WORKING PAPERS IN ECONOMICS

PENSION BENEFITS AND THE DECLINE IN ELDERLY MALE LABOUR FORCE PARTICIPATION

by

W.J. Merrilees

NO. 63 SEPTEMBER 1982

DEPARTMENT OF ECONOMICS

The University of Sydney
Australia 2006

PENSION BENEFITS AND THE DECLINE IN ELDERLY MALE LABOUR FORCE PARTICIPATION

by

W.J. Merrilees

NO. 63 SEPTEMBER 1982

National Library of Australia Card Number and ISBN 0 86837 063 0

The author wishes to thank Peter Saunders, Barry Hughes, Bob Gregory, Viv Hall and Russell Ross for their very helpful comments. Cecilia Clark and Nguyen Van Anh provided able research assistance. The project was aided by a Reserve Bank Grant.

Abstract

This paper uses time series econometric methods to unravel the causes of the secular decline in the labour force participation rate of males aged 65 years and over. The study finds that most of the sharp and sudden decline in the participation rate during 1972-1976 is attributable equally to more generous age pension benefits and to life cycle wealth effects, with minor support from the discouraged worker effect associated with the current recession. The continuing decline over the 1976-1981 period is mainly due to wealth effects, with minor reinforcement from discouraged worker effects, and the failure to index the 'free area' means test limit of the age pension.

PENSION BENEFITS AND THE DECLINE IN ELDERLY MALE LABOUR FORCE PARTICIPATION

1 Introduction

Preceded by a period of relative stability, the 1970's witnessed a dramatic reduction in older male labour force participation. Although this decline is pronounced for males aged 55 and over, it is expedient here that we concentrate on a sub-section of this group, namely males aged 65 and over. As discussed in an earlier paper (Merrilees 1982a), male workers aged 55-64 have been subject to a somewhat different set of influences which require separate investigation. Figure 1 illustrates the movement in the elderly male participation rate over the 1964-1981 period. A sharp decline occurs during 1972-1976 and has continued to the present.

What elements have contributed to such a decline in labour force participation? Four main factors have been discussed recently: (1) discouraged worker effects, associated with the recession, (2) wealth effects, (3) the relative value of the age (or equivalent) pension and (4) changes in the means test relating to the age pension.

The discouraged worker effect, in our context is an extremely plausible explanation. If an older male loses his job, the likelihood of re-employment is slim. Discouraged by the difficulty of obtaining re-employment, many older males are likely to give up job search and leave the labour force. As Figure 1 reveals, the sharp rise in the unemployment rate in 1974/75, makes this factor a likely candidate, though the exact turning point in the participation rate precedes the jump in unemployment by a couple of years.

Wealth effects refer to the idea that one motive behind the accumulation of private wealth over the prime working age is to finance greater future leisure in the form of earlier retirement. In Australia this effect has been noted by Barry Hughes (1982). Although there are data problems in measuring wealth, our findings give credence to the importance of such effects.

Both the third and fourth factors relate to the pension tier of the social security system. As we discuss more fully in the next section, the likely effect of alterations in the pension means tests on labour force participating is ambiguous. However, less ambiguous is the effect of the rising relative value of the age pension, dating from 1971. As can be seen in Figure 1, this is certainly consistent with the timing of the sudden decline in the participation rate. This consistency is even tighter if there are lags in the response to age pension benefits.

Our emphasis on pensions is justified when it is realised that the great bulk of elderly males who have withdrawn from the labour force in the last decade have moved to a pension for at least partial income support. Thus the dramatic decline in older male labour force participation rates is matched by an equally dramatic rise in pension usage rates. The two phenomena are closely, though not perfectly, intertwined. Yet despite this nexus, it is only in recent years that it has been taken into account. A pathbreaking effort in this regard is the book by Stricker and Sheehan (1981), which seeks to explain (by graphical and indirect, rather than econometric) labour force participation rates in terms of pension and other variables. At the same time, they use econometric methods to explain pension usage rates in terms of labour market and other variables. Carter and Gregory (1981), using Census data instead, have also emphasised the nexus between the social welfare system and the labour market. However, Australian Census cross-sectional analyses are limited by the lack of age-specific pension data.

In Section II the basic model is presented, followed in Section III by a quarterly time series application of the model. Further information exploiting part-time/full-time differences, but with annual data only, is presented in Section IV. In Section V the labour force participation model is checked for broad consistency against a pension usage model. Finally, Section VI sketches some concluding remarks. Our main findings are summarised in the abstract above.

II The Basic Model

Logit analysis has become an increasingly popular specification of labour force participation models. In part this befits the binary (zero or one) nature of the participation decision. A related advantage is the assurance that predicted probability remains inside the unit interval and therefore nonsense results can be avoided. Other advantages of the logit approach in cross-sectional work are noted by Gunderson (1980). However in our application to aggregate time series analysis, the comparative advantage of the logit specification compared to the linear probability model is slight, so both will be reported.

In the case of the logistic function, the probablity of elderly males participating in the labour force is given by:

$$P_L = [1 + \exp(-X'b)]^{-1} \tag{1}$$

where X' is a vector of explanatory variables and b the logit coefficients to be estimated.

For estimation purposes, equation (1) is in an inconvenient non-linear form. Re-expressing (1) we get:

$$P_L = \exp(X'b) / [1 + \exp X'b] \qquad (1a)$$

and hence:

$$1 - P_L = 1 / [1 + \exp X'b] \qquad (2)$$

Thus:

$$P_L / (1 - P_L) = \exp X'b \qquad (3)$$

Taking logarithms:

$$\text{Log } [P_L / (1-P_L)] = X'b \qquad (4)$$

Equation (4), with error term added, is the specification used to obtain the b- coefficients. Note that the effect of a unit change in an explanatory variable on the probablity of participation ($\delta P_L/\delta X$) is derived as $b\, P_L(1-P_L)$. The sample mean of P_L over the period 1964(1) to 1977(4) is 0.212, so all the estimated b coefficients need to be multiplied by 0.167.

The selection of explanatory variables (X') is based on the stock of previous studies, in particular those reported in the survey by Clark, Kreps and Spengler (1978).

Four main influences are considered: (a) more generous pension benefits, (b) more liberal means testing of social security benefits, (c) discouraged worker effects associated with the recession and (d) life cycle private wealth effects.

As noted by Parsons (1980) and others, it is important to specify the value of pension benefits in <u>relative</u> terms, that is, relative to wage rates. This brings out the essence of the work/leisure (work/retirement) choice that we are trying to model. We expect a rise in the pension/wage ratio to reduce the probability of working.

Apart from the relative dollar value of the old age (or equivalent) pension, there have been several major qualitative changes in the pension system. These changes relate to liberalisation of the means/income tests. The "free area" is the amount of income (means) a pensioner can have before the pension benefit is reduced. From October 1969 the pension was "tapered", in that the amount of the pension payable was reduced - by $1 for every $2 that income exceeded the "free area" (as defined above). Previously there had been a $1 for $1 reduction. In October 1972 the "free area" was doubled from $17.25 to $34.50 per week for a married pensioner couple. In October 1973 the means test on old age pensions was abolished for persons aged 75 years or more. This abolition was extended to persons aged 70-74 from May 1975. Prior to November 1976 the pension means tests included an <u>imputed</u> income component on <u>non-exempt</u> assets (a 10 percent rate of return was imputed). This imputation of non-realised asset income ceased in November 1976. More recently, from November 1978, <u>increments</u> in the rates of age pension to persons aged 70 and over became subject to a means test, thus partially retreating on the October 1973 and May 1975 reforms.

What is the best way to model the myriad of qualitative changes? Fortunately many of these changes are largely irrelevant to the work force participation experience of males aged 65 and over. The latter is completely dominated by males aged 65-69, with a negligible number of males aged 70 and over in the labour force during the past two decades. Thus the abolition of the means test for males 70 and over, in 1973 and 1975, and the re-introduction of partial means testing in 1978, would have had an infinitesimal effect on the participation rate of males aged 65 and over as a whole. This is confirmed in a series of tests noted in the next section.

We are left with three means test changes which are of importance to the 65-69 age group: the 1969, 1972 and 1976 policy changes. The second (free area) of these can be readily transformed into a continuous variable and deflated by the consumer price index to convert it into real terms. The other two policy changes are specified as dummy variables.

Unlike the relative value of the age pension, we cannot predict *a priori* the direction of these three means tests alterations on the labour force participation rate. This ambiguity has been noted in overseas studies (Vroman 1971) and in the Hancock Report (1974 p.118). A particularly lucid analysis of the ambiguity is given in Stricker and Sheehan (1981, pp.76-78). Their illustrations deal with the effects of the 1972 policy change, that is, the doubling of the 'free area' limit. The effects vary, depending on whether someone is initially working or not, receiving a pension or not, and the amount of unearned income. The most likely outcome is an increase in part-time work and a possible decrease in full-time work. Similar patterns would be likely with the other two means test alterations. For instance, the 1976 decision to ignore imputed asset income is tantamount to an increase in the 'free area'.

The expected sign of the cyclical effect is also ambiguous, in that either discouraged worker effects or added worker effects could dominate. However most of the recent Australian debate has emphasised discouraged worker effects. Nevertheless, it may be interesting to contrast full-time from part-time behaviour (c.f. Section IV), with added worker effects more likely to operate on part-time work.

The life-cycle private wealth effect has been popularised by Felstein (1974). He was particularly concerned with the effect of the rights to future (American) social security benefits on aggregate savings and on the age of retirement. This literature, which has Australian counterparts (Carmichael and Hawtrey, 1981), is mainly concerned with aggregate savings and investment, with retirement age of peripheral concern. Nevertheless, the life-cycle approach does raise the possibility that accumulated wealth is partly motivated by a desire for future leisure time (earlier retirement). In Australia Hughes (1982) has stressed the importance of this aspect. Ideally time series age-specific private wealth data is needed to test this hypothesis. However, as noted by Yates (1981), there is a paucity of data in this respect and even cross-sectional data is often incomplete (regarding accrued pension rights, for example). Some aggregate (all ages) private wealth data is used (Helliwell and Boxall, 1978) to check our results. However, primarily we will use the crude assumption that the relevant (but unknown) age specific private wealth is growing at a constant rate so that the effect on the participation rate is changing by a constant amount per period. A time index (1,2,3 ... etc.) is our proxy for private wealth effects. That is, we interpret the time variable as essentially reflecting private wealth effects. Nonetheless, these effects cannot be distinguished from other secular influences, though the more obvious of these are already separately specified.

III Quarterly Time Series Results

As is well-known, the quarterly population household survey was subject to a major re-design in 1978. The quarterly survey became monthly, there were intra-month differences in the timing of data collection and some operational concepts were altered slightly. Therefore it is unclear just how comparable are the pre and post 1978(1) data. Accordingly we emphasise the period 1964(1) to 1977(4), though we will also present results for the 1964(1) to 1981(3) period.

Lags were tested in relation to all the key variables. However only in the case of the relative pension benefit to wage variable (PEN) were lags significant. It is emphasised that lags were not evident with the cyclical variable (CYC) and even when included (albeit insignificantly) they did not increase the magnitude of this factor. Lags were tested in all cases in a fairly general manner, namely with an Almon type polynomial distributed lag (PDL) structure. As is now preferred in the econometric literature, the initial and final period of the lag were not arbitrarily imposed (i.e. constrained to zero), but rather selected by the data. An initial length (six quarters) was used in all cases. Only in the case of PEN was the mean length of lag significant and individual period lag components significant. Since the last (sixth) lag component was significant, the length of the lag was extended until the last component became insignificant. This turned out to be the eighth quarter. Thus the approximately zero weight of the last lagged term is determined by the data. The degree of the polynomial was determined by goodness of fit criteria. Quadratic and cubic structures were deemed to be sufficiently general, with the cubic PDL giving a slightly better fit. Only the cubic PDL results are reported.

There is therefore support for the notion that men adjust their desired retirement age to changes in the relative value of pension benefits with a lag extending over two years.[1] About a quarter of the response is in the first year and three quarters in the second year. More precisely, there is sizeable impact effect, which then eases, re-intensifies after four quarters, peaks after six quarters and finally drops back again.

The logit and linear probability model results are given in Tables 1 and 2 respectively. The variables, with data sources, are defined more fully in the appendix. All four of our key variables are highly significant, usually at the one percent level. The linear probability model gives a fairly similar pattern to the logit model, though the latter is marginally superior in subtle respects (other than coefficients of determination, which of course are not comparable).

It is useful if we quickly interpret the main results, initially for the 1964(1) to 1977(4) period.

The seasonal variables all have significantly negative coefficients, which means that labour force participation in the February, May and August quarters decline relative to the peak November quarter. The coefficient of -0.047 on CYC implies that a one percentage point rise in the prime age male unemployment rate would (*ceteris paribus*) lower the elderly male participation rate by 0.78 percentage points (about 4,000 workers), obtained by multiplying -0.047 by 0.167. The coefficient of -0.041 on PEN (which in fact is the sum of coefficients over eight quarters) means that a one percentage point rise in the pension benefit/wage ratio would lower the probability of participating by 0.007. The TIME variable is our proxy for private wealth accumulation and the coefficient of -0.014 implies that the probability of remaining in the workforce is declining by 0.0023 per quarter (or about 0.01 per annum), with the usual *ceteris paribus* qualification. Only the two pension means tests variations which were significant are reported in Table 1. Both the 1972 and 1976 social security policy changes resulted in a *net increase* in labour force participation. The coefficient on POL72 of 0.005 implies that the $17 ($12 when expressed in real 1966 dollars) lift in the 'free area' in 1972, raised the probability of participating in the labour force by 0.01. The subsequent failure to index the 'free area' (prior to the August 1982 budget) has lowered the probability of participating by an even greater magnitude. The coefficient on POL 76 is at best marginally significant and caution should be exercised. It would seem that the 1976 social security policy change raised the probability of labour force participation by about 0.006. None of the other social security policy changes, those affecting males aged 70 and over, had a significant effect on labour force participation, as expected.[2]

The model looks quite robust. Not only are the key variables highly significant, but they remain so over time.[3] The coefficients of the variables are also quite stable over time, as revealed by a comparison between time periods in both Tables 1 and 2. This stability also occurs for other time periods (with different starting dates) not shown in these tables. Incidentally, although inspection of the data does suggest a different seasonal pattern prior to 1970, formal testing (a likelihood ratio test) reveals that the difference is insignificant.

Two specific issues need closer scrutiny. First, what of the counter argument that much of the post 1974 participation response to changes in age pension benefits is primarily associated with the recession? Our defense comes from the results for the period prior to the current recession, that is, for the period 1964(1) to 1974(3). As can be seen in Tables 1 and 2, the sum of the pension benefit coefficients in this earlier period is about the same as in more recent periods. Thus we have clear evidence of significant pension benefit effects of comparable magnitude operating during a period (1964-1974) when the average rate of unemployment was quite low.

Secondly, how plausible is the magnitude of our discouraged worker effect? The coefficient of -0.66 for 1964(1) to 1977(4) in the linear probability model (slightly greater in the logit specification) compares quite closely with the 1976 Census cross-sectional estimate of -0.58 by Carter and Gregory (1981).[4] However it is substantially below the very large estimate by Stricker and Sheehan (1981). The latter estimate that about 40,000 males aged 65 and over withdrew as discouraged workers over the 1974-1980 period, whereas our estimate is about 10,000. Both figures are large and certainly our estimate is significant at the one per cent level. Yet the Stricker and Sheehan estimate seems too large. It is doubtful whether as many as 40,000 males aged 65 and over involuntarily lost their jobs during 1974-1980. This is at least one case where the econometric approach gives apparently more meaningful results than the graphical measurement of hidden unemployment.[5] Thus we concur with Stricker and Sheehan (1981) that discouraged worker effects are pronounced amongst males aged 65 and over, though our numerical estimates are considerably smaller. While the large discouraged worker effects estimated by Stricker and Sheehan for males aged 55-64 look more plausible, we have not tested for such here.

Table 3 is an alternate way of summarising our results. The 1972-76 period is particularly interesting in light of the sudden and sharp decline in the participation rate. Most of the explanation of this decline is shared between the relative pension benefit influence and the wealth effect. Since the latter is assumed to be part of an unchanged trend, this leaves the relative pension benefit variable as the key dynamic factor in 1972-1976. Discouraged worker effects play a supportive role. The 1972 social security policy change to the 'free area' limit had the initial effect of partially counteracting the above factors.

During 1976-1981 the continuing decline, albeit at a slower rate, of the participation rate is mainly attributable to the wealth effect. Minor support comes from the discouraged worker effect and the failure to index the 'free area' limit between 1972 and 1981.

The 1976 social security policy change (POL 76) had a small counter-acting role. There was minor contribution from relative pension benefits because they varied little.

Similarly, we can also explain why the participation rate hardly fell during 1964-1972. There was little variation in the unemployment rate, nor labour force affecting means test alterations. The on-going wealth effects should have substantially lowered the participation rate. However this was almost exactly counter balanced by a dramatic decline in relative pension benefits over the 1962-1971 period.

IV A Comparison of Part-Time and Full-Time Labour Force Behaviour

In Section II we noted that there could be interesting differences between part-time and full-time labour force behaviour, but we are constrained in testing for these differences by the lack of appropriate long-running quarterly data. However, some long-running (since 1966) data on a part-time/full-time classification is available on an annual (August) basis. We proceed with such, despite the fewer observations.

Table 4 summarises our results, which in all respects accord with our expectations. The wealth (TIME) and relative pension benefit (PEN) effects are stronger for full-time compared to part-time labour force participants. The lagged response to changes in pension benefits are longer for full-time participants. Unfortunately, it seems as if the cyclical influence is not given full justice in an annual model. Nevertheless, the contrasting pattern is noteworthy, with discouraged worker effects apparent for full-time participants and added worker effects (possibly in an extended family context) apparent for part-time participants. Finally, the POL 72 results are as predicted by Stricker and Sheehan (1981), with a slight decline in full-time participation and a substantial rise in part-time labour force participation.

V. Are the Labour Force Estimates Broadly Consistent With A Pension Usage Model?

This section extends the pension usage model developed by Stricker and Sheehan (1981). The pension usage rate (or take-up rate) of males aged 65-69 is the proportion of the population of males aged 65-69 who are in receipt of a pension (usually an age pension, but sometimes a service pension and in a small number of cases an invalid pension). Stricker and Sheehan attempt to explain this pension usage rate over the 1971-1980 period in terms of a relative pension benefit variable (comparable to our PEN), a cyclical variable and a 'free area' limit on the means test variable. Our cyclical variable (CYC) differs from theirs (they use a duration measure), as does our 'free area' variable (POL 72) (we deflate by a price index rather than wages). The Stricker and Sheehan model is extended by adding (1) a lagged term for PEN; (2) a wealth effect variable (TIME) and (3) a variable (POL 76) representing the 1976 policy switch from a means test to an income test.

Our results are summarised in Table 5. All variables except the cyclical term are significant at the one percent level. In light of the small number of degrees of freedom we do not wish to over-sell these results. Primarily we are interested here in seeing if the results are broadly consistent with our labour force participation results above. In this respect, we do find that the wealth (TIME) and pension benefit (PEN) influences are mirrored in the pension model, with statistical significance and appropriate sign. The lack of significance of the cyclical coefficient is disppointing, but may be due to the use of annual data (c.f. Section IV) or the short time interval.

Of course, we do not expect an exact correspondence between the pension model and the labour force participation model. Some of the historical take-up of pensions emanates from males who previously were not receiving a pension nor in the labour force. This seems to have been important in relation to the responses to the social security policy changes (POL 72 and POL 76). In both cases there was a net <u>increase</u> in (mainly part-time) labour force participation as well as an <u>increase</u> in the pension take-up rate.

VI Conclusions

Using quarterly data, we have found that pension benefits, wealth, the cyclical state of the labour market and means tests criteria, have all influenced the labour force participation of males aged 65 and over. However the relative importance of each has varied markedly between time periods. Changes in pension benefits are especially important in accounting for the sharp and sudden decline in the participation rate during 1972-1976, while wealth effects are important in the 1976-1981 period. Substantial discouraged worker effects are evident throughout the 1975-1981 period.

The basic results are quite robust in that the coefficients tend to be stable within the sample period. Section V establishes that a pension usage model is broadly consistent with the labour force participation results, though the former is severely constrained by a small number of observation.

The model seems to be successful in introducing policy changes with respect to means test criteria, which have not been estimated in previous Australian labour force participation models. Similarly we have successfully included lags in the response to pension benefit changes. This recognises the role of a planning horizon in retirement decisions, but, surprisingly, no international study has previously allowed for such.

Future research in this area might usefully be directed towards males aged 55-64, where discouraged worker effects are likely to be very important. Data limitations regarding pension use are particularly disturbing. Both the Departments of Social Security and Veterans' Affairs should be encouraged to instigate special sample surveys detailing the wage, wealth, health and employment records of new pension beneficiaries.

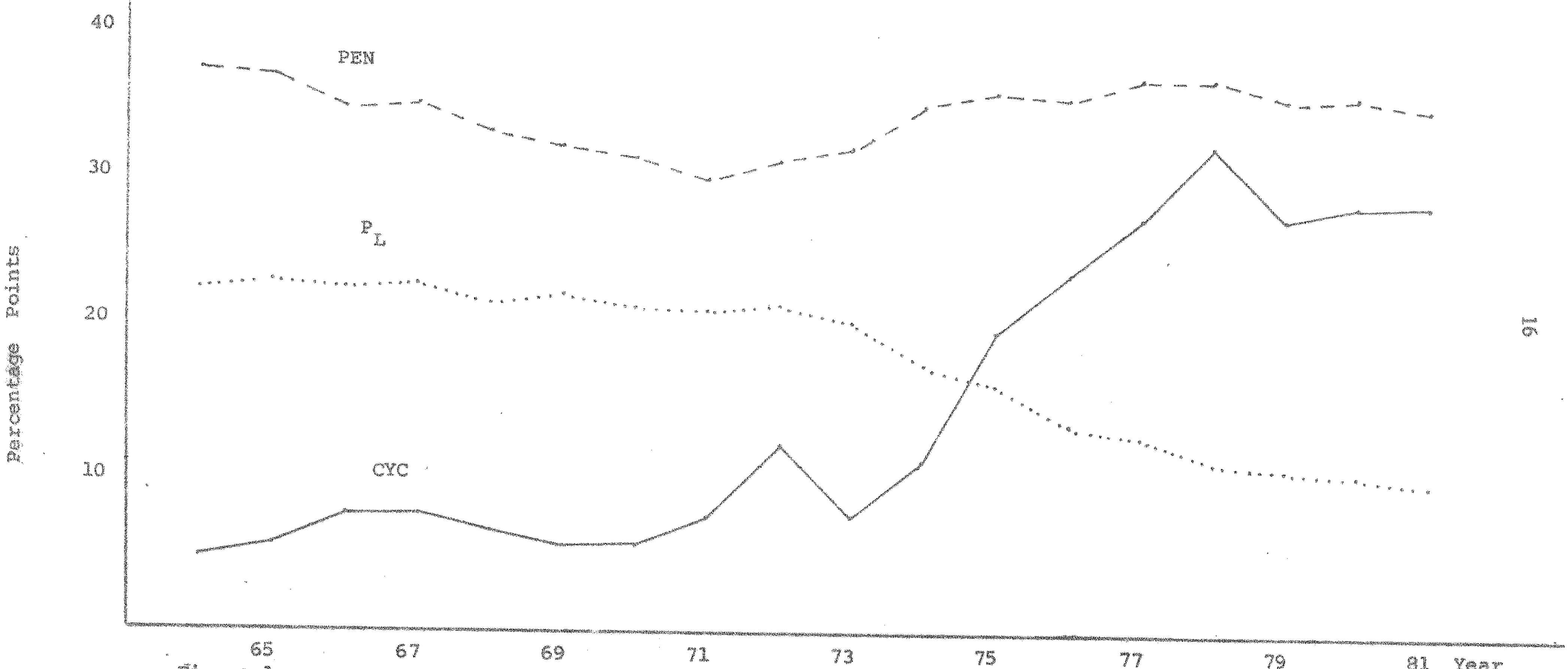

Figure 1

Annual (third quarter) time series for elderly male participation rate (P_L), prime age male unemloyment rate(CYC) and pension/wage ratio (PEN). Scale on CYC is ten times greater.

TABLE 1

Quarterly Logit Model of Labour Force Participation

Rate for Males 65 Years and Over, Various Time Periods

(N.B. Variables defined in Appendix)

Explanatory Variable	1964(1) to 1977(4)	1964(1) to 1981(3)	1964(1) to 1974(3)
Constant	0.53 (4.5)**	0.60 (5.8)**	0.40 (2.3)*
S1	-0.024 (2.5)*	-0.025 (2.6)*	-0.048 (4.7)**
S2	-0.022 (2.3)*	-0.020 (2.2)*	-0.041 (4.1)**
S3	-0.027 (2.7)**	-0.028 (2.8)**	-0.035 (3.0)**
CYC	-0.047 (3.5)**	-0.045 (3.8)**	-0.038 (1.6)
TIME	-0.014 (16.2)**	-0.014 (22.3)**	-0.013 (12.0)**
POL72	0.0050 (3.6)**	0.0046 (3.2)**	0.0016 (1.0)
POL76	0.038 (1.9)	0.045 (2.2)*	n.a.
SHIFT	n.a.	-0.032 (2.0)*	n.a.
PDL [PEN]	-0.041 (14.1)**	-0.042 (16.5)**	-0.035 (8.3)**
$\bar{R}^2$	0.9879	0.9945	0.9352
D.W.	2.02	2.06	2.06

Notes: (1) The PEN coefficient is the sum over eight quarters using a cubic PDL. See Text.
(2) t-values in parentheses.
(3) ** denotes significant at one percent level.
* denotes significant at five percent level.
(4) n.a. means not applicable.

TABLE 2

Quarterly Linear Probability Model of Labour Force

Participation Rate for Males 65 Years and Over

Explanatory Variable	1964(1) to 1977(4)	1964(1) to 1981(3)	1964(1) to 1974(3)
Constant	50.6 (25.9)**	49.0 (30.7)**	49.6 (16.2)**
S1	-0.50 (3.1)**	-0.42 (2.8)**	-0.86 (4.7)**
S2	-0.43 (2.7)**	-0.33 (2.3)*	-0.74 (4.2)**
S3	-0.46 (2.8)**	-0.44 (2.9)**	-0.62 (2.9)**
CYC	-0.66 (3.0)**	-0.84 (4.7)**	-0.60 (1.5)
TIME	-0.23 (16.2)**	-0.21 (21.6)**	-0.22 (11.3)**
POL72	0.059 (2.6)*	0.056 (2.6)*	0.021 (0.7)
POL76	1.06 (3.2)**	0.90 (2.9)**	n.a.
SHIFT	n.a.	0.41 (1.7)	n.a.
PDL [PEN]	-0.63 (13.3)**	-0.59 (15.2)**	-0.58 (7.5)**
$\bar{R}^2$	0.9862	0.9935	0.9300
D.W.	2.09	1.88	1.98

Notes: As per Table 1

TABLE 3

An Analysis of the Component Determinants of the Change in the Elderly Male Participation Rate: Different Epochs

	1964(3) to 1972(3)	1972(3) to 1976(3)	1976(3) to 1981(3)
Total Change	-0.008	-0.083	-0.040
Contribution from:			
TIME	-0.069	-0.035	-0.043
CYC	-0.001	-0.009	-0.004
PEN	+0.074	-0.030	-0.017
POL72	-0.003	+0.002	-0.004
POL 76	n.a.	n.a.	0.007
SHIFT	n.a.	n.a.	-0.005

Note:

(1) Contribution calculated by multiplying the respective coefficient from Table 1, 1964(1) to 1981(3), times 0.155 times the change in the explanatory variable. Lagged responses are allowed for with PEN.

(2) Most of the PEN contribution in 1976(3) to 1981(3) comes from lagged effects.

(3) n.a. means not applicable

TABLE 4

Annual Linear Probability Model for Part-Time and Full-Time Labour Force Participation, Males Aged 65 and Over, 1966-1981

(N.B. Adjustment has been made for first-order serial correlation in the full-time participation model)

Explanatory Variable	Full Time Participation	Part-Time Participation
Constant	37.6 (26.3)**	12.9 (5.2)**
CYC	-0.48 (2.1)	0.81 (2.2)
TIME	-0.74 (18.1)**	-0.24 (3.8)**
POL72	-0.09 (2.7)**	0.17 (4.6)**
PEN_t	0.12 (1.4)	-0.18 (2.0)
PEN_{t-1}	-0.57 (8.1)**	-0.08 (1.1)
SHIFT	0.83 (4.1)**	0.01 (0.1)
$\bar{R}^2$	0.9991	0.9306
D.W.	2.64	2.34

Notes: (1) As per Table 1.

(2) It is not possible to meaningfully isolate POL76 from SHIFT and therefore POL76 is excluded.

TABLE 5

Annual Linear Probability Model of

Pension Usage, Males Aged 65-69, 1971-1980

(N.B. Adjustment has been made for first-order serial correlation)

Explanatory Variable	
Constant	-16.0 (10.7)**
CYC	0.04 (0.2)
TIME	1.37 (39.3)**
POL72	0.47 (23.8)**
POL76	3.33 (24.4)**
PEN_t	0.68 (10.5)**
PEN_{t-1}	0.90 (17.8)**
$\bar{R}^2$	0.9999
D.W.	2.06

Notes: (1) As per Table 1.
(2) Dependent variable from Stricker and Sheehan (1981)

APPENDIX: DATA SOURCES

1.	P_L	Participation rate of males aged 65 and over, A.B.S. "Labour Force", Cat. No. 6203.
2.	CYC	Prime age (25-44) male unemployment rate, IBID. Note post 1977 figures scaled down slightly to allow for effects of new survey. Scaling factor based on 1977(4) when both surveys were collected.
3.	TIME	Arithmetic time index (1, 2, 3 ...).
4.	S_1	February seasonal dummy (a value of one for first quarter, zero otherwise).
5.	S_2	May seasonal dummy (a value of one for second quarter, zero otherwise).
6.	S_3	August seasonal dummy (a value of one for third quarter, zero otherwise).
7.	POL72	Real value of married couple, 'free area' limit for pension. Nominal value jumped from $17.25 to $34.50 in 1972(4). Nominal amounts deflated by A.B.S. Consumer Price Index. Note that nominal value is scheduled to jump to $50.00 in 1982(4).
8.	POL76	Social security policy dummy variable representing the switch from a means to an income test (a value of one for the period since 1976(4) and zero for earlier period).
9.	PEN	Ratio of pension benefits to wages. Pension benefit is the married couple weekly pension benefit obtained from the Department of Social Security. Wages are the seasonally adjusted A.B.S. adult male average weekly earnings series. The wage variable is not age specific. We assume that elderly male wages have increased proportionately to adult male wages, an assumption supported by the income distribution surveys (A.B.S. Cat. No. 5523).
10.	SHIFT	A dummy variable (a value of one for 1978(1) onwards, zero otherwise) to allow for the re-design of the household survey.
11.	PENSION USAGE RATE	As used in Table 5. This refers to males aged 65-69 and is taken from Stricker and Sheehan (1981, p.95).

FOOTNOTES

1. There is independent evidence (Harper 1980, Parnes 1975 and ABS Cat. No. 6238) that older males do have a fairly definite retirement plan horizon. That is, workers aged 50 years or more have a fairly clear idea as to a preferred retiring age. However such plans are subject to modification in light of changes in factors, such as pension benefits, which impinge on the work leisure choice. The existence of such plans leads to a distributed lag response between pension benefit changes and changes in labour force participation.

2. One variant of these tests involved a variable which combined the 1975 (abolition of means test for males aged 70-74) and 1978 (means testing for incremental benefits) changes. The weights used were 0 for1964(1) to 1975(1), 1 for 1975(2) to 1978(3) and 0.5 for 1978(4) onwards. All variants were statistically insignificant.

3. Incidentally, when the aggregate private wealth variable from Helliwell and Boxall (1978) is used for the 1964(ii) to 1975(3) period in lieu of TIME, the pattern of results is not greatly affected. However the statistical performance does suffer somewhat. In particular, serial correlation suggests that the aggregate (all age) wealth variable is a misspecification.

   Hughes (1982) suggests that the life cycle wealth effect should show an increase over time. The stability of our TIME coefficient suggests that retirees in the 1970's have not had greater wealth influences than retirees in the 1960's. However Hughes notes that extremely long time series, dating back to the 1950's, 1940's, etc. are needed to examine this hypothesis.

4. It should be pointed out that there is an arithmetic error in the Carter-Gregory (1981) paper when they use their Table 3 results (in which the -0.58 coefficient on the unemployment rate appears) to estimate hidden unemployment amongst males 65 and over in their Table 9. The latter estimate of 12.2 percent should be less than 2 percent. The -0.58 coefficient (with hidden unemployment less than 2 percent) is consistent with our results, whereas the 12.2 hidden unemployment estimate would not be.

5. My preference for the econometric over the graphical approach when estimating discouraged worker effects is outlined in Merrilees (1982b).

REFERENCES

Carmichael, J. and K. Hawtrey, (1981), "Social Security, Government Finance, and Savings", The Economic Record, 57, December, pp. 332-343.

Carter, M. and R. Gregory, (1981), "Government Pensions, Benefits and Distribution of Employment for Males During a Recession", Paper presented to Tenth Conference of Economists, Canberra. Partially reprinted in Stricker and Sheehan (loc. cit.) Appendix 1, pp. 213-223.

Clark, R., J. Kreps and J. Spengler, (1978), "Economics of Aging: A Survey", Journal of Economic Literature, XVI, September, pp. 919-962.

Feldstein, M. (1974), "Social Security, Induced Retirement and Aggregate Capital Accumulation", Journal of Political Economy, 82, September/October, pp. 905-926.

Gunderson, M., (1980), "Probit and Logit Estimates of Labour Force Participation", Industrial Relations, 19, Srping, pp. 216-220.

Hancock, K., (1974), National Superannuation in Australia, (Interim Report, A.G.P.S.).

Harper, C., (1978), "Two Views of Retirement", Work and People, 4, No. 3, pp. 3-7.

Helliwell, J. and P. Boxall, (1978), "Private Sector Wealth: Quarterly Estimates for Use in an Aggregate Model", The Economic Record, 54, April, pp. 45-64.

Hughes, B., (1982), "Labour Force Participation: What are the Issues?" in A. Kaspura (ed.) Labour Force Participation in Australia: Proceedings of a Conference, (Canberra, A.G.P.S., forthcoming).

Merrilees, W., (1982a), "The Mass Exodus of Older Males from the Labour Force: An Exploratory Analysis", Australian Bulletin of Labour, 8, March, pp. 81-94.

Merrilees, W., (1982b), Book Review of Stricker and Sheehan (loc.cit.) in The Economic Record, 58, March, pp. 100-101.

Parnes, H. et.al, (1975), "The Pre-Retirement Years", U.S. Department of Labour, Manpower Research and Development Monograph, No. 15 (Washington, U.S. G.P.O.).

Parsons, D., (1980), "The Decline in Male Labour Force Participation", Journal of Political Economy, 88, February, pp. 117-134.

Stricker, P. and P. Sheehan, (1981), Hidden Unemployment: The Australian Experience (Melbourne, Institute of Applied Economic and Social Research).

Vromen, W., (1971), "Older Worker Earnings and 1965 Social Security Act Amendments", S.S.A. Research Report No. 38 (Washington, U.S. G.P.O.).

Yates, J., (1981), "An Analysis of Asset Holdings in Australia by Income Class:, Department of Economics, University of Sydney Working Paper No. 53, May.

WORKING PAPERS IN ECONOMICS

* 1	I.G. Sharpe	A Framework for Analysis of the Money Supply Process in Australia
* 2	I.G. Sharpe & R.G. Walker	Asset Revaluation and Stock Market Prices
* 3	N.V. Lam	Incidence and Stabilization Impact of Tin Export Taxation in West Malaysia
* 4	V.B. Hall & M.L. King	Inflationary Expectations in New Zealand: A Preliminary Study
* 5	A.J. Phipps	Strike Activity and Inflation in Australia
6	N.V. Lam	Incidence of the Rice Export Premium in Thailand
* 7	I.G. Sharpe	Secondary Reserve Requirements, the Monetary Base and the Money Supply in Australia
8	P. Saunders	Labour Demand Functions and the Quasi-Fixity Hypothesis: Some Empirical Results for U.K. Manufacturing Industries, 1963-1974
9	W.P. Hogan	Economic Strategies for Recovery
10	T.P. Truong	Asset Revaluation and Share Prices: A Study using the M.S.A.E. Regression Technique
11	S. Kim	Instability of Primary Exports, Income Stabilization Policies and Welfare
*12	I.G. Sharpe & P.A. Volker	Institutional Change, Specification Error, Inflation and the Stability of the Demand for Money Function in the United States, 1901-1974
*13	I.G. Sharpe & P.A. Volker	The Impact of Institutional Changes on the Australian Short-Run Money Demand Function
*14	W.P. Hogan	The Connections Between Foreign Trade and Economic Development: An Empirical Study
*15	F. Gill	The Case of the Black Exodus from the Southern U.S., 1910-1970: Some Lessons for Theory and Applied Theory
*16	A.J. Phipps	The Impact of Wage Indexation on Wage Inflation and Strike Activity in Australia
*17	V.B. Hall	Pricing Behaviour in Australia: A Data Evaluation Study
*18	I.G. Sharpe	Australian Money Supply Analysis: Direct Controls and the Relationship Between the Monetary Base, Secondary Reserve and the Money Supply
*19	L. Haddad	Economic Systems: Towards a New Classification
20	G. Lewis	A Strategy for Winning at Roulette

21	R.L. Brown	A Test of the Black and Scholes Model of Option Valuation in Australia
*22	V.B. Hall	Pricing Behaviour in Australian Manufacturing Industry: Hypothesis Testing 1955-1956 to 1967-1968
*23	I.G. Sharpe & P.A Volker	The Selection of Monetary Policy Instruments: Evidence from Reduced Form Estimates of the Demand and Supply of Money in Australia
*24	V.B. Hall	Excess Demand and Expectations Influences on Price Changes in Australian Manufacturing Industry
*25	I.G. Sharpe & P.A. Volker	The Tradeoff Between Improved Monetary Control and Market Interest Rate Variability in Australia: An Application of Optimal Control Techniques
*26	Evan Jones with the assistance of Mary MacDonald	An Examination of Earnings Differentials in Australian Manufacturing Industry
27	W.P. Hogan	Questions on Structural Adjustment Policies
28	P. Saunders	Price and Cost Expectations in Australian Manufacturing Firms
29	W.P. Hogan, I.G. Sharpe & P.A. Volker	Regulation, Risk and the Pricing of Australian Bank Shares 1957-1976
30	W.P. Hogan	Quicksands of Policy-Making
31	C. Emerson	Taxing Natural Resources Projects
32	R.W. Bailey, V.B. Hall & P.C.B. Phillips	A Small Model of Output, Employment, Capital Formation and Inflation, applied to the New Zealand Economy
33	W.P. Hogan	Eurofinancing: Currencies, Loans and Bonds
34	S. Adei	The Growth of Foreign Investment and Economic Nationalism in Post Independence Ghana: 1957-1975
35	W.P. Hogan	The 40 Per Cent Investment Allowance
36	W.P. Hogan	Controlling Eurofinance Markets
37	R.T. Ross	Disaggregate Labour Supply Functions for Married Women: Preliminary Estimates for New Zealand
38	U.R. Kohli	Beginning- and End-of-Period Specifications of Asset Market Equilibrium in Balance-of-Payments

39	G. Mills	Government Incentive Contracts with Private Companies: Some Lessons from the Channel Tunnel
40	C.G.F. Simkin	Closer Economic Relations Between Australia and New Zealand
41	U.R. Kohli	Relative Price Effects and the Demand for Imports
42	W.J. Merrilees	Alternative Models of Apprentice Recruitment: with Special Reference to the British Engineering Industry
43	P. Saunders	Price Determination in Australian Manufacturing Firms: A Cross-Section Study
44	W.P. Hogan	Immigration Policies and Issues
45	W.J. Merrilees	Labour Market Segmentation in Canada: A Translog Approach
46	W.J. Merrilees	Pricing Strategies in the Newspaper Industry
47	J.L. Whiteman	The Micro-Foundations of Layoffs and Labour-Hoarding
48	U.R. Kohli	On the Duality between Fixed and Flexible Exchange Rates.
49	U.R. Kohli	Nonjoint Technologies
50	P. Saunders	Price Determination, Expectations Formation and some Tests of the Rationality of Australian Price Expectations
51	J.L. Whiteman	Rational Choice, Learning-By-Doing and the Personal Distribution of Income.
52	J.L. Whiteman	Firm- Specific Human Capital, Experience and the Differential Incidence of Unemployment.
53	J. Yates	An Analysis of Asset Holdings in Australia By Income Class.
54	J. Yates	An Analysis of the Distributional Impact of Imputed Rent Taxation.
55	G. Mills	Investment in Airport Capacity - A Critical Review of the MANS Study
56	V.B. Hall & P. Saunders	Pricing Models In Australian Manufacturing The Evidence From Survey Data.
57	P. Saunders	How Rational are Australian Price Expectations?
58	F. Gill	The Costs of Adjustment and the Invisible Hand with Special Reference to the Labour Market

59	G. Mills & W. Coleman	Peak Load Pricing and the Channel Tunnel: A Re-Examination
60	J. Yates	Access to Housing Finance and the Campbell Report: the Implications of Implementing the Recommendations of Chapter 37.
61	S.S. Joson	The Gatt Agreement on Government Procurements: Canada and Australia.
62	R.T. Ross	General Report of the 1980 Survey of Work Patterns of Married Women in the Sydney Metropolitan Region
63	W.J. Merrilees	Pension Benefits and the Decline in Elderly Male Labour Force Participation

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

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

Working Papers in Economics published or accepted for publication elsewhere

2.	I.G. Sharpe & R.G. Walker	Journal of Accounting Research, Fall, 1975, 293-310.
3.	N.V. Lam	Journal of the Developing Economies vol. 17, No. 1, March 1979.
4.	V.B. Hall & M.L. King	New Zealand Economic Papers, 1976, 118-51.
5.	A.J. Phipps	Economic Record, September 1977, 297-319.
6.	N.V. Lam	Journal of Development Studies, vol. 14, No. 1, October 1977.
7.	I.G. Sharpe	Australian Journal of Management, April 1976, 85-106.
9.	W.P. Hogan	Economic Papers, No. 55, The Economic Society of Australia and New Zealand, 29-57.
12.	I.G. Sharpe & P.A. Volker	Economics Letters, 2, 1979, pp.45-49.
13.	I.G. Sharpe & P.A. Volker	Kredit und Kapital, vol.12, No. 1, 1979.
14.	W.P. Hogan	Some Calculations in Stability and Inflation, A.R. Bergstrom et.al. (eds), John Wiley and Sons, 1978.
15.	F. Gill	Australian Economic Papers, vol. 19, No. 35, December 1980.
18.	I.G. Sharpe	Journal of Banking and Finance, 4, 1980, pp. 283-300.
21.	R.L. Brown	Australian Journal of Management, vol. 3, No. 1, April 1978, 17-36.
23.	I.G. Sharpe & P.A. Volker	The Australian Monetary System in the 1970s, M. Porter (ed.), Supplement to the Economic Record, 1978.
24.	V.B. Hall	Economic Record, vol. 56, No. 152, March 1980, 69-81.
25.	I.G. Sharpe & P.A. Volker	Australian Journal of Management, October 1979, pp. 119-134.
27.	W.P. Hogan	Malayan Economic Review, vol. 24, No. 1, April 1979.
28.	P. Saunders	Australian Economic Papers, vol. 19, No. 34, June 1980.

29.	W.P. Hogan I.G. Sharpe & P.A. Volker	Economics Letters, 6, 1980, 373-379.
29.	W.P. Hogan I.G. Sharpe & P.A. Volker	Economics Letters, 7, 1981, 69-74.
30.	W.P. Hogan	Australian Economics Papers, Vol. 18, No. 33, December 1980.
33 & 36	W.P. Hogan & F.F. Pearce	The Incredible Euro-Dollar, Allen and Unwin, London 1982, pp. 144.
39.	G. Mills	Journal of the Operational Research Society 33 (1982), 505-514.
43.	P. Saunders	Australian Economic Papers, Vol. 19, No. 35, December 1981.
50.	P. Saunders	Economic Record, Vol. 57, December 1981.
55.	G. Mills	Seventh Australian Transport Research Forum-Papers Hobart, 1982, pp. 171-210.
59.	G. Mills & W. Coleman	Journal of Transport Economics and Policy, forthcoming