherwise.

11. As the ceiling on large deposits was removed on 16.5.1973, \( \Delta(R-Q) = 0 \) for observations 1973(3) to 1975(4).
BIBLIOGRAPHY


TABLE 1
DIFFERENCE BETWEEN THE SEASONALLY ADJUSTED ANNUAL GROWTH RATES
OF THE ADJUSTED MONETARY BASE AND MONEY
FOR AUSTRALIA APRIL 1960 TO JUNE 1975*+

<table>
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<th>1 Month</th>
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<td>M3</td>
<td>M1</td>
<td>M3</td>
<td>M1</td>
<td>M3</td>
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<td>M3</td>
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<td>2.66</td>
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</tr>
</tbody>
</table>

*Consecutive periods are used. For example, if the first 3 month period is January - March inclusive, the next period is February - April inclusive.

+Data source [16, pp. 97-8 and 100-1].
<table>
<thead>
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* Source [16]
+ Variables are defined in text
‡ Significant at the 95% confidence level (two tail test)
§ 't' statistics in parentheses
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** Significant at the 95% confidence level (one tail test)
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§ 't' statistics in parentheses
# NONSYM 3 and NONSYM 4 for the M1 and M3 regressions respectively
** D66 for REG2D, D71 for REG2C
++ Significant at the 95% confidence level (one tail test)
FIGURE 1

CUSUM OF SQUARES PLOT FOR REG 1C
[QUARTERLY DATA, OBSERVATION 1 = 1962 (1)]
FIGURE 2
CUSUM OF SQUARES PLOT FOR REG 1D
[QUARTERLY DATA, OBSERVATION 1 = 1962 (1)]
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<td>The Impact of Wage Indexation on Wage Inflation and Strike Activity in Australia.</td>
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17  V.B. Hall  Pricing Behaviour in Australia: A Data Evaluation Study.


Papers marked with an asterisk are out of stock. Copies of the others are available upon request from:

Department of Economics
University of Sydney
N.S.W. 2006.