

**THE RELATIONSHIP BETWEEN FINANCIAL INDICATORS
AND ECONOMIC ACTIVITY: SOME FURTHER EVIDENCE**

Glenn Stevens

and

Susan Thorp*

Research Discussion Paper
8903

June 1989

Research Department
Reserve Bank of Australia

* We are grateful to Warwick McKibbin, Warren Tease and Rob Trevor for helpful discussions and comments on an earlier version of this paper. The opinions expressed, and any remaining errors are ours, and should not be attributed to the above or to the Reserve Bank of Australia.

ABSTRACT

This paper focusses on the empirical relationship between financial indicators (monetary and credit aggregates and short-term interest rates) and measures of economic activity.

It aims to supplement an earlier paper by Bullock, Morris and Stevens (1988) (BMS), which explored these issues. BMS tentatively concluded that short-term interest rates and the narrow aggregate M1 had a reasonably good leading relationship with private final demand. Broad monetary and credit aggregates tended to be lagging indicators, and the intermediate aggregates (M3 and bank lending) presented a mixed picture. This earlier paper relied on simple graphical and correlation-based techniques to draw these conclusions.

The same questions are addressed in this paper, this time using more rigorous statistical testing techniques. Vector auto-regression (VAR) analysis is used to identify leading and lagging relationships among the data. All data are pre-tested for the presence of deterministic trends and unit roots, and differenced and detrended accordingly, before the models are estimated. Estimation is over the period 1969-1988 (given available data), using seasonally adjusted quarterly series.

Results confirm that the broader aggregates generally lag activity, however there is no strong evidence of a leading relationship between the short-term interest rate (or M1) and activity. The latter suggests a complex relationship between interest rates and activity over time; a process influenced by the operation of monetary policy, which cannot be satisfactorily unravelled using the techniques employed here.

The data set of BMS is also extended in this paper to allow a preliminary examination of the tradeable goods sector. Models including the exchange rate, foreign demand and prices, as well as domestic activity and financial variables are estimated. Results from these tests suggest an effect of the exchange rate on imports and exports, which is consistent with a link between monetary policy and the tradeable goods sector.

TABLE OF CONTENTS

Abstract	i
1. Introduction	1
2. Background	2
3. Data	4
(a) Indicators of Financial Conditions and Economic Activity	4
(b) Differencing and Detrending	5
4. VAR Estimation Results	6
(a) Financial Indicators and GDP	7
(b) Financial Indicators and Private Final Demand	9
5. The External Sector	13
6. Conclusions	17
Appendix A: Tests for Unit Roots and Time Trends	20
Appendix B: Tests using Alternative Data	24
Appendix C: Data	30
References	32
Data Listing	35

THE RELATIONSHIP BETWEEN FINANCIAL INDICATORS AND ECONOMIC ACTIVITY: SOME FURTHER EVIDENCE

Glenn Stevens and Susan Thorp

1. Introduction

The role of money and credit in the economy, and particularly the empirical relationships between monetary and credit aggregates and measures of economic activity, have attracted much attention in the macroeconomics literature. Many prescriptions for monetary policy have arisen as a result of strongly-held beliefs about these relationships.

The aim of this paper is to explore whether a range of financial indicators - short-term interest rates, and various monetary and credit measures - have useful leading relationships with measures of economic activity.

An earlier paper by Bullock, Morris and Stevens (1988) (BMS) has already considered this issue. Its tentative conclusions were that the narrow monetary aggregate M1¹ and the level of short-term interest rates had a reasonably good relationship with private final spending, and had the added advantage of being leading indicators. Broad monetary and credit aggregates tended to be at best coincident with activity, if not lagging. The intermediate aggregates, M3 and bank lending, were useful indicators at times, principally in the early and mid-1970s, but had since been subject to considerable disturbance in their relationship with activity.

These conclusions were drawn on the basis of fairly simple methodology - graphs and correlation coefficients. The approach adopted in this paper is to take the same data set as in BMS (updated and revised for re-basing of the national accounts to 1984/85 prices) to see whether the earlier preliminary conclusions draw support from more sophisticated tests.

In recent years in particular, questions of statistical methodology have tended to dominate the empirical literature. While it is not our intention to dwell on these issues, Section 2 of the paper, which gives a brief (and far from exhaustive) review of the empirical literature, highlights some of the methodological issues. Section 3 discusses data.

¹ BMS conjectured that the interest-sensitivity of M1 meant that the information conveyed by it was likely in fact to be the same information as conveyed by short-term interest rates. In this case, perhaps these two cannot really be viewed as independent indicators.

New empirical work is reported in Section 4. The tests used confirm that the broader aggregates do tend to be lagging indicators of activity, but are unable to detect any systematic leading or lagging relationship between interest rates and activity. The evidence on the narrow and intermediate monetary aggregates is mixed.

Section 5 broadens the scope of the analysis by allowing for the foreign sector. In an open economy, a floating exchange rate means that changes in monetary policy can affect output of the tradeable goods sector, through the link between interest rates and the exchange rate. The data set is expanded to allow for this, and the preliminary results reported are consistent with such an effect.

2. Background

Early work for the U.S. by Friedman and Schwartz (1963) suggested that turning points in the money stock preceded turning points in nominal income. This work was extremely influential, though a similar study for the U.K. (Friedman and Schwartz (1982)) came in for trenchant criticism from Hendry and Ericsson (1983), an example of how far econometric methodology had advanced in two decades. The monetary theory of nominal income popularised by Friedman was also embodied in econometric models of the "St Louis" tradition, such as Andersen and Jordan (1968) and Andersen and Carlson (1970), where economic activity was explained (in part) by lags of a monetary aggregate.

There was also some interest in Australia in monetary aggregates and activity. Sheppard (1972), Sharpe (1975) and Davis and Lewis (1977) all found evidence for money leading real activity. Boehm (1983), in a study of the business cycle since 1948, found that M1, M3 and bank lending all led his "reference cycle".

Some studies used simple regression analysis to test the hypothesis that money leads income, but did not actually test the *alternative* hypothesis, that income leads money. This approach is potentially misleading, especially when dealing with this type of macroeconomic data. Most economic time series are autocorrelated. Where there is a relationship between two variables, this means that lags of one variable will frequently be correlated with the current value of the other. Further, the order can be reversed, often with equal statistical (and theoretical) validity.

For example, suppose m is money and y income, and e_t and u_t are uncorrelated with each other and with their own lagged values, and that

$$m_t = \alpha y_t + e_t \quad (1)$$

$$\text{but } y_t = \gamma y_{t-1} + u_t, 0 < \gamma < 1. \quad (2)$$

Then a regression such as

$$y_t = \beta m_{t-1} + z_t \quad (3)$$

will, in all likelihood, show a significant estimate for β , since β will be picking up the effect of γ and α . But to conclude from this that m_{t-1} causes y_t , or even leads it in a strict sense, is unwarranted.

Sims (1972) introduced a more general testing procedure in an attempt to distinguish more clearly between the alternative hypotheses. If m_t and y_t were treated as a vector, $X_t = [m_t \ y_t]$

then the vector autoregression

$$A(L)X_t = u_t \quad (4)$$

where A is a matrix of coefficients, (L) denotes the lag operator and u_t is now a 2×1 vector of residuals, becomes the basic building block of the methodology. In simple language, *both* m_t and y_t are regressed on lags of themselves *and* lags of the other variable. Two hypotheses are tested: (i) that the coefficients on lags of m are jointly zero in the equation explaining y , and (ii) that the coefficients on lags of y are jointly zero in the equation explaining m . If (i) can be rejected, but (ii) cannot, then this is taken to be evidence of "Granger-causality"² from m to y .

The test for "causality" is harder to pass in this case, since lags of money have to add information for predicting current income *not already present in lags of income itself* in order for it to be concluded that money leads income.

Sims (1972) was able to conclude (for U.S. data) that money did indeed lead income on this basis. Sims' finding, however, has not been universal.

² So-named after C.W.J. Granger, who suggested the techniques (see Granger (1969)). Note that the term "causality" is used in a technical sense here. It is a short-hand way of denoting statistical significance in these tests, which help establish certain stylised facts about the data, but does not necessarily imply causality in the strict sense.

Using similar methodology, Williams, Goodhart and Gowland (1976) found evidence of "Granger-causality" from income to money for the U.K. For Canada, Sharpe and Miller (1975) found that money led activity, but Barth and Bennett (1974) and Auerbach and Rutner (1978) found that unidirectional "causation" could not be established. Sarlo (1979) found that, for Canada, the question of whether money led income depended on the exchange-rate regime: money only led for periods of floating exchange rates. Suzuki, Kuroda and Shirakawa (1988) reported that money led activity in Japan for the 1967-1987 period. For Australia, this sort of approach was used in Bullock, Stevens and Thorp (1988), where the tentative conclusion was that monetary aggregates do not, on the whole, lead measures of economic activity.

More doubt was cast over Sims' results when later studies found that the test outcomes were sensitive to model specification. Sims (1980) added interest rates to the models of money and income, and found that there was no longer strong support for money leading income. Other authors have overturned or restored the original result, with conclusions usually depending on model specification.

In many cases, these conclusions turn on how the data are detrended. Questions of econometric practice dominate this issue; these questions are taken up briefly below.

The aim of present paper is to review the tentative conclusions drawn in BMS, by applying more rigorous statistical techniques to a similar dataset. A series of vector autoregressions are estimated and tests conducted to determine whether "Granger-causal" relationships exist between the variables.

3. Data

(a) Indicators of Financial Conditions and Economic Activity

The variables used in BMS were:

- . the yield on 90-day bank-accepted bills;
- . monetary aggregates M1, M3, and broad money;
- . lending/credit aggregates bank lending, lending by all financial intermediaries (AFI lending) and credit; and
- . private final demand (PFD) , both in current and constant prices.

All variables were in seasonally adjusted form, except the bill rate.

The data used in Section 4 of this paper are the same, except that:

- . national accounts aggregates have been re-based to 1984/85 prices for the constant-price series;
- . all series have been updated to the September quarter 1988, two quarters later than in BMS;
- . GDP is used, as well as private final demand, as an indicator of activity; and
- . the analysis is conducted using unadjusted (results reported in Appendix B) as well as seasonally-adjusted data.

Details of data definitions, etc. are in Appendix C. The actual data used are reproduced at the end of the paper.

(b) Differencing and Detrending

Standard econometric tests, including those used in VAR analysis, assume that the time series used in estimation are stationary; that is, that the mean and variance of the distributions from which the observations are drawn are unchanging through time. This assumption is rarely true for *levels* of macroeconomic time series. Most series must be made stationary, usually by detrending or differencing, before reliable econometric models can be estimated and tests conducted.

Economists frequently detrend data on the assumption that series have a secular (trend) and a cyclical component. However some recent studies (eg Nelson and Plosser (1982)) have suggested that many macroeconomic series may actually have stochastic, rather than deterministic, trends. That is, they may have a "unit root". In such cases, model residuals do not have the properties needed for valid testing of hypotheses, even if data series are detrended. What is needed, then, is a testing procedure which distinguishes between deterministic time trends and unit roots in data.

Standard asymptotic theory cannot be used to test for unit roots in series which are non-stationary.³ Fuller (1976) demonstrated that conventional

³ Consider the process:

$$y_t = \rho y_{t-1} + u_t$$

testing procedures will be biased towards accepting stationarity when data are generated by a random-walk-type process. Dickey and Fuller (1979) derive the limiting distributions of the test statistic for the case where the null hypothesis is a unit root, and provide tables of critical values for the test statistic. This test, and two others, developed by Stock and Watson (1988), and Dickey and Pantula (1987) are applied to the series used in the model estimation and testing reported here. Further details of the tests, together with the results, are given in Appendix A.

On the basis of the test results, which suggested the presence of unit roots, all the data on indicators of activity and financial aggregates were first-differenced. The evidence for deterministic trends *in addition to* unit roots was weaker; hence the tables in the body of this paper report results from models estimated with differenced data only⁴.

For the most part, first-differencing the data is consistent with the approach taken in BMS, where quarterly percentage changes were used for most variables⁵. The exception is that in most of the results reported in this paper, the short-term interest rate has also been differenced, whereas the level was used in BMS.

4. VAR Estimation Results

This section presents results for VAR tests of the relationship between financial indicators and measures of activity. Two measures of activity are

with $u_t \sim N \text{ iid } (0, \sigma_u^2)$

Under the null hypothesis that $\rho = 1$, (as in the case of one unit root), the usual formula for the large-sample variance of the least-squares estimator $(1-\rho^2)/T$ gives a value of zero for the variance of ρ when the true variance is non-zero. Applying conventional asymptotic theory to this type of model would clearly give misleading results. Thus usual least-squares techniques and 't'-tests for the value of ρ are not valid.

- ⁴ Subsidiary tests were conducted in which the affected series were first detrended by regressing the first-differenced series on a constant and a first or second-order time trend, and the residuals from those regressions were then used in estimation. This change makes little difference to test results, which are available from the authors on request.
- ⁵ It should be noted, of course, that this sort of specification ignores the potential long run relationships between the *levels* of the time series. Series may be "cointegrated", that is, they may "trend together". But it is not the purpose of this paper to pursue that issue. For a discussion of cointegration, see, *inter alia*, Engle and Granger (1987).

used: gross domestic product, and private final expenditure. The two sets of results are discussed in turn.

Each VAR model includes four lags of each variable. The number of lags was determined by estimating models with eight lags, then using likelihood ratio tests to compare these with models with six or four lags. Neither of the shorter lag specifications were dominated by the eight-lag specification, and so four lags were used for all the causality tests⁶.

(a) Financial Indicators and GDP

This section presents some results, using VAR methodology, for the relationship between GDP, as a measure of activity, and the various financial aggregates and short-term interest rates.

Table 1 shows the results for two-variable VARs, where each financial indicator is compared "one-on-one" with GDP. Both nominal and real GDP are tested. The table shows results over two time periods for the narrow financial aggregates and interest rates: 1969-88, and 1978-88. Tests involving the broader aggregates are restricted to the later period by availability of data.

In interpreting the table, note that the rows of each cell represent the left-hand-side variables in the equation, and the columns represent the right-hand-side variables. The statistics quoted are the computed values of the F-statistic in a test of the hypothesis that lags of the right-hand-side variable are jointly zero in an equation determining the left-hand-side variable. In the top-left-hand cell of Table 1, for example, in an equation explaining growth in nominal GDP by lags of itself and lagged growth of M1, imposing the restriction that coefficients on the lags of nominal GDP are zero yields a test statistic of 0.371, which is below the critical value of 2.5 at the 5 per cent significance level, so that the hypothesis cannot be rejected. Similarly, a test of the hypothesis that lags of M1 have zero coefficients yields a test statistic of 1.548, also insignificant, so the hypothesis cannot be rejected.

In the next row of this cell, lags of nominal GDP do not add much explanatory power to an equation for M1 but lags of M1 itself do. (The test statistic for the latter is 8.036, well outside the critical value.) Clearly, in each cell, the results of most interest are the off-diagonal elements, where the explanation of current values of a variable require more than just the lags of that variable itself.

⁶ For models with seasonally adjusted data, two lags performed as well as four. But four lags were retained anyway for consistency.

Table 1: VAR Tests of Financial Indicators
and Gross Domestic Product¹
(seasonally adjusted data)

1969:2 - 1988:3											
	Nom GDP	M1		Nom GDP	M3		Nom GDP	Bank lend.		Nom GDP	Bill Rate
Nom GDP	0.371	1.548	Nom GDP	0.290	1.942	Nom GDP	0.335	2.371	Nom GDP	0.947	2.275
M1	0.570	8.036**	M3	3.140*	7.972**	Bank lend.	3.042*	13.000**	Bill Rate	0.412	1.142
1978:1 - 1988:3											
	Nom GDP	M1		Nom GDP	M3		Nom GDP	Bank lend.		Nom GDP	Bill Rate
Nom GDP	5.769**	4.943**	Nom GDP	2.001	0.636	Nom GDP	3.267*	1.088	Nom GDP	2.557	1.842
M1	0.852	1.862	M3	1.716	1.619	Bank lend.	0.731	5.413**	Bill Rate	1.055	3.024*
	Nom GDP	Broad money		Nom GDP	AFI lend.		Nom GDP	Credit			
Nom GDP	2.675*	0.226	Nom GDP	1.823	0.413	GDP	2.776*	1.370			
Broad money	2.534	0.688	AFI lend.	4.061**	5.837**	Credit	2.679*	7.965			
1969:2 - 1988:3											
	Real GDP	M1		Real GDP	M3		Real GDP	Bank lend.		Real GDP	Bill Rate
Real GDP	1.476	1.761	Real GDP	1.405	0.877	Real GDP	1.589	1.587	Real GDP	1.553	0.761
M1	0.813	8.090**	M3	0.922	7.839**	Bank lend.	0.802	15.650**	Bill Rate	0.941	1.576
1978:1 - 1988:3											
	Real GDP	M1		Real GDP	M3		Real GDP	Bank lend.		Real GDP	Bill Rate
Real GDP	1.380	2.082	Real GDP	0.878	0.860	Real GDP	1.917	0.812	Real GDP	1.405	0.981
M1	1.340	1.732	M3	2.849*	1.626	Bank lend.	1.394	3.882*	Bill Rate	1.496	3.108*
	Real GDP	Broad money		Real GDP	AFI lend.		Real GDP	Credit			
Real GDP	1.181	0.378	Real GDP	0.919	0.360	Real GDP	1.193	1.030			
Broad money	2.853*	0.622	AFI lend.	7.586**	3.687*	Credit	6.486**	5.297**			

∞

¹ Calculated values for F-tests of the hypothesis that the coefficients on lags of explanatory variables are jointly zero. An* denotes significance at the 5 per cent level, ** at the 1 per cent level.

Interpreting the other cells in Table 1 in like manner suggests the following results:

- . both real and nominal GDP tend to lead the broader financial aggregates;
- . there is some evidence for GDP leading M3 and bank lending, though this is less consistent; and
- . M1 leads nominal GDP in the 1978-88 period.

Table 2 shows results for three-variable VARs, where the bill rate is included in every model. The interpretation of the table is similar to that for Table 1 except that each cell now contains nine entries: the test statistics for the hypothesis of jointly zero coefficients for lags of each of the three variables in each of three equations.

Results here are similar to those for the two-variable models: GDP tends to lead AFI lending and credit, and also M3, though again the latter result is not as consistent: it occurs only on half the occasions on which M3 enters. There is one instance of the bill rate leading nominal GDP, and one of M1 leading nominal GDP, but overall there is not strong evidence of "Granger-causality" in these cases.

There are a number of instances of complex relationships between the bill rate and the financial aggregates, where lags of the aggregate help explain the bill rate and vice versa.

Appendix B contains results for the same tests based on data which are not seasonally adjusted. Similar conclusions are evident: the broad lending and credit aggregates tend to be led by GDP, and there is two-way dynamic interaction between the bill rate and the financial aggregates in a number of cases.

(b) Financial Indicators and Private Final Demand

The principal activity indicator in BMS was private final demand. This section presents results of tests parallel to those in Section 4(a), but using PFD as the activity indicator. The interpretation of Table 3 and 4 is analogous to that of the earlier tables.

There is some support for the hypothesis that activity leads the broad aggregates, though it is not as strong as where GDP is used as the activity variable.

**Table 2: VAR Tests of Financial Indicators
and Gross Domestic Product¹**
(seasonally adjusted data)

1969:2 - 1988:3											
	Nom GDP	Bill rate	M1		Nom GDP	Bill rate	M3		Nom GDP	Bill rate	Bank lend.
Nom GDP	0.707	2.943*	2.229	Nom GDP	0.386	1.379	1.078	Nom GDP	0.452	1.809	1.898
Bill rate	0.570	5.601**	7.066**	Bill rate	0.602	3.489*	4.624**	Bill rate	0.796	1.665	2.424
M1	0.759	4.596**	1.734	M3	2.609*	5.107**	5.876**	Bank lend.	1.922	1.013	13.828**
1978:1 - 1988:3											
	Nom GDP	Bill rate	M1		Nom GDP	Bill rate	M3		Nom GDP	Bill rate	Bank lend.
Nom GDP	5.613**	1.586	4.311**	Nom GDP	.465	1.798	1.734	Nom GDP	3.389*	2.201	1.494
Bill rate	.370	4.642**	2.004	Bill rate	.961	1.816	2.712*	Bill rate	1.467	3.004*	1.816
M1	.889	1.880	0.558	M3	1.912	16.941**	1.733	Bank lend.	0.844	0.245	4.500**
	Nom GDP	Bill rate	Broad money		Nom GDP	Bill rate	AFI lend.		Nom GDP	Bill rate	Credit
Nom GDP	2.934*	2.350	0.812	Nom GDP	1.730	1.349	0.126	Nom GDP	2.290	1.258	0.859
Bill rate	1.459	5.403**	4.222**	Bill rate	2.033	2.927*	1.775	Bill rate	2.051	3.375*	2.658
Broad money	1.872	3.322*	1.055	AFI lend.	2.936*	1.516	4.912**	Credit	3.757*	1.775	9.460**
1969:2 - 1988:3											
	Real GDP	Bill rate	M1		Real GDP	Bill rate	M3		Real GDP	Bill rate	Bank lend.
Real GDP	1.484	0.879	1.831	Real GDP	1.233	0.658	0.767	Real GDP	1.469	0.268	1.026
Bill rate	0.154	5.350**	5.828**	Bill rate	0.911	4.101**	4.387**	Bill rate	0.908	2.402	1.999
M1	0.867	4.445**	2.020	M3	0.956	5.613**	9.081**	Bank lend.	1.263	2.452	19.048**
1978:1 - 1988:3											
	Real GDP	Bill rate	M1		Real GDP	Bill rate	M3		Real GDP	Bill rate	Bank lend.
Real GDP	1.402	0.659	1.606	Real GDP	0.893	0.607	0.504	Real GDP	1.922	1.375	1.217
Bill rate	.500	4.393**	1.735	Bill rate	0.774	3.470*	1.164	Bill rate	1.226	2.831*	1.167
M1	1.598	2.167	0.276	M3	3.367*	0.963	1.886	Bank lend.	1.340	0.155	3.209*
	Real GDP	Bill rate	Broad money		Real GDP	Bill rate	AFI lend.		Real GDP	Bill rate	Credit
Real GDP	1.493	0.990	0.450	Real GDP	1.114	0.707	0.170	Real GDP	1.019	0.784	0.827
Bill rate	0.748	4.407**	2.816*	Bill rate	1.891	2.178	1.233	Bill rate	1.829	2.872*	1.984
Broad money	2.644	3.885*	0.747	AFI lend.	5.672**	1.385	1.965	Credit	7.347**	1.626	5.567**

¹ Calculated values for F-tests of the hypothesis that the coefficients on lags of explanatory variables are jointly zero. An* denotes significance at the 5 per cent level, ** at the 1 per cent level.

**Table 3: VAR Tests of Financial Indicators
and Private Final Demand¹**
(seasonally adjusted data)

1969:2 - 1988:3											
	Nom PFD	M1		Nom PFD	M3		Nom PFD	Bank lend.		Nom PFD	Bill Rate
Nom PFD	3.781**	1.725	Nom PFD	3.330*	0.879	Nom PFD	3.896**	0.738	Nom PFD	5.772**	0.351
M1	1.084	6.311**	M3	1.419	6.022**	Bank lend.	0.970	13.218**	Bill Rate	1.256	1.778
1978:1 - 1988:3											
	Nom PFD	M1		Nom PFD	M3		Nom PFD	Bank lend.		Nom PFD	Bill Rate
Nom PFD	1.196	1.815	Nom PFD	1.969	1.871	Nom PFD	2.626	1.197	Nom PFD	2.133	0.100
M1	1.831	1.785	M3	1.142	1.882	Bank lend.	0.670	4.955**	Bill Rate	2.875*	3.669*
	Nom PFD	Broad money		Nom PFD	AFI lend.		Nom PFD	Credit			
Nom PFD	2.628	2.063	Nom PFD	2.882*	0.730	PFD	2.403	0.230			
Broad money	2.507	1.253	AFI lend.	2.119	3.692*	Credit	1.011	7.389**			
1969:2 - 1988:3											
	Real PFD	M1		Real PFD	M3		Real PFD	Bank lend.		Real PFD	Bill Rate
Real PFD	1.178	1.257	Real PFD	1.634	0.882	Real PFD	1.988	1.734	Real PFD	2.501	1.377
M1	2.431	5.323**	M3	2.266	6.705**	Bank lend.	0.499	14.670**	Bill Rate	5.081**	3.629**
1978:1 - 1988:3											
	Real PFD	M1		Real PFD	M3		Real PFD	Bank lend.		Real PFD	Bill Rate
Real PFD	1.085	1.255	Real PFD	2.234	1.087	Real PFD	2.532	0.977	Real PFD	2.335	0.098
M1	3.389*	2.378	M3	0.934	1.741	Bank lend.	1.170	4.519**	Bill Rate	3.198*	3.971**
	Real PFD	Broad money		Real PFD	AFI lend.		Real PFD	Credit			
Real PFD	1.924	2.561	Real PFD	2.742*	1.596	Real PFD	2.700*	1.152			
Broad money	3.035*	1.281	AFI lend.	4.929**	1.335	Credit	2.306	4.033**			

¹ Calculated values for F-tests of the hypothesis that the coefficients on lags of explanatory variables are jointly zero. An* denotes significance at the 5 per cent level, ** at the 1 per cent level.

**Table 4: VAR Tests of Financial Indicators and
Private Final Demand¹**
(seasonally adjusted data)

1969:2 - 1988:3											
	Nom PFD	Bill rate	M1		Nom PFD	Bill rate	M3		Nom PFD	Bill rate	Bank lend.
Nom PFD	3.054*	0.233	1.520	Nom PFD	3.093*	0.328	0.825	Nom PFD	2.096*	0.501	1.001
Bill Rate	0.298	5.710**	5.643**	Bill rate	0.438	3.887**	3.478**	Bill rate	0.662	2.316	1.541
M1	1.093	4.408**	1.543	M3	1.441	5.631**	5.975**	Bank lend.	0.930	1.877	14.392**
1978:1 - 1988:3											
	Nom PFD	Bill rate	M1		Nom PFD	Bill rate	M3		Nom PFD	Bill rate	Bank lend.
Nom PFD	1.018	0.610	2.227	Nom PFD	1.267	0.135	1.707	Nom PFD	2.291	0.243	1.123
Bill Rate	0.764	4.170**	0.883	Bill rate	1.671	3.689*	0.939	Bill rate	3.208*	3.935*	1.845
M1	1.063	1.166	0.754	M3	0.868	0.171	1.545	Bank lend.	0.618	0.085	4.028**
	Nom PFD	Bill rate	Broad money		Nom PFD	Bill rate	AFI lend.		Nom PFD	Bill rate	Credit
Nom PFD	1.801	0.537	2.372	Nom PFD	2.366	0.110	0.667	Nom PFD	2.057	0.190	0.306
Bill Rate	1.608	5.191**	2.510	Bill rate	2.680	3.411*	0.819	Bill rate	2.735*	3.633*	1.643
Broad money	1.328	2.719*	1.363	AFI lend.	1.486	1.682	4.323**	Credit	1.200	0.925	7.737**
1969:2 - 1988:3											
	Real PFD	Bill rate	M1		Real PFD	Bill rate	M3		Real PFD	Bill rate	Bank lend.
Real PFD	1.336	0.845	0.736	Real PFD	1.834	0.918	0.463	Real PFD	1.975	1.203	1.377
Bill Rate	1.834	6.662**	3.576*	Bill rate	4.655**	6.471**	4.230**	Bill rate	5.022**	4.904**	2.244
M1	1.370	3.303*	2.098*	M3	1.555	4.816**	8.382**	Bank lend.	1.052	2.467	16.943**
1978:1 - 1988:3											
	Real PFD	Bill rate	M1		Real PFD	Bill rate	M3		Real PFD	Bill rate	Bank lend.
Real PFD	1.060	0.154	1.184	Real PFD	1.896	0.071	0.942	Real PFD	2.291	0.156	0.939
Bill Rate	0.999	4.260**	0.883	Bill rate	1.798	4.029**	0.820	Bill rate	2.774*	3.964*	1.219
M1	3.003*	1.737	1.514	M3	0.773	0.251	1.356	Bank lend.	1.482	0.459	4.552**
	Real PFD	Bill rate	Broad money		Real PFD	Bill rate	AFI lend.		Real PFD	Bill rate	Credit
Real PFD	1.330	0.489	2.778	Real PFD	2.285	0.047	1.361	Real PFD	2.440	0.161	1.100
Bill Rate	1.754	5.783**	2.390	Bill rate	2.323	3.563*	0.306	Bill rate	2.067	3.595*	0.811
Broad money	1.798	2.771*	1.311	AFI lend.	4.362**	2.085	1.754	Credit	2.647	1.149	4.609**

¹ Calculated values for F-tests of the hypothesis that the coefficients on lags of explanatory variables are jointly zero. An * denotes significance at the 5 per cent level, ** at the 1 per cent level.

On a number of occasions lags of growth in PFD explain changes in the bill rate. This result is in apparent contrast to the conclusions of BMS, and some reconciliation is in order.

First, it is notable that in the three-variable models, the result occurs five times, and four of these are when bank lending is the third variable. In the thirteen sets of results in Table 4 which do not include bank lending, PFD leads the bill rate only once (when M3 is included). This suggests that perhaps there is some unique feature of the interaction of interest rates, PFD and bank lending which is reflected in the results.

Second, the result that PFD leads the bill rate hinges, to some extent, on the specification of the interest rate series in the present paper as a first difference, rather than as a level as in BMS. When the two-variable VAR tests in Table 3 are conducted with the level, rather than the change, of the bill rate, a unidirectional relationship between PFD and the bill rate can no longer be established.

5. The External Sector

To this point, the discussion has focussed on the interaction of the financial system and domestic economic activity. In this section, the scope is broadened, to allow explicitly for external linkages.

In an open economy, the impact of monetary policy comes partly through the exchange rate. Most treatments of this begin with some sort of interest-parity condition:

$$i_t = i_t^* + E(de_t) \quad (5)$$

where i_t is the interest rate at time t , i_t^* is the foreign interest rate of equivalent maturity, e is the log of the exchange rate and $E(\)$ and d denote, respectively, the expectations (conditional on information available at time t) and difference operators.

This condition says that properly-functioning financial markets keep the domestic interest rate aligned with the foreign rate (assumed to be exogenous), allowing for expected changes in the exchange rate over the relevant period. A change in monetary policy which alters the domestic interest rate will, other things equal, alter the exchange rate so as to preserve the equality of exchange rate-adjusted expected returns across countries. For example, higher domestic interest rates will, other things equal, result in an instantaneous appreciation of the exchange rate so as to generate an expected

depreciation of the exchange rate back towards the given "fundamental" level, which will offset the interest differential over the life of the asset. Were this not so, opportunities would exist to make large expected profits.

Now there are some practical difficulties with equation (5), mainly because other things will not always be equal. For example, the behaviour of risk-averse market participants may allow deviations from interest parity to occur. Indeed, there is good reason to suppose that there is an additional term driving a wedge between foreign and domestic rates, representing a currency risk premium.⁷ As long as this premium is constant, then the statements made above about monetary policy changes still hold. But if the premium varies through time, then this approach, as it stands, is not entirely adequate.

In addition, a change in domestic interest rates may come at a time when "fundamental" factors in the economy are causing a reassessment of expectations about the likely course of the exchange rate. This may make a clear connection between changes in monetary policy and the exchange rate difficult to observe in practice.

Nevertheless, it seems a reasonable starting point for analysis to accept that a change in domestic monetary policy will have implications for the exchange rate, and therefore for those sectors of the economy which are sensitive to exchange rate changes. Under this maintained hypothesis, the channels through which such effects might be observed are the price elasticities of demand and supply for imports and exports. A tightening of domestic monetary policy, for example, will tend to raise the exchange rate, and lower the domestic currency price of tradeable goods. This will encourage the substitution of imported for domestically produced goods in domestic expenditure, discourage the production of domestically produced tradeables both for domestic consumption and export, and discourage absorption of Australian exports by the rest of the world. In testing for these channels empirically, it will also be necessary to control for domestic and foreign price developments, since it is the real exchange rate which is important, and changes in foreign and domestic absorption⁸.

The other part of the story, of course, is that a rise in domestic interest rates should also reduce domestic expenditure and incomes, and therefore imports (especially as business investment, usually thought to be interest-sensitive, has a high imported component). There are therefore two effects

⁷ For a discussion of empirical issues in general, see Goodhart(1988); for Australian evidence, see Tease(1988) and Kearney and MacDonald(1988).

⁸ A more formal model of an open economy can be found in Genberg (1988).

of a change in monetary policy on the real trade balance, which operate in different directions. The empirical tests will therefore need to control for changes in private domestic expenditure.

This section uses VAR models to look at some of these channels. The first set of models includes real GDP, the bill rate, one monetary aggregate, the trade-weighted index of the Australian dollar, a term representing the difference between foreign and domestic prices (PDIFF, the log difference between the GDP deflators for Australia and the major seven OECD economies) and private expenditure in the major seven OECD economies (M7PFD).

The second set of VAR models includes exports instead of GDP. The third set of models includes imports and real PFD rather than the bill rate.

As in section 4, all the models use variables in log-differences, apart from the bill rate which is simply differenced⁹. The availability of OECD data restricted the sample period to 1972:2-1988:2, which imposed a fairly tight constraint on degrees of freedom. With respect to financial aggregates, we confined attention to M1 and M3, since there are really too few observations available on the broader aggregates to estimate these large models.

The results are presented in Table 5. The interpretation of these is similar to that of the earlier tables. Results are presented using both M1 and M3 as the monetary aggregate.

The first panel shows results for models including real GDP and the range of financial and foreign variables. There is no evidence of Granger-causality from any of the other variables to GDP. There is evidence again of a dynamic relationship between the monetary aggregates and the bill rate (the test statistic for lags of M1 or M3 affecting the bill rate are significant at the 5 per cent level or less, and the statistics for the reverse relationship would be significant at levels only slightly higher than the 5 per cent level used as the critical value in the tables).

In the second panel of the table, real exports of goods and services replaces GDP. When the price differential and foreign absorption are controlled, lags of the TWI are significant in explaining exports in the equation with M1.

⁹ Statistical tests reported in Appendix A suggest that the trade-weighted index (TWI) and major seven private final demand (M7PFD) series may also have a trend component. Models using detrended variables show results similar to models without detrended variables. Results are available from the authors on request.

**Table 5: VAR Tests of Financial Indicators
and Trade Sector Indicators¹**
(seasonally adjusted data)

1972:2 - 1988:2													
	Real GDP	Bill rate	M1	TWI	PDIFF	M7PFD		Real GDP	Bill rate	M3	TWI	PDIFF	M7PFD
Real GDP	3.413*	0.477	1.891	0.911	1.725	2.077	Real GDP	2.806*	0.419	0.644	0.858	2.014	2.091
Bill rate	0.505	5.611**	3.215*	1.333	1.799	1.400	Bill rate	1.321	5.577**	4.183**	2.504	2.435	1.412
M1	1.001	2.817*	1.126	1.644	0.128	1.674	M3	1.390	2.192	4.315**	1.409	0.961	0.757
TWI	1.170	1.286	1.606	1.260	0.388	0.562	TWI	1.665	2.421	1.899	2.249	0.502	0.853
PDIFF	0.944	3.065*	0.489	1.084	2.408	2.666*	PDIFF	0.739	1.252	1.314	0.787	2.011	1.967
M7PFD	1.185	0.803	1.267	0.888	3.911**	1.904	M7PFD	0.848	0.992	0.824	0.859	3.241*	1.547

1972:2 - 1988:2													
	Real Xpts	Bill rate	M1	TWI	PDIFF	M7PFD		Real Xpts	Bill rate	M3	TWI	PDIFF	M7PFD
Real Xpts	0.622	0.447	2.168	2.940*	0.049	0.917	Real Xpts	1.508	0.094	0.512	2.003	0.201	0.667
Bill rate	1.902	5.731**	5.455**	1.613	2.331	0.993	Bill rate	2.314	6.213**	5.926**	2.747*	3.856**	1.441
M1	1.216	1.788	1.517	2.399	0.222	1.686	M3	0.978	1.529	5.877**	1.471	1.072	0.893
TWI	1.782	2.087	2.067	0.833	0.540	0.769	TWI	1.502	2.304	1.566	1.330	0.615	0.626
PDIFF	2.625*	4.145**	1.674	2.196	2.828*	3.695*	PDIFF	1.674	1.396	1.867	1.129	2.294	2.297
M7PFD	0.874	0.845	0.591	0.778	3.176*	2.189	M7PFD	1.018	1.123	0.629	0.889	2.691*	1.771

1972:2 - 1988:2													
	Real Mpts	Real PFD	M1	TWI	PDIFF	M7PFD		Real Mpts	Real PFD	M3	TWI	PDIFF	M7PFD
Real Mpts	0.820	2.097	2.438	2.989*	1.666	1.166	Real Mpts	0.987	2.891*	2.707*	2.885*	1.967	1.276
Real PFD	0.366	0.795	0.527	0.655	0.619	0.965	Real PFD	0.483	1.024	1.242	1.610	0.977	1.297
M1	1.726	2.094	2.699*	2.099	2.111	1.399	M3	2.540	2.212	2.363	1.784	3.385*	2.892*
TWI	0.471	0.208	1.337	0.603	0.390	0.778	TWI	1.197	0.655	1.057	0.962	1.277	0.850
PDIFF	3.349*	2.530	2.229	0.888	1.991	3.306*	PDIFF	3.531*	1.441	4.993**	0.452	1.566	1.825
M7PFD	1.677	0.622	0.577	0.189	2.913*	3.668*	M7PFD	1.539	0.328	0.456	0.058	1.679	3.780*

¹ Calculated values for F-tests of the hypothesis that the coefficients on lags of explanatory variables are jointly zero. An* denotes significance at the 5 per cent level, ** at the 1 per cent level.

M1 and M3 again help explain the bill rate, though the reverse is not true in this case.

In the third panel, real imports of goods and services is the activity variable, and real private final demand replaces the bill rate. The TWI is significant in explaining imports. Real PFD is also significant when included with M3 (and would be significant at the 10 per cent level with M1). M3 also helps in explaining imports.

There also appears to be a relationship between the price differential and M7PFD. In five out of six models, lags of PDIFF help explain M7PFD, and the reverse is true in three out of six cases. Given the definition of PDIFF, this could be interpreted as a proxy for effects of changes in the major countries' terms of trade on absorption in those countries. In only one instance does M7PFD have a significant relationship with a variable other than itself or PDIFF¹⁰.

One important point in all this is that while the discussion of the external-sector impacts of changes in monetary policy was motivated in a floating exchange rate context, the long sample period required by the VAR techniques (because of the number of parameters to be estimated) covers more than just the floating rate period. It also covers the period of fixed exchange rates (although the parities were altered in this period) until November 1976, and the crawling peg from then until December 1983.

Of course changes in the exchange rate, under whatever regime, would still be expected to have subsequent developments on the economy, but the dynamic interaction between monetary policy, the exchange rate and the economy may differ between exchange rate regimes.

Accordingly, the results in this section should be regarded as quite preliminary. That said, the results do suggest that there is some evidence of both exchange rate and expenditure effects on components of the real trade balance. The relative size and timing of these effects is, naturally, a separate question.

6. Conclusions

On the basis of the results, there is further support for the notion that measures of economic activity lead the broader lending/credit aggregates, which was an important conclusion of BMS. No consistent leading or

¹⁰ Models estimated without M7PFD, however, show a weaker relationship between the TWI and the trade variables. See Appendix B, Table B.5.

lagging relationship for the narrower aggregates could be found using this methodology.

The other important conclusion drawn tentatively in BMS, was that the level of short-term interest rates was consistently related to movements in economic activity, with a lag, in episodes of changing interest rates.

There is no strong *statistical* support for this proposition on the basis of the techniques used here. BMS found a strong negative correlation between the level of the bill rate and subsequent growth in PFD. Equally, a simple linear regression of PFD on lags of the bill rate would reveal significant negative coefficients. But the tests in the present paper look for that information to be found *after past values of PFD itself* are included; this is a more difficult test to pass.

It is noteworthy that while BMS observed that each major period of weakness in PFD was preceded by a big rise in the bill rate, that rise in turn came during a period of very strong growth in PFD: "boom" conditions provoked rising interest rates. In addition, the bill rate kept rising for a quarter or two after the growth of PFD initially slowed. A possible reconciliation of the observations of BMS with the results in the present paper is that interest rates responded, partly through market forces, but at least partly because of a monetary policy reaction as well, to the growth of domestic demand, and in so doing affected the subsequent growth of the economy. Part of that reconciliation would also have to be that monetary policy changed course only when it was clear that the economy had already done so. In that case, tests such as those employed in this paper would be unlikely to support a view that interest rates are "exogenous" in a statistical sense. Nor would there be much hope for finding precise estimates of the response of the economy to monetary policy changes, at least using these techniques, since policy changes themselves are related to earlier developments in the economy, and effects may be limited only to changes greater than some (unknown) threshold.

A disentanglement of these processes is probably required for a full understanding of the effect of monetary policy on the economy. In principle, techniques with very general lag structures, such as those in this paper, should allow something to be said about two way "causation". The fact that the results here do not allow much to be said may indicate that the responses are not systematic - the lags both in changing monetary policy and in its taking effect may be variable - or that the world does not work in linear fashion. At the very least, it suggests that the structure underlying the reduced forms that make up the VARs is not well understood.

Under the maintained hypothesis that the exchange rate and short-term domestic interest rates are linked through an interest-parity condition, the results of Section 5 are consistent with a monetary policy effect on the trade sector through the exchange rate, though again it should be emphasised that these results are only preliminary in nature. Little can be said about the size and speed of this effect compared with that operating on the trade balance (in the opposite direction) through domestic expenditure. This is an important question, however, and should be the subject of continued research.

APPENDIX A: TESTS FOR UNIT ROOTS AND TIME TRENDS

These tests are typically based on an equation of the form:

$$\Delta y_t = \delta y_{t-1} + \mu + \beta t + e_t$$

The null hypothesis is that there is a unit root in y - i.e. that $\delta = 0$. Tests of this hypothesis frequently involve comparing the computed values from the above equation with appropriate critical values (e.g. the t -statistic for δ is the test-statistic in the Dickey-Fuller test).

If $\delta = 0$, $\mu \neq 0$, there is a unit root "with drift"; if $\beta \neq 0$, there is a time trend.

Tables A.1, A.2 and A.3 report results of Dickey-Pantula (DP), Stock-Watson (SW) and Dickey-Fuller (DF) tests for the likely presence of two or less unit roots under a series of nested hypotheses on deterministic trends. (The test statistics were computed using a programme developed by Dr Rob Trevor.) All variables except interest rates are tested in natural log form. The test samples correspond to the data lists attached.

The interpretation of the tables is as follows. The first row of figures gives the test statistic for the null hypothesis that there is no time trend in a model which assumes two unit roots. A significant value then leads to the first set of unit root tests immediately below. Here the null is that two unit roots exist. Significant values lead to a rejection of the hypothesis. If the statistic in the 'T' row is not significant, the null of no time trend is accepted, and the next test is to see whether the constant, or "drift" term, is significant. If so, the "two unit roots with drift" hypothesis can be tested with the next set of statistics. Significant statistics here mean a rejection of the null hypothesis. If the hypothesis of two unit roots is rejected, the next step is to assess the hypothesis of a single unit root, using an analogous procedure, in the lower half of the table.

The results suggest that all the time series have at least one unit root, indicating the need for first-differencing. The evidence on the trend components of the series is mixed, and generally weak, but several series may have first or second-order time trends.

Table A1: Tests for Unit Roots and Time Trends¹
(seasonally adjusted data)

Test	Variable									
	Real PFD	Real GDP	Nom PFD	Nom GDP	M1	M3	Bank lend.	BM	AFI lend	Credit
Two unit roots vs. at most one										
<i>T</i>	-2.742**	-1.781 ⁺	0.373	0.201	0.236	-0.298	0.465	-1.151	0.919	1.476
DP	-6.969**	-3.142 ⁺	-3.200 ⁺	-2.815	-3.484*	-3.299 ⁺	-3.066	-3.416*	-3.379 ⁺	-2.235
SW	-119.120**	-95.409**	-64.411**	-91.491**	-41.129**	-34.800**	-24.820*	-33.588**	-17.073	-16.143
DF	-5.120**	-3.313 ⁺	-2.544	-2.675	-3.920*	-3.182 ⁺	-2.480	-2.708	-2.942	-2.575
<i>Constant</i>	4.701**	3.169**	3.365**	3.330**	3.718**	2.788**	2.655**	2.761**	2.684**	2.343*
DP	-5.632**	-2.714 ⁺	-3.357*	-3.024*	-3.503**	-3.336*	-3.029*	-3.252*	-3.111*	-1.740
SW	-117.880**	-93.885**	-58.904**	-87.604**	-40.883**	-34.723**	-24.082**	-33.362**	-16.275*	-12.719
DF	-4.323**	-2.905*	-2.785 ⁺	-2.907*	-3.942**	-3.212*	-2.457	-2.454	-2.784 ⁺	-2.074
One unit root vs. none										
<i>T</i> ²	-2.810**	0.771	-1.506	-1.247	-1.818 ⁺	-2.227*	-1.251	-2.974**	2.286*	2.570*
SW	-24.096	-7.276	-3.408	-4.680	-12.182	-10.634	-8.592	-15.137	-8.224	-6.818
<i>T</i>	1.475	2.386*	1.876 ⁺	1.842 ⁺	2.377*	2.290*	2.893**	2.358*	1.822 ⁺	1.152
DP	-1.165	-2.804	-1.744	-1.869	-2.227	-2.262	-2.220	-1.196	-0.342	-0.747
SW	-4.508	-6.607	-5.286	-6.044	-9.800	-8.914	-8.052	-7.140	-5.402	-2.464
DF	-1.602	-2.785	-1.822	-1.846	-2.365	-2.852	-2.628	-1.870	-1.462	-0.612
<i>Constant</i>	2.954**	2.436*	0.810	0.920	0.455	1.085	0.479	1.474	-0.113	-0.681
DP	-3.773**	-2.080	0.268	-0.050	0.081	-0.241	0.462	-1.149	1.262	1.335
SW	-0.995	-1.135	0.072	0.024	0.027	-0.141	0.112	-0.147	0.153	0.302
DF	-2.973*	-2.303	0.204	0.052	0.072	-0.437	0.311	-1.201	0.866	1.434

¹An *(**)(⁺) indicates rejection of the null hypothesis that the estimated coefficient is zero at the one(five)(ten) per cent level. For "T²", T, and constant, the null is that the coefficient on the trend or drift term is zero. For the other tests the null is that there are two, or one, unit roots.

Table A2: Tests for Unit Roots and Time Trends¹
(not seasonally adjusted data)

Test	Variable									
	Real PFD	Real GDP	Nom PFD	Nom GDP	M1	M3	Bank lend.	BM	AFI lend	Credit
Two unit roots vs. at most one										
T	-2.790**	-2.618**	0.489	0.494	0.283	0.071	0.420	-1.132	0.831	1.393
DP	-5.307**	-4.091**	-2.656	-2.720	-2.744	-2.366	-2.325	-2.804	-2.428	-1.997
SW	-161.900**	-144.180**	-163.660**	-139.550**	-65.158**	-57.648**	-61.208**	-42.167**	-31.195**	-30.395**
DF	-7.7631**	-5.790**	-4.071**	-3.744*	-4.370**	-3.342+	-2.838	-3.584*	-2.962	-2.955
Constant	4.979**	4.048**	4.063**	3.953**	5.094**	-3.863**	2.652**	2.588**	2.901**	2.210*
DP	-4.294**	-3.275*	-2.904*	-2.923*	-2.755+	-2.401	-2.303	-2.375	-2.297	-1.513
SW	-162.140**	-144.180**	-163.630**	-139.310**	-65.134**	-57.530**	-60.406**	-42.444**	-30.536**	-26.140**
DF	-6.575**	-4.832**	-4.177**	-3.830**	-4.392**	-3.370*	-2.816+	-3.199*	-2.837+	-2.357
One unit root vs. none										
T ²	-3.284**	-0.682	-0.636	-0.957	-2.225*	-2.432*	-1.185+	-3.850**	2.122*	2.888**
SW	-135.250**	-110.770**	-35.398*	-52.909**	-15.555	-13.327	-8.926	-27.447+	-8.168	-7.439
T	2.143*	1.449	1.654+	1.833+	2.649**	2.339*	2.574*	2.484*	1.652+	0.602
DP	-1.522	-1.975	-1.803	-1.944	-2.805	-3.159+	-2.974	-1.158	-1.546	-0.566
SW	-62.560**	-66.172**	-26.435*	-43.733**	-12.628	-10.431	-8.336	-12.142	-5.635	-2.136
DF	-1.823	-1.859	-1.645	-1.801	-1.893	-2.121	-2.635	-1.578	-1.391	-0.429
Constant	2.828**	3.057**	1.066	0.931	0.377	0.938	0.482	1.272	-0.062	-0.807
DP	-3.139*	-2.774+	-0.049	-0.064	0.089	-0.418	0.255	-1.451	0.796	1.273
SW	-1.469	-3.229	0.087	0.049	0.044	-0.044	0.096	-0.161	0.133	0.314
DF	-3.055*	-2.953*	0.336	0.347	0.148	-0.179	0.262	-1.179	0.779	1.362

¹An **(*) (+) indicates that the null hypothesis that the estimated coefficient is zero is rejected at the one(five)(ten) per cent level. For "T²", T, and constant, the null is that the coefficient on the trend or drift term is zero. For the other tests the null is that there are two, or one, unit roots.

Table A3: Tests for Unit Roots and Time Trends¹
(seasonally adjusted data)

Test	Variable								
	Real Impts	Real Expts	Nom Impts	Nom Expts	90 day Bill	TWI	GDP Def.	Price Diff.	M7PFD
Two unit roots vs. at most one									
<i>T</i>	-0.866	0.040	0.235	0.976	-0.172	-0.895	0.026	-0.352	0.306
DP	-6.458**	-4.902**	-5.342**	-4.991**	-3.890*	-3.494*	-1.874	-1.839	-2.770
SW	-74.813**	-115.750**	-78.767**	-104.060**	-79.569**	-98.801**	-64.220**	-74.390**	-45.300**
DF	-5.445**	-4.785**	-4.973**	-4.532**	-4.898**	-4.112**	-1.966	-1.786	-2.415
<i>Constant</i>	3.301**	3.657**	4.178**	4.165**	0.621	-0.728	1.723+	2.072*	2.062*
DP	-6.334**	-4.936**	-5.404**	-4.809**	-3.922**	-3.303*	-1.886	-1.836	-2.895*
SW	-74.688**	-115.780**	-78.109**	-103.000**	-79.482**	-95.481**	-60.358**	-74.358**	-44.900**
DF	-5.374**	-4.819**	-5.062**	-4.427**	-4.945**	-3.892**	-1.969	-1.785	-2.545
One unit root vs. none									
<i>T</i> ²	-1.019	-1.016	0.390	-0.361	-1.529	-3.317**	-1.143	2.118*	0.646
SW	-24.632+	-25.561+	-8.731	-12.474	-27.270+	-17.458	-5.009	-6.829	-7.054
<i>T</i>	3.882**	1.976	1.919+	2.496*	3.941**	-2.063*	-3.987**	2.437*	-2.704**
DP	-3.169+	-1.806	-1.606	-2.353	-4.008**	-1.519	-3.561*	-3.525*	-2.449
SW	-21.303+	-20.138+	-7.166	-11.390	-25.596*	-7.040	-5.570	-7.868	-8.256
DF	-3.993**	-1.944	-1.821	-2.377	-3.753*	-2.099	-3.837*	-2.943	-2.852
<i>Constant</i>	1.660+	0.560	0.893	0.280	1.969*	1.539	1.054	0.414	0.162
DP	-1.688	-0.353	0.346	1.014	-1.395	-0.571	-0.099	-0.974	-0.235
SW	-1.566	-0.276	0.001	0.282	-7.109	-1.965	-0.237	-1.187	-0.091
DF	-1.516	-0.360	-0.019	0.711	-1.533	-1.087	-0.347	-1.006	-0.086

¹An **(*) (+) indicates that the null hypothesis that the estimated coefficient is zero is rejected at the one(five)(ten) per cent level. For "T²", T, and constant, the null is that the coefficient on the trend or drift term is zero. For the other tests the null is that there are two, or one, unit roots.

APPENDIX B: TESTS USING ALTERNATIVE DATA

The first four tables in this Appendix duplicate the tests reported in Tables 1 to 4 in the main paper, except that the data are not seasonally adjusted. Seasonality is captured by including seasonal dummies in the regression equations.

Tables B.1 and B.2 show results using GDP as the activity variable. Compared with the results in the main paper, the principal difference is that there are no cases of GDP leading M3 or bank lending. There is still support for GDP leading the broader aggregates, though not as strong as in the seasonally adjusted case.

Tables B.3 and B.4 show results using PFD as the activity variable. The main difference with earlier results here is that PFD leads broader aggregates more often, and that the narrow monetary aggregates M1 and M3 lead PFD when the 1970s data are included in the sample period.

Table B.5 shows the results from Section 5 of the paper when M7PFD is excluded. The main differences are that in the absence of M7PFD, the price differential term PDIFF helps to explain both real GDP and the bill rate, and that the TWI is no longer significant in the equations for exports and imports.

The tests reported in Appendix A suggested that some series may contain deterministic time trends in addition to unit roots. If so, these series should arguably be detrended *as well as* differenced before use in VAR models.

The series in question are:

- . M1, M3, Bank lending, M7PFD - linear time trend;
- . Broad money, AFJ lending, Credit, TWI - quadratic time trend.

Results for tests using detrended data are available from the authors on request. There are few significant differences. If anything, the evidence for measures of activity leading the broader financial aggregates is marginally stronger when the latter are detrended.

**Table B1: VAR Tests of Financial Indicators
and Gross Domestic Product¹**
(not seasonally adjusted data)

1969:2 - 1988:3											
	Nom GDP	M1		Nom GDP	M3		Nom GDP	Bank lend.		Nom GDP	Bill Rate
Nom GDP	2.418	1.205	Nom GDP	2.449	1.527	Nom GDP	2.279	1.510	Nom GDP	1.576	1.127
M1	1.648	3.594*	M3	1.382	3.924**	Bank lend.	0.698	6.552**	Bill Rate	0.719	0.044
1978:1 - 1988:3											
	Nom GDP	M1		Nom GDP	M3		Nom GDP	Bank lend.		Nom GDP	Bill Rate
Nom GDP	4.637**	4.186**	Nom GDP	1.848	0.228	Nom GDP	1.539	0.303	Nom GDP	2.083	1.324
M1	0.831	0.728	M3	0.925	0.932	Bank lend.	0.160	3.427*	Bill Rate	0.885	0.461
	Nom GDP	Broad money		Nom GDP	AFI lend.		Nom GDP	Credit			
Nom GDP	1.458	0.284	Nom GDP	1.536	1.523	GDP	1.424	0.592			
Broad money	2.600	0.747	AFI lend.	2.338	3.791*	Credit	2.866*	4.885**			
1969:2 - 1988:3											
	Real GDP	M1		Real GDP	M3		Real GDP	Bank lend.		Real GDP	Bill Rate
Real GDP	2.764*	0.826	Real GDP	2.415	1.518	Real GDP	2.389	0.760	Real GDP	2.175	0.312
M1	1.103	3.592*	M3	0.489	4.749**	Bank lend.	1.202	9.844**	Bill Rate	1.290	0.065
1978:1 - 1988:3											
	Real GDP	M1		Real GDP	M3		Real GDP	Bank lend.		Real GDP	Bill Rate
Real GDP	1.882	1.075	Real GDP	1.535	0.853	Real GDP	1.410	1.324	Real GDP	1.569	1.171
M1	0.941	0.702	M3	1.227	0.608	Bank lend.	0.658	2.759*	Bill Rate	0.822	0.652
	Real GDP	Broad money		Real GDP	AFI lend.		Real GDP	Credit			
Real GDP	1.430	0.982	Real GDP	1.115	1.273	Real GDP	1.069	1.252			
Broad money	2.652	0.682	AFI lend.	5.507**	2.688*	Credit	4.754**	3.265*			

¹ Calculated values for F-tests of the hypothesis that the coefficients on lags of explanatory variables are jointly zero. An* denotes significance at the 5 per cent level, ** at the 1 per cent level.

**Table B2: VAR Tests of Financial Indicators and
Gross Domestic Product¹**
(not-seasonally adjusted data)

1969:2 - 1988:3											
	Nom GDP	Bill rate	M1		Nom GDP	Bill rate	M3		Nom GDP	Bill rate	Bank lend.
Nom GDP	2.209	1.266	1.341	Nom GDP	2.016	0.751	1.120	Nom GDP	1.209	1.477	1.846
Bill Rate	0.238	1.430	3.902**	Bill rate	0.402	0.602	2.718*	Bill rate	0.530	0.215	0.919
M1	0.605	6.842**	1.489	M3	0.958	4.344**	4.031**	Bank lend.	0.656	2.544*	9.460**
1978:1 - 1988:3											
	Nom GDP	Bill rate	M1		Nom GDP	Bill rate	M3		Nom GDP	Bill rate	Bank lend.
Nom GDP	3.475*	0.370	2.616	Nom GDP	1.576	1.117	0.167	Nom GDP	1.762	1.598	0.658
Bill Rate	0.396	1.418	1.692	Bill rate	0.289	0.694	1.584	Bill rate	0.876	0.391	0.518
M1	0.448	3.470*	1.215	M3	0.810	0.293	0.884	Bank lend.	0.172	0.039	2.707
	Nom GDP	Bill rate	Broad money		Nom GDP	Bill rate	AFI lend.		Nom GDP	Bill rate	Credit
Nom GDP	1.678	1.170	0.262	Nom GDP	2.149	1.989	2.181	Nom GDP	1.421	2.518	1.770
Bill Rate	0.579	1.648	4.563**	Bill rate	1.194	0.285	1.756	Bill rate	1.163	0.396	0.959
Broad money	2.839*	1.830	1.017	AFI lend.	1.197	0.482	2.085	Credit	3.690	1.000	5.744**
1969:2 - 1988:3											
	Real GDP	Bill rate	M1		Real GDP	Bill rate	M3		Real GDP	Bill rate	Bank lend.
Real GDP	2.375	0.159	0.639	Real GDP	1.934	0.705	1.868	Real GDP	2.152	0.344	0.767
Bill Rate	0.511	1.269	3.606*	Bill rate	1.017	0.667	2.815*	Bill rate	1.481	0.267	1.336
M1	0.663	7.617**	1.954	M3	0.341	4.604**	5.689**	Bank lend.	1.514	2.962*	13.437**
1978:1 - 1988:3											
	Real GDP	Bill rate	M1		Real GDP	Bill rate	M3		Real GDP	Bill rate	Bank lend.
Real GDP	1.662	0.901	0.819	Real GDP	1.528	1.270	0.984	Real GDP	1.347	0.880	1.011
Bill Rate	0.377	1.584	1.732	Bill rate	0.274	0.859	1.627	Bill rate	0.769	0.627	0.468
M1	0.640	3.609	0.886	M3	1.174	0.384	0.524	Bank lend.	0.611	0.041	2.224
	Real GDP	Bill rate	Broad money		Real GDP	Bill rate	AFI lend.		Real GDP	Bill rate	Credit
Real GDP	1.813	1.146	0.979	Real GDP	1.281	0.921	1.009	Real GDP	0.990	2.018	2.098
Bill Rate	0.275	1.832	4.174**	Bill rate	0.868	0.171	1.467	Bill rate	0.613	0.431	0.475
Broad money	2.438	1.430	0.754	AFI lend.	3.727*	0.505	0.949	Credit	5.359**	0.882	3.616*

¹ Calculated values for F-tests of the hypothesis that the coefficients on lags of explanatory variables are jointly zero. An * denotes significance at the 5 per cent level, ** at the 1 per cent level.

**Table B3: VAR Tests of Financial Indicators
and Private Final Demand¹**
(not-seasonally adjusted data)

1969:2 - 1988:3											
	Nom PFD	M1		Nom PFD	M3		Nom PFD	Bank lend.		Nom PFD	Bill Rate
Nom PFD	1.824	2.813*	Nom PFD	1.626	2.736*	Nom PFD	1.420	1.004	Nom PFD	2.559*	0.284
M1	1.306	3.277*	M3	0.619	4.757**	Bank lend.	1.581	8.256**	Bill Rate	0.944	0.197
1978:1 - 1988:3											
	Nom PFD	M1		Nom PFD	M3		Nom PFD	Bank lend.		Nom PFD	Bill Rate
Nom PFD	0.061	1.490	Nom PFD	0.701	2.926	Nom PFD	0.273	1.153	Nom PFD	0.189	0.062
M1	2.516	1.720	M3	0.101	0.800	Bank lend.	0.281	3.322*	Bill Rate	2.387	0.578
	Nom PFD	Broad money		Nom PFD	AFI lend.		Nom PFD	Credit			
Nom PFD	0.157	1.289	Nom PFD	0.180	0.383	Nom.PFD	0.235	0.332			
Broad money	3.209*	1.546	AFI lend.	1.738	1.875	Credit	0.606	3.329*			
1969:2 - 1988:3											
	Real PFD	M1		Real PFD	M3		Real PFD	Bank lend.		Real PFD	Bill Rate
Real PFD	0.192	3.186*	Real PFD	0.643	3.971**	Real PFD	0.222	1.704	Real PFD	0.555	1.571
M1	1.438	3.160*	M3	0.716	5.112**	Bank lend.	0.904	9.071**	Bill Rate	4.501**	0.934
1978:1 - 1988:3											
	Real PFD	M1		Real PFD	M3		Real PFD	Bank lend.		Real PFD	Bill Rate
Real PFD	0.232	1.978	Real PFD	0.613	2.301	Real PFD	0.296	1.093	Real PFD	0.320	0.280
M1	1.762	1.512	M3	0.371	0.876	Bank lend.	0.767	3.091*	Bill Rate	3.325*	0.977
	Real PFD	Broad money		Real PFD	AFI lend.		Real PFD	Credit			
Real PFD	0.365	2.388	Real PFD	0.356	1.393	Real PFD	0.369	0.898			
Broad money	3.984*	1.519	AFI lend.	4.607**	1.009	Credit	2.169	2.046			

¹ Calculated values for F-tests of the hypothesis that the lags of explanatory variables are jointly zero. An* denotes significance at the 5 per cent level, ** at the 1 per cent level.

**Table B4: VAR Tests of Financial Indicators and
Private Final Demand¹**
(not-seasonally adjusted data)

1969:2 - 1988:3											
	Nom PFD	Bill rate	M1		Nom PFD	Bill rate	M3		Nom PFD	Bill rate	Bank lend.
Nom PFD	1.409	0.180	2.543*	Nom PFD	1.408	0.126	2.409	Nom PFD	1.734	0.811	1.511
Bill Rate	0.180	1.504	3.581*	Bill rate	0.274	0.634	2.338	Bill rate	0.679	0.271	0.859
M1	1.336	8.305**	1.843	M3	0.741	4.953**	5.007**	Bank lend.	1.753	2.828*	11.307**
1978:1 - 1988:3											
	Nom PFD	Bill rate	M1		Nom PFD	Bill rate	M3		Nom PFD	Bill rate	Bank lend.
Nom PFD	0.293	0.837	2.224	Nom PFD	0.403	0.290	2.871*	Nom PFD	0.342	0.272	1.253
Bill Rate	0.785	0.629	0.832	Bill rate	1.315	0.691	1.383	Bill rate	2.664	0.840	0.892
M1	0.798	2.207	1.270	M3	0.138	0.341	0.579	Bank lend.	0.307	0.067	2.749*
	Nom PFD	Bill rate	Broad money		Nom PFD	Bill rate	AFI lend.		Nom PFD	Bill rate	Credit
Nom PFD	0.079	0.182	1.271	Nom PFD	0.185	0.065	0.345	Nom PFD	0.244	0.086	0.322
Bill Rate	1.069	1.670	3.531*	Bill rate	1.948	0.287	1.183	Bill rate	1.884	0.568	0.414
Broad money	2.077	0.709	1.337	AFI lend.	0.961	0.711	1.806	Credit	1.065	0.620	3.706*
1969:2 - 1988:3											
	Real PFD	Bill rate	M1		Real PFD	Bill rate	M3		Real PFD	Bill rate	Bank lend.
Real PFD	0.236	0.671	2.116	Real PFD	0.564	0.953	3.139*	Real PFD	0.473	1.256	1.380
Bill Rate	1.631	1.695	1.816	Bill rate	3.391*	1.485	2.244	Bill rate	4.667**	1.414	1.437
M1	0.778	7.346**	1.927	M3	0.872	5.003**	6.232**	Bank lend.	1.620	3.395*	12.866**
1978:1 - 1988:3											
	Real PFD	Bill rate	M1		Real PFD	Bill rate	M3		Real PFD	Bill rate	Bank lend.
Real PFD	0.110	0.208	1.679	Real PFD	0.581	0.452	2.265	Real PFD	0.500	0.447	1.175
Bill Rate	1.554	0.737	0.899	Bill rate	1.833	1.015	1.172	Bill rate	3.153*	1.110	0.608
M1	0.684	2.773	1.315	M3	0.543	0.508	0.607	Bank lend.	0.953	0.266	2.881*
	Real PFD	Bill rate	Broad money		Real PFD	Bill rate	AFI lend.		Real PFD	Bill rate	Credit
Real PFD	0.211	0.352	2.216	Real PFD	0.347	0.101	1.051	Real PFD	0.334	0.131	0.660
Bill Rate	1.235	1.889	2.859*	Bill rate	2.087	0.441	0.627	Bill rate	2.259	0.585	0.092
Broad money	2.892*	0.860	1.485	AFI lend.	3.714*	1.024	0.664	Credit	2.972*	0.974	2.420

¹ Calculated values for F-tests of the hypothesis that the lags of explanatory variables are jointly zero. An * denotes significance at the 5 per cent level, ** at the 1 per cent level.

**Table B5: VAR Tests of Financial Indicators
and Trade Sector Indicators¹**
(seasonally adjusted data)

1972:2 - 1988:2											
	Real GDP	Bill rate	M1	TWI	PDIFF		Real GDP	Bill rate	M3	TWI	PDIFF
Real GDP	2.019	0.821	1.824	0.759	2.653*	Real GDP	1.316	1.182	0.466	0.714	2.835*
Bill rate	0.122	6.974**	4.803**	0.888	3.119*	Bill rate	0.817	7.074**	5.943**	1.952	4.135**
M1	1.646	2.390	1.597	1.543	0.905	M3	1.543	3.258*	4.604**	1.378	1.833
TWI	1.383	1.150	1.364	1.157	0.672	TWI	1.335	2.217	1.338	1.952	1.255
PDIFF	0.509	3.368*	0.269	0.777	1.262	PDIFF	0.352	1.356	1.866	0.400	1.126

1972:2 - 1988:2											
	Real Xpts	Bill rate	M1	TWI	PDIFF		Real Xpts	Bill rate	M3	TWI	PDIFF
Real Xpts	0.692	0.482	1.956	3.048*	0.523	Real Xpts	1.562	0.642	0.456	2.068	0.634
Bill rate	2.068	6.833**	7.658**	1.311	3.134*	Bill rate	1.822	6.965**	7.474**	2.119	4.849**
M1	1.764	1.294	1.750	2.527	0.855	M3	0.939	1.907	5.692**	1.463	1.641
TWI	1.810	1.631	1.649	0.594	0.726	TWI	1.422	2.262	1.288	1.158	1.415
PDIFF	1.278	3.455*	0.720	1.315	1.170	PDIFF	1.009	1.316	2.267	0.621	1.251

1972:2 - 1988:2											
	Real Mpts	Real PFD	M1	TWI	PDIFF		Real Mpts	Real PFD	M3	TWI	PDIFF
Real Mpts	0.454	1.720	2.600*	2.367	1.431	Real Mpts	0.534	2.841*	2.759*	2.271	1.535
Real PFD	0.205	0.821	1.122	0.517	0.960	Real PFD	0.297	0.867	1.565	1.282	1.652
M1	1.905	3.251*	3.197*	2.547	2.869*	M3	1.722	2.560	1.620	1.105	3.984**
TWI	0.199	0.328	1.503	0.489	0.271	TWI	0.891	0.728	1.114	0.825	1.446
PDIFF	3.075*	1.827	1.809	0.386	2.084	PDIFF	3.790**	0.999	6.671**	0.329	2.619*

¹ Calculated values for F-tests of the hypothesis that the lags of explanatory variables are jointly zero. An* denotes significance at the 5 per cent level, ** at the 1 per cent level.

APPENDIX C: DATA

The variables used in Section 4 of the paper are defined as follows:

- . M1 is currency in the hands of the public plus current deposits with trading banks;
- . M3 is M1 plus other deposits of trading banks and deposits of savings banks (net of government and inter-bank deposits);
- . broad money is M3 plus borrowings by non-bank financial corporations other than from banks, net of identifiable double-counting;
- . bank lending is lending (including bills discounted) to the private sector by trading and savings banks;
- . AFI lending is bank lending plus lending (including bills discounted) to the private sector by non-bank financial corporations;
- . credit is AFI lending plus bank bills outstanding other than those held by financial intermediaries (which are already included in AFI lending);
- . the bill rate is the yield on 90-day bank-accepted bills of exchange;
- . PFD is the sum of private consumption and gross fixed capital expenditure on dwellings, non-dwelling construction and plant and equipment from the national accounts; and
- . GDP is gross domestic product from the national accounts.

For these series, data sources and methods are as described in the Appendix to Bullock, Morris and Stevens (1988). The only difference is that for national accounts variables, the September quarter 1988 issue of the Quarterly Estimates of National Income and Expenditure, ABS Cat. No. 5206.0 is the source. The constant-price estimates are in 1984/85 prices, rather than 1979/80 prices as in the earlier paper. Constant-price estimates prior to 1974 were calculated by splicing BMS 1979/80 series to 1984/85-based series.

Additional variables used in analysing the external sector in Section 5 are:

TWI: Trade-weighted index of average value of the Australian dollar, quarterly average of figures for last day of the month; Reserve

Bank of Australia *Bulletin*. (Rates prior to June 1970 were constructed using weights based on visible trade for 1971-72, and International Monetary Fund par values of exchange rates, as published in International Financial Statistics Vol. 24. For method of calculation, see "The Trade-Weighted Index of Value of the Australian Dollar", Reserve Bank of Australia *Bulletin*, April 1984 pp. 696-697).

M7PFD: Private final consumption expenditure plus gross fixed capital formation, seasonally adjusted, at 1980 exchange rates and prices, \$US billion; OECD *Quarterly National Accounts*, No. 3, 1988.

M7GDP Deflator: Ratio of current to 1980 price measures of Gross Domestic Product for OECD Major Seven Economies; OECD *Quarterly National Accounts*, No. 3, 1988.

The tests for unit roots and time trends used in the main paper require the availability of levels for all series. This raises the issue of adjustments to financial aggregates to allow for the effects of new banks. The method used in BMS was to adjust the growth rates of the aggregates (the procedure is described in the Appendix to BMS). In the present paper, an artificial series for the levels was created, by compounding together the growth rates calculated in the same manner as in BMS

The actual data used are reproduced at the end of the paper.

References

- Andersen, L.C., and J.L. Jordan (1968) "Monetary and Fiscal Actions: A Test of their Relative Importance in Economic Stabilization" *Federal Reserve Bank of St Louis Review*, 50, 11, pp.11-24.
- Andersen, L.C., and K.M. Carlson (1970) "A Monetarist Model for Economic Stabilization", *Federal Reserve Bank of St Louis Review*, 52, 4, pp.7-27.
- Auerbach, R., and J. Rutner (1978) "A Causality Test of Canadian Money and Income: A Comment on Barth and Bennett", *Canadian Journal of Economics*, 11, pp.583-593.
- Barth, J.R., and J.T. Bennett (1974) "The Role of Money in the Canadian Economy: An Empirical Test", *Canadian Journal of Economics*, 7, pp.306-311.
- Boehm, E.A., (1983) "Cycles in Money, Credit, Wages, Costs, Prices and Business Activity in Australia: A Comparative Study 1948-82", Melbourne University Department of Economics Research Paper, no.100.
- Bullock, M., D. Morris and G. Stevens (1988) " The Relationship Between Financial Indicators and Activity: 1968-1987", Reserve Bank of Australia Research Discussion Paper no. 8805.
- Bullock, M., G. Stevens and S. Thorp (1988) "Do Financial Aggregates lead Activity? A Preliminary Analysis", Reserve Bank of Australia Research Discussion Paper no. 8803.
- Davis, K., and M. Lewis (1977) "Money and Income: Evidence from Simple Models" in M.G. Porter and M.E. Burns, (eds.), *The Australian Monetary System in the 1970s*, Monash University, Melbourne.
- Dickey, D.A., and W.A. Fuller (1979) "Distribution of the Estimators for Autoregressive Time Series with a Unit Root", *Journal of the American Statistical Association*, 74, pp.427-431.
- Dickey, D.A., and S.G. Pantula (1987) "Determining the Order of Differencing in Autoregressive Processes", *Journal of Business and Economic Statistics*, vol. 5, no. 4, pp.455-461.

- Engle, R.F., and C.W.J. Granger (1987) "Co-integration and Error Correction: Representation, Estimation and Testing", *Econometrica*, vol. 55, no. 2, pp.251-267.
- Friedman, M., and A. J. Schwartz (1982) *Monetary Trends in The United States and the United Kingdom: Their Relationship to Income, Prices, and Interest Rates, 1867-1975*, University of Chicago Press, Chicago.
- Friedman, M., and A.J. Schwartz (1963) *A Monetary History of the United States 1867-1960*, Princeton University Press, Princeton.
- Fuller, W. A., (1976) *Introduction to Statistical Time Series*, Wiley, New York.
- Genberg, H., (1988) "The Fiscal Deficit and the Current Account: Twins or Distant Relatives?", Reserve Bank of Australia Research Discussion Paper no. 8813.
- Goodhart, C.A.E., (1988) "The Foreign Exchange Market: A Random Walk with a Dragging Anchor", *Econometrica*, vol. 55, no. 220, pp.437-460.
- Hendry, D.F., and N.R. Ericsson (1983) "Assertion Without Empirical Basis: An Econometric Appraisal of Friedman and Schwartz's 'Monetary Trends in the United Kingdom'" in "Monetary Trends in the United Kingdom", Bank of England Panel of Academic Consultants Paper no. 22.
- Kearney, C., and R. MacDonald (1988) "Modelling the Australian-US dollar Exchange Rate during the Recent Float", University of New South Wales Centre for Applied Economic Research Research Report.
- Nelson, C.R., and C.I. Plosser (1982) "Trends and Random Walks in Macroeconomic Time Series", *Journal of Monetary Economics*, 10, pp.139-162.
- Sarlo, C., (1979) "The Role of Money in the Canadian Economy: Fixed vs Flexible Exchange Rates", *Canadian Journal of Economics*, 12, pp.89-93.
- Sharpe, B., and M. Miller (1975) "The Role of Money in the Canadian Economy", *Canadian Journal of Economics*, 8, pp.289-290.
- Sharpe, I.G., (1975) "The Money Supply, Financing Government and Economic Activity", *Economic Papers* no. 50, pp.23-43.

- Sheppard, W.R., (1973) "Money and Economic Activity in Australia", Conference Paper prepared for Australia and New Zealand Association for the Advancement of Science 45th Congress, Perth, August 1973.
- Sims, C. A., (1972) "Money, Income and Causality", *American Economic Review*, 62, 1972 pp.540-52.
- Sims, C. A., (1980) "Comparison of Interwar and Postwar Business Cycles: Monetarism Reconsidered", *American Economic Review*, 70, pp.250-257.
- Stock, J.H., and M.W. Watson, (1988) "Testing for Common Trends", *Journal of the American Statistical Association*, vol. 83, no. 404, Theory and Methods, pp.1097-1107.
- Suzuki, Y., A. Kuroda and H. Shirakawa (1988) "Monetary Control Mechanism in Japan", *Bank of Japan Monetary and Economic Studies*, vol. 6, no. 2, pp.1-27.
- Tease, W.J., (1988) "Speculative Efficiency and the Exchange Rate: Some Evidence Since the Float", *Economic Record*, vol. 64, no. 184, pp.2-13.
- Williams, D., C.A.E. Goodhart and D. H. Gowland (1976) "Money, Income and Causality: The U.K. Experience", *American Economic Review*, 66, pp.417-23.

DATE	Exports, SA		Imports, SA		Private Demand, SA		Final Product, SA		Gross Domestic Product, SA		Exports, SA		Imports, SA	
	1984-85prices		1984-85prices		1984-85prices		1984-85prices		1984-85prices		currentprices		currentprices	
	\$million		\$million		\$million		\$million		\$million		\$million		\$million	
	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc
Sep-59		2256		2593		13583						537		521
Dec-59		2624		2745		15848						623		565
Mar-60		2272		2802		16321						542		574
Jun-60		2100		3039		16488						503		619
Sep-60		2204		3224		16609						496		660
Dec-60		2144		3310		16551						503		671
Mar-61		2456		3257		16031						555		671
Jun-61		2828		2840		15957						606		586
Sep-61		2740		2531		16102						616		520
Dec-61		2816		2498		16122						617		508
Mar-62		2744		2764		16727						617		558
Jun-62		2720		2968		16927						615		600
Sep-62		2548		3086		17173						578		634
Dec-62		2724		3153		17527						617		650
Mar-63		2712		3139		18042						644		641
Jun-63		2648		3248		17527						644		669
Sep-63		3092		3300		18455						762		666
Dec-63		3160		3319		18760						799		672
Mar-64		3072		3580		18752						805		725
Jun-64		3068		3827		19477						786		783
Sep-64		2968		3955		19472		25220				747		800
Dec-64		3060		4212		19918		25670				762		858
Mar-65		3104		4207		19786		25812				762		876
Jun-65		3216		4364		20636		26386				775		911
Sep-65		3268		4615		20266		26395				792		954
Dec-65		3112		4464		20450		26229				765		925
Mar-66		3024		4060		20632		26338				772		855
Jun-66		3120		3974		20380		26647				802		843
Sep-66		3316		4107		21079		27462				843		861
Dec-66		3148		4232		21145		27589				815		875
Mar-67		3492		4508		21417		28551				902		962
Jun-67		3659		4562		21358		28862				917		970
Sep-67		3581		4426		21851		28673				876		959
Dec-67		3646		4621		22429		28505				896		982
Mar-68		3472		5197		22669		29428				869		1112
Jun-68		3577		4921		22808		30119				923		1054
Sep-68		3653		4940		23141		31093				908		1060
Dec-68		4081		5016		23789		31728				979		1055
Mar-69		3683		4894		23805		32325				982		1038
Jun-69		3777		4959		24629		32608				1016		1082
Sep-69		4320		5248		24691		32896				1145		1139
Dec-69		4473		5332		25066		33036				1183		1163
Mar-70		4537		5369		25398		33269				1235		1176
Jun-70		4553		5348		25654		34447				1209		1240
Sep-70		4728		5266		25910		34501				1246		1233
Dec-70		4867		5173		26305		35013				1251		1241
Mar-71		4734		5214		26754		35511				1213		1260
Jun-71		5152		5359		26835		35949				1358		1347
Sep-71		5251		5410		27524		36954				1396		1354
Dec-71		5335		5153		27172		36922				1356		1327
Mar-72		5421		4974		27202		36776				1433		1299
Jun-72		5408		4766		27553		37938				1504		1225
Sep-72		5236		4511		27870		37556				1531		1205
Dec-72		5655		4966		28451		38666				1753		1304
Mar-73		5688		5310		29078		39629				1858		1389
Jun-73		5347		5576		29600		39345				1829		1453
Sep-73		5255		5918		29767		40163				1879		1623
Dec-73		5371		6384		30401		40638				1956		1782
Mar-74		4939		6731		30500		40530				1928		2039
Jun-74		4963		7183		30141		39974				2082		2409
Sep-74		5306		7604		29896		40148				2286		2667
Dec-74		5434		7105		29538		40811				2459		2740
Mar-75		5501		6143		30204		40667				2552		2448
Jun-75		5644		5865		30463		41562				2707		2415
Sep-75		5474		5932		30936		41130				2575		2470
Dec-75		5583		6212		30650		41057				2656		2621

DATE	Exports, SA		Imports, SA		Private Final Demand, SA		Gross Domestic Product, SA		Exports, SA		Imports, SA	
	1984-85prices		1984-85prices		1984-85prices		1984-85prices		currentprices		currentprices	
	\$million		\$million		\$million		\$million		\$million		\$million	
	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc
Mar-76	5729		6434		31525		42157		2847		2810	
Jun-76	5875		6595		32018		42735		3049		2930	
Sep-76	6328		7096		31982		42601		3262		3184	
Dec-76	6100		6918		32549		42903		3203		3272	
Mar-77	5891		7064		32345		42905		3411		3683	
Jun-77	5846		6953		32241		43286		3375		3736	
Sep-77	6103		6688		32186		42973		3486		3724	
Dec-77	6331		6419		32151		42785		3571		3580	
Mar-78	6094		6768		32486		43397		3413		3788	
Jun-78	6152		6950		33502		44006		3547		3984	
Sep-78	6325		7115		33773		44928		3669		4155	
Dec-78	6613		7399		33930		45229		3950		4479	
Mar-79	6934		7160		34400		46081		4320		4427	
Jun-79	6887		7437		34485		45550		4631		4800	
Sep-79	6972		6854		34458		45347		4897		4652	
Dec-79	7695		7418		34545		46498		5662		5205	
Mar-80	7322		7598		35073		46316		5730		5640	
Jun-80	6978		7156		35381		46901		5503		5491	
Sep-80	6756		7683		36341		46778		5395		5939	
Dec-80	6993		7855		36529		47950		5577		6114	
Mar-81	6718		7976		36982		47871		5545		6292	
Jun-81	6938		8206		37744		48586		5724		6581	
Sep-81	6743		8336		38218		48741		5549		6649	
Dec-81	6475		8636		38692		48518		5296		6932	
Mar-82	7172		9092		38639		48512		5888		7496	
Jun-82	7171		9108		38853		48601		6048		7645	
Sep-82	7152		8432		38029		48507		6128		7270	
Dec-82	7089		8214		37923		48034		6268		7303	
Mar-83	6941		7694		37559		47947		6190		6843	
Jun-83	6534		7649		37072		47513		6112		7117	
Sep-83	6926		7676		37852		48981		6527		7129	
Dec-83	7410		8062		38094		49680		6918		7306	
Mar-84	7734		8848		38880		51079		7160		8041	
Jun-84	7811		9163		39240		51786		7281		8370	
Sep-84	8516		9857		39642		51782		8197		9412	
Dec-84	8226		9641		40229		52802		7884		9185	
Mar-85	8323		9678		41134		52790		8278		9570	
Jun-85	9117		9845		41616		54308		9776		10887	
Sep-85	9231		10016		41921		55656		9833		11241	
Dec-85	8819		10059		41756		55303		9368		11604	
Mar-86	9357		9881		41521		55597		9838		11613	
Jun-86	8712		9646		41709		54895		8916		11115	
Sep-86	9040		9340		41573		55823		9752		11568	
Dec-86	10069		9529		41643		56526		10828		11923	
Mar-87	9906		9576		41593		56725		10818		12077	
Jun-87	10185		9747		41956		58135		10887		11942	
Sep-87	10064		9729		42812		58092		11072		11904	
Dec-87	10532		10562		43374		58641		12158		13111	
Mar-88	11028		10931		44337		58936		13273		13883	
Jun-88	10149		10805		44772		59566		12384		13015	
Sep-88	10216		11707		44810		59763		12431		13301	

DATE	Private Demand, SA current prices \$million Sep 88	Final SA Nat. Acc \$million Sep 88	Gross Domestic Product, SA current prices \$million Sep 88	Domestic Product, SA current prices \$million Sep 88	M1, SA \$million	M3, SA new bank adjusted \$million	Bank lending SA, new bank adjusted \$million	AFI Lending SA \$million	Broad money SA \$million
Sep-59		2702		3426					
Dec-59		2798		3509					
Mar-60		2907		3593					
Jun-60		3012		3705					
Sep-60		3069		3826					
Dec-60		3087		3873					
Mar-61		3037		3776					
Jun-61		3017		3722					
Sep-61		3030		3772					
Dec-61		3048		3812					
Mar-62		3145		3955					
Jun-62		3216		4049					
Sep-62		3268		4077					
Dec-62		3324		4142					
Mar-63		3422		4287					
Jun-63		3429		4332					
Sep-63		3563		4538					
Dec-63		3618		4642					
Mar-64		3670		4666					
Jun-64		3810		4816					
Sep-64		3896		4958					
Dec-64		4001		5101					
Mar-65		4045		5180					
Jun-65		4189		5307					
Sep-65		4221		5329					
Dec-65		4263		5338					
Mar-66		4336		5421					
Jun-66		4375		5535					
Sep-66		4483		5733					
Dec-66		4565		5878					
Mar-67		4674		6041					
Jun-67		4732		6182					
Sep-67		4870		6158	4210	12155			
Dec-67		4986		6272	4295	12433	5556		
Mar-68		5088		6467	4373	12656	5679		
Jun-68		5190		6624	4452	12853	5894		
Sep-68		5321		6854	4526	13115	6109		
Dec-68		5494		7139	4585	13348	6245		
Mar-69		5619		7290	4712	13697	6318		
Jun-69		5792		7488	4815	14030	6481		
Sep-69		5880		7644	4894	14309	6698		
Dec-69		6038		7852	4976	14592	6895		
Mar-70		6213		8037	5100	14832	7120		
Jun-70		6333		8273	5108	15001	7202		
Sep-70		6463		8386	5130	15074	7233		
Dec-70		6698		8593	5219	15337	7379		
Mar-71		6954		8968	5262	15607	7562		
Jun-71		7085		9160	5341	15974	7768		
Sep-71		7363		9551	5457	16326	7925		
Dec-71		7412		9657	5515	16655	8133		
Mar-72		7514		9872	5592	17049	8314		
Jun-72		7743	10291		5822	17627	8539		
Sep-72		7966	10508		6100	18539	8903		
Dec-72		8224	10995		6496	19692	9316		
Mar-73		8526	11564		6801	20739	9938		
Jun-73		8926	11948		7272	21955	10776		
Sep-73		9325	12765		7676	23276	11647		
Dec-73		9818	13236		7783	24122	12398		
Mar-74	10101		13746		7748	24820	13120		
Jun-74	10509		13953		7692	25376	13897		
Sep-74	11011		15266		7479	24831	14187		
Dec-74	11377		16035		7625	25793	14807		
Mar-75	12011		16447		7980	27196	15596		
Jun-75	12576		17288		8466	28706	16114		
Sep-75	13238		17888		8889	30266	16826		
Dec-75	13734		18725		9329	31499	17299		

DATE	Private Demand, SA current prices \$million	Final Gross Domestic Product, SA current prices \$million	M1, SA \$million	M3, SA new bank adjusted \$million	Bank lending SA, new bank adjusted \$million	AFI Lending SA \$million	Broad money SA \$million
	Sep 88 Nat.Acc	Sep 88 Nat.Acc					
Mar-76	14547	19590	9644	32113	18039		
Jun-76	15233	20479	9758	33012	18931		
Sep-76	15565	21198	9906	34277	19808		
Dec-76	16269	21574	10143	35431	20702	37064	51068
Mar-77	16596	22161	10478	36461	20975	38245	53059
Jun-77	16933	22703	10524	36798	21659	39857	53910
Sep-77	17279	23086	10711	37163	22522	41599	55234
Dec-77	17659	23276	10922	37858	23321	43054	56791
Mar-78	18094	24103	11048	38587	24002	44584	58353
Jun-78	18835	24688	11405	39590	24716	46178	60158
Sep-78	19568	25789	11729	40815	25491	47767	62326
Dec-78	20262	26575	12086	41816	26388	49465	64337
Mar-79	20956	27677	12663	43039	27163	51311	66524
Jun-79	21419	27957	13291	44237	27967	53326	68990
Sep-79	21971	29018	13803	45169	28911	55263	70800
Dec-79	22508	29859	14042	46502	30199	57615	72959
Mar-80	23589	31157	14697	48266	31250	59883	75903
Jun-80	24317	31916	15000	49288	32070	61887	77972
Sep-80	25579	32923	15568	51018	32893	63951	80868
Dec-80	26296	34407	16329	52589	33796	66766	84571
Mar-81	27327	35207	16379	53825	34864	69332	86996
Jun-81	28462	36330	16803	55437	36042	72340	90023
Sep-81	29421	37505	17184	56802	37272	75963	93519
Dec-81	30569	38378	17249	58355	38504	79012	96638
Mar-82	31226	39238	17325	59560	39749	81948	99496
Jun-82	32211	40550	17179	61742	41126	84616	102737
Sep-82	32541	41563	17070	63071	42134	87708	105907
Dec-82	33233	42273	17115	64461	43087	89982	108784
Mar-83	33497	42815	17631	66398	44663	92171	110911
Jun-83	33728	43073	18027	68998	45981	94604	114901
Sep-83	34860	45068	18380	71018	47140	96178	118192
Dec-83	35817	46470	19189	72896	48718	98591	120400
Mar-84	36931	48819	19663	75389	50439	102109	124110
Jun-84	37756	50260	19862	76856	51612	105154	128121
Sep-84	38678	50752	20340	79202	53545	110911	133520
Dec-84	39766	52103	21001	81948	56216	116305	137881
Mar-85	41283	53226	21914	85554	59399	121605	143246
Jun-85	42881	55600	22755	88608	62347	126632	148245
Sep-85	44297	57936	22298	92348	65431	132991	154157
Dec-85	45107	58390	22557	94638	68694	140444	159657
Mar-86	45754	60039	22303	95584	71579	147554	163804
Jun-86	46747	60354	23300	98490	75224	154010	169314
Sep-86	47873	62064	24015	100312	78132	159709	170728
Dec-86	49123	64294	24546	102389	80942	163941	175022
Mar-87	49962	65810	25652	105235	84139	170377	180196
Jun-87	51142	68747	26891	107550	87075	175982	184432
Sep-87	53091	69885	27990	110755	90117	182587	191706
Dec-87	54517	71780	29753	115064	93904	189635	196155
Mar-88	56616	74206	30321	117100	97259	196913	200909
Jun-88	58328	76769	31912	120730	99869	206590	207461
Sep-88	59417	78948	32583	124569	105715	215903	215416

DATE	Credit SA \$million	Trade-weighted Index May 1970=100	90-day bank-accepted bill rate per cent	OECD Major-7 Private final Demand, SA 1980 prices, ex \$US billion	OECD Major-7 Gross Domestic Product, SA 1980 prices, ex \$US billion	OECD Major-7 Gross Domestic Product, SA current prices \$US billion
Sep-59		96.4545				
Dec-59		96.4545				
Mar-60		96.4545				
Jun-60		96.4545				
Sep-60		96.4545				
Dec-60		96.4545				
Mar-61		96.3386				
Jun-61		96.0169				
Sep-61		96.0169				
Dec-61		96.0169				
Mar-62		95.9937				
Jun-62		95.9472				
Sep-62		95.9472				
Dec-62		95.9472				
Mar-63		95.9472				
Jun-63		95.9472				
Sep-63		95.9472				
Dec-63		95.9472				
Mar-64		95.9472				
Jun-64		95.9472				
Sep-64		95.9472				
Dec-64		95.9472				
Mar-65		95.9472				
Jun-65		95.9472				
Sep-65		95.9472				
Dec-65		95.9472				
Mar-66		95.9472				
Jun-66		96.073				
Sep-66		96.326				
Dec-66		96.326				
Mar-67		96.326				
Jun-67		96.326				
Sep-67		96.326				
Dec-67		98.961				
Mar-68		100.278	5.13			
Jun-68		100.278	5.32			
Sep-68		100.278	5.08			
Dec-68		100.278	4.93			
Mar-69		100.278	5.12			
Jun-69		100.278	5.6			
Sep-69		100.488	5.9			
Dec-69		100	5.65			
Mar-70		100	6.42	3716	4494	2061
Jun-70		99.8	8.8	3764	4549	2121
Sep-70		99.2	6.85	3828	4596	2167
Dec-70		99.2	6.67	3844	4607	2202
Mar-71		100	7.4	3881	4660	2270
Jun-71		99.9	7.92	3946	4704	2323
Sep-71		99.6	6.65	3982	4758	2376
Dec-71		99.5	6.07	4036	4800	2421
Mar-72		98.2	5.53	4123	4881	2500
Jun-72		98.1	5.62	4177	4953	2564
Sep-72		98.7	4.57	4230	5008	2630
Dec-72		101.9	4.62	4317	5117	2723
Mar-73		109	4.98	4440	5460	2904
Jun-73		109.2	6.2	4445	5486	2976
Sep-73		110.2	7.38	4465	5509	3059
Dec-73		116.4	9.37	4486	5545	3175
Mar-74		118.6	9.62	4609	5522	3225
Jun-74		116.8	18.93	4602	5543	3344
Sep-74		114.9	13.93	4611	5542	3453
Dec-74		105.3	10.15	4547	5481	3323
Mar-75		105.3	8.9	4520	5402	3556
Jun-75		105.3	9.17	4564	5455	3664
Sep-75		105.3	8.13	4606	5512	3780
Dec-75		105.3	7.9	4657	5595	3906

DATE	Credit SA \$million	Trade-weighted Index May1970=100	90-day bank-accepted bill rate per cent	OECD Major-7 Private final Demand, SA 1980 prices,ex \$US billion	OECD Major-7 Gross Domestic Product, SA 1980 prices,ex \$US billion	OECD Major-7 Gross Domestic Product, SA current prices \$US billion
Mar-76		105.3	8.13	4727	5693	4042
Jun-76		105.3	10.18	4762	5739	4162
Sep-76		105.3	9.43	4796	5774	4261
Dec-76	37129	94.8	9.3	4852	5838	4383
Mar-77	38499	92.4	9.45	4908	5903	4520
Jun-77	40112	92.5	10.98	4947	5950	4648
Sep-77	42000	91.8	10.77	4993	6012	4761
Dec-77	43564	90.1	9.95	5041	6057	4882
Mar-78	45150	88.1	9.95	5100	6108	5011
Jun-78	46605	87	10.77	5201	6239	5217
Sep-78	47889	84	9.78	5249	6282	5352
Dec-78	49822	82.7	9.17	5303	6361	5519
Mar-79	51709	82.5	8.85	5332	6378	5645
Jun-79	53864	83	10.43	5407	6441	5816
Sep-79	56298	83.4	9.9	5426	6489	5990
Dec-79	58742	83.6	10.22	5460	6519	6138
Mar-80	61099	83.7	11	5482	6579	6333
Jun-80	63453	84.8	13.73	5359	6487	6417
Sep-80	65959	85.7	12.17	5398	6502	6581
Dec-80	68829	86.7	11.75	5437	6544	6780
Mar-81	71708	88.2	13.78	5456	6628	7006
Jun-81	74954	91.1	16.05	5459	6630	7131
Sep-81	78606	94.1	15.52	5469	6659	7320
Dec-81	81988	91.6	15.07	5441	6632	7447
Mar-82	85693	89.4	17.9	5431	6602	7528
Jun-82	88747	88.1	19.45	5436	6623	7660
Sep-82	91915	84.7	16.08	5441	6592	7736
Dec-82	94273	83.6	13.13	5498	6615	7846
Mar-83	96623	80.7	13.88	5524	6670	8026
Jun-83	99186	77.2	13.13	5586	6760	8208
Sep-83	101177	79.6	11.58	5659	6829	8391
Dec-83	103954	81.6	10.17	5735	6917	8604
Mar-84	107307	83.5	12.27	5803	7051	8869
Jun-84	111258	81.1	13.58	5856	7087	8992
Sep-84	118916	79.7	11.47	5892	7144	9139
Dec-84	125504	82.3	11.88	5947	7206	9301
Mar-85	131920	74.1	14.55	6011	7266	9473
Jun-85	138471	64.7	15.95	6061	7323	9633
Sep-85	145814	66.6	16.13	6141	7395	9820
Dec-85	154363	61.7	18.25	6192	7445	9967
Mar-86	162241	61.2	17.65	6227	7492	10105
Jun-86	169699	59.5	15.25	6305	7544	10272
Sep-86	179105	50.5	16.88	6367	7571	10412
Dec-86	185586	54.4	15.82	6395	7613	10522
Mar-87	193748	54.1	16.42	6425	7679	10687
Jun-87	202025	55.6	13.88	6521	7743	10863
Sep-87	209709	55.6	12.03	6622	7847	11088
Dec-87	220576	52	11.82	6675	7939	11237
Mar-88	234434	53.1	10.97	6773	8040	11473
Jun-88	248934	58	12.47	6824	8061	11612
Sep-88	261194	60.9	13.45			

DATE	Exports, NSA		Imports, NSA		Private Demand, NSA		Final Product, NSA		Gross Domestic Product, NSA		Exports, NSA		Imports, NSA	
	1984-85 prices		1984-85 prices		1984-85 prices		1984-85 prices		1984-85 prices		current prices		current prices	
	\$million		\$million		\$million		\$million		\$million		\$million		\$million	
	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc
Sep-59	1852		2463		15219		19734		520		462			
Dec-59	2468		2564		16658		22221		551		610			
Mar-60	2190		2704		15670		19515		581		554			
Jun-60	2051		2976		16575		19287		627		518			
Sep-60	1838		3071		16528		20699		658		454			
Dec-60	2044		3098		17494		22941		657		519			
Mar-61	2359		3144		15603		19825		676		568			
Jun-61	2746		2758		16134		19292		594		624			
Sep-61	2281		2418		15957		20365		519		565			
Dec-61	2659		2336		17046		22957		496		639			
Mar-62	2617		2655		16026		20414		560		627			
Jun-62	2637		2876		17055		20666		608		631			
Sep-62	2217		2976		17123		21658		639		536			
Dec-62	2644		2958		18434		24542		638		639			
Mar-63	2569		2995		17084		21443		637		649			
Jun-63	2547		3154		17865		21734		677		659			
Sep-63	2708		3199		18277		23215		676		713			
Dec-63	3060		3112		19811		26611		660		826			
Mar-64	2891		3380		18001		22727		713		807			
Jun-64	2941		3711		19386		23017		791		803			
Sep-64	2633		3871		19384		24653		821		706			
Dec-64	2963		3956		21067		27831		844		787			
Mar-65	2899		3943		18955		24534		857		758			
Jun-65	3076		4219		20528		24755		918		790			
Sep-65	2929		4537		20292		25835		983		757			
Dec-65	3004		4201		21707		28426		911		789			
Mar-66	2806		3807		19542		24809		837		762			
Jun-66	2982		3847		20796		25341		849		817			
Sep-66	3004		4034		20827		26649		888		816			
Dec-66	3139		3915		22457		30222		863		837			
Mar-67	3320		4279		20363		27068		942		885			
Jun-67	3559		4397		21695		27027		971		934			
Sep-67	3271		4410		21749		27932		987		855			
Dec-67	3574		4337		23739		31730		973		918			
Mar-68	3376		5018		21624		27362		1087		851			
Jun-68	3620		4836		22894		28383		1056		935			
Sep-68	3436		4968		23050		29769		1092		896			
Dec-68	3867		4768		25255		34654		1049		997			
Mar-69	3668		4591		22845		29879		1011		960			
Jun-69	3889		4873		24732		30421		1086		1029			
Sep-69	4302		5341		24548		31956		1167		1142			
Dec-69	4377		5326		26573		35937		1170		1165			
Mar-70	4430		5176		24114		31628		1147		1220			
Jun-70	4565		5278		25830		32644		1231		1222			
Sep-70	4688		5342		25784		33948		1264		1248			
Dec-70	4800		5141		27921		37716		1244		1248			
Mar-71	4626		5076		25349		33738		1230		1195			
Jun-71	5180		5258		26993		34335		1332		1374			
Sep-71	5237		5528		27416		35936		1396		1410			
Dec-71	5240		5154		28864		40079		1339		1350			
Mar-72	5279		4863		25916		35158		1272		1397			
Jun-72	5387		4623		27651		36225		1201		1502			
Sep-72	5253		4624		27783		36723		1244		1550			
Dec-72	5596		4954		30043		41844		1314		1745			
Mar-73	5564		5207		27686		37070		1360		1856			
Jun-73	5282		5411		29719		37770		1425		1833			
Sep-73	5224		6064		29699		38926		1675		1852			
Dec-73	5423		6350		32098		43983		1792		1969			
Mar-74	4848		6586		28897		38638		2002		1939			
Jun-74	4913		6958		30270		38233		2359		2087			
Sep-74	5318		7859		29877		39203		2754		2310			
Dec-74	5503		7100		31041		44348		2747		2527			
Mar-75	5415		6093		28572		39005		2412		2486			
Jun-75	5697		5747		30709		40465		2376		2711			
Sep-75	5523		6124		30882		40301		2546		2628			
Dec-75	5546		6147		32235		45104		2600		2652			

DATE	Exports, NSA		Imports, NSA		Private Demand, NSA		Final Product, NSA		Gross Domestic Exports, NSA		Imports, NSA	
	1984-85 prices		1984-85 prices		1984-85 prices		1984-85 prices		current prices		current prices	
	\$million		\$million		\$million		\$million		\$million		\$million	
	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc	Sep 88	Nat.Acc
Mar-76	5650		6440		29997		40541		2800		2772	
Jun-76	5935		6463		32142		41403		2884		3049	
Sep-76	6364		7282		32002		42138		3260		3315	
Dec-76	6063		6854		34156		46275		3250		3202	
Mar-77	5770		7089		30671		41301		3680		3315	
Jun-77	6001		6837		32285		41869		3682		3443	
Sep-77	5959		6820		32239		42833		3794		3442	
Dec-77	6380		6356		33702		46100		3553		3622	
Mar-78	6044		6815		30848		41506		3797		3379	
Jun-78	6322		6832		33623		42781		3928		3624	
Sep-78	6172		7248		33762		43794		4232		3604	
Dec-78	6726		7345		35490		48652		4456		4023	
Mar-79	6845		7183		32726		45085		4424		4254	
Jun-79	7073		7323		34575		43961		4731		4750	
Sep-79	6783		7001		34337		44630		4752		4797	
Dec-79	7708		7394		36250		50528		5193		5676	
Mar-80	7246		7560		33436		44671		5599		5632	
Jun-80	7143		7053		35429		45133		5416		5611	
Sep-80	6618		7846		36284		46359		6070		5363	
Dec-80	7044		7844		38422		52235		6109		5643	
Mar-81	6611		7897		35075		45446		6221		5374	
Jun-81	7092		8097		37795		47008		6496		5811	
Sep-81	6628		8700		38150		48108		6946		5491	
Dec-81	6554		8489		40801		53509		6814		5373	
Mar-82	7094		8929		36552		45855		7356		5830	
Jun-82	7345		9007		38866		47062		7569		6191	
Sep-82	7214		8812		37964		48238		7605		6179	
Dec-82	7099		8093		40049		52129		7199		6279	
Mar-83	6695		7500		35600		45433		6663		5977	
Jun-83	6676		7576		37002		46355		7060		6250	
Sep-83	6974		8070		37788		48029		7494		6584	
Dec-83	7484		8008		40250		54502		7249		6982	
Mar-84	7568		8551		36966		49210		7739		7015	
Jun-84	7979		9102		39144		49775		8310		7446	
Sep-84	8478		10365		39461		50980.22		9903		8174	
Dec-84	8220		9625		42498		57713.28		9165		7877	
Mar-85	8135		9255		38953		50279.28		9141		8108	
Jun-85	9306		9763		41494		52511.22		10799		9980	
Sep-85	9152		10572		41880		54934		11888		9742	
Dec-85	8883		10091		44177		60359		11647		9450	
Mar-86	9183		9353		39260		52692		10964		9664	
Jun-86	8887		9573		41527		53182		11018		9092	
Sep-86	8947		9840		41550		55224		12250		9663	
Dec-86	10204		9574		44046		61454		11997		10991	
Mar-87	9590		9086		39405		54017		11414		10438	
Jun-87	10390		9671		41732		56373		11830		11107	
Sep-87	9918		10261		42805		58005		12606		10900	
Dec-87	10712		10627		45919		63322		13196		12374	
Mar-88	10619		10368		42107		56528		13114		12876	
Jun-88	10295		10704		44578		57526		12879		12603	
Sep-88	10119		12333		44847		59751		14078		12225	

DATE	Private Demand, current prices \$million	Final Gross Domestic Product, current prices \$million	M1, NSA \$million	M3, NSA new bank adjusted \$million	Bank lending NSA, new bank adjusted \$million	Broad Money NSA \$million	AFI Lending NSA \$million	Credit NSA \$million
	Sep 88 Nat.Acc	Sep 88 Nat.Acc						
Sep-59	2681	3463						
Dec-59	2968	3951						
Mar-60	2785	3417						
Jun-60	3007	3459						
Sep-60	3052	3797						
Dec-60	3268	4289						
Mar-61	2894	3657						
Jun-61	3018	3447						
Sep-61	3004	3749						
Dec-61	3218	4275						
Mar-62	3002	3759						
Jun-62	3212	3782						
Sep-62	3241	4042						
Dec-62	3522	4666						
Mar-63	3252	4061						
Jun-63	3427	4046						
Sep-63	3540	4508						
Dec-63	3836	5206						
Mar-64	3489	4454						
Jun-64	3817	4506						
Sep-64	3868	4945						
Dec-64	4253	5669						
Mar-65	3829	4958						
Jun-65	4194	4980						
Sep-65	4194	5307						
Dec-65	4547	5940						
Mar-66	4092	5125						
Jun-66	4378	5233						
Sep-66	4451	5661						
Dec-66	4859	6515						
Mar-67	4420	5858						
Jun-67	4736	5790						
Sep-67	4829	6113	4074	12026				
Dec-67	5297	6992	4328	12519	5561			
Mar-68	4849	6063	4511	12809	5606			
Jun-68	5188	6302	4427	12754	5936			
Sep-68	5274	6773	4385	12977	6136			
Dec-68	5850	7981	4620	13443	6250			
Mar-69	5331	6926	4858	13852	6239			
Jun-69	5785	7023	4789	13930	6530			
Sep-69	5829	7604	4747	14159	6725			
Dec-69	6418	8575	5020	14705	6897			
Mar-70	5882	7668	5244	14987	7036			
Jun-70	6329	7945	5076	14896	7267			
Sep-70	6413	8408	4994	14927	7253			
Dec-70	7119	9274	5257	15449	7374			
Mar-71	6577	8570	5401	15787	7476			
Jun-71	7083	8890	5317	15829	7841			
Sep-71	7315	9492	5308	16090	7944			
Dec-71	7884	10520	5555	16774	8124			
Mar-72	7145	9454	5738	17336	8224			
Jun-72	7727	9891	5793	17464	8625			
Sep-72	7918	10481	5932	18262	8919			
Dec-72	8694	12048	6546	19831	9303			
Mar-73	8103	10826	6981	21107	9833			
Jun-73	8905	11512	7243	21753	10884			
Sep-73	9262	12468	7459	22916	11662			
Dec-73	10381	14591	7829	24280	12391			
Mar-74	9544	13194	7957	25284	12984			
Jun-74	10493	13511	7668	25140	14021			
Sep-74	10970	14878	7276	24456	14202			
Dec-74	12039	17792	7668	25967	14822			
Mar-75	11329	15647	8204	27699	15437			
Jun-75	12616	16626	8394	28414	16231			
Sep-75	13178	17495	8644	29812	16835			
Dec-75	14532	20966	9382	31723	17355			

DATE	Private Demand, current prices \$million	Final NSA current prices \$million	Gross Domestic Product, NSA current prices \$million	M1, NSA \$million	M3, NSA new bank adjusted \$million	Bank lending NSA, new bank adjusted \$million	Broad Money NSA \$million	AFI Lending NSA \$million	Credit NSA \$million
	Sep 88	Nat.Acc	Sep 88	Nat.Acc					
Mar-76	13811		18583		9918	32681	17860		
Jun-76	15273		19709		9723	32688	19030		
Sep-76	15534		21013		9639	33800	19808		
Dec-76	17161		23539		10183	35671	20812	51328	37296
Mar-77	15695		21078		10781	37089	20778	53838	38117
Jun-77	16959		21873		10476	36433	21731	53386	39807
Sep-77	17258		23107		10427	36680	22510	54663	41517
Dec-77	18594		25182		10973	38111	23483	57105	43331
Mar-78	17134		22853		11385	39222	23792	59195	44442
Jun-78	19112		23994		11317	39190	24766	59569	46120
Sep-78	19509		25224		11426	40325	25466	61697	47672
Dec-78	21278		28649		12148	42070	26585	64711	49768
Mar-79	19891		26880		13037	43712	26951	67446	51170
Jun-79	21483		27003		13195	43843	28008	68359	53293
Sep-79	21853		28628		13446	44641	28872	70104	55139
Dec-79	23701		32898		14115	46737	30407	73368	57914
Mar-80	22434		29728		15142	48999	31039	76872	59736
Jun-80	24358		30542		14875	48892	32122	77257	61847
Sep-80	25505		32674		15169	50460	32841	80148	63815
Dec-80	27745		37879		16440	52826	33989	85055	67076
Mar-81	25859		33132		16856	54558	34665	88005	69184
Jun-81	28505		35003		16638	55042	36114	89201	72294
Sep-81	29344		36989		16780	56290	37209	92798	75826
Dec-81	32315		42601		17357	58557	38677	97181	79334
Mar-82	29493		36945		17834	60245	39553	100582	81818
Jun-82	32217		39202		16996	61379	41221	101922	84663
Sep-82	32481		41212		16675	62652	42071	105083	87486
Dec-82	35157		46092		17243	64661	43245	109330	90270
Mar-83	31717		40593		18055	66915	44453	112011	92012
Jun-83	33642		41957		17793	68608	46096	113999	94660
Sep-83	34790		44227		18032	70719	47095	117276	95908
Dec-83	37908		51182		19407	73177	48862	120939	98841
Mar-84	35101		46890		20100	75833	50187	125282	101926
Jun-84	37628		48333		19619	76453	51751	127105	105195
Sep-84	38502		50091		19986	78981	53532	132513	110582
Dec-84	42067		57106		21238	81914	56364	138188	116144
Mar-85	39109		50553		22225	86083	59063	143025	119889
Jun-85	42728		53733		22469	88220	62516	146515	125682
Sep-85	44238		57393		21939	92222	65453	153079	132443
Dec-85	47765		63655		22931	94699	68871	160055	140457
Mar-86	43270		56877		22624	95991	71139	163551	145304
Jun-86	46549		58265		22969	98134	75446	167375	152897
Sep-86	47812		61884		23648	100258	78264	169499	159204
Dec-86	52041		69257		24985	102546	81129	175443	164032
Mar-87	47311		62603		25926	105503	83533	179908	167690
Jun-87	50850		66640		26552	107089	87342	182314	174713
Sep-87	53032		70455		27602	110818	90328	190401	182211
Dec-87	57791		76997		30257	115334	94123	196633	189512
Mar-88	53788		71027		30726	117381	96511	200512	196158
Jun-88	58012		73857		31463	120056	100181	205039	205095
Sep-88	59432		79675		32086	124644	105953	213902	215033