Bank of England

Discussion Paper No.1

Personal savings: the impact of life assurance and pension funds

by

A.R.Threadgold

October 1978

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Introduction[1]

1 The aim of the paper is threefold: first, to attempt to discover whether saving through the medium of private pension funds and life assurance substitutes for other personal saving or whether, and to what extent, it results in a net addition to personal sector saving; second, to cast some light on the effect on the composition of personal sector saving of the special tax treatment of life assurance and pension saving; and third, to analyse the impact of unfunded pension schemes on personal sector saving.[2]

2 The data on life assurance and pension fund saving are imperfect. In particular, it is not possible to separate pension from life assurance business, nor within the life assurance category to separate single premium from contractual premium business. The annual data for life assurance and pension funds in the Central Statistical Office's National Income and Expenditure (the 'Blue Book') are rather weakly based, as indeed is the quarterly series for the net inflows into life assurance and pension funds. The main conclusions from the time series analysis in Section 3 are, therefore, at best very tentative and must be treated with caution.

[1] I should like to thank L.A.Dicks-Mireaux, C.T.Taylor and other members of the Economic Intelligence Department of the Bank, the Inland Revenue, the Government Actuary's Department and the Central Statistical Office for helpful comments on earlier versions of this paper.

[2] This paper does not consider the normative issue of whether higher or lower personal sector saving is desirable or undesirable. This is a very difficult area because there is a trade-off between short-run cyclical considerations, whereby a lower saving ratio would stimulate demand and output, and a longer-run view that a lower saving rate could act as a constraint on the growth of investment and productive potential. Nor does the paper consider the effect of state pension arrangements on personal sector saving. For quantitative results in this area, see Feldstein (1974), and Hemming (1978).

Some general considerations

3 Individuals save (accumulate assets) during years of peak earning potential in order to finance later consumption because earning capacity declines beyond a certain age and because of uncertainty about future incomes. In the absence of state schemes and private pension funds, individuals would save and accumulate wealth for their retirement, and would probably attempt to prolong their working life. The effect of funded pension schemes on aggregate personal saving vis-a-vis a situation of no pension schemes thus largely depends on:

(i) the impact of funded pension schemes on the age of retirement; and

(ii) the extent of substitution of assets accumulated within pension funds for private accumulation - assuming that wages received by the individual would be reduced to reflect fully employers' contributions into the superannuation fund.[1]

Effect of retirement age on saving

4 The earlier retirement is taken, the greater the saving that the individual would require to make during his active working life in the absence of some form of pension scheme. In contrast, later retirement will mean greater life-time earnings, and less need to save to finance future consumption.

5 In aggregate, with a stable population, and a stable age distribution, the stock of savings would be higher for any given level of income, if individuals opted for earlier retirement. In such a steady state, the flow of saving - once the new higher stock of savings had reached an equilibrium - would be higher in the early retirement case only if

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[1] If nominal wages were not fully reduced, either profits and gross trading surpluses would be squeezed, or prices (and taxes) would rise. In the former case, company sector saving would fall, probably more than offsetting the rise in personal sector saving. In the latter case, real wages net of deductions would fall to reflect fully the higher employees' and employers' contributions: the analysis would be the same as in the text, but in real rather than nominal terms.

each successive generation wished to finance a higher real level of consumption during retirement. With a growing population, the optimum stock and flow of saving would both be higher in the early retirement case. Of course, the disequilibrium period during which the actual stock of savings adjusted towards the optimum as the average desired retirement age declined would be long. Thus, there is little doubt that the effect of a reduction in the desired retirement age would be for the flow of aggregate saving, at any given level of income, to be increased.

6 This, however, begs the question of what would happen to aggregate output and income if there were a pronounced switch to earlier retirement. Logically, potential output and income would decline because earlier retirement would reduce the total labour input in production. But to the extent that output is constrained by the balance of payments rather than by the availability of resources, the effective maximum level of output would be unchanged. If the economy were working at less than full employment, actual output and income could be maintained by reducing underemployment and unemployment,[1] but in considering the long-run implications of structural change, it must be assumed that the economy is maintained at full employment.[2] The result of earlier retirement would therefore be a lower level of output and real income with a higher personal saving ratio. The exact impact on the level of saving is indeterminate: it depends on the precise extent of the fall in output which may be affected by some tendency to work longer hours while seeking earlier retirement, and on the nature of government action to maintain full employment.[3]

Effect of pensions on retirement age

7 The role of pension funds in encouraging earlier retirement is unclear. Company-based pension schemes typically specify the rate of

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[1] The switch from unemployment to employment, ceteris paribus, would probably be associated with a higher saving ratio.

[2] The higher saving ratio implied in paragraph 5 would require fiscal or monetary action to maintain full employment, except in so far as the rate of interest fell and stimulated additional investment.

[3] In time, potential output may be higher if people save more in absolute terms despite the shorter working life, because the higher stock of financial wealth may imply a larger physical stock of capital.

contributions, and the age of retirement (or at least an upper limit); and membership is normally compulsory.

8 There is some anecdotal evidence to suggest that, given the existence of the state pension scheme, pension scheme saving may be associated with an earlier retirement age. It is not clear, however, whether the causation runs from earlier retirement to higher saving, or whether the high saving encourages the adoption of earlier retirement. In particular, many schemes incorporate compulsory retirement for men at sixty, some years before the state pension is paid, and probably some years before the average retirement age of self-employed persons who have greater freedom to determine the pattern of life-time saving and the age of retirement. These assertions are not readily testable, and the effects of pension fund saving on retirement age probably cannot be disentangled from the substitution effects discussed below.

Substitution of pension fund saving for voluntary saving

9 The extent of substitution of pension fund saving for other (voluntary) saving would seem to depend on:

(i) The degree of awareness of, and the valuation put upon, pension rights by individuals. There may be some tendency for individuals to underestimate the value of the annuity which the pension funds will buy for them on retirement, and thus to supplement pension saving by other saving by more than necessary when seen ex post. In addition, the realisation of full pension benefits may depend upon continuity of employment, and, of course, the equity in a pension scheme is illiquid. These characteristics may lead to a relatively low valuation of pension rights.

(ii) Whether the compulsory nature of pension saving may force some individuals to save more than they would otherwise have done.

(iii) Whether pension funds are able to provide annuities on more favourable terms than individuals could buy themselves. This possibility is not explored further here, but, if this were the case, pension funds may tend to reduce household saving unless the higher rate of return encouraged more saving.

(iv) The value of tax concessions given to life assurance and pension fund saving as compared with private voluntary saving. The tax system gives a powerful incentive to pension fund and to a lesser extent to life assurance saving, and to owner-occupied housing as compared with most other forms of voluntary saving with the possible exception of some national savings and gilt-edged stocks.[1]

10 Whether the tax concessions affect saving will depend on whether saving through life assurance and pension funds (LAPFs) is marginal or intra-marginal. If pension saving is intra-marginal, the tax concession results in a subsidy to saving that would have occurred anyway, and its only effect is to raise disposable income. Moreover, if it can be assumed that the tax revenue forgone by the tax concessions will be exactly offset by compensating higher other (income) tax receipts, saving may be unchanged because the compensating taxes would reduce disposable income by an equivalent amount to the increase resulting from the tax concession. If the incidence among individuals of the compensating tax is different from that of the tax concessions to LAPF saving, aggregate saving would change.

11 If, on the other hand, saving through LAPFs is marginal, the tax concessions which increase the rate of return to the saver will encourage additional saving to some degree.[2] The compensating other tax receipts will reduce both consumption and saving, but the presumption is that saving will increase.[3]

12 If the compensating other taxes are adjusted not to maintain revenue but to achieve a given level of aggregate demand, then the posited behaviour of saving will determine the magnitude of the 'compensating other taxes'. If tax concessions to LAPF saving

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[1] These points are dealt with in more detail in Appendix A.

[2] Tax concessions tend to become capitalised in asset values - which is particularly important in relation to housing and is likely to affect relative post-tax returns on different assets and the distribution of savings. In the case of LAPF saving, however, the tax concessions are not capitalised, and the rate of return is accordingly relatively attractive. The authorities attach limits to the amount of saving subject to tax concessions to avoid too great an erosion of the tax base.

[3] Feldstein (1977a).

increase aggregate saving, the existence of the concessions will permit both higher personal disposable income and personal saving for any given level of aggregate demand.

13 The conclusion is that LAPF saving is likely to increase aggregate personal saving but by significantly less than on a one-for-one basis.

Time series analysis

14 The life funds of life assurance companies and the funds of superannuation schemes are considered to be the collective property of households. The revenue account of LAPFs gives the following identity: the net inflows into LAPFs must equal employees' and employers' contributions to LAPFs plus net property income received by the funds;[1] and wages and salaries are measured before deduction of employees' contributions. Total personal income does not, however, include pensions etc. paid by the funds. Saving is defined as total personal income after tax and national insurance contributions less consumers' expenditure (the latter includes the administrative expenses of LAPFs). Personal sector saving therefore includes the net inflows into LAPFs, while personal disposable income includes employees' and employers' contributions to the funds and the property income of the funds but not pensions and other benefits paid by LAPFs (Central Statistical Office, 1968).

15 A simple test of the impact of LAPF saving on aggregate personal saving has been proposed by Feldstein (1977a). Briefly, the test is to incorporate the net inflow into LAPFs as an additional explanatory variable in a saving equation which already includes an income term. It should be remembered that over the post-war period the state pension scheme in the United Kingdom has provided a more or less adequate basic income to retired persons. The test for this country is thus of the impact of LAPF saving on aggregate personal saving, given the existence of the state pension scheme.[2]

[1] Property income is net of payment of interest and, in the case of life assurance only, of tax on interest and dividend income.

[2] Changes in the value of pension rights, as opposed to state pensions paid, do not enter the estimated consumption functions. Attempts by Hemming (1978) to incorporate pension rights in aggregate consumption equations for the United Kingdom yielded inconclusive results. Their omission is unlikely to bias the results severely.

16 A simple model of the form:

$$S = a_o + a_1 \text{ RPDI} + a_2 Z \qquad (1)$$

where

S = personal sector saving, at 1970 prices
RPDI = real personal disposable income, at 1970 prices
Z = other explanatory variables

can be expanded to include the real net inflow into LAPFs, viz.:

$$S = a_o + a_1 \text{ RPDI} + a_2 Z + a_3(\text{NLPF/PC}) \qquad (2)$$

where

NLPF = the net inflow into LAPFs
PC = implicit deflator of consumers' expenditure.

17 Equation 2 tests to determine the consequences for personal sector saving of a change in saving through LAPFs. The size and significance of the coefficient on the real net inflow into LAPFs (a_3) will show what the response of total personal sector saving has been to a change in the net inflow into the funds assuming personal disposable income to have been held constant. The net inflow into LAPFs may change, and leave personal disposable income constant in the short run, when employees' contributions change, or when administrative expenses change, or when pensions and other benefits paid change (see paragraph 14). As the last two instances are relatively unimportant, the analysis concentrates upon the effect of changes in employees' contributions.

18 If employers' contributions or property income receipts of the funds change, then, ceteris paribus, both personal disposable income and the net inflow into LAPFs will change. The test for the response of total personal saving to a change in employers' contributions to the funds or to a change in net property income receipts of the funds is the size and significance of the sum of the coefficients ($a_1 + a_3$) on RPDI and NLPF/PC in Equation 2. In the longer run, however, higher employers' contributions probably substitute for higher wages. In this case the test for the effect on total personal saving will be the same as in the case of employees' contributions; namely, the size of the coefficient (a_3), assuming the substitution between employers' contributions and wages is complete.

19 Two alternative extreme hypotheses are tested:

(i) The add-on hypothesis

This hypothesis states that the largely contractual saving through the medium of LAPFs results in a one-for-one increase

in total personal saving. In other words, persons' voluntary or non-contractual saving is not affected at the margin by changes in their pension or life assurance arrangements. If this were the case, the expected value of a_3 might be expected to be unity, but because a_1 is typically positive it is most unlikely that a_3, and $(a_1 + a_3)$, could both be unity. For higher employers' contributions and net property income of the funds (wages unchanged) to add on on a one-for-one basis, the sum of the coefficients $(a_1 + a_3)$ would need to be unity, implying that $a_3 = (1 - a_1)$, and that higher employees' contributions did not add on to personal sector saving on a one-for-one basis. It thus seems appropriate to specify this hypothesis in terms of employers' contributions and net property income of the funds (implying incomplete adding on in the case of employees' contributions). Under this hypothesis the expected value of a_3 is $(1 - a_1)$.

(ii) The substitution hypothesis

The second hypothesis holds that total personal saving is unaffected by changes in net inflows into LAPFs: households perceive accurately the changes in contractual saving and in saving within the funds on their behalf and adjust their voluntary saving accordingly. Total personal saving is determined by demographic factors, wealth and income, and is unaffected by changes in any one element of saving for contractual or other reasons. The expected value of a_3 under this hypothesis is zero. This implies that the sum of the coefficients $(a_1 + a_3)$ is positive $(= a_1)$ so that complete substitution would not be expected in the case of higher employers' contributions or higher net property income of the funds.[1]

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[1] An alternative approach is to define personal disposable income net of LAPF elements, and incorporate NLPF/PC separately. This does not permit the distinction, say, between the effects of employees' and employers' contributions (the coefficient on NLPF/PC would apply to changes in LAPFs for whatever reason). One set of results is given in Appendix B. To isolate fully the differential effects of the various components of the revenue account of LAPFs on saving, each component would have to be incorporated separately (and RPDI defined net of the relevant elements). This was not attempted, primarily because of the limitations of the data but also because of probable multi-collinearity problems.

Table A

Regression results using Bank model type equations[a]

Estimation period: 1963 4th quarter - 1977 2nd quarter

Dependant variable	$(\frac{NLPF}{PCND})$	Constant	$(\frac{YD-YJG}{PCND})$	$(\frac{NLAJ_{-1}}{PCND})$	$(\frac{NLAJ_{-2}}{PCND_{-1}})$	$CNDA_{-1}$	D731	D68C	Q_1	Q_2	Q_3	u_{t-1}	s.e.	$\bar{R}^2$	χ^2	
CNDA		797.77	0.1980	0.0744	-0.0370	0.4799	144.15	1.10	-25.01	35.47	32.23	-0.3464	34.93	0.9907	5.87	(1)
		(4.90)	(6.23)	(4.24)	(1.80)	(5.96)	(3.97)	(3.13)	(1.44)	(2.50)	(1.80)	(2.26)				
CNDA	-0.2670	659.90	0.2481	0.0810	-0.0465	0.4713	171.24	1.03	-26.29	37.77	27.75	-0.4151	31.62	0.9924	9.34	(2)
	(3.32)	(4.57)	(7.56)	(5.26)	(2.57)	(6.66)	(5.14)	(3.23)	(1.53)	(3.02)	(1.57)	(2.80)				

Estimation period: 1966 2nd quarter - 1977 2nd quarter

Dependent variable	$(\frac{NLPF}{PCD})$	Constant	YCDL	RMD	DRML	$(\frac{NLAJ_{-1}}{PCD})$	$(\frac{SCD\not{S}_{-1}}{PCD})$	$\frac{LHZN}{PCD}$	$(\frac{PCD}{PCND})$	(RCBR+2) -PEXP	D68C· YCDL	D721· YCDL	D731· YCDL	s.e.	$\bar{R}^2$	D.W.	
CD		-1515.66	0.0879	-7.31	-7.05	0.0275	-0.0187	0.1508	1136.88	-3.2066	0.018	-0.006	0.017	26.4	0.9607	1.9	(3)
		(2.57)	(2.95)	(6.08)	(1.09)	(7.72)	(0.96)	(1.81)	(2.60)	(2.20)	(4.97)	(1.78)	(4.86)				
CD	0.2742	-1514.88	0.0614	-6.24	-7.14	0.0279	-0.0206	0.0989	1204.14	-3.4053	0.017	-0.006	0.016	24.3	0.9667	1.8	(4)
	(2.65)	(2.80)	(2.10)	(5.30)	(1.20)	(8.50)	(1.15)	(1.25)	(2.99)	(2.54)	(5.16)	(1.91)	(4.85)				

where

$CNDA = CND - [0.6(YJG/PCND) + 0.3(YJG/PCND)_{-1} + 0.1(YJG/PCND)_{-2}]$

CND = non-durables consumption, at 1970 prices
YD = personal disposable income
YJG = current grants from general government to persons
PCND = implied deflator of non-durables consumption
NLPF = net inflow into life assurance and pension funds
NLAJ = net liquid assets of persons
CD = durables consumption, at 1970 prices
YCDL = constructed smoothed series of personal disposable income deflated by PCD
PCD = implied deflator of durables comsumption
RMD = minimum HP deposit rate
DRML = constructed sum of changes in RMD
SCD$\not{S}$ = stock of consumer durables
LHZN = flow of building society mortgage advances (net)
RCBR = clearing banks' base rate
PEXP = constructed price expectation series

[a] Figures in brackets are t-statistics.

20 The method used in this paper was to estimate consumption functions - partly because the existing Bank short-term model[1] has disaggregated consumption into durables and non-durables expenditure, and the counterpart saving equation would be unwieldy and very difficult to estimate. However, the implied estimate of a_1 and a_3 in Equation 2 can be easily derived from the consumption function.[2] Appendix B gives detailed results of various estimated consumption functions, but the results using consumption equations of the type incorporated in the Bank model are given in Table A opposite, and the essentials summarised in Table B.

Table B

Implied coefficients on (NLPF/PC) and real disposable income in saving Equation 2 as derived from Equations (2) and (4) in Table A[a]

		CND equation	CD equation[b]	Total saving
a_3	current period	+0.27	-0.27	-
	long run[c]	+0.51	-0.27	+0.24
a_1	current period	+0.75	+0.02	+0.77
	long run[c]	+0.53	+0.06	+0.59
$(a_1 + a_3)$	current period	+1.02	-0.25	+0.77
	long run[c]	+1.04	-0.21	+0.83

[a] For derivation of the numbers in Table B from Table A see footnote [2] below.

[b] YCDL in the durable equation is defined as:

$$0.3(YD - YJG)/PCD + 0.7\ YCDL_{-1}.$$

[c] Ignoring long-run feedbacks through saving and the acquisition of liquid assets which, if included, would tend to reduce the saving coefficients. The long run in this context is the effect after two or three years; the adjustment coefficient, λ, in the CND equation (see Appendix B, Equation 6) is 0.53.

21 The results for the durables equation are surprising and disappointing: the coefficient a_3 is wrong-signed, and the size of the coefficient is such that taken at face value it, together with

[1] The form of the durables equation used in this paper is slightly different from that currently in the Bank model. Copies of the model listing are available from the Economic Intelligence Department of the Bank on request.

[2]
$$S = a_1\ RPDI + a_3(NLPF/PC) \quad (3)$$

$$S = RPDI - C \quad (4)$$

$$C = (1 - a_1)\ RPDI - a_3(NLPF/PC) \quad (5)$$

the coefficient in the CND equation, implies that in the current period increased saving through higher employees' contributions to LAPFs, ceteris paribus, has no effect on total saving. It seems implausible that net inflows into LAPFs could have equal and opposite impact effects on expenditure on non-durables and on durables. Even so, the size of the coefficient on (NLPF/PCD) was largely unaffected by the inclusion or exclusion of other minor variables from the equation. But the chief effect on the durables equation of including (NLPF/PCD) was to reduce the coefficients on disposable income and mortgage advances quite substantially. As the (NLPF/PCD) series increased most rapidly during the period 1971-73, coincidentally with a consumer durables expenditure boom, this suggests, perhaps, that the correlation of (NLPF/PCD) and CD is spurious. Indeed, when the coefficient on (NLPF/PCD) is set at zero the standard error of the equation is little changed, and the coefficient on the income term appears more plausible. In Equation (3) in Table A the marginal propensity to consume durables (MPCD) is close to the average, whereas in the equation with (NLPF/PCD) included, the MPCD out of household income is only about two thirds of the average. Over time the average propensity has tended to rise slowly so that the expected value of the MPCD is close to or a little above the average propensity to consume durables. Setting a_3 in the durables equation at zero, therefore, results in a more plausible equation. This assumption is carried forward throughout the subsequent analysis.[1]

22 The results for the non-durables equation on their own conform closely with those expected under the add-on hypothesis: the sum of the coefficients a_1 and a_3 is unity. The propensity to save out of income (coefficient a_1) after two or three years, as derived from the CND and CD equations, appears high (0.6), but it does exclude feedbacks from saving through the accumulation of liquid assets to consumption.

23 These results suggest that an increase in LAPFs resulting from higher employees' contributions (as indicated by the value of a_3)

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[1] An alternative way of viewing the results would be to regard real personal saving as given by [(YD/PC) - CND]. That is, 'saving' includes the purchase of durables. To be theoretically correct CND should include the implied rental value of durable goods, but this omission is unlikely to affect the fit of the CND equation very much.

will result in some offsetting reduction in other saving. The point estimates of Equation (2) in Table A[1] indicate that, after two or three years, for every £1 increase in employees' contributions and premium payments to life assurance companies, other saving of persons will fall, ceteris paribus, by just over £0.5. The model does not explicitly pick up very long-run influences such as those due to changes in income distribution, to changes in pension arrangements, or to large changes in the coverage of private pension schemes, all of which are assumed to be zero in the time series analysis.

24 Where, however, the inflow into LAPFs is due to higher employers' contributions (wages unchanged) or to higher (net) interest and dividend income accruing to the funds etc. (as indicated by the sum of the value of coefficients a_1 and a_3 in the CND column in Table B) there appears to be no discernible substitution for other saving; instead there appears to be a virtual one-for-one addition to personal sector saving, even after two or three years. Where higher employers' contributions are associated with lower wages, other saving will fall by just over half of the increase in contributions.

25 The estimates should be treated with extreme caution, not only because of the problems with the durables equation, but also because the results have been obtained from quarterly data covering only a short period of fourteen or so years. In addition, the real net inflow into LAPFs is clearly highly correlated with various components of disposable income[2] - both the wage and the property income elements - and the danger of spurious estimated relationships is great. Appendix B attempts to test the hypothesis using other models - with limited success.

26 For the United States, Feldstein (1977a) using a much longer run of annual data - from 1929 to 1974 - derived an insignificant point estimate of a_3 in Equation 2 of +0.35. While this result is

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[1] Other models using similar data give a range of estimates (see Appendix B). In addition there is some evidence to suggest that the point estimates are not very stable over time.

[2] For example, the simple correlation coefficient of (YD-YJG)/PCND on (NLPF/PCND) is 0.93.

consistent with the substitution hypothesis (a_3 not significantly different from zero), the point estimate is close to the estimates given in Table B and in Appendix B.

27 Thus, the very tentative conclusion of the time series analysis is that aggregate personal saving has been increased by LAPF saving, more or less on a one-for-one basis, except when the increase resulted from higher employees' contributions or premium payments on life assurance policies or when higher employers' contributions were associated with lower wages, in which cases aggregate saving was increased by less than one half.

Cross-section studies

28 Time series analysis - particularly with a short run of data - has severe limitations. An alternative approach, and in theory at least, a more fruitful one, is to test for the influence of pension fund and life assurance contributions and rights on other saving using standard cross-section analysis techniques. This section first reviews the literature - wholly North American in origin - and then briefly discusses the feasibility of undertaking a cross-section study using UK data.

Survey of the literature

29 Early papers by Cagan(1965) and Katona(1965) concluded that persons covered by private pensions may save more than persons not covered by pensions. Cagan analysed data generated by a postal survey of US 'Consumer Union' subscribers - by no means typical consumers. A regression equation implied that an increase in the individual's rate of pension contribution was associated with a higher level of direct or discretionary saving. Katona analysed data collected by a University of Michigan survey of randomly selected households and also found that participation in a pension plan raised other saving when age and current income were taken into account.

30 Cagan defended his results in terms of a 'recognition effect': when an individual is 'forced' to participate in a pension plan , he recognises for the first time the importance of saving for his old age. Katona(1965, p.4) added a second explanation: according to the psychological research 'goal gradient' hypothesis, 'effort is intensified the closer one is to one's goal'. However, Feldstein(1974) argues that these findings can be explained by extending the life-cycle hypothesis of saving to make the extent of retirement endogenous. Persons covered by pensions have an incentive to retire earlier than they otherwise would, but at the same time need to increase their other saving to finance consumption over the longer retirement period (see Section 2 of this paper).

31 Despite the intellectual effort involved in explaining the apparently perverse results of Cagan and Katona, later work -

particularly by Munnell - has tended to throw up results more in line with the time series results reported for the United Kingdom in the previous section of this paper. Indeed, Munnell(1974) reanalysed Cagan's data using a multiple regression model which incorporated demographic and economic characteristics and found a very weak and completely insignificant negative effect of pension saving on other saving.

32 Work on Canadian data by Schoeplein(1970) found that lower and middle income classes do substitute - albeit imperfectly - pension contributions for alternative forms of (contractual) retirement saving.[1] Other forms of 'retirement' saving in Canada, and pension contributions, are tax-deductible when invested in one or more of several savings media, up to various ceilings: there are restrictions both on the forms of saving and penalties for withdrawal prior to retirement age. Licensed annuities (including the annuity element of life assurance policies), special life assurance contracts and special federal government old age income bonds are eligible. However, he found that other retirement saving complemented pension saving in the highest income groups which, because of tax inducements, have high propensities to save in all forms.

33 Munnell(1976) using longitudinal panel data found that male employees over forty-five years have a lower stock of direct or discretionary savings when they have private pension rights, although not lower by as much as the net present value of the benefits. The evidence suggests some substitution between discretionary and contractual saving.

34 Thus, on the basis of North American data, the cross-section econometric evidence is inconclusive, though the later evidence - and the more sophisticated treatment of earlier studies - does point to there being a small substitution effect.

Possible research using UK data

35 The Department of Employment Family Expenditure Survey (FES) collects information on expenditure, and income, and, in addition, separates out life assurance premiums and contributions to private

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[1] In equations for the various lower to middle income ranges with other 'retirement' saving as the dependent variable, the significant coefficients on pension contributions ranged from -0.12 to -0.56 although most fell in the -0.25 to - 0.45 range.

pension funds, by household. It should, therefore, be possible to run cross-section regressions, probably for each income bracket, with household discretionary saving specified as a function of age and sex of head of household, number and age of children and other members of the household, income, type of housing tenure, employment status, and the amount of contributions to life assurance and/or pension funds. But, the survey is primarily a survey of expenditure on goods and services by households, and income information is only collected to enable the classification of households into income groups. The difference between reported expenditure and reported income is not a reliable measure of saving or dissaving. Although most of the income information obtained is on a current basis, income from investment, self-employment and some other sources relates to a previous twelve-month period, so that all the information does not relate to a common time period. Information on changes in financial and other assets is not collected. For these reasons any test for the influence of LAPF saving on other saving using the FES is unlikely to be reliable.

Implications of the form of pension scheme arrangements for personal sector saving

36 The very tentative conclusion to be drawn from the time series analysis, and from the review of North American cross-section studies, is that there is less than full substitution of saving through LAPFs for other saving. Where saving is made explicit to the individual through marginal changes in employees' contributions and premiums on life assurance policies, or where employers' contributions to pension funds substitute for wages paid, substitution is about one half. Higher employers' contributions and net property income of the funds, ceteris paribus, increase personal sector saving almost pound for pound.[1][2]

37 The spread of funded pension schemes to cover a larger proportion of the working population would increase aggregate personal sector saving quite significantly. The scope for extending the membership of private funds is, however, relatively limited. Excluding the 2 1/2 million or so public sector employees in 'pay-as-you-go' schemes, probably almost half of all employees are in private funded schemes. Of the 10 million workers not covered, probably 4 million are ineligible for a funded scheme because of age, insufficient service or part-time or temporary employment.

38 The net inflow into LAPFs has risen from about 4 3/4% of personal sector disposable income in the late 1960s to about 6 1/2% in the mid-1970s. This increase is probably due more to the enhancement of schemes, and to the need since 1975 to make good both the fall in the value of assets held and dividend and interest income received by the funds relative to the salaries of fund members, than to the wider coverage of schemes.

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[1] If these marginal coefficients are applied to the total net inflow into LAPFs, which is stretching credibility to the extreme, and assuming all inflows substitute for wages in the long term, the following picture emerges. In 1977, the net inflow into LAPFs was £6 billion (45.2% of personal sector saving): without LAPF saving, personal sector saving would have been about 25% lower.

[2] In the very long run, of course, higher contributions will be matched by higher pensions paid and will thus be consumed.

39 To the extent that the continued enhancement of private pension schemes may offset the effect of abandonment by some companies of their own schemes in favour of the new state scheme, the level of net inflows into LAPFs is likely to be maintained relative to personal disposable income. If this proves to be the case, the personal sector saving ratio could be about three quarters of one percentage point or, on extreme assumptions about the degree of substitution of contributions for wages,[1] 1 3/4 percentage points higher than the average of the 1960s (about 8 1/2%).

40 The results of the time series analysis may be used also to cast some light on the implications for personal sector saving of a switch from a funded to a state unfunded pension arrangement.[2][3] Under an unfunded scheme, contributions by or on behalf of current employees more or less match claims by retired persons. Given the security afforded by the state, an individual should be indifferent as between a state unfunded scheme, and a funded scheme which offered similar benefits. Initially, contributions and saving would be less under an unfunded scheme simply because there is no need to accumulate the fund.[4] Later in the life of the scheme, contributions would be less in a funded scheme because of the flow of income from the accumulated assets in the fund. Total contributions (employees' and employers') for and on behalf of an individual over his working and pensionable life would be identical under the two schemes, if the real interest rate were zero, and real final salaries and thus real initial

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[1] Assuming all of the net inflow into LAPFs to be the result of higher employers' contributions (or property income) paid for out of profits rather than wages.

[2] The wider issues, and particularly the dynamic problems of moving from funding to pay-as-you-go pensions are dealt with in two papers (as yet unpublished) submitted to the Committee to Review the Functioning of Financial Institutions (the Wilson Committee): a note by HM Treasury on 'Economic implications of switching pension schemes from funding to pay-as-you-go', and evidence by the Government Actuary's Department on 'The financing of occupational pension schemes'.

[3] The effects of a switch to a company unfunded scheme are dealt with in paragraph 42.

[4] In the United Kingdom at present, contributions to a state unfunded scheme would be about £2 billion as compared with the existing contributions of £4.4 billion (see HM Treasury, 'Economic implications of switching pension schemes from funding to pay-as-you-go').

pensions were constant.[1] If the rate of growth of real final salaries and real initial pensions exceed the real interest rate, the unfunded state scheme would have lower contributions.[2] With a growing population, aggregate contributions under an unfunded state scheme would tend to be lower because there is always a relatively high worker/pensioner ratio as compared with a situation in which both population and age distribution were stable.

41 It seems reasonable to assume that some reduction in discretionary saving results from an unfunded state pension scheme compared with a situation of no formal pension arrangements.[3] This assumption, together with the tentative conclusion earlier that net inflows into LAPFs tend to augment total personal saving, suggests that a switch from funded pension schemes to a state unfunded scheme (ignoring the problems of transition) would result in a fall in personal sector saving at any given level of income. A most important qualification is that the marginal coefficients deduced earlier in the paper are assumed, perhaps unjustifiably, to hold for a change in the whole structure of pension arrangements.

42 A switch from funded to unfunded company or industry pension schemes would tend to have broadly the same influence on personal sector saving as a switch to a state unfunded scheme with two potentially important provisos.

(i) The security provided by a private unfunded scheme based as it is on the future viability of the company or industry is poorer than for a state scheme. Discretionary saving may tend to be higher as a result.

(ii) The company could adapt its policies in a number of ways, one of which would be the distribution of its initially

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[1] Pensions in payment held constant in nominal terms, at the level given by the real initial pension.

[2] Indexation, or any enhancement of pensions in payment, swings the argument even further in favour of an unfunded state scheme.

[3] This is based on the evidence presented earlier in the paper on the impact of contributions, albeit to funded schemes, on savings and on the results of investigations of the marginal propensity to consume 'social security wealth' which indicate that the marginal propensity to consume this form of wealth could be as high as for other wealth. See Feldstein (1974, 1976a, 1976b, and 1977b), Munnell(1974 and 1976) and Hemming(1978).

reduced wages bill as higher dividends.[1] The equity market, if fully informed, would recognise that these higher dividends did not represent a permanent increase in the company's profitability but only a postponement of employee compensation until the pension is paid. Shareholders should save all of the dividend to maintain the net present value of their net worth but they are unlikely to do so. If the initially reduced wages bill is passed on in lower prices, real incomes, real consumption and real saving would increase, but the increase in real saving would be small relative to the fall associated with the initial cut in the wages bill because the marginal propensity to save out of real wages is low, say 0.1 or 0.2.

[1] One alternative is that companies could save the reduced wages bill: that is, the pensions would be informally funded by reinvesting in the business.

Summary

43 The tentative conclusions of the paper are that inflows into LAPFs (given the existence of the state pension scheme) result in a net addition to personal sector saving. Where an increase results from higher employees' contributions or from higher employers' contributions associated with lower wages, personal sector saving rises by probably about half of the higher contributions. In the case of an increase resulting from higher property income or employers' contributions, it may be almost fully reflected in higher personal sector saving. The relevant tax arrangements, outlined in Appendix A, appear to give a strong incentive towards this type of institutional saving, although the tax system also discriminates in favour of other forms of saving - notably through the treatment of owner-occupied housing. On the basis of present tax arrangements and assuming no sizable switch from private pension schemes to the new state scheme, this paper suggests that LAPF saving is likely to help maintain the saving ratio at a slightly higher level than in the late 1960s. Finally, a switch from funded to unfunded pension schemes (ignoring the problems of transition) would probably be associated with a fall in personal sector saving.

Appendix A

Tax arrangements for life assurance and pension fund saving

Introduction

44 The UK income and capital taxation system has evolved over a number of years: concessions have been given to various outlets for saving and investment which at some point in time have been regarded as worthy of special encouragement. For example, concessions have been given to owner-occupied housing, to gilt-edged securities, to national savings, to industrial and agricultural investment, as well as to saving through life assurance and pension funds (LAPFs). Concessions to one form of saving/investment are likely in some degree to counterbalance concessions to another form. It could be misleading to single out only the concessions to LAPFs. Those for owner-occupation - the tax deductibility of interest payments on the first £25,000 of mortgages when the imputed rent on owner-occupied houses is not taxable,[1] and the exemption of owner-occupied housing from capital gains tax - are clearly important counterweights to any concessions given to LAPF saving. However, the concessions to industrial investment tend to interact with, and reinforce, the effects of the concessions to LAPFs.

Treatment of life assurance and pension funds

45 The tax arrangements for LAPF saving are:

(i) Treatment of individuals' contributions to pension funds.

(a) Subject to certain limitations,[2] saving out of earnings of an employed person (including employers' contributions) which is placed with approved pension schemes is not subject to tax.

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[1] In terms of fiscal principle, mortgage interest would be a proper deduction if imputed owner-occupier rent was included in taxable income. This was the case under Schedule A. In the absence of a charge on imputed rent, the justification for the deductibility of mortgage interest is less clear.

[2] The rules of approved schemes are required to limit employees' contributions to 15% of earnings.

(b) Self-employed persons' saving, subject to a different and more restrictive set of limitations,[1] which is used for the purchase of an approved retirement annuity, is similarly exempt from income tax.

(c) Tax is charged on the full amount of the pension or annuity, which is treated as earned income, when received by the retired person. However, about one quarter of the total value of an individual's retirement benefit,[2] under some approved schemes, may be commuted as a lump sum, which is tax-free.

(ii) Treatment of pension funds and 'pension business' of life assurance companies. The investment income and capital gains which accrue to the pension or retirement annuity fund are exempt from tax, as also are underwriting commissions. There is no exemption from development land tax.

(iii) Treatment of individuals' saving through life assurance.

(a) Saving through premiums for life assurance, subject to certain limitations,[3] qualifies for income tax relief, but this relief is limited to half the basic rate. From 1979/80 onwards, this relief will be given by reducing qualifying premiums by 17% and so will not enter into the individual's tax return.

(b) Policyholders are not taxed on the proceeds of the policy. The amount paid on maturity of a life assurance policy can be regarded as a return of premiums, plus income and capital gains earned on the premiums by the life assurance company, less the costs of providing the policy (including the life assurance element).

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[1] Contributions up to 15% of net earnings (or in the case of 1977/78 and subsequent years £3,000 per annum if smaller) only are exempt. In earlier years the specific limit was lower.

[2] About one quarter commutation is possible where benefits in pension and cash are at or about the maximum the Inland Revenue permit. The cash limit is, however, up to 1 1/2 times final remuneration and where benefits are modest the proportion in cash form can be greater than one quarter, even up to 100%.

[3] Qualifying life assurance policies of ten years or more attract relief on total premiums not exceeding one sixth of total income for the year. From 1979/80, the relief must not exceed £1,500 per annum or one sixth of total income, whichever is the greater.

(c) Single premium and other non-qualifying policies do not attract relief at (a) above, and the excess of policy proceeds over premiums (unindexed) may be liable to higher-rate tax.

(d) Term insurance cover (under which nothing is paid by the insurance company if the policyholder survives to a stipulated date) attracts concessions under (a) and (b) above, and (iv) below.

(iv) Treatment of the 'non-pension business' of life assurance companies. The rate of tax on income received by insurance companies[1] which is earmarked for the benefit of policy-holders is restricted to 37.5% (not too dissimilar from the standard rate of income tax). Combined with (iii)(b), this effectively exempts policyholders from higher rates of income tax on income earned on their premiums.

46 The general treatment of saving under an income tax system is that saving takes place out of tax-paid income, and incomes derived from savings are by and large subject to income tax,[2] augmented in the United Kingdom by an investment income surcharge. The tax treatment of pension provision, in effect regards the pension as deferred pay, and specifically excludes from tax the various stages in the funding process. Thus, the contributions, both by employers and employees, are excluded from tax and, in the case of a funded scheme, so is the investment income of the fund. The pension paid out is taxed as earned income, although it is possible to provide for about one quarter of the total value of an individual's retirement benefit to be taken in the form of a tax-free lump sum. As the Meade Committee(1978) has pointed out, this tax treatment can be regarded as being consistent with an expenditure tax, where saving is exempt from tax. In this instance the pension paid out, which

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[1] Under section 26(2)(a) of the 1974 Finance Act, the policyholder's share of life assurance capital gains is charged at 30%. Because of the operation of the alternative charge for individuals (Section 21, 1965 Finance Act), this is a higher rate than would be charged to an individual with a marginal income tax rate of less than 60%, and/or if the individual was able to avail himself of the small disposals exemption.

[2] Some national savings interest is tax-free.

is used presumably almost wholly for consumption is taxed. The exemption from tax of any commuted lump-sum payment would not be consistent with an expenditure tax.

47 The present treatment of approved life assurance policies is more consistent with an income tax, rather than an expenditure tax: premiums are paid out of taxed income, income arising within the company from the premiums is taxed, and maturing policies are not taxed. Deviations from consistency in this treatment are:

(a) that premium payments enjoy half remission of basic rate income tax, and

(b) that income and capital gains accruing within the companies are taxed at only 37.5% rather than the policy-holders' marginal income tax rate.

48 The arrangements covering pensions and life assurance are therefore not wholly consistent with any system of personal taxation, although the treatment of pensions is broadly similar to that under an expenditure tax, while life assurance is treated more or less as under an income tax. The present personal tax system treats most other saving as under an income tax.[1]

49 The tax treatment of much fixed investment converts an apparent income tax as far as treatment of saving is concerned into a tax with many of the attributes of an expenditure tax. For example, investment in plant and machinery is entitled to 100% initial year capital allowance against corporation tax and income tax. The Meade Committee spells out the full implications, but provided that the business making the investment has other (sufficient)

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[1] The treatment of owner-occupied housing (both imputed rent and interest charges on mortgage tax exempt) is inconsistent with either an expenditure tax or with an income tax. The Meade Committee (1978 pp.221-2) view the appropriate expenditure tax treatment as being the taxation of imputed rent as consumption, and the allowance of mortgage interest and repayment as deductions. Under an income tax, imputed rent would be taxed as income and interest payments would be deductible.

tax liabilities it is able to invest the full amount saved before tax.[1]

Table C

Hypothetical example: investment in plant and machinery

	£		
1 Saver:[a]			
(i) saving pre-tax	200		
(ii) saving after tax (tax rate 50%)	100		
2 Investor:[a]			
(i) funds available from saver	100		
(ii) tax saving if investor invests 200 (50% tax rate)	100		
(iii) investment in plant and machinery	200		
3 Investment yields 10% per annum:[b]			
(i) return to investor, pre-tax	20	10%	(of 200)
(ii) return to investor, after tax (50% tax rate)	10	10%	(of 200)
(iii) return to saver, pre-tax (after tax credit of 50% of 200)	20	20%	(of 100 post-tax saving)
(iv) return to saver, post tax (50% tax rate)	10	10%	(5% of pre-tax saving)

[a] In the case of an unincorporated business the saver and investor may well be one and the same person.

[b] The symmetry of rates of return follow from the fact that the rate of advanced corporation tax is assumed to be the same as the individual saver's marginal income tax rate.

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[1] The chief allowances on capital expenditure are as follows:

(i) Plant and machinery: 100% initial year capital allowances, or at the discretion of the taxpayer, a lower initial year percentage with the balance written off at 25% on the written-down cost. Sale proceeds of such assets are taxed as income.

(ii) Industrial buildings: 50% initial year capital allowances of the cost of the structure (not the land), plus an annual allowance of 4% of the cost. The full cost is written off over twenty-five years regardless of subsequent sale proceeds, although if sold within the twenty-five years adjustments are made on sale to equate allowances with actual expenditure suffered.

(iii) Agricultural and forestry buildings and works: 20% initial year capital allowances, and the balance written off over eight years with no adjustments on subsequent sales.

(iv) Hotels: 20% initial year capital allowances, plus an annual allowances of 4%. The treatment of sales etc. is similar to that for industrial buildings.

(v) Other commercial buildings and rented houses: no depreciation allowances.

50 If the saver pays no tax - as in the case of saving through a pension fund - and the investing company has other tax liabilities against which to offset the capital allowances, the hypothetical example shows that the investor would be able to invest 400 in plant and machinery, for every 200 saved (pre-tax). Assuming a 10% return pre-tax to the investor, the pension fund would receive (no tax payable) 40 for every 200 saved (i.e. a 20% return), compared with 10 (i.e. a 5% return on pre-tax saving) for a taxpayer with a marginal tax rate of 50%. When the pension is paid (with tax levied at 50%) the rate of return on saving through the pension fund would drop to 10% (on pre-tax saving). To the extent that the pension is tax exempt, as in the case of a commuted lump-sum pension, the rate of return will be 20%.

51 The illustrative example on the previous page shows the great incentive to direct saving through pension schemes; the incentives for life assurance saving are not quite so marked, although the remission of half the basic rate tax on premiums, and the virtual exemption of property income accruing within the company from higher rates of income tax make life assurance relatively attractive - particularly to the very high marginal rate income tax payer.

Appendix B

Consumption functions: regression results

52 Bank model type equations[1]

The Bank equations for personal consumption of non-durable goods (CND) [Townend 1976] and durable goods consumption (CD) were re-estimated using data for the periods 1963 4th quarter - 1977 2nd quarter, and 1963 3rd quarter - 1977 2nd quarter respectively. The CND equation was freely estimated, with no constraint on the coefficient of lagged real net liquid assets being imposed.

The two equations on the Bank model are:

$$\begin{aligned} CND = {} & \lambda\alpha_o + \left[0.6\left(\frac{YJG}{PCND}\right) + 0.3\left(\frac{YJG}{PCND}\right)_{-1} + 0.1\left(\frac{YJG}{PCND}\right)_{-2}\right] \\ & - \lambda\alpha_1\left(\frac{YD - YJG}{PCND}\right) + \alpha_2\left(\frac{NLAJ_{-1}}{PCND}\right) - (1-\lambda)\alpha_2\left(\frac{NLAJ_{-2}}{PCND_{-1}}\right) \\ & + (1-\lambda)\left\{CND - \left[0.6\left(\frac{YJG}{PCND}\right) + 0.3\left(\frac{YJG}{PCND}\right)_{-1} + 0.1\left(\frac{YJG}{PCND}\right)_{-2}\right]\right\} \\ & + \text{seasonal and other dummy variables} + u - (1-\lambda)u_{-1}; \end{aligned} \tag{6}$$

$$\begin{aligned} CD = {} & \beta_o + \beta_1\, YCDL - \beta_2\, RMD - \beta_3\, DRML + \beta_4\left(\frac{NLAJ_{-1}}{PCD}\right) \\ & + \beta_5\left(\frac{SCD\$_{-1}}{PCD}\right) + \beta_6\left(\frac{LHZN}{PCD}\right) + \text{dummies} + u. \end{aligned} \tag{7}$$

The durables equation actually run incorporated two extra explanatory variables, namely (PCD/PCND), and [(RCBR + 2) - PEXP].

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[1] For further details see the Bank model listing, available on request from the Economic Intelligence Department, Bank of England.

Where

YJG = current grants from general government to persons
PCND = implied deflator of non-durables consumption
YD = personal disposable income
NLAJ = net liquid assets of persons
YCDL = a constructed smoothed series of personal disposable income deflated by PCD
PCD = implied deflator of durables consumption
RMD = minimum HP deposit rate
DRML = constructed sum of changes in RMD
SCDØ = stock of consumer durables
LHZN = flow of building society mortgage advances
RCBR = clearing banks' base rate (Bank rate prior to competition and credit control)
PEXP = a constructed price expectations series.

53 Disaggregated income non-durables consumption function

The following equation was estimated for the period 1968 1st quarter - 1977 2nd quarter:

$$CND^1 = \beta_1 \, YDPW + \beta_2 \, RTSM + \beta_3 \, YGRS + \beta_4 \, RYOE + \beta_5 \left(\frac{NLAJ_{-1}}{PCND^1}\right)$$

$$+ \beta_6 \, INF + \text{seasonal and other dummies} + u \qquad (8)$$

where

CND^1 = real non-durables consumption excluding owner-occupier imputed rent and estimated income in kind, plus household interest payments, less real disposable current grants (using lag distribution as in the Bank model - see above)
$PCND^1$ = implied deflator of non-durables consumption excluding owner-occupier imputed rent
RTSM = real personal tax allowances
YDPW = real disposable wage and pension income excluding income in kind and current grants but without allowance for RTSM
YGRS = exponentially smoothed, real disposable self-employment income (before deducting depreciation and stock appreciation)
RYOE = real disposable gross income from property of persons
INF = rate of change of $PCND^1$ over previous four quarters.

54 Life cycle hypothesis equation

An annual equation was estimated over 1967 to 1976:

$$C^1 = \alpha_o + \alpha_1 \, RYDW + \alpha_2 \left(\frac{NW_{-1}}{PC}\right) + u \qquad (9)$$

where

C^1 = real consumers' expenditure, adjusted to include the value of rental services of durable goods, to exclude consumption by non-profit-making bodies serving persons and life assurances and pension funds, and to include household interest payments

PC = implied deflator of total consumers' expenditure

RYDW = real disposable household wage and current grant income (including contributions to life assurance and pension funds), i.e. excluding disposable income from property

NW = net worth (CSO personal sector balance-sheet estimates).

55 HM Treasury non-durables consumption equation

Following work by Davidson and Hendry, the Treasury have recently incorporated in their model a new non-durables consumption equation of the following logarithmic form (Bean 1978):

$$\ln CND^2 = \ln CND^2_{-1} + \sum_{i=0}^{3} \alpha_i \Delta_4 \ln RPDI^2_{t-i}$$

$$- \alpha_5 \ln (CND^2/RPDI^2)_{-4} - \alpha_6 \Delta_4 \ln PCND^2$$

$$- \alpha_7 \Delta \Delta_4 \ln UR + \text{dummies} + u \qquad (10)$$

where

CND^2 = real non-durables consumption excluding owner-occupied rent

$RPDI^2$ = real personal disposable income excluding owner-occupied rent and stock appreciation

$PCND^2$ = implied deflator of CND^2

UR = unemployment rate.

56 LBS 'saving' equation

The London Business School have an equation for saving (LBS 1978), where 'saving' is defined as including expenditure on durables:

$$\frac{YD - YJG - CND\$ + 0.6YJG + 0.3YJG_{-1} + 0.1YJG_{-2}}{YD - YJG}$$

$$= \alpha_o + \sum_{i=0}^{2} \alpha_i \left[\Delta(YD - YJG)_{t-i} / (YD - YJG)_{t-i-1} \right]$$

$$+ \alpha_4 \frac{1}{3} \sum_{i=0}^{2} (YJO/YWS)_{t-i} - \alpha_5 (NLAJ/YD)_{-1} + u \qquad (11)$$

where

YJO = personal income other than income from employment and current grants

YWS = wage and salary income.

Table D
Regression results [a]

1 Bank model equations Estimation period: 1963 4th quarter - 1977 2nd quarter

Dependent variable	$(\frac{NLPF}{PCND})^{\prime}$	Constant	$(\frac{YD-YJG}{PCND})$	$(\frac{NLAJ_{-1}}{PCND})$	$(\frac{NLAJ_{-2}}{PCND_{-1}})$	$CNDA_{-1}$	D731	D68C	Q_1	Q_2	Q_3	u_{t-1}	s.e.	$\bar{R}^2$	χ^2	
CNDA		797.77	0.1980	0.0744	-0.0370	0.4799	144.15	1.10	-25.01	35.47	32.23	-0.3464	34.93	0.9907	5.87	(1)
		(4.90)	(6.23)	(4.24)	(1.80)	(5.96)	(3.97)	(3.13)	(1.44)	(2.50)	(1.80)	(2.26)				
CNDA	-0.2670	659.90	0.2481	0.0810	-0.0465	0.4713	171.24	1.03	-26.29	37.77	27.75	-0.4151	31.62	0.9924	9.34	(2)
	(3.32)	(4.57)	(7.56)	(5.26)	(2.57)	(6.66)	(5.14)	(3.23)	(1.53)	(3.02)	(1.57)	(2.80)				

where $CNDA = CND - \left[0.6\ (\frac{YJG}{PCND}) + 0.3\ (\frac{YJG}{PCND})_{-1} + 0.1\ (\frac{YJG}{PCND})_{-2}\right]$

Estimation period: 1966 2nd quarter - 1977 2nd quarter

Dependent variable	$(\frac{NLPF}{PCD})^{\prime}$	Constant	YCDL	RMD	DRML	$(\frac{NLAJ_{-1}}{PCD})$	$(\frac{SCD^{\beta}_{-1}}{PCD})$	$(\frac{LHZN}{PCD})$	$(\frac{PCD}{PCND})$	$(\frac{RCBR+2}{-PEXP})$	D68C·YCDL	D721·YCDL	D731·YCDL	s.e.	$\bar{R}^2$	D.W.	
CD		-1515.66	0.0879	-7.31	-7.05	0.0275	-0.0187	0.1508	1136.88	-3.2066	0.018	-0.006	0.017	26.4	0.9607	1.94	(3)
		(2.57)	(2.95)	(6.08)	(1.09)	(7.72)	(0.96)	(1.81)	(2.60)	(2.20)	(4.97)	(1.78)	(4.86)				
CD	0.2742	-1514.88	0.0614	-6.24	-7.14	0.0279	-0.0206	0.0989	1204.14	-3.4053	0.017	-0.006	0.016	24.3	0.9667	1.89	(4)
	(2.65)	(2.80)	(2.10)	(5.30)	(1.20)	(8.50)	(1.15)	(1.25)	(2.99)	(2.54)	(5.16)	(1.91)	(4.85)				

2 Disaggregated income non-durable equation Estimation period: 1968 1st quarter - 1977 2nd quarter

Dependent variable	$(\frac{NLPF}{PCND^1})^{\prime}$	YDPW	RTSM	YGRS	RYOE	$(\frac{NLAJ_{-1}}{PCND^1})$	D731	D68C	Q_1	Q_2	Q_3	INF	s.e.	$\bar{R}^2$	D.W.	
CND^1		0.5977	-0.4293	0.2046	0.6223	0.0824	152.60	0.86	-54.43	22.13	20.12	-7.046	43.72	0.9825	2.03	(5)
		(16.24)	(1.56)	(2.27)	(6.65)	(14.04)	(3.05)	(2.05)	(2.43)	(0.88)	(0.95)	(2.42)				
CND^1	-0.3709	0.6680	-0.5447	0.3727	0.5648	0.0707	169.63	0.98	-38.08	36.40	15.50	-10.1507	39.52	0.9857	2.30	(6)
	(2.65)	(15.71)	(2.15)	(3.61)	(6.47)	(10.26)	(3.71)	(2.56)	(1.80)	(1.56)	(0.81)	(3.53)				

3 Life cycle hypothesis equation Estimation period: 1967 - 1976

Dependent variable	$(\frac{NLPF}{PC})^{\prime}$	Constant	RYDW	$RYDW_{-1}$	$(\frac{NW_{-1}}{PC})$	s.e.	$\bar{R}^2$	D.W.	
C^1		7237.18	0.486	0.169	0.0206	212.8	0.9928	2.75	(7)
		(8.27)	(4.92)	(1.82)	(3.10)				
C^1	-0.3418	6590.82	0.571	0.131	0.0190	228.7	0.9917	3.00	(8)
	(0.44)	(3.80)	(2.61)	(0.99)	(2.40)				

4 HM Treasury model equation Estimation period: 1964 4th quarter - 1977 3rd quarter

Dependent variable	$\Delta_4 \ln \left(\frac{NLPF}{PCND^2}\right)$ [/]	$\Delta_4 \ln RPDI^2$	$(0.6\Delta_4 \ln RPDI_{-1}^2 + 0.3\Delta_4 \ln RPDI_{-2} + 0.1\Delta_4 \ln RPDI_{-3}^2)$	$\ln\left(\frac{CND^2}{RPDI^2}\right)_{-4}$	$\Delta_4 \ln PCND^2$	Δ_4 ln UR	Δ_4 D68C	s.e.	$\bar{R}^2$	D.W.	
$\Delta_4 \ln CND^2$		0.2693 (7.71)	0.2015 (5.12)	-0.1150 (10.37)	-0.1941 (10.09)	-0.0208 (2.55)	0.0001 (2.90)	0.0056	0.905	2.23	(9)
$\Delta_4 \ln CND^2$	-0.0096 (1.14)	0.2922 (7.27)	0.2004 (5.11)	-0.1123 (9.93)	-0.1876 (9.39)	-0.0237 (2.79)	0.0001 (3.04)	0.0056	0.906	2.31	(10)

5 London Business School 'saving' equation Estimation period: 1963 2nd quarter - 1977 3rd quarter

Dependent variable	$\frac{NLPF}{YD-YJG}$ [/]	Constant	$\frac{\Delta(YD-YJG)}{(YD-YJG)_{-1}}$	$\frac{\Delta(YD-YJG)_{-1}}{(YD-YG)_{-2}}$	$\frac{\Delta(YD-YJG)_{-2}}{(YD-YJG)_{-3}}$	$\frac{1}{3}\sum_{i=0}^{2}\left(\frac{YJO}{YWS}\right)_{t-i}$	$\left(\frac{NLAJ}{YD}\right)_{-1}$	s.e.	$\bar{R}^2$	D.W.	
SA/(YD-YJG)		0.2882 (8.19)	0.5325 (8.58)	0.2393 (3.85)	0.2276 (3.54)	0.4024 (3.30)	-0.0890 (14.09)	0.0086	0.929	0.89	(11)
SA/(YD-YJG)	0.6816 (4.38)	0.2161 (8.23)	0.4603 (4.36)	0.2336 (3.08)	0.1743 (3.00)	0.3200 (3.00)	-0.0678 (9.30)	0.0074	0.947	1.28	(12)

where

$$SA = YD - YJG - CND\beta + 0.6\ YJG + 0.3\ YJG_{-1} + 0.1\ YJG_{-2}$$

[a] Figures in brackets are t-statistics.

[/] NLPF = net increase in life assurance and pension funds.

57 These various consumption functions were subsequently re-estimated with the value of the net inflow into life assurance and pension funds (NLPF) included as an extra explanatory variable (see paragraphs 14 to 18). Results are given in Table D on pages 36 and 37. The crucial results for the present purpose are the long-run coefficients on the income terms, and on the net inflow into life assurance and pension fund terms. These are summarised in Table E. The apparently implausible results for the Bank-type durables equation are discussed in paragraph 21.

Table E

	Marginal 'long-run' propensity to consume income[a]	Long-run coefficient on real NLPF
(2) Bank CND equation	0.47	-0.51
(4) Bank CD equation	0.06	+0.27
(6) Disaggregated income, CND^1 equation[b]	0.67	-0.37
(8) Life cycle C^1 equation	0.70	-0.34
(10) HM Treasury CND^2 equation (logarithmic)	0.58[c] (η=0.49)	-0.17[c] (η=-0.0096)
(12) London Business School 'saving' equation (signs reversed)	0.76	-0.68

[a] Excluding current grants where appropriate, and excluding feed-backs through net liquid assets or wealth terms.

[b] The income variable is defined as wage and pension income. It is an estimate using the Bank model tax equations etc. of household disposable income.

[c] At 1970 values.

58 Although the range of estimates is wide, and some are not significant,[1] a fairly common picture emerges from the different equations. Positive inflows into LAPFs - with income fixed - tend to be associated with a decline in non-durables consumption, such that saving is increased by significantly less than the net inflow into LAPFs. Where income increases by the same amount - as would occur when NLPF changes result from increased employers' contributions

[1] At the 5% probability level.

Table F

Regression results of the alternative approach: Bank type CND equations

Estimation period: 1963 4th quarter - 1977 2nd quarter

Dependent variable	$(\frac{NLPF}{PCND})$	Constant	$(\frac{YD-YJG}{PCND})$	$(\frac{YD-YJG-LAPF}{PCND})$	$(\frac{NLAJ_{-1}}{PCND})$	$(\frac{NLAJ_{-2}}{PCND_{-1}})$	$CNDA_{-1}$	D731	D68C	Q_1	Q_2	Q_3	u_{t-1}	s.e.	$\bar{R}^2$	$\chi 2$
CNDA		797.77	0.1980		0.0744	-0.0370	0.4799	144.15	1.10	-25.01	35.47	32.23	-0.3464	34.93	0.9907	5.87 (1)
		(4.90)	(6.23)		(4.24)	(1.80)	(5.96)	(3.97)	(3.13)	(1.44)	(2.50)	(1.80)	(2.26)			
CNDA		681.34		0.2469	0.0801	-0.0451	0.4659	168.17	1.03	-26.28	37.25	27.83	-0.4139	31.28	0.9925	9.28 (2)
		(5.65)		(7.69)	(5.37)	(2.63)	(6.92)	(5.42)	(3.26)	(1.55)	(3.05)	(1.60)	(2.82)			
CNDA	-0.0189	659.88		0.2481	0.0810	-0.0465	0.4713	171.24	1.03	-26.29	37.77	27.75	-0.4152	31.62	0.9924	9.34 (3)
	(0.27)	(4.57)		(7.56)	(5.26)	(2.57)	(6.66)	(5.14)	(3.23)	(1.53)	(3.02)	(1.57)	(2.80)			

or from higher property income - aggregate saving would increase substantially: in the Bank and LBS type equations almost on a one-for-one basis, and in the others by well over 0.5, and usually by about 0.7. However, these results are particularly unreliable because tests have not been thoroughly applied to see whether income should or could be disaggregated to obtain a proper estimate of the marginal propensity to consume out of employers' contributions or out of property income of LAPFs.[1]

59 An alternative approach (mentioned in a footnote to paragraph 19) would be to define personal disposable income net of its LAPF component in the conventional consumption/saving equations and to include it as an extra explanatory variable. In a consumption equation, the expected value of the coefficient on NLPF under the add-on hypothesis is zero and under the substitution hypothesis unity (see paragraph 19 for details). This approach does not differentiate between inflows into LAPFs due to employees' contributions, and those due to employers' contributions and property income of the funds. The results using a Bank-type non-durables consumption equation are given in Table F on the previous page, and confirm the results reported elsewhere in this paper. The coefficient on the real net inflow into LAPFs is very small and negative, and is very insignificant.

60 Data sources

The basic data are consistent with those published by the Central Statistical Office in Economic Trends and Financial Statistics up to March 1978.[2] Series derived within the Bank from other sources or from manipulation of equations in the Bank short-term model may be obtained on request.

[1] For further qualifications see paragraph 25.

[2] The Bank model equations were, in fact, run with data available in August 1978.

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