Summary of a research paper on substitution among capital-certain assets in the Personal sector of the U.K. economy 1963–71

This summary describes a research paper prepared in the Bank's Economic Section by J. C. Townend. Copies of his full paper, which was presented at the European Meeting of the Econometric Society in Budapest in September 1972 and at the Money Study Group at the London School of Economics in November 1972, may be obtained from the Bank at the address shown on the back of the contents page.

The readiness with which holders of money and other financial assets switch between such assets (*i.e.* the degree of substitution) is central to a number of related issues in monetary theory.

First, it is important in deciding which set of assets should be added together and defined as 'money', and this has implications for the control by the authorities of the money stock. The definition of money is perhaps best decided empirically, since the theoretical characteristics which an asset should possess before it is included in 'money' are very hard to define. One way of proceeding is to make direct estimates by comparing the results of equations in which different definitions of money are successively related to the interest rate on an alternative financial asset. Another method is to estimate a complete model in which the degree of substitution which people show in choosing between each of a number of possible monetary assets is determined simultaneously, largely on interest rate considerations. The first approach, adopted in research work already published by the Bank,[1] allows substitution only between money and one alternative representative asset; the second approach, adopted in this paper, allows substitution between money and virtually all 'near monies'.

Secondly, in a wider context, the degree of substitution between these assets has implications for the channels through which monetary influences affect expenditure decisions. It is now commonly agreed that the so-called 'transmission mechanism' is largely determined by the way people adjust their equilibrium portfolio of assets in response to disturbances, often initiated by the authorities, which cause divergences between desired and actual holdings of assets; this adjustment in turn is dependent on which assets are generally viewed as close substitutes for money balances. Thirdly, it has consequences for the impact of the growth of non-bank financial intermediaries (such as finance houses and building societies) on the effectiveness of monetary policy and, related to this, the need for controls on these institutions.

This study, using data from the beginning of 1963 to the first quarter of 1971, was restricted to the personal sector and to the following assets: current and deposit accounts with deposit banks, building society deposits, national savings and deposits with other institutions – in particular, local authorities and hire purchase finance companies. Other financial assets subject to capital appreciation or depreciation (such as gilt-edged securities) were excluded, and as a result were not allowed to be substitutes for the above capital-certain assets. This important exclusion was forced

1 See Appendix II to "The importance of money" in the June 1970 *Bulletin*, page 191 and "The demand for money in the United Kingdom: a further investigation" in the March 1972 *Bulletin*, page 43.

upon the study for the present because a large part of the yield on these other assets takes the form of expected capital gains, which are very difficult to measure.

The major part of this study of the personal sector's capital-certain assets required three important assumptions. The first was that the investor derives 'utility' from his asset holdings, largely in the form of the income earned from them, and attempts to maximise utility by allocating his portfolio according to relative interest rates. The second was that at any point in time people would not hold just the highest-yielding capital-certain asset but would diversify their holdings among several such assets. This can be justified quite easily because of the uncertainty of future interest rates and the fact that costs are necessarily involved in liquidating any part of the portfolio. The final assumption was that adjustment of holdings to changes in interest rates is not instantaneous. This implies that investors respond to changing interest rates with some delay, and so make continuous adjustments to their portfolios over time, perhaps because of the transactions costs of an immediate full re-arrangement of the portfolio. The results from the study suggest that investors may in fact take up to two years to adjust fully to a new pattern of interest rates.

The nature of the analysis made complicated econometric techniques necessary. A large number of problems arose in the estimation, mainly associated with the dynamic response paths of the asset holdings, and much of the paper summarised here is devoted to their solution. The presence of extreme multicollinearity meant that the generalised stock-adjustment model suggested for this kind of analysis by Brainard and Tobin proved unsatisfactory,[1] but an alternative system of equations using Almon variables was proposed and estimated.[2]

The results accorded fairly well with *a priori* expectations. It was found that investors holding deposits with local authorities, hire purchase finance companies and building societies were, as was to be expected, relatively sensitive to interest rates. But ordinary account holders with the National Savings Bank were not and indeed cannot be, almost by definition, very sensitive to the monetary return obtained on their deposits because it is so low in relation to other similar assets.

The interest-elasticity of current accounts was found to be about 0·1 with respect to the average interest rate on other assets. This result is at the lower end of the range of other empirical estimates for the United Kingdom and implies that a 1% rise in the general level of interest rates would reduce current account holdings by as little as £50 million. Deposit accounts were found to be rather more sensitive, with an elasticity with respect to Bank rate of 1·0. This indicates that if Bank rate were to rise/fall by 1%, deposit accounts might rise/fall by some £600 million. The large difference in the degree of response of current and deposit accounts to interest rate changes suggests that

1 **W. C. Brainard and James Tobin** "Pitfalls in financial model building" (*American Economic Review*, May 1968, Volume 58 No. 2, pages 99–122).

2 **Shirley Almon** "The distributed lag between capital appropriations and expenditures" (*Econometrica*, January 1965, Volume 33 No. 1, pages 178–96).

separate considerations may govern the extent of investors' holdings of the two assets, and indeed little evidence was found of any significant substitution between them. Given this (and assuming current accounts and notes and coin to be perfect substitutes) the results imply that the deposit banks would find it difficult to change the amount of cash held by the public through changes in the interest rates on their own liabilities. On the other hand there was evidence that banks might be able to attract funds from certain other non-bank financial intermediaries by raising their interest rates.

These conclusions relating to the separate interest rate effects on current accounts and deposit accounts, and the degree of substitution between them, must be treated with caution. Since the deposit banks report only the totals of current accounts and deposit accounts and the totals of persons' and companies' deposits, a number of assumptions had to be made to derive the separate series required for this analysis. These inevitably influence the results and, if they were in any way incorrect, will have biased the conclusions.