

27

9

THE AUSTRALIAN NATIONAL UNIVERSITY
Centre for Economic Policy Research

DISCUSSION PAPERS

INFLATION AND THE CONSUMPTION RATIO
R.K. Anstie, M.R. Gray and A.R. Pagan

Discussion Paper No. 27

May 1981

ROUND SHELF

G

6 HC8
A973
no. 27

P.O. Box 4, Canberra 2600, Australia

The *Centre for Economic Policy Research* was established as one of a number of new initiatives in 1980. It was provided with an annual grant for a period of five years and given a mandate to foster policy oriented studies of the Australian economy. The Centre intends to work closely with other economic research groups - both within the Australian National University and in other Australian universities.

The *Discussion Papers* of the Centre are intended to make available to a wider audience a series of economic research studies. These studies will have been either commissioned by the Centre (for instance in conjunction with a Conference held under the Centre's auspices) or undertaken by its research workers.

Discussion Papers will also be published where economic research work with relevance to policy has been undertaken by individual academics within the Australian National University - or where the Centre is able to act as a focal point for such research.

The Centre will not have any views on policy; individuals will.

INFLATION AND THE CONSUMPTION RATIO
R.K. Anstie, M.R. Gray and A.R. Pagan

Discussion Paper No. 27

May 1981

ISBN: 0 949838 26 8

ISSN: 0705-5137



Agc

TABLE OF CONTENTS
DISCUSSION PAPER NO. 27

	<u>Page</u>
ABSTRACT	(i)
1. Introduction	1
2. A Definition of Income	5
3. An Analysis of Some Studies of the Consumption Ratio	11
1. Freebairn, Bonyhady and Caton	11
2. INDECS	14
3. Turnidge	17
4. A First Look at Wealth Adjustments to the Consumption Ratio	22
5. Some Econometric Evidence on Inflation Induced Wealth Effects	28
6. Concluding Comments and Implications	34
<u>Appendix:</u> Data Sources and Construction	41
References	47

TABLES AND FIGURES

Table 1	Selected Receipts and Payments as a Percentage of Disposable Income	9
Table 2	Consumption Ratio Adjusted for Financial Asset Losses	13
Table 3	Selected Ratios Involving Depreciation and Capital Stock	16
Table 4	Balance Sheet Structure of the Household Sector	23
Table 5	Ratio of Selected Assets and Liabilities to Disposable Income	25
Table 6	'Non-Farm' Consumption Ratios	27
Table 7	Non-Farm Consumption Ratio (with Equity Adjustment)	28
Figure 1	Recursive Estimates on Coefficient of $\rho\phi$	39
Figure 2	Cusums Squared for Equation 28	40

ABSTRACT

The rise in the consumption ratio observed in Australia in the 1970s has puzzled many commentators. A number of explanations have been provided, the two most popular concentrating upon uncertainty and the effects of a high rate of inflation. The latter has been justified largely by the observed correlation between the consumption ratio and the rate of inflation, but some observers have been uneasy with this explanation as the transmission mechanism has not been well specified. In fact, in some quarters this scepticism has been so strong that the connection has been regarded as a very weak and unstable one.

The present paper suggests that the correlation between inflation and the consumption ratio arises because the Statistician's definition of the denominator - household disposable income - is inadequate in the face of inflation. An ideal definition of income should incorporate the fact that households suffer capital losses and gains on assets and liabilities. These arise when interest rates fail to adjust sufficiently for inflation. The paper constructs such a series of income and finds that a consumption ratio formed with this definition is very much more stable; in particular over the year 1979-80 this adjusted consumption ratio was virtually identical to its counterpart in the period 1966/7 to 1972/3.

A number of other features of existing work are examined in the present study. Firstly, the proposed framework demonstrates why previous studies achieved the results that they did. Secondly, an alternative explanation involving the growth in two-income families is rejected in preference to accounting properly for the capital gains and losses induced by inflation. Finally, the 'capital loss effect' is found to be strong and stable over time.

A number of policy implications emerge from the study. One of these is that the traditional consumption ratio, by using a definition of income that

includes interest receipts which rise with inflation but are not fully available for consumption, will generally exhibit a correlation with inflation rates. This does not mean inflation has an effect upon *consumption*. In fact, if interest rates rose sufficiently to compensate for any rise in inflation, it is possible that inflation would have little effect on consumption. At present, however, this is unlikely due to regulated interest rates and the taxation of nominal interest receipts. Some policy changes in these areas seem necessary if continuing high inflation rates are not to depress consumption demand.

INFLATION AND THE CONSUMPTION RATIO

R.K. Anstie, M.R. Gray and A.R. Pagan *

1. INTRODUCTION

The dramatic fall in the consumption ratio in Australia during the 1970s has stimulated a great deal of debate and spawned a number of papers concerned with various aspects of the phenomenon. Initial reactions seemed to be that it was a product of the well-known lags in the growth of consumption behind income but subsequently attention shifted towards the impact of inflation, this shift being enshrined in a number of Budget Statements and forming one of the corner-stones of the 'inflation first' strategy. Within this milieu it was assumed that the consumption ratio would only return to its original level when inflation declined, and impressive empirical evidence bolstering this position was provided by Freebairn (1976, 1977). Freebairn's argument concentrated upon the stimulation to saving following a reduction in the real value of consumers' net wealth associated with inflation, and this theme runs fairly strongly through the subsequent literature surveyed by Williams (1979).

Despite the attention directed towards a 'real wealth' effect, no specific quantitative assessment of the effect has been presented; most authors being content to note that the negative correlation observed between inflation and the consumption ratio is a qualitative prediction of the theory. It is perhaps because of this lack of evidence that a number of commentators are doubtful if consumption is likely to grow very much even if inflation is reduced, some even claiming that the fall in the measured consumption ratio is perhaps a statistical illusion. Thus the INDECS team concludes that

The modified figures clearly cast a shadow over the neo-classical view that we are about to witness the beginning of a self-starting and self-sustaining consumer-led recovery. Some scope for consumer spending to grow more rapidly than household disposable income does undoubtedly exist, but its extent could only be a fraction of the size the published series suggests. (1980, p.90)

A similarly pessimistic viewpoint is taken by Sheehan (1980):

... while there are some connections between lower inflation and

* This paper forms part of a project on the effects of inflation being carried out by the Centre for Economic Policy Research. We would like to thank the many people who have taken the time to read earlier drafts and to give us their comments - Pravin Trivedi, Fred Gruen, Michael Carter, Alan Hall, Bryan Haig, John Piggott, Paul Volker, John Taylor, Bill Poole and Pasquali Perazzelli.

increased economic activity, the magnitudes realised are not sufficient to generate recovery. (p.109)

These quotations serve to illustrate what are two commonly held beliefs on the matter. Firstly, that the consumption ratio formed from raw data is misleading and that, when measured properly, the difference between the current ratio and that of the 1960's is not very large. Members of INDECS have been strong proponents of this idea and an interesting variant is given by Johnston and Looker (1979) who argue that some of the statistical discrepancy might well be unrecorded consumption. Secondly, there is a belief that, even if inflation does have an effect upon consumption, this effect may be weak or not well determined. For example, Hughes (1980, p.155) says:

A common suggestion is that households have been intent on rebuilding the real value of accumulated savings depleted by inflation. But the linkage has been neither precise nor tight.

Of course, there have been views on the time profile of the consumption ratio other than the two instanced above. Some have ascribed it to an "age of uncertainty" while Turnidge (1980), following up a lead of Johnston and Looker (1979), believes that the rise in the number of multiple income families, which coincided with the rise in the inflation rate, may also be an important determinant. Indeed, he presents evidence that some of the effects of inflation upon the consumption ratio elicited by Freebairn more properly belong to demographic features, so that a reduction in the inflation rate will not necessarily increase the consumption ratio unless there is some connection between the number of multiple income families and inflation. To the extent that Turnidge's results are supported by the data, their policy implications are quite marked and do throw doubt upon the underpinnings of an 'inflation first' strategy.

When one looks at the studies above and the extensive surveys by Freebairn and Williams which have been fairly exhaustive in enumerating and discussing potential causes, one cannot help but notice that there has been little attempt to quantify either 'real wealth' effects, or to provide a systematic analysis

aimed at discriminating between the different views. Yet these views frequently contain assertions about the magnitude of the effects, for example, Sheehan and Hughes above. Johnston and Looker summarize this deficiency rather neatly:

Rather, we are inclined to support a more traditional explanation for the rise in the ratio, revolving around habit persistence and money illusion, wealth and financial effects, and shifts in income distribution rather than increased consumer uncertainty. No doubt all these factors have had a part to play. The crucial question is that of their relative importance and that, to our minds, remains an unresolved question. (p.178)

Not only have there been statements concerning magnitudes but also some concerning the *stability* of the consumption income relation. Williams concludes his survey with the comment:

But it is not clear that the coefficients connecting household saving in Australia with other economic variables are as yet sufficiently stable to be amenable to estimation using time series data, (p.159)

but we are not aware of any detailed study that has ever focussed upon the stability of the consumption function. Indeed, Hughes (1980) would seem to argue (fn. p.161) that the marginal propensity to consume has been stable, and an investigation of this issue seems somewhat overdue.

It is the purpose of our paper to try to sort out some of the issues raised above. Fundamental to our analysis is a definition of income consistent with economic theory in the presence of inflation and which accounts for the capital losses and gains sustained by households as a result of price level changes. This framework becomes extremely valuable in assessing the origin and validity of previous work, and Section 2 of this paper therefore spends some time in explicating it.

Section 3 then reviews some of the studies cited in the introduction, with specific attention being paid to the extent to which these works adopt a definition of income compatible with that espoused in Section 2. In Section 4 we concentrate on the influence of inflation upon the consumption ratio. Here we present some rough evidence that the fall in the consumption ratio is

consistent with a reduction in income arising from inflation-induced real capital losses on assets. Accordingly, higher consumption ratios than observed were unlikely as these would require that consumers spend their real wealth; a phenomenon, possible for a short period, but unlikely to be sustainable in the long term. Moreover, in contrast to what now seems the Treasury attitude that

The falls in 1979-80 notwithstanding, both the total and 'non-farm' saving ratios remain above their levels of earlier years and there is still scope for consumption to grow more strongly than real disposable income, (1980, p.12)

we believe there is likely to be only slight improvement in the measured consumption ratio unless various adjustments for inflation occur.

Suggestive though the numbers of Section 4 are, they do not directly refute Hughes's claim that the effects of inflation are "neither precise nor tight" and certainly, by their very nature, cannot effectively deal with Turnidge's contentions over the effects of multiple income families. To investigate these issues a more formal econometric analysis is needed and this is done in Section 5. Our conclusion from this section is that the role of inflation is well supported by the evidence, strong and stable over time. In contrast, the 'two-income family' effect is rather weak, if indeed it even exists. Faced with these findings, Section 6 reviews some of the policy implications of our work and makes some recommendations.

Perhaps it is wise to conclude this opening section with a disclaimer. Generally our objective is not so much to advance any new ideas but to give a more cohesive presentation of old ones; the object of the exercise being a clearer appreciation of what actually does need to be explained and the provision of a framework wherein quantitative evaluation can proceed. In fact, it is doubtful if any of the ideas expressed in this paper cannot be found, explicitly or implicitly, in one or other of the papers mentioned in this introduction.

2. A DEFINITION OF INCOME

When dealing with the consumption ratio there are two magnitudes that need to be carefully defined - the numerator, consumption, and the denominator, income. A good deal of attention was paid by Williams to alternative definitions of consumption. The ideal definition of course involves adding the services yielded by durable goods in any period to the expenditure on perishables, but measurement of service yields has proven difficult and most 'consumption ratios' take total expenditure as consumption. We will do likewise and will therefore work with the series, 'Final Consumption Expenditure - Private', as our definition of consumption.

This then leaves the problem of defining income. Our preference is for the Haig-Simons definition that income is that which may be consumed while leaving real wealth intact. This will be referred to as 'economic income'; in some places it is referred to as 'real income', but this normally connotes income at constant prices in macroeconomic analysis. Economic income *for an individual unit with a constant price level* is easily determined from the net worth identity

$$A_t - L_t = A_{t-1} - L_{t-1} + Y_t - C_t \quad (1)$$

where Y_t is income net of taxes and expenses incurred in earning it

(disposable income) *from all sources* during t

A_t is the stock of assets at the end of t

L_t is the stock of liabilities at the end of t

C_t is consumption during time t ,

by choosing C_t such that the change in net wealth $(A_t - L_t) - (A_{t-1} - L_{t-1})$ is zero. As expected, this indicates that economic income is identical to disposable income when prices are constant.

When prices are not constant (1) would be

$$A_t - L_t = A_{t-1} - L_{t-1} + P_t \bar{Y}_t - P_t C_t + (g_t + r_t) A_{t-1} - r_t L_{t-1} \quad (2)$$

where A_t and L_t are nominal stocks of assets and liabilities, $\bar{Y}_t$ is income excluding interest receipts from assets and interest payments on liabilities, g_t is the rate of inflation in *asset* prices and r_t the nominal rate of interest. Of course in practice assets and liabilities are not homogenous and exhibit differing rates of return, but this simply complicates the expression without fundamentally altering it. (2) is converted to constant price terms by dividing through by P_t

$$\frac{A_t - L_t}{P_t} = \frac{A_{t-1} - L_{t-1}}{P_t} + \bar{Y}_t - C_t + \frac{(g_t + r_t) A_{t-1}}{P_t} - r_t \frac{L_{t-1}}{P_t} \quad (3)$$

and subtracting $\frac{A_{t-1} - L_{t-1}}{P_{t-1}}$ from both sides of (3) gives

$$\begin{aligned} \frac{A_t - L_t}{P_t} - \frac{A_{t-1} - L_{t-1}}{P_{t-1}} &= \frac{A_{t-1} - L_{t-1}}{P_t} - \frac{A_{t-1} - L_{t-1}}{P_{t-1}} + \bar{Y}_t - C_t \\ &+ \frac{(g_t + r_t) A_{t-1}}{P_t} - \frac{r_t L_{t-1}}{P_t} \end{aligned} \quad (4)$$

The change in real net wealth given by the left hand side of (4) is zero when consumption equals

$$Y_t^* = \frac{A_{t-1} - L_{t-1}}{P_t} - \frac{A_{t-1} - L_{t-1}}{P_{t-1}} + \bar{Y}_t + \frac{(g_t + r_t) A_{t-1}}{P_t} - \frac{r_t L_{t-1}}{P_t} \quad (5)$$

establishing that Y_t^* is economic income. Writing $P_t = P_{t-1}(1 + \dot{p}_t)$, where $\dot{p}_t$ is the rate of inflation,

$$\begin{aligned} Y_t^* &= \frac{A_{t-1}}{P_{t-1}(1+\dot{p}_t)} - \frac{A_{t-1}}{P_{t-1}} + \frac{(g_t + r_t) A_{t-1}}{P_{t-1}(1+\dot{p}_t)} + \left(\frac{L_{t-1}}{P_{t-1}(1+\dot{p}_t)} - \frac{r_t L_{t-1}}{P_{t-1}} \right) \\ &+ \bar{Y}_t \end{aligned} \quad (6)$$

which simplifies to

$$Y_t^* = \frac{A_{t-1}}{P_t} (g_t + r_t - \dot{p}_t) + \frac{L_{t-1}}{P_t} (\dot{p}_t - r_t) + \bar{Y}_t = (g_t - \dot{p}_t) \frac{A_{t-1}}{P_t} + \frac{L_{t-1}}{P_t} \dot{p}_t + Y_t \quad (7)$$

where

$$P_t Y_t = P_t \bar{Y}_t + r_t A_{t-1} - r_t L_{t-1} \text{ is disposable income.}$$

Economic income is therefore the sum of Y_t and any *real* capital gain on assets and liabilities. Notice that there are real capital gains upon assets only if $g_t - \dot{p}_t \geq 0$, that is, if the rate of inflation of asset prices *exceeds the general rate of inflation*. When asset prices are fixed in nominal amounts ($g_t = 0$), the rate of capital loss sustained on such assets as a result of inflation is identical to the rate of inflation. At first sight this may seem strange but it should be remembered that Y_t includes interest income from such assets ($i_t A_{t-1}$) and, as the interest rate rises with inflation, the capital loss ($\dot{p}_t A_{t-1}$) needs to be subtracted from such interest receipts in order that inflation does not produce a spurious rise in income. These receipts would be reinvested to maintain the real value of such assets and so may not be available for consumption. In fact, abstracting from the effects of the income tax, in the long run it would be expected that interest rates would rise to fully reflect the rate of inflation so that, whilst inflation has an impact upon Y_t through the inflation-induced rise in interest receipts, it would have no impact upon Y_t^* . The presence of income taxation of course requires that interest rates rise to a much greater extent than the rate of inflation, a point we return to later.

It is the central contention of this paper that the denominator of the consumption ratio should be Y_t^* , this being the only definition signifying exactly the extent of consumption possible without impinging upon real wealth. What then is the denominator used in current discussion? This is generally the series *household disposable income at constant prices* defined as:

Wages, salaries and supplements + unincorporated enterprise income
+ Income from dwellings + imputed Interest of Life and Superannuation

Funds + Other Interest and Dividends + Net Transfers less Direct
Taxes less Consumer Debt Interest,
deflated by the consumption deflator.

For the moment we will ignore the measurement of unincorporated enterprise income and accept the definition of consumer durable expenditure as consumption. Then the composition of the personal sector portfolio - houses and land, financial assets (including equity), advances (including mortgages) and consumer debt (see Parkin *et al.* (1973)) - reveals that household disposable income corresponds to Y_t owing to the inclusion of income from dwellings, equity and financial assets.¹ From the discussion above such a definition would be appropriate for an individual household's consumption ratio only when there is no inflation; in the presence of inflation it might be expected that some of the interest receipts and payments solely reflect an inflation premium. In the case of assets such an income is not available for consumption as it needs to be reinvested to preserve the real value of assets. For liabilities it needs to be recognised that disposable income is lowered as interest payments rise, but that the real value of liabilities declines also. To appreciate the magnitude of some of these effects, Table 1 records various sources of income as a percentage of disposable income.

1. Interest payments on dwellings are expenses allowed for in forming the income from dwellings series.

TABLE 1
SELECTED RECEIPTS AND PAYMENTS AS A PERCENTAGE OF DISPOSABLE INCOME

	(1)	(2)	(3)	(4)	(5)	(6)
1968/69	2.29	3.80	2.58	0.82	3.59	17.34
1969/70	2.37	4.03	2.60	0.81	3.81	15.47
1970/71	2.35	4.11	2.37	0.86	4.13	13.68
1971/72	2.37	4.27	2.29	0.84	4.27	14.26
1972/73	2.33	4.52	2.01	0.82	4.21	15.76
1973/74	2.07	5.17	1.81	1.03	3.70	16.93
1974/75	2.03	5.93	1.59	1.12	3.61	13.31
1975/76	2.11	5.56	1.46	1.12	4.07	12.65
1976/77	2.07	6.03	1.40	1.21	4.57	12.50
1977/78	2.15	6.42	1.37	1.29	5.17	11.57
1978/79	2.18	6.52	1.26	1.32	5.51	14.10

Source: Australian National Accounts 1978-79 Table No.35, *Household Income by Type of Income*

- (1) Interest on Life and Superannuation Funds (Imputed)
- (2) Other Interest
- (3) Dividends
- (4) Interest on Consumer Debt
- (5) Income from Dwellings
- (6) Unincorporated Enterprise Income

The two most striking movements in this table have been exhibited by the series of interest receipts from financial (non-equity) assets and the income from dwellings, the sum of the two rising from 7.39% to 12.03% of disposable income. To understand the potential importance of such a movement, and because we will later make extensive use of the fact, observe that a reduction in the denominator of the consumption ratio by only 5.56% would convert an observed fall in the consumption ratio from .9 to .85 to one that was constant at .9. In other words, if income appropriate to the consumption decision is overstated by the Statistician's measure by something of the order of 5-6%, the observed drop in the conventional consumption ratio could be fully accounted for.

Returning to the analysis, the Statistician's measure of income is seen to exclude any capital losses or gains as a result of inflation but to include

the increased receipts and payments associated with it. This seems an unfortunate asymmetry and we would agree with Johnston and Looker (1979, p175):

... capital gains and losses on financial assets were included in income. We find the arguments in favour of this approach quite compelling. It does not appear to be unreasonable to assume that such gains and losses are viewed by households in a similar way to profits and losses accruing to other activities of (unincorporated) enterprises.

Throughout the analysis above we have been concerned to emphasize the proper accounting for *individuals* and not for households in aggregate. The distinction is an important one in theory. Consider, for example, a household with a portfolio of savings bank deposits and assume that the interest rate (r_t) on them does not adjust fully for inflation. Then this household suffers a real capital loss of $(\dot{p}_t - r_t) \frac{A}{P_t} \frac{t-1}{t}$. However, the banking sector theoretically obtains a capital gain and, as the equity in banks is ultimately held by the household sector, other households would register a real capital gain in their equity assets. In aggregate then, real net wealth of the household sector would be unchanged. This point is an old one, arising initially in the context of whether price level falls could restore full employment in a capitalist economy. The upshot of that debate was that only outside money qualified as net worth, i.e., cash and bonds, but subsequently it has been argued by Barro (1974) that bonds are not net wealth.²

This theoretical position is not necessarily attractive for empirical work. Even apart from the possibility that households have asymmetric views of capital gains and losses, the distortions introduced into a capitalist system by various features such as taxation, historical cost depreciation, etc., make it doubtful if equity values will fully reflect any capital losses sustained by the household sector. Much of this gain may well go to the government sector where it might be returned to the household sector

2. The effect upon expenditure of a change in the real value of outside money has long been termed the *real balance* effect. It seems better to maintain this terminology for the effects of a change in real values of a very restricted range of assets than to extend it to all, as has sometimes been done in Australian discussion.

via reduced taxation, higher transfer payments or expenditure that is directly substitutable with private consumption. Only the latter is not accounted for in the definition of Y_t above. Of course in the case of assets held as claims on the corporate financial sector, some of the losses due to interest rates failing to adjust for inflation will be reflected in gains to households who borrow at rates of interest below the rate of inflation.

The above considerations establish a case against any prior simplification of the definition of economic income; if losses and gains do cancel then no harm is done by a failure to simplify from the outset, but if not, a source of error is thereby avoided. What is needed is a complete accounting for income changes as a result of price level movements, a task - to the best of our knowledge - not previously attempted for the household sector - but done by Swan (1980) for the corporate sector. Hartley (1976), in an unpublished paper, did investigate the impact upon consumption in Australia of the reduction in the real value of outside money while, internationally, Hendry and Von Ungern-Sternberg (1979), Jump (1980) and the Bank of England (1978) have all provided some adjustments to income arising from inflation-induced capital gains and losses. Section 4 of this paper will therefore return to the question of the likely adjustments in the Australian context, but for the next section, the idea of a redefined consumption ratio will be utilized to reinterpret some existing studies.

3. AN ANALYSIS OF SOME STUDIES OF THE CONSUMPTION RATIO

There are four recent studies of some importance that are examined in this section - those of INDECS (1980), Freebairn (1976), Bonyhady and Caton (1976) and Turnidge (1980). Throughout, we will obtain considerable insight into the results of those papers by a use of our modified definition of income.

1. Freebairn, Bonyhady and Caton

It is now time to review some econometric studies of the fall in the consumption ratio which in certain of their aspects can be regarded as

incorporating wealth effects arising from inflation. Consider two classes of assets - $\bar{A}_t$ which exhibit nominal capital gains and A_t which do not. From (3) economic income will be

$$Y_t^* = \frac{\bar{A}_{t-1}}{P_t} (g_t - \dot{p}_t) - \dot{p}_t \left(\frac{A_{t-1}}{P_t} - \frac{L_{t-1}}{P_t} \right) + Y_t$$

and, if there are no real capital gains ($g_t = \dot{p}_t$),

$$Y_t^* = Y_t - \dot{p}_t \left(\frac{A_{t-1}}{P_t} - \frac{L_{t-1}}{P_t} \right) = Y_t - \dot{p}_t W_{t-1}, \quad (8)$$

where W_t will be referred to as real net wealth. This terminology is not strictly correct as $\frac{\bar{A}_{t-1}}{P_t}$ represents part of wealth, but it will be convenient to have a title for the net position of households in assets and liabilities that do not exhibit capital gains. Then, if the main proposition of this paper - that consumption C_t is related to Y_t^* holds -

$$C_t = \alpha + \beta Y_t^* = \alpha + \beta Y_t - \beta \dot{p}_t W_{t-1} \quad (9)$$

and

$$\frac{C_t}{Y_t} = \frac{\alpha}{Y_t} + \beta - \beta \dot{p}_t \frac{W_{t-1}}{Y_t} \quad (10)$$

illustrating that the measured consumption ratio will not be a constant in the face of inflation if the net wealth to income ratio, $\phi = \frac{W_{t-1}}{Y_t}$, remains fairly constant. Furthermore, a crude estimate of the reduction in the consumption ratio as a response to inflation would be available from $\dot{p}_t \phi$ (this assumes that the m.p.c. is unity and hence overstates the effect), so that an adjusted consumption ratio might be formed by adding back to the conventional ratio the value of $\dot{p}_t \phi$. To do so requires a value for ϕ , and because of the emphasis upon liquid assets in much of the Australian discussion, this will be taken as the ratio of liquid assets to disposable income, leaving until Section 4 the question of the adequacy of such an approximation. Williams presents evidence that $\phi \approx .6$ over the period 1966/67 to 1978/79. Table 2 - using inflation figures from Table 3.1 of INDECS (p 28), original consumption ratios from Table 2 of Budget Statement No 2, and ϕ from Williams (p 114) - computes:

$$(C_t/Y_t) + \dot{p}_t \phi_t.$$

TABLE 2
CONSUMPTION RATIO ADJUSTED FOR FINANCIAL ASSET LOSSES

	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79
ORIG.	.84	.833	.853	.858	.861	.857
$\dot{p}$	.095	.151	.151	.135	.123	.082
ϕ	.597	.584	.599	.606	.623	.628
$\phi\dot{p}$	.057	.088	.090	.082	.077	.052
$\phi\dot{p} + \text{ORIG.}$	.897	.921	.943	.940	.938	.909

The behaviour of the adjusted ratio is quite striking. With the average inflation rate of 5% from 1966/67 to 1972/73 and an average consumption ratio of .915 (Williams, p.131) the equivalent adjusted ratio was .927 - very close to the values observed from 1974-75 to 1977-78 above. The two values for 1973-74 and 1978-79 are likely to be too low owing to the rapid growth of farm incomes in those years. Later, in Section 4, an adjustment will be performed to disposable income to account for the farm sector as in Statement No. 2. The major point emerging from Table 2 is that the adjustment for losses on financial assets can create a ratio in which much of the reduction in the conventionally measured consumption ratio disappears. As such, this conclusion is at variance with that of Williams (1979) (p145) that "[B]ecause of the stability in the ratio of liquid assets to income, deducting capital losses on liquid assets from household incomes makes little difference to the household saving ratio", but it is clear from (10) that the constancy of W_{t-1}/Y does not of itself allow this inference to be drawn.

The above (rather rough) analysis certainly suggests that the maintenance of real financial assets can provide a good explanation of the change in the consumption ratio (as conventionally measured). Furthermore, as will now be shown, some extra insight into existing studies is obtainable with this

orientation. Consider a standard consumption function in which consumption is related to Y_t^*

$$C_t = \beta C_{t-1} + \alpha Y_t^*$$

$$\text{Now } Y_t^* = Y_t - \dot{p}_t W_{t-1}$$

$$\text{Therefore } C_t = \beta C_{t-1} + \alpha Y_t - \alpha \dot{p}_t W_{t-1}$$

and

$$\frac{C_t}{Y_t} = \beta \frac{C_{t-1}}{Y_t} + \alpha - \alpha \dot{p}_t \frac{W_{t-1}}{Y_t}.$$

Now this equation is one of those estimated by Freebairn, i.e., $\dot{p}_t$, the rate of inflation, appears as an extra regressor in a conventional consumption function. With $W_{t-1}/Y_t = \phi$ fairly constant over time and $\alpha > 0$ it is clear that the regression coefficient of $\dot{p}_t$ should have a negative sign. Furthermore, its absolute value should be the product of the constant and ϕ ($\approx .6$ if liquid assets represent net worth). Freebairn's equation (5') has a constant of .551 leading to a predicted coefficient on $\dot{p}$ of around $-.33$, quite close to the reported value of $-.29$.

The redefined consumption function also sheds some light on other aspects of consumption function studies. Rather than estimate in ratio form with the rate of inflation as an additional regressor, an alternative would be to estimate (9). In this case the additional regressor would be real net wealth and this variable would exhibit a *negative* sign with its value being directly dependent upon the rate of inflation. This provides an explanation of the negative effect of real balances upon consumption noted in Bonyhady and Caton (1976), although they do not investigate the stability of the coefficient over time.

2. INDECS

Section 3.1 has demonstrated the plausibility of an incorrect definition of income as an explanation for a reduced consumption ratio. However, the

definition of disposable income in the national accounts reveals that there is a substantial contribution to this total from the surplus arising from the activities of unincorporated enterprises and from the imputed transactions households engage in with themselves over dwellings. Given this 'profits' element in disposable income, it is appropriate to enquire if any measurement errors are likely to come from this source as a consequence of inflation.

Such an argument has been put forth by INDECS. They argue that both these sources of income are likely to be overstated in times of inflation owing to an understatement of depreciation allowances (these being essentially based on historical cost). They therefore propose a revised ratio of "total household savings (personal saving plus household depreciation allowances) to a disposable income aggregate adjusted to embrace the gross operating surpluses rather than the net operating surpluses of unincorporated trading enterprises and dwelling ownership". They note that the time profile of this ratio relative to its value in a base year is relatively flat and draw the conclusion cited in the introduction to this paper. The comparison with a base year is crucial as

$$\frac{S + D}{Y + D} = \frac{Y - C + D}{Y + D} = 1 - C/(Y + D),$$

where D are depreciation allowances, modifies the *demoninator* of the consumption ratio by *augmenting* disposable income; such an adjustment actually *reducing* the consumption ratio. Accordingly, given that their underlying consumption ratio is, in our view, quite incorrect, there seems no necessary reason why what they present is a satisfactory measure of the impact of inflation upon depreciation; it may be, but there is no obvious reason why it should be.

Ideally, what is required to assess the INDECS argument is not to make some arbitrary adjustments as above, but to make some estimates of the distorting impact of inflation upon the size of depreciation allowances. A full adjustment for this, as commented on by INDECS, is quite difficult, but some appreciation of the orders of magnitude involved is available from the following argument. Many models (and measures) of depreciation effectively

assume it to be a fixed proportion of the capital stock at replacement values. This suggests that some indication of the extent to which inflation has resulted in an understatement of depreciation is available from a comparison of the depreciation/capital stock ratio before and after the genesis of inflation. Values of the capital stock of non-farm unincorporated enterprises and the value of dwellings (both at replacement prices) were therefore compared to the value of depreciation on those assets allowed for in the National Accounts (for unincorporated enterprises depreciation is essentially that allowed for tax purposes while for dwellings it is imputed on the basis of historical cost).³ Table 3 provides some of the ratios useful for assessing the INDECS argument.

TABLE 3
SELECTED RATIOS INVOLVING DEPRECIATION AND CAPITAL STOCK

	(1)	(2)	(3)	(4)
1966/67	.095	.0091	.162	1.281
1967/68	.096	.0094	.154	1.316
1968/69	.095	.0096	.152	1.242
1969/70	.095	.0098	.157	1.224
1970/71	.092	.0098	.154	1.204
1971/72	.088	.0097	.147	1.201
1972/73	.087	.0091	.138	1.194
1973/74	.082	.0082	.135	1.252
1974/75	.074	.0073	.140	1.292
1975/76	.071	.0069	.154	1.330
1976/77	.072	.0067	.168	1.366
1977/78	.067	.0068	.175	1.354
1978/79	.066	.0072	.173	1.263

- (1) Ratio of Depreciation Allowances to Capital Stock at Replacement Values - Non-Farm Trading Unincorporated Enterprises.
- (2) Ratio of Depreciation Allowances to Dwelling Stock at Replacement Values.
- (3) Ratio of Non-Farm Trading Enterprise Capital Stock to Disposable Income.
- (4) Ratio of Housing Stock at replacement prices to Disposable Income.

3. The source of both stock series is the data-base of the N.I.F. model and we are grateful to Pasquali Perazzelli and John O'Leary for providing these series and for helpful discussion over the construction of the series making up the ownership of dwellings account.

Table 3 reveals a tendency for depreciation allowances to fail to keep pace with capital stock values with the onset of inflation at the beginning of the 1970s. Furthermore, the most marked changes do occur from 1974/75 onward, thereby coinciding with the large shift in the consumption ratio. However, if it is assumed that the pre-inflation ratios were applied in the inflationary period, it is found that the adjustment to disposable income is less than 1½%. To illustrate this notice that the increase in depreciation on dwellings would have a maximal value of the order of .3% of the nominal value of dwellings (taking the pre-inflation ratio as .98% and the post-inflation figure as .68% of the dwelling stock). As dwellings have average around 130% of disposable income, this yields a maximal overstatement in disposable income of around .4%. A similar computation for non-farm unincorporated enterprises yields a .52% overstatement. Although figures for the farm capital stock were not available, the magnitude of depreciation allowances for this sector is around that for non-farm unincorporated enterprises and it seems likely therefore that a .5% overstatement of disposable income from this component would also be a maximum.

Hence, on very favourable assumptions, the maximal extent to which income would be overstated by a failure to account properly for depreciation would be of the order of 1.5%, which needs to be compared to the 6% adjustment required. Certainly, it may have been a contributing factor, although even then the maximal effect would not be available until the end of the period, but its magnitude is much too small to be a complete explanation. Nevertheless, the analysis does illustrate some of the difficulties that can arise in interpreting items in the national accounts during periods of inflation.⁴

3. Turnidge

Johnston and Looker (1979) drew attention to the fact that the participation rate of married women and the ratio of female to male wages had

4. It is perhaps worth noting that the maintenance deductions in the household dwelling income accounts have also declined as a percentage of the dwelling stock, and this may be another source of understatement.

displayed a considerable rise over the period in which the consumption ratio had declined. The implication of these features was presumably a growth in the number of two-income families and a redistribution of income towards such households. If the average or marginal propensities of two income households differ from others, such demographic changes are likely to affect the aggregate consumption ratio.

The connection between the magnitudes listed above and the consumption ratio has not yet been formally set out and there are some advantages in doing so. Consider two groups of households, designated 1 and 2, exhibiting different marginal (and hence average) propensities to consume

$$C_1 = \alpha + \beta_1 Y_1 \quad (11)$$

$$C_2 = \alpha + \beta_2 Y_2 \quad (12)$$

Aggregate consumption is available by summing (11) and (12)

$$C = C_1 + C_2 = 2\alpha + \beta_1 Y_1 + \beta_2 Y_2 \quad (13)$$

and the aggregate consumption ratio is therefore

$$\frac{C}{Y} = \frac{2\alpha}{Y} + \beta_1 \frac{Y_1}{Y} + \beta_2 \left(1 - \frac{Y_1}{Y}\right) \quad (14)$$

since

$$Y_2/Y = \frac{Y - Y_1}{Y} = 1 - \frac{Y_1}{Y}.$$

$$\therefore \frac{C}{Y} = 2\alpha/Y + \beta_2 + (\beta_1 - \beta_2) \frac{Y_1}{Y} \quad (15)$$

showing that the consumption ratio varies as the income distribution Y_1/Y varies. Let group 1 be the two-income households, distinguished by working wives, and define

L_F = hours worked by the female labour force

L_M = hours worked by the male labour force

W_F = average hourly wage rate for females

W_M = average hourly wage rate for males

H_F = hours worked by married females in the labour force

H_M = hours worked by married males in the labour force.

Then, by definition, $Y_1 = W_F H_F + W_M H_M$ and $Y = W_F L_F + W_M L_M$.

$$\begin{aligned} \frac{Y_1}{Y} &= \frac{W_F H_F + W_M H_M}{W_F L_F + W_M L_M} \\ &= \frac{W_F H_F / W_M L_M}{\frac{W_F L_F}{W_M L_M} + 1} + \frac{W_M H_M / W_M L_M}{\frac{W_F L_F}{W_M L_M} + 1} \end{aligned} \quad (16)$$

Various assumptions will now be required to obtain an estimating equation similar to Turnidge's. The first two of these are:

- (A1) That $W_M H_M / W_M L_M$ - the share of married men's earnings to total male earnings - is a constant;
- (A2) That $W_F L_F / W_M L_M$ - the ratio of total female to male earnings - is a constant.

Applying assumptions (A1) and (A2) enables income distribution to be expressed as

$$\frac{Y_1}{Y} = \alpha_0 \frac{W_F H_F}{W_M L_M} + \alpha_1 \quad (17)$$

and therefore

$$\frac{C}{Y} = 2\alpha/Y + \beta_2 + (\beta_1 - \beta_2)\alpha_1 + (\beta_1 - \beta_2)\alpha_0 \frac{W_F H_F}{W_M L_M} \quad (18)$$

$$= \alpha'/Y + \gamma' + \beta' \frac{W_F H_F}{W_M L_M} \quad (19)$$

Now the distribution of income between married females and total males

can be further decomposed with the aid of the following identities.

$$W_F H_F \equiv W_F \cdot M_F \cdot AH_F$$

$$W_M L_M \equiv W_M \cdot N_M \cdot AH_M$$

where M_F = the number of employed married females in the labour force

N_M = total number of employed males in the labour force

AH_F = average hours worked by employed married females in the labour force

AH_M = average hours worked by employed males in the labour force.

$$\begin{aligned} \therefore \frac{W_F H_F}{W_M L_M} &= \frac{W_F}{W_M} \cdot \frac{M_F}{N_M} \cdot \frac{AH_F}{AH_M} \\ &= \frac{W_F}{W_M} \cdot \frac{M_F}{N_F} \cdot \frac{N_F}{N_M} \cdot \frac{AH_F}{AH_M} \end{aligned} \quad (20)$$

where N_F = total number of married females.

Two further assumptions will be sufficient to complete the derivation; namely:

(A3) That the total number of married females to the total number of males

N_F/N_M is constant; and

(A4) The average hours worked by married females to males (AH_F/AH_M) is constant.

Application of assumptions (A3) and (A4) to (20) and substitution into (19) gives

$$\frac{C}{Y} = \alpha'_Y + \gamma' + \psi \frac{W_F}{W_M} \cdot \frac{M_F}{N_F}, \quad (21)$$

with the principal regressor in (21) being recognised as the product of a married women participation rate (M_F/N_F) and the relative earnings of females to males. Ignoring the differences that (i) the participation rate in (21) relates to employed married women, and (ii) that it is relative earnings rather than relative award wage rates that is important, (21) encompasses the form of consumption function estimated by Turnidge and used by him to argue for the importance of two-income families as an explanation of changes in the consumption

ratio. Our development above demonstrates a possible derivation of his equation but also draws attention to a number of assumptions required for his income distribution variable to enter linearly into a consumption-income relationship. Some of these assumptions - for example (A3) - do not seem unreasonable but others are more suspect, although the paucity of data at present precludes any definite conclusion on their validity.

Turnidge therefore estimates a version of (21) of the following form from quarterly data

$$\frac{C}{Y} = b_0 + b_1 S_2 + b_2 S_3 + b_3 S_4 + b_4 \dot{p} + b_5 \frac{W_F}{W_M} \cdot \frac{M_F}{N_F} + b_6 \frac{\Delta Y}{Y} + b_7 \left(\frac{C}{Y}\right)_{-1}, \quad (22)$$

where the S_j are seasonal dummies and $\dot{p}$ is a measure of expectations concerning the rate of inflation. This latter measure was not readily available but, using the actual rate of inflation of the consumption deflator as a proxy, (22) was fitted⁵ over the period 1966(3) to 1978(2) with the following result:

$$\begin{aligned} \frac{C}{Y} = & .1248 + .1560 S_2 + .1137 S_3 + .1570 S_4 - .4193 \dot{p} - .0705 \frac{W_F}{W_M} \cdot \frac{M_F}{N_F} \\ & (2.49) \quad (23.88) \quad (8.41) \quad (11.97) \quad (2.92) \quad (2.43) \\ & -.8275 \frac{\Delta Y}{Y} + .7726 (C/Y)_{-1} \\ & (20.05) \quad (15.49) \end{aligned} \quad (23)$$

$$R^2 = .991, \quad D.W. = 2.47$$

Comparison of (23) with Table C of Turnidge indicates similar coefficients (his estimate of b_7 is a misprint) and the significant coefficient on the income distribution variable illustrates Turnidge's contention that the two-income family effect is an important one. Turnidge does not rest his case upon this regression, however, since he observes that there is some serial correlation present and he proceeds to develop a different form of the lagged response of

5. $\dot{p}$ is the quarterly rate of inflation. Turnidge uses a yearly rate of inflation so that the coefficient $-.4193$ needs to be divided by 4 to yield $-.1048$ which is to be compared to his coefficient of $-.0899$

consumption to income. Nevertheless, it is worth noting that there are two other features of (23) that make it an unsatisfactory relationship. Firstly, the model has a very peculiar short-run marginal propensity to consume (m.p.c.). Ignoring all lagged variables (23) could be written as

$$C_t = .1248Y_t + .1560S_2.Y_t + .1137S_3.Y_t + .1570S_4.Y_t - .8275\Delta Y_t + \dots$$

which shows that the short-run m.p.c.'s for each quarter are *negative*. This is a very odd result and one that has never been observed before in Australian research on consumption functions. Secondly, the 't' statistics for the autocorrelation function of the residuals from (24) (corrected for the presence of a lagged dependent variable) are:

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
2.01	.03	.83	2.56	1.47	1.20	1.42	.52

revealing substantial fourth order serial correlation as well as the first order that Turnidge draws attention to. Both of these facts must cast some doubt upon Turnidge's findings and we will turn to an explanation of them in Section 5 of this paper.

4. A FIRST LOOK AT WEALTH ADJUSTMENTS TO THE CONSUMPTION RATIO

In this section an attempt is made to make some adjustments to the consumption income ratio similar to those in Table 2. There, only the losses on liquid assets were encompassed. This was a somewhat blinkered view as inflation does provide a potential for capital gains from either an appreciation in the real value of some assets or reduction in the real value of liabilities. Because interest payments upon these liabilities are already deducted from receipts in forming disposable income, a failure to make some sort of adjustment can have a distorting effect, unless it is maintained that households are not aware of the effect of inflation upon the real value of their liabilities.

The balance sheet of the household sector has the following structure.

TABLE 4
BALANCE SHEET STRUCTURE OF THE HOUSEHOLD SECTOR

ASSETS	LIABILITIES
(i) Notes and Coin	(xi) Advances from the Banking System
(ii) Bank Deposits	(xii) Advances from Other Financial Institutions
(iii) Deposits with Other Financial Institutions	
(iv) Government Securities	
(v) Debentures, Notes and Deposits	
(vi) Equities	
(vii) Dwellings	
(viii) Consumer Durables	
(ix) Land	
(x) Other Assets	

The principal source of information to construct the financial variables in the balance sheet above is the flow of funds statistics. In the case of equities a valuation was obtained directly by dividing the dividend receipts of households in the national accounts by an average dividend yield. A complete description of the methodology employed in constructing the data is provided in the appendix to this paper.

After accounting for the financial assets attention must be paid to the real assets - consumer durables, land, dwellings and the capital stock of unincorporated enterprises (which form part of the household sector). As consumer durables have been treated as consumption, consistency requires that these be excluded from net wealth, but it is doubtful if real capital gains would have been available upon them over the period. A similar situation exists for dwellings. The implicit price deflator for dwellings over the period 1966/7 to 1978/9 rose by 189% whereas the consumption deflator rose by 171% and, although this is a flow price for dwellings, it might

be expected to bear some relation to the stock price. There was some variation in the respective rates of change of these deflators from year to year, but it might well be asked if households would expect that the price of dwellings would consistently rise faster than the general price index; if not, households would be unlikely to treat temporary, real capital gains as a source of income.

Land represents a difficult asset to obtain valuations upon, although casual evidence suggests that the price of land has almost certainly risen faster than the consumption deflator, and that this could be a source of real capital gain. Parkin *et al.* have updated Scott's (1969) series on the value of land to 1972. It is of interest to note that, between 1966(4) and 1972(4), the value of land to disposable income was around .89 whilst the annual rate of inflation of the value of land over this period was around 12%; at the same time the consumption deflator rose at an annual rate of 4.25%, yielding a real capital gain of around 8% per annum. Obviously this represents a sizeable increase in income each year and some justification must be given for ignoring it. Our argument for doing so derives from the fact that we are interested in a *relative* comparison of the years 1966/7 to 1972/3 with those following. Thus, to a first approximation, and assuming that the value of land to income ratio has remained fairly stable from 1972-3 to 1978-9, the issue is whether the real capital gains in land since 1972-3 exceed those prior to 1972-3. The question, therefore, is whether the value of land has risen faster than 20% p.a. Although it is hoped to present a more detailed analysis in a later paper, it would seem that this is unlikely or, even if it were true, that the difference would not be very great (at 20% per annum the value of land would have trebled since 1972/3). A similar argument applies for the capital stock of unincorporated enterprises.

With the above arguments as justification, net wealth for the household sector is defined as financial net worth. Table 5 presents the ratio of selected assets and liabilities to disposable income over the period 1966/7 to 1978/9.

TABLE 5
RATIO OF SELECTED ASSETS AND LIABILITIES TO DISPOSABLE INCOME

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1966/67	.056	.576	.100	.125	.382	.452	.787
1967/68	.057	.604	.100	.130	.406	.496	.800
1968/69	.055	.580	.089	.126	.399	.501	.748
1969/70	.056	.575	.084	.132	.406	.516	.736
1970/71	.056	.555	.079	.135	.401	.505	.721
1971/72	.055	.549	.075	.135	.399	.498	.715
1972/73	.053	.563	.067	.140	.385	.512	.697
1973/74	.052	.547	.055	.137	.350	.511	.631
1974/75	.050	.517	.045	.133	.314	.490	.570
1975/76	.051	.522	.051	.146	.300	.496	.575
1976/77	.052	.530	.061	.154	.296	.514	.578
1977/78	.052	.539	.067	.159	.300	.531	.586
1978/79	.052	.540	.071	.158	.299	.530	.590

- (1) Notes and Coin in the hands of the Public.
- (2) Deposits with Major Trading Banks, Savings Banks, Permanent Building Societies and Credit Co-operatives.
- (3) Government Securities.
- (4) Debentures, Notes and Deposits.
- (5) Reserves of Life Insurance Offices and Public and Private Pension Funds.
- (6) Net Advances to the Household Sector.
- (7) Net Financial Wealth (non-equity) = (1)+(2)+(3)+(4)+(5)-(6).

Source: Appendix

Table 5 reveals that there has been a substantial reduction in the total percentage of disposable income held in financial assets in the 1970s - principally through a failure of the reserves of life offices and funds to increase - and a rise in the percentage of income going to liabilities. Overall, the ratio of net financial worth to income fell; a reaction to inflation that is perhaps expected even though it is not entirely clear what portfolio substitutions took place. Table 2 showed a substantial rise in the value of dwellings relative to income but a more detailed examination of the portfolio behaviour of the household sector is best left to a later paper; for the moment

it is the net worth position that is of interest.

Perhaps the most striking feature of Table 5 is the fact that, at the end of the period, the net worth position was almost identical to liquid assets. Thus the analysis underlying Table 2, which utilized a value of net worth to disposable income of around .6, is close to what would be required even though it was argued in terms of capital losses on liquid assets. Constancy of many of the ratios also means that more accurate computation is not likely to cause any marked changes in the numerical exercises in the remainder of this paper.

Arduous the process may have been but, with the aid of Table 5, the stage is now set for the adjustment of the consumption ratio to allow for any capital losses and gains induced by inflation. That is, instead of the traditional consumption ratio we consider C/Y^* where $Y^* = Y - \dot{p}W$ and W is real net wealth. The relationship of this adjusted ratio to the conventional one is given by

$$C/Y^* = \frac{C}{Y - \dot{p}W} = \frac{C/Y}{1 - \dot{p}W/Y} = \frac{C/Y}{1 - \dot{p}\phi} \quad (24)$$

showing that the adjusted ratio involves division of the traditional ratio by $1 - \dot{p}\phi$, where $\dot{p}$ is the rate of inflation and ϕ is the net wealth to disposable income ratio. As was observed earlier in connection with Table 2, however, years such as 1973/4 and 1978/9, which were characterized by a rapid expansion of farm incomes, frequently see a reduction in the consumption ratio. In Statement No 2 an attempt is made to correct for this by a different measure of disposable income. This latter aggregate is constructed as household disposable income less farm income plus income tax paid by other individuals and is adopted below in computations to gain comparability with Table 2 of Statement No. 2. To be consistent with this new definition of income, the net worth to income ratios need to be modified so that they differ from those of Table 5.

Table 6 contains the computations for the adjusted consumption ratio. The first line records the traditional Treasury ratio (Table 2, Statement No. 2, 1980 Budget Papers) while the rate of inflation ($\dot{p}$) is measured by the consumption deflator.

TABLE 6
'NON-FARM' CONSUMPTION RATIOS*

	1966/7- 1972/3	1973/4	1974/5	1975/6	1976/7	1977/8	1978/9	1979/80
TREAS.	.910	.876	.840	.847	.853	.855	.873	.889
ϕ	.753	.696	.611	.605	.611	.620	.647	.602
$\dot{p}$	.050	.121	.176	.156	.115	.094	.090	.097
$1 - \phi\dot{p}$	.963	.916	.892	.906	.930	.942	.942	.942
ADJ. RATIO	.945	.957	.941	.935	.917	.908	.927	.944

* The 1979/80 figures assume that ϕ in Table 5 is the same as for 1978/9.

There are some interesting contrasts between the traditional and adjusted ratios. Firstly, by 1979/80 the difference between the beginning and end ratios was almost zero compared to 2.1 percentage points for the traditional one, indicating that the 'scope for consumption to grow more strongly than real disposable income' is much smaller than expected.

Secondly, the pattern of variation in the adjusted ratio is quite different from the original with the adjusted consumption ratio showing little difference in the years 1973/4 to 1974/5 to that in the period 1966/7 to 1972/3; the major decline in the adjusted consumption ratio occurring between 1976/7 and 1977/8.

Table 6 has recorded the consumption ratio adjusted for capital losses sustained upon net financial (non-equity) wealth. Because it might be expected that some of these losses would be reflected in capital gains upon equity held by households, it is appropriate to re-compute Table 6 with equities included in financial wealth. Denoting the increase in equity prices by $g_t E_{t-1}$, equation (7) indicates that income would be augmented by the term $(g_t - \dot{p}_t)E_{t-1}$, where E_{t-1} represents the value of equity at the end of (t-1). Therefore, the consumption ratio adjusted for both the capital losses on non-equity financial assets and the real capital gain on equity is given by

$$\frac{C}{Y^*} = \frac{C/Y}{1 - \dot{p}\phi + \phi_1(g-\dot{p})}$$

where ϕ_1 is the equity to disposable income ratio. This modified ratio is presented in Table 7.

TABLE 7
NON-FARM CONSUMPTION RATIO (WITH EQUITY ADJUSTMENT)

	1966/7- 1972/3	1973/4	1974/5	1975/6	1976/7	1977/8	1978/9
TREAS	.910	.876	.840	.847	.853	.855	.873
ϕ_1	.412	.347	.216	.172	.175	.173	.184
g	.112	-.287	-.309	.455	-.020	.066	.177
$1-\dot{p}\phi+\phi_1(g-\dot{p})$	.988	.774	.787	.957	.906	.937	.958
ADJ. RATIO	.921	1.132	1.067	.885	.941	.912	.912

This adjusted ratio is considerably more variable than that of Table 6; the variability being an outcome chiefly of the very erratic performance of equity prices in the 1970s. Theoretically equities are a hedge against inflation, that is $g = \dot{p}$, and under this view they may not appear in the computation of adjusted income. If they are to appear it would be likely that short-run fluctuations such as 1974/5 would be smoothed. Nevertheless, it is apparent that the adjusted ratio at the end of the period is quite close to that which occurs in 1966/7 to 1972/3 and this provides support for the conclusions drawn from Table 6.

5. SOME ECONOMETRIC EVIDENCE ON INFLATION INDUCED WEALTH EFFECTS

Table 6, while demonstrating the consequences of adopting an adjusted definition of income for the consumption ratio, does not allow discrimination between our main proposition concerning the effects of capital gains and losses and other views which emphasize (say) two-income family effects. Furthermore,

it is unlikely that a completely stable ratio would be observed as it is well-known that consumption growth lags behind income growth and, with durables included in the definition of consumption, this lag may be quite lengthy. Therefore it is necessary to explicitly model consumption behaviour.

Because of our interest in two-income family effects as a competing view, the analysis can usefully begin with (23). The rationale for such an equation is documented in Turnidge and Freebairn (1976) and derives from the consumption function

$$C = b_0 Y + b_1 S_2 Y + b_2 S_3 Y + b_3 S_4 Y + b_4 \dot{p} Y + b_5 \delta Y + b_6 \Delta Y + b_7 C_{-1} \quad (25)$$

where δ is the product of the participation rate and relative wage rates.

Division of (25) by Y gives

$$\frac{C}{Y} = b_0 + b_1 S_2 + b_2 S_3 + b_3 S_4 + b_4 \dot{p} + b_5 \delta + b_6 \frac{\Delta Y}{Y} + b_7 \frac{C_{-1}}{Y} \quad (26)$$

which differs from (23) only in the variable C_{-1}/Y appearing in place of C_{-1}/Y_{-1} . On this substitution Turnidge comments: "... although lags were captured via a lagged dependent variable $(C/Y)_{-1}$ instead of C_{-1}/Y as per the specification for purposes of simplicity" (p.13).

Examining (25) it is apparent that the underlying consumption function in Turnidge's paper exhibits a seasonally varying marginal propensity to consume. This is sensible as the consumption ratios exhibit a distinct seasonal pattern. However, it is pertinent to ask why the slope of the consumption function in (25) is assumed to vary with the season, but there is no intercept at all; as there is no good reason for such a strong prior specification in our work, (25) is assumed to include a seasonally varying intercept term of the form $\gamma_0 + \gamma_1 S_2 + \gamma_2 S_3 + \gamma_3 S_4$. This implies that (26) would include the variables $1/Y, S_2/Y, S_3/Y, S_4/Y$. Generally, two or more of these variables are significant in our regressions but, to keep the presentation simple, no details are given on them until our final regression.

Our first step is to re-estimate (23) but with C_{-1}/Y replacing C_{-1}/Y_{-1}

as it has already been observed that there are serious deficiencies in the economics of the estimated consumption function underlying (23). Doing so yields

$$\begin{aligned}
 C/Y = & .1458 + .1545S_2 + .0966S_3 + .1168S_4 + .7989C_{-1}/Y - .1480\Delta Y/Y \\
 & (3.66) \quad (10.72) \quad (5.99) \quad (6.95) \quad (17.25) \quad (4.00) \\
 & - .7073\dot{p}_t - .0745\delta \\
 & (13.78) \quad (1.55)
 \end{aligned} \tag{27}$$

$$R^2 = .995, \quad D.W. = 1.88, \quad D_4 = 1.85, \quad LMN = 1.55, \quad LMH = .002$$

Corr. a.c.f. 't'	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
	.17	.82	.00	.15	.69	1.76	.26	2.37

There are a number of auxiliary statistics above that may not be familiar. D_4 is a test for fourth order serial correlation in the disturbances due to Wallis (1972); LMN is a test statistic for normality of the disturbances developed by Jarque and Bera (1980) and is to be referred to a $\chi^2(2)$; LMH is a test statistic, based upon the Lagrange Multiplier principle, for heteroscedasticity used in Pagan, Hall and Trivedi (1981); the corrected a.c.f. 't' values are equivalent to Durbin's (1970) 'second method' for adjusting serial correlation coefficients in the presence of a lagged dependent variable, being computed as set out in Breusch and Pagan (1980, p.244)⁶ and it is to be treated as a standard normal deviate.

The change in regressor from $(C/Y)_{-1}$ to the correct C_{-1}/Y has had striking effects - gone is any of the strong first and fourth order serial correlation exhibited by (23); the implied lag distribution is now quite realistic owing to the shrinkage of the coefficient of $\Delta Y/Y$ from $-.8979$ to $-.1480$; the inflation rate has become highly significant and the 'two-income family' effect has become insignificant.⁷ Perhaps these last two features

6. Although a typographical error there has been Nr , instead of Nr_{-1} . Note also that we use the absolute value of the 't' statistics.

7. The changes were caused by this modification and not the introduction of the regressors $1/Y$, S_2/Y , S_3/Y , S_4/Y .

should be treated with caution owing to some possible high order serial correlation, but it is quite clear that Turnidge's simplification has had a marked bearing upon his conclusions.

From (27) the rate of inflation is an important determinant of the consumption ratio. Because the net wealth to income ratio has remained fairly constant over time, the algebra of 3.2 indicates that the inflation variable may well be capturing the effects of capital losses upon income. To investigate this the rate of inflation is replaced by a variable $\dot{p}\phi$. This variable is the quarterly analogue of the adjustment performed in Table 6 and measures the capital losses inflicted by inflation upon the net worth position of households as a fraction of household disposable income.⁸ A legitimate query is why $\dot{p}\phi$ is added as a regressor to a basic consumption function and not deducted from disposable income as was done in Table 6. On statistical grounds such a strategy was inferior, and it might be expected to be so on a quarterly basis for the following reasons.⁹ Firstly, the distributed lag between changes in Y and $\dot{p}\phi$ may be different, although the changes after a period such as a year may be the same. Secondly, the net wealth capital losses are based on interpolation of some annual stock figures and this may not give a completely true picture of the quarterly losses.

One further modification to (27) is needed. If all households possessed the same consumption function

$$C_i = \alpha + \beta Y_i,$$

the aggregate relation would be

$$C = \sum_{i=1}^N C_i = N\alpha + \beta \sum_{i=1}^N Y_i = N\alpha + \beta Y$$

-
8. Some assets and liabilities needed to form net worth were not available quarterly and were therefore linearly interpolated. The rate of inflation was measured as the quarterly rate of change of the consumption deflator.
 9. In fact, although the matter is too complex to deal with now, such a distinction would be appropriate for a consumption function derived from a life-cycle model.

and so the intercept term would vary with the number of households. When converted to a consumption ratio

$$\frac{C}{Y} = \frac{N}{Y} \cdot \alpha + \beta$$

it is seen that an appropriate adjustment to (27) would require that the intercept terms $1/Y$, $S2/Y$, $S3/Y$, $S4/Y$ be multiplied by the number of households. As an attempt to correct for this effect, N was taken to be the population of Australia and a quarterly series constructed by Alan Hall (1981) was utilized.

After the above adjustments (27) was estimated over the period 1966(3) to 1978(4).

$$\begin{aligned} \frac{C}{Y} = & .0927 + .1710S2 + .0983S3 + .0865S4 + .8459C_{-1}/Y - .1528\Delta Y/Y \\ & (1.83) \quad (7.65) \quad (4.09) \quad (3.55) \quad (12.91) \quad (3.94) \\ & - .1869\dot{p}\phi - .0668\delta - .0309N/Y + .0309 \frac{S3.N}{Y} + .0684 \frac{S4.N}{Y} \\ & (3.55) \quad (1.06) \quad (.94) \quad (2.03) \quad (4.03) \\ & + .0133 \frac{S1.N}{Y} \end{aligned} \quad (28)$$

(.94)

$$R^2 = .995, D.W. = 2.30, D4 = 1.55, LMN = 6.18, LMH = .105$$

Corr.a.c.f.	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
	1.28	.35	.67	1.34	.14	.36	.80	1.10

The specification in (28) provides a good fit to the data and there is no evidence of any serial correlation in the disturbances; as a check on this proposition (28) was estimated allowing for both first and fourth order serial correlation, but neither coefficient was significantly different from zero. For our purposes the item of most interest in (28) is that the term reflecting the effect of the net capital losses induced by inflation ($\dot{p}\phi$) has a highly significant coefficient and is of the correct sign. As $\phi \approx 2.4$ on a quarterly basis, the size of the coefficient of $\dot{p}\phi$ reveals that, *if there was no change in the interest rate or real net wealth*, a rise in the inflation rate by $1\frac{1}{2}$ percentage points *per quarter* would lead to an initial reduction in the consumption ratio of .71 percentage points and to a final reduction of

4.67 percentage points. However, as it is unrealistic to expect that interest rates would not change, the impact of inflation upon the consumption ratio cannot be gauged directly from (28); a point that we will return to in the next section. A further interesting point can be made about the magnitude of the coefficients. Ignoring the term C_{-1}/Y the 'yearly' m.p.c. obtained by increasing income by one unit for four quarters would be $\frac{1}{4}[4 \times .0927 + .1710 + .0983 - .0865] = .1817$ which is almost identical to the coefficient of $-\dot{p}\phi$ upon the capital loss term $\dot{p}\phi$. It is in this sense that the result observed in 3.1 that the coefficient on the income term would be equal and opposite in sign to that on $\dot{p}\phi$ holds.

As mentioned in the introduction there are some questions of stability to be resolved. Here it is necessary to make a distinction between the stability of the coefficient attached to the capital loss term ($\dot{p}\phi$) and the overall stability of (28). Provided (28) is taken as an accurate specification of the consumption function, the distinction is between the stability of a single effect upon the consumption ratio and the stability of the overall relationship. Fig. 1 presents the recursive least squares estimates of the coefficient of $\dot{p}\phi$ over the complete period; considerable stability is in evidence, particularly from 1971(2) onward. Certainly it would be inaccurate to conclude along with Hughes that the impact of inflation is "neither precise nor tight". Furthermore, since ϕ is fairly constant over time, a constant rate of inflation (as pre-1971) would mean that the regressor $\dot{p}\phi$ would be fairly constant and correlated with the constant term, making it hard to distinguish the relative contributions of the intercept and capital loss variables.

Fig. 2 gives the cusums squared statistic of Brown, Durbin and Evans (1975). Because of the presence of a lagged dependent variable in (28) it seems likely that the period 1974/5, during which the statistic came very close to indicating instability, was one in which some part of the consumption relation shifted. Closer examination of the recursive estimates of the

coefficients of (28) shows that the instability was in the coefficients of $S2/Y$, $S3/Y$, $S4/Y$; that is, in the average rather than marginal propensity to consume, which agrees with Hughes's assertion (1980, fn. p 161). Generally the issue of whether the overall function is stable or not is much more clouded than that concerning the stability of inflation effects alone.

One final exercise was conducted. Equation (28) was used to forecast the consumption ratio for 1978-9 (conditional upon knowledge of the right-hand variables). The forecast errors and the absolute value of their associated 't' statistics - computed as in Salkever (1976) - were 0.0048 (.67), -.0056 (.80), .0131 (1.76) and -.0227 (2.99). The most interesting of these errors is that for 1979(2); the equation yields a large over-prediction of the consumption ratio. Revisions to the national accounts since the March quarter of 1980 - upon which our data is based - have revised the consumption ratio upward by about a third of the prediction error. Moreover, as this was a year in which the consumption ratio fell due to a rapid rise in farm incomes, it would seem more appropriate to use a 'non-farm' consumption ratio as the dependent variable in (28). Because this would have meant losing comparability with Turnidge's paper it was not done, but it will be pursued at a later date.

6. CONCLUDING COMMENTS AND IMPLICATIONS

Throughout the paper our attention has been focussed upon the connection between inflation and the *consumption ratio*. Our argument has revolved around the fact that a failure to account properly for inflation overstates household disposable income and leads to a consequent fall in the consumption ratio; this being true even if inflation had a completely neutral impact upon consumption itself. To see this point most clearly assume that there are no taxes, that all assets and liabilities bear the same interest rate (r) and that the rate of interest is identical to the rate of inflation. Then real adjusted income

is $Y_t^* = N_t + rW_{t-1} - pW_{t-1} = N_t$ where N_t is real non-interest income. Allied with the hypothesis that $C_t = \alpha Y_t^*$, inflation in such a world would be neutral in its impact upon consumption. However, the conventional consumption ratio $(C_t/Y_t) = \alpha Y_t^*/Y_t = \alpha (N_t + rW_{t-1})^{-1} N_t$ must register a decline owing to the erroneous inclusion of the interest receipts rW_{t-1} in the denominator. Relaxing these assumptions does not change the result. If DN_t is real non-interest income after tax and t is the tax rate on interest receipts,

$$\frac{C_t}{Y_t} = \alpha \left[1 - \frac{(\dot{p}/r)}{\frac{W_{t-1}}{DN_t} \cdot \frac{.1}{r} + (1-t)} \right].$$

Thus the impact of any inflation upon the measured consumption ratio depends upon the response of interest rates to changes in the rate of inflation as well as the tax rate on interest receipts. It is this observation which justifies the previous statement concerning the invalidity of any inferences made directly from a regression equation such as (28); it is not possible to decide on the effect of inflation from a coefficient attached to the rate of inflation term as the cet-par assumption underlying such a strategy is seriously deficient.

Two conclusions follow at this stage from the above analysis.

1. The consumption ratio as currently measured does not provide a good indicator of the extent to which inflation modifies consumption behaviour. At the very least some adjustment needs to be made to eliminate those rises in interest receipts and payments that are simply a product of a higher inflation rate. Notice that inflation generally leads to a net rise in interest receipts as households are, in the aggregate, net lenders.
2. As the utility of the consumption ratio is diminished because of the mis-measurement of income in the face of inflation, there is a clear need to consider whether adjustments should not be made to the national accounts to more adequately account for inflation. There might be a number of objections

to doing so but, just as corporations have found it useful to present two sets of accounts, there is a good case for providing any information that enables users to perform an inflation adjustment. It might be objected that these adjustments are hypothetical, not reflecting any actual cash flows, but there are two counter arguments to this. Firstly, even at present quite a significant proportion of income is imputed. Secondly, a failure to make any adjustments can be quite misleading for a policy analysis that compares periods exhibiting very different inflation rates, and our judgement is that the debate over the consumption ratio illustrates this well. Certainly something needs to be done to ensure that the national accounts do not present a misleading picture of what is actually occurring with the principal aggregates in the face of sustained inflation.

The above deals with inflation and the consumption ratio. Presumably however, the question that investigators were trying to answer was whether inflation had a non-neutral impact upon consumption. It has emerged that this is not necessarily revealed by examining the relation between inflation and the conventional consumption ratio; they will most likely be correlated regardless of the neutrality of inflation.¹⁰ A better way to examine this question is to explore the neutrality of inflation upon real adjusted income Y_t^* ; certainly this does not directly provide an answer to the fundamental question but it removes one source of spurious correlation.

Proceeding in this fashion $Y_t^* = N_t + (1-t)rW_{t-1} - pW_{t-1}$. Assuming that N_t is invariant to the rate of inflation, it is clear that a rise in the rate of inflation will reduce real adjusted income Y_t^* unless $r = \dot{p}/(1-t)$.¹¹ A study of this formula reveals that there are three ways in which adjusted

10. Not necessarily negatively however. It is conceivable that the real capital gains on assets are such that real adjusted income rises with inflation.

11. It will be convenient in this analysis to regard any capital gains as forming part of the rate of return r .

income could vary with the inflation rate. Firstly, even if the tax rate on interest receipts was zero, rates of return may not rise with the rate of inflation or, if they do, may do so only slowly. Secondly, even if the "Fisher" effect operated, the taxation of nominal interest receipts will reduce adjusted income. It is hard to know how large such an effect is since many assets may be nominally held by taxpayers with low marginal rates and there is evidence of tax evasion in this respect. Finally, some assets actually earn no interest - cash and demand deposits - and others such as savings bank deposits, which seem in the main transactions balances, also bear a rate of interest far below the rate of inflation. These holdings are not insignificant; in 1978/9 the ratio of cash plus demand deposits to disposable income is around .1, so that at an inflation rate of 10 per cent there is a yearly capital loss of 1 per cent of disposable income.

By a consideration of the ways in which adjusted income varies with inflation we are led to the following implications and recommendations.

1. The scope for consumption growth has been overstated by an exclusive concentration upon the conventional consumption ratio. Table 6 reveals little scope for expansion of real consumption except through growth in real incomes; otherwise, households would be consuming their real wealth. Although such over-consumption may occur for some time it is unlikely to be sustainable in the longer term. Of course, most of this analysis is predicated upon the fact that real capital gains are not made upon housing. To the extent to which this is not true in the future there will be scope for expanded consumption. In the US, for example, Downs (1980) has argued that households exhibited very low savings ratios as the capital gains on housing enabled them to maintain their real wealth while consuming almost all their flow of income.¹²

12. See also the article 'Soaring Housing Values Help Consumers to Thwart Economists', *The Australian Financial Review*, Wednesday April 1st, 1981.

2. As the formula for adjusted income illustrates taxation of all interest receipts (not imputed) causes households to sustain a net wealth loss when interest rates rise to reflect inflation. Such a tax is therefore a real wealth rather than income tax and, given that the rate of inflation is likely to remain high for the next few years, some consideration should be given to following other tax systems - for example, Canada - in which part of interest receipts are tax exempt.

3. The "inflation first" strategy, to the extent to which it relies upon the observed correlation of consumption ratio and inflation as symptomatic of the effects of inflation upon demand, has dubious underpinnings. Consumption demand does not seem to have been much below what would have been expected over the period 1973/4 to 1978/9, and it is the false expectations raised by an over-statement of income that produces the idea that consumption should have grown faster.

4. The net effect of inflation upon consumption is a complex one. In an era of greater flexibility of interest rates it might be supposed that, provided only the "real rate of interest" is taxable, a rise in the inflation rate would only have a small effect upon consumption (through the existence of assets with zero interest rates).

5. The idea of a re-definition of income for the purposes of assessing the movements in consumption is of wider applicability. Many social service benefits are subject to a means test upon income and this income may well be artificially inflated by the presence of inflation. A failure to define income correctly may mean that beneficiaries have their payments reduced and are thereby forced to consume what real wealth they possess. A proper definition of income would avoid this problem.

FIGURE 1
RECURSIVE ESTIMATES ON COEFF. OF $\dot{p}\phi$

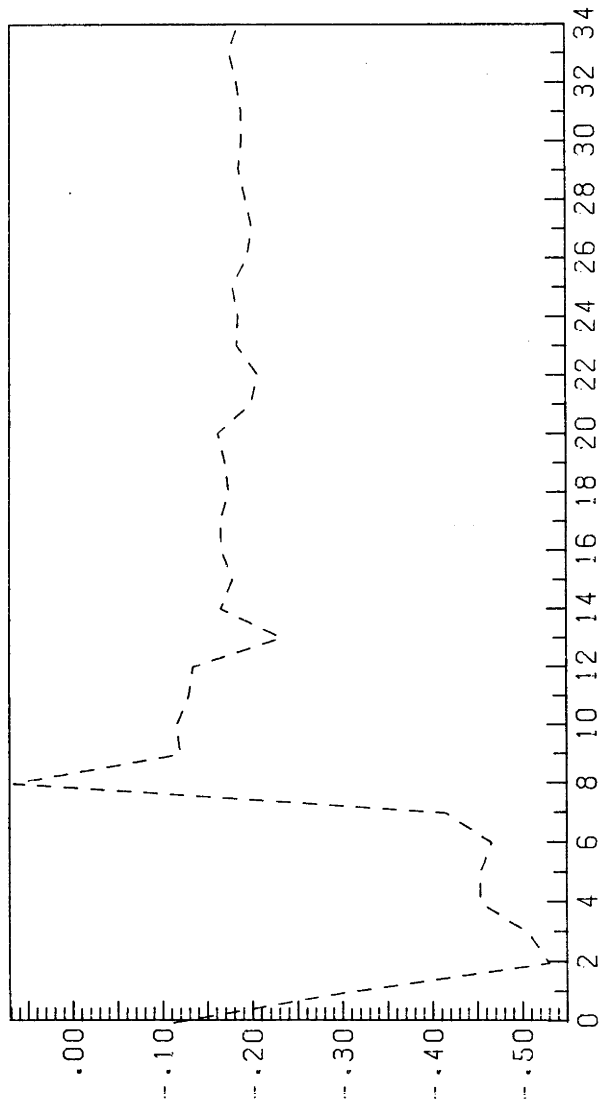
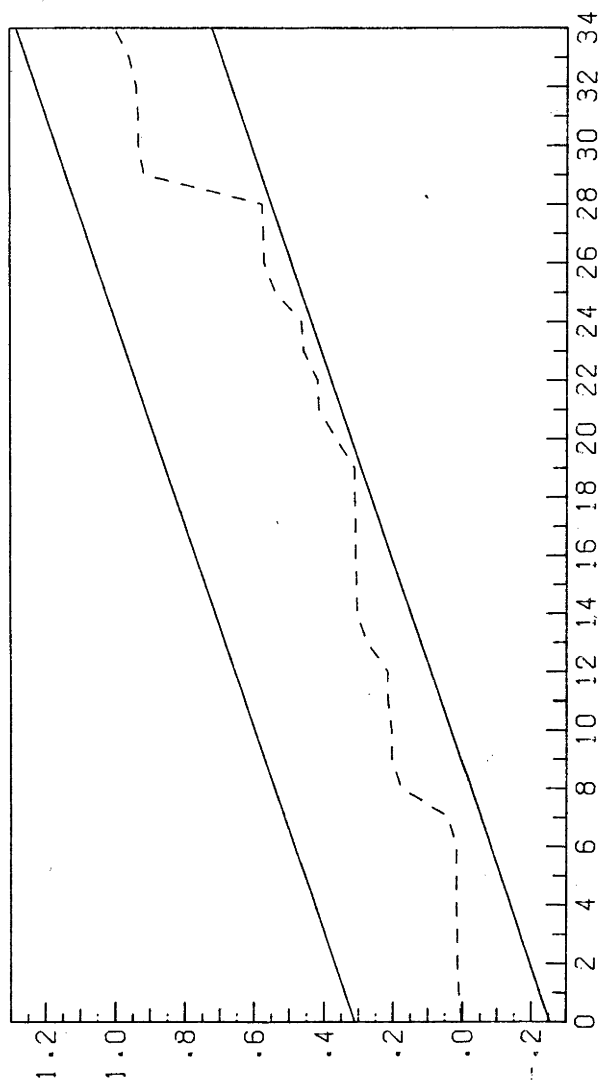


FIGURE 2
CUSUMS SQUARED FOR EQUATION 28



APPENDIX

Data Sources and Construction

This appendix describes the sources of the data used in the paper and the construction of some series not available directly from official sources. The following abbreviations are used throughout.

SB - *Reserve Bank of Australia Statistics Bulletin*

FF - *Reserve Bank of Australia Financial Flow of Funds Supplement*

ABS - *Australian Bureau of Statistics*

CS - *Reserve Bank of Australia Company Supplement*

1. Consumption, Disposable Income, Consumption Deflator

These were obtained from *Quarterly Estimates of National Income and Expenditure* (ABS 5206.0), March 1980.

2. Notes and Coin (Source: SB)

Household holding of notes and coin is taken to be Notes and Coin in the hands of the Public. This is therefore an overstatement but it would not appear to be a large source of error.

3. Trading Bank Deposits (Source: SB)

The semi-annual series providing a breakdown of Trading Bank Deposits into those held by persons and companies was used. Household holdings were defined as the sum of personal and non-company business holdings. The series was then linearly interpolated to yield quarterly values.

4. Savings Bank, Building Society and Credit Co-operative Deposits (Source: SB and Credit Unions, Australia 1979-80. ABS 5618.0)

The total deposits of these institutions were attributed to the household sector.

5. Government Securities

Commonwealth Government securities held by households were assumed to be Special/Savings Bonds. For local and semi-government authorities a base figure for 30 June 1965 was constructed. Thereafter, this figure is updated using the

'Acquisition of Local and Semi-Government Securities' series published in the FF (May 1980 and January 1979). A base figure of \$902.5m was obtained from an estimate of household holdings of Local and Semi-Government securities at June 1965 constructed as follows:

(i)	Total Public Loans (Local and Semi-Government)	\$3318.5m
	Less	
(ii)	RBA Holdings	\$ 2.0 m
	Other Banks	\$1092m
	Life Offices	\$302m
	Public and Private Pension Funds	\$929m
	Non-Life Offices	\$80m
	Building Societies	<u>\$11m</u>
		<u>\$ 2416.0 m</u>

giving \$902.5m as household holdings at 30 June 1965. The source for (i) is 'Local Authorities and Public Corporations: Debt 1970-71', ABS 5507, while that for (ii) is the Balance Sheets of FF (July 1976). Note that it is assumed that the rest of world holdings of local and semi-government authority issues is zero.

6. Debentures, Notes and Deposits (DND)

A similar strategy was followed here as for government securities. Define

- (i) DND issued by Life Offices and Pension Funds
- (ii) DND issued by other financial groups
- (iii) DND issued by State and Local governments
- (iv) DND issued by Corporate Trading Enterprises
- (v) DND held by Banks (other than RBA)
- (vi) DND held by Life Offices and Pension Funds
- (vii) DND held by other financial groups
- (viii) DND held by Commonwealth Government
- (ix) DND held by State and Local Governments

- (x) DND held by Corporate Trading Enterprises
- (xi) DND held by Rest of World.

Then household holdings of DND are available as a residual from

$$[(i)+(ii)+(iii)+(iv)] - [(v)+(vi)+(vii)+(viii)+(ix)+(x)+(xi)]$$

Stock figures for June 1965 for each of these components was obtained in the following way.

- (i) FF Balance Sheet Data
- (ii) FF Balance Sheet Data
- (iii) These were deposits for pension funds and for 1965 were about \$4m.
This was therefore subtracted from Pension Funds' Holdings of DND.
- (iv) CS, Nov. 1971. In 1965 the coverage was about 50% of companies (information supplied by Peter Winglee of the RBA) and the statistics given in the supplement were therefore doubled.
- (v) No statistics were available on this and it was assumed that the stock was the cumulated flows from 1953-4 to 1964-5 = \$130m.
- (vi) FF Balance Sheet Data.
- (vii) FF Balance Sheet Data.
- (viii) No stock figures could be obtained. Flows in the FF are small and holdings are assumed to be the cumulated flows from 1953-4 to 1964-5 (= \$5m.)
- (ix) As for (viii) (= \$86m.)
- (x) The CS gives a category 'Other investments' which includes DNDs. For 1965 the RBA used a figure of 61% of this category as representing DNDs (information supplied by Peter Winglee of the RBA). As coverage of companies was 50%, the value of 'other investments' is multiplied by (2 x .61) to obtain a stock figure of \$262.18m.
- (xi) The publication *Overseas Investment* (ABS 5.20) gives a figure for "total paid up value of shares, debentures, unsecured notes and other obligations of Australian Companies held by overseas companies or individuals". For June 1965 this was \$2,351 million. To obtain

a breakdown between shares and DND the flows for the years 1960-1 to 1964-5 for both categories were obtained for the Rest of the World from the FF (no figures earlier than 1960-1 were published) and cumulated. The ratio of DND to shares was formed ($= .453$) and DND was derived as \$733.51m.

$$(i)+(ii)+(iii) = \$3,773.1m$$

$$(v)+(vi)+(vii)+(viii)+(ix)+(x)+(xi) = \$1,994.79m.$$

Therefore Household Holdings at June 1965 were \$1,778.3m.

7. Liabilities

The same strategy as for DNDs was followed but with a base figure approximately at 1 July 1966. The components required to form the series were:

- (i) Advances by Trading Banks to Persons and Non-Company Business (SB)
\$1,487.2m.
- (ii) Advances by Savings Banks (excluding advances to Building Societies)
(SB, Jan 1969) \$1,230.9m.
- (iii) Mortgages and Other Loans of Building Societies \$870.0m.
- (iv) Life Offices (Loans on Mortgages and Policies) \$1,561.9m.
(*Life Insurance, 1966, CBCS*).
- (v) Loans from Credit Unions (SB, April 1972) \$37.7m.
- (vi) Government Loans for Housing \$1250.5m
(figures for June 1965 supplied by J. Piggott. Housing Commission Loans for June 1966 assumed to be 8% lower than June 1967 figures. Defence Service Homes Loans for June 1966 supplied by J. Piggott).
- (vii) Loans from Minor Trading Banks (not including ACT, NT, QLD) \$174.5m.
Figures supplied by J. Piggott.

Total liabilities at 1 July 1966 were therefore taken as \$6613m. These are then cumulated forward by addition of the 'Acquisition of Liabilities: Bank Advances and Other Advances' from the FF.

8. Equity

Equity Value was obtained by division of the yearly dividend flow from

Australian National Accounts 1978-79 and 1977-78 (ABS 5204.0) by the average dividend yield on the Sydney Stock Exchange (SB). Yearly series (in millions of dollars) for (5), (6), (7), (8) are given below (for 30 June of the year shown):

	(5)	(6)	(7)	(8)
1966	1529	1877	6613	
1967	1610	2055	7562	6677
1968	1638	2192	8619	7498
1969	1656	2443	9879	9017
1970	1711	2870	10927	9388
1971	1849	3229	11912	8336
1972	1948	3658	13455	9831
1973	2004	4598	16698	12090
1974	1960	5231	19888	10444
1975	1975	6425	23009	7200
1976	3144	8426	27406	9412
1977	3826	9305	31836	9735
1978	4738	10894	35771	11144
1979	5557	11856	40613	12953

There are four other matters requiring attention:

- (a) The above assets only represent those *directly* held by the household sector. Indirectly, through their participation in life offices and pension funds, households have *indirect* holdings as well. Furthermore, liabilities such as loans from Life Offices are not liabilities to the household sector in aggregate as they form part of household indirect asset holdings and so cancel. To encompass the indirect holdings the *reserves* of life offices and pension funds are therefore regarded as assets of the household sector. Statistics on these were taken from the FF Balance Sheet Data.
- (b) The FF data is of book values only. Therefore, both the direct and indirect holdings obtained by the above methodology probably overstate the current market values. Helliwell and Boxall (1978) present evidence for pension funds that the valuation ratio is about .8. Ideally it would be desirable to attempt to capture this effect but there appears to be no

satisfactory way of doing so. Of course changes in the market value of (say) debentures due to an interest rate rise may not be allowed for by households in forming their consumption decisions.

- (c) The ratios of Table 5 were constructed by forming the average value of a stock over a year and then related to the flow over the year. Thus, for (say) 1975/6, the ratio of DND to disposable income in Table 5 was obtained by dividing the average stock value of $\frac{1}{2}[\$6425\text{m} + \$8426\text{m}] = \$7425.5\text{m}$ by the disposable income for 1975/6 of \$50868m.
- (d) Quarterly values of the annual constructed series were obtained by linearly interpolating between the end-of-year figures.

REFERENCES

- Bank of England (1978), *Quarterly Bulletin*, Vol. 18, No. 1.
- Barro, R., (1974), "Are Government Bonds Net Wealth?", *Journal of Political Economy*, 82, 1095-1118.
- Bonyhady, B and C.N. Caton, (1976), "The Saving Ratio - A Progress Report", Australian Treasury (Mimeo).
- Breusch, T.S. and A.R. Pagan, (1980), "The Lagrange Multiplier Test and its Applications to Model Specification in Econometrics", *Review of Economic Studies*, XLVII, 239-253.
- Brown, R.J., J. Durbin and J.M. Evans, (1975), "Techniques for Testing the Constancy of Regression Relationships Over Time", *Journal of the Royal Statistical Society, Series B*, 37, 149-163.
- Downs, A., (1980), "Too Much Capital for Housing?", *Brookings Bulletin*, 17, 1-5.
- Durbin, J., (1970), "Testing for Serial Correlation in Least-Squares Regression When Some of the Regressors are Lagged Dependent Variables", *Econometrica*, 38, 410-421.
- Freebairn, J.W., (1976), "Determinants of Consumption", in *Conference in Applied Economic Research : Papers and Proceedings*, W.E. Norton and D.W. Stammer (Eds), Reserve Bank of Australia, Sydney.
- Freebairn, J.W., (1977), "Inflation and the Stability of the Household Consumption - Savings Function", *Economic Record*, 53, 198-218.
- Hall, A.R., (1981), "A Critique of the Official Australian Population Estimates", *Discussion Paper No. 16*, Centre for Economic Policy Research, Australian National University.
- Hartley, P., (1976), "Wealth and Aggregate Consumption", unpublished paper for the M.Ec. degree, Australian National University.

- Helliwell, J. and Boxall, P., (1978), "Private Sector Wealth: Quarterly Estimates for Use in an Aggregate Model", *Economic Record*, 54, 45-63.
- Hendry, D.F. and T. von Ungern - Sternberg (1979), "Liquidity and Inflation Effects on Consumers' Expenditure", in A.S. Deaton (Ed.), *Essays in the Theory and Measurement of Consumers' Behaviour*, Cambridge, Cambridge University Press.
- Hughes, B., (1980), *Exit Full Employment*, Angus and Robertson, Sydney.
- I.N.D.E.C.S., (1980), *State of Play*, George Allen and Unwin, Sydney.
- Jarque, C.M. and A.K. Bera, (1980), "An Efficient Large-Sample Test for Normality of Observations and Regression Residuals", Australian National University (Mimeo).
- Johnston, H.N. and J.C. Looker, (1979), "Comment", in W.E. Norton and I.W. Little (Eds.), *Conference in Applied Economic Research*, Reserve Bank of Australia, Sydney.
- Jump, G., (1980), "Interest Rates, Inflation Expectations and Spurious Elements in Measured Real Income and Saving", *American Economic Review*, 70, 990-1004.
- Pagan, A.R., Hall, A.D. & Trivedi, P.K., (1981), "Assessing the Variability of Inflation", Australian National University (Mimeo).
- Parkin, J.M., R.J. Cooper, J.F. Henderson and M.V. Danes, (1975), "An Integrated Model of Consumption, Investment and Portfolio Decisions", in *Papers in Monetary Economics* Vol II, Reserve Bank of Australia, Sydney.
- Salkever, D.S., (1976), "The Use of Dummy Variables to Compute Predictions, Prediction Errors and Confidence Intervals", *Journal of Econometrics*, 4, 393-97.

Scott, R., (1969), "The Value of Land in Australia", paper presented to ANZAAS, Adelaide, 1969.

Sheehan, P. (1980), *Crisis in Abundance*, Penguin, Sydney.

Swan, P., (1980), "An Optimum Business Tax Structure for Australia", Submission to the Committee of Inquiry into the Australian Financial System.

Turnidge, G., (1980), "The Consumption Ratio in Australia: An Explanation of its Behaviour in the 1970's", *Research Discussion Paper No. 4, Victorian Chamber of Manufactures*.

Wallis, K.F., (1972), "Testing for Fourth Order Autocorrelation in Quarterly Regression Equations", *Econometrica*, 40, 617-636.

Williams, R. (1979), "Household Saving and Consumption", in W.E. Norton and I.W. Little (Eds) *Conference in Applied Economic Research*, Reserve Bank of Australia, Sydney.