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Wealth, Expenditure and the Demand for Money: The Case of France

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Abstract

This paper utilizes recently published French data on the financial wealth of the private sector to test for evidence of wealth effects in IS and LM functions in France. The analysis suggests that wealth effects are indeed in evidence in expenditure functions, provided this is considered with a sufficiently high degree of aggregation. Wealth effects also appear to operate in the demand for money. These results are assessed in the light of theoretical arguments concerning the role of wealth in macroeconomic models.

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I. Introduction

The recent publication of quarterly data for financial assets and liabilities of the various sectors of the French economy 1/ permits for the first time a serious investigation of the role of wealth effects in expenditure and money demand functions. Theoretical macroeconomic models usually begin by assuming relatively simple functional relationships which relate both expenditure and money demand to real income and interest rates. Empirical models tend to follow this example. Theoretical models which incorporate wealth effects in expenditure and money demand functions are more difficult to solve analytically beyond a fairly low threshold of complexity. Resort is often made to assuming numerical rather than algebraic parameters and solving by computer. Whatever the method of solution, such models often generate rather different macroeconomic properties to those of the simpler variety. That empirical models rarely incorporate these effects owes less to the lack of adventure of researchers than to the inability to estimate such effects. Discovery of the latter appears to depend critically upon the quality and frequency of the data for wealth.

The research reported in this paper has therefore sought to take advantage of the newly published French data to seek empirical support for wealth effects in France. In the case of the expenditure function wealth effects appear to be significant but strictly speaking only at a highly aggregated level of inquiry. Such a finding may explain why conventional research at disaggregated levels has usually failed to find such effects. Wealth effects appear also to be significant in money demand functions. Here also there is a conundrum, for these effects appear more robust for narrow money than for broad money. Bearing these considerations in mind, these two findings can be combined to generate a new relationship between income, expenditure and the demand for money.

Theoretical analysis of IS/LM models that allow for wealth effects have tended to suggest, among other things, that a fixed monetary rule is likely to be destabilizing, primarily owing to the potentially explosive effect of debt interest. This result has proved to be fairly robust to alternative model specifications within a closed economy framework. An early example of this type of model is found in Blinder and Solow (1973) and a more recent study is that of Sargent and Wallace (1981). This question has also been looked at in an open economy context by Whittaker et al (1986). Their analysis, set in the context of imperfect international capital mobility, suggests that, as long as wealth effects on expenditure are important or post tax real interest rates are positive in equilibrium, a bondist policy rule (fixing the time path of the stock of government bonds) is much more likely to be stable than the monetarist alternative. However, if simultaneously both

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1/ "Tableau d'Equilibre des Relations Financières" (T.E.R.F.), Cahiers Economiques et Monétaires No. 23, Banque de France, 1986.

these two conditions do not hold, they found that the open economy aspects of their model did increase somewhat the chances of stability under a monetarist rule.

This "debt interest" problem can be side-stepped in an open economy model by assuming perfect capital mobility. By making this assumption, Camilleri et al (1984) are able to demonstrate some other consequences of including wealth effects. In this model, where a monetarist policy rule is followed and where expectations are rational, it is shown that the inclusion of wealth may actually improve the tendency to stability. Essentially, this is because the model identifies two specific effects, among others, on expenditure from an expansion of domestic demand. The first is a positive effect through interest earnings on bond holdings, brought about by the effect of a change in national income on the domestic interest rate (or, equivalently, on the rate of depreciation). The introduction of wealth, however, brings a second effect, which is negative, resulting from the inflation tax on existing wealth following the direct effects on the inflation rate of both excess demand and exchange rate depreciation. For the model to be stable the latter effect must dominate the former. Camilleri et al also found (op cit) that while the inclusion of wealth does not much alter the exchange rate consequences of a fiscal expansion, it tended to dampen the initial exchange rate depreciation resulting from monetary expansion.

Some more practical implications of including wealth in IS and LM functions are demonstrated in Bennett (1986 b.). In an open economy model with a floating exchange rate and rational expectations, it is shown that nominal wealth, and any monetary aggregate whose demand depends upon wealth, may <u>accelerate</u> in the early stages of counterinflationary monetary policy. Monetary aggregates for which transactions demand dominates portfolio considerations would, by contrast, be expected to decelerate in the normal fashion. Monetary targeting that involves aggregates of the former type may therefore result in instability. In the case of France, whose scope for independent monetary policy is limited by virtue of adherence to the EMS, it is the fiscal policy implications which are probably of greater interest. During the mid-1970s the Cambridge Economic Policy Group in the United Kingdom argued strongly that in the long run fiscal deficits inevitably led to current account deficits with an equivalence offset only by a "small and stable surplus" on the part of the private sector. The expenditure function upon which this analysis is based, although not explicitly incorporating wealth, has been shown by Vines and McCallum (1981), Bennett (1986 a.) and others to be equivalent to one that does. The "small and stable surplus" is in fact a function of real economic growth and/or inflation. With a lower rate of inflation and therefore smaller "inflation tax" this surplus will shrink, implying that more of any given fiscal deficit will be financed by the overseas sector rather than residents. Falling inflation may also increase the perceived real return to financial wealth, but this will induce a once-for-all stock effect and therefore only a finite flow effect on private savings. In this context the current situation in France is interesting since this is one where the rate of inflation has fallen sharply in recent years. Although the perceived real return to financial wealth has no doubt also been increased, the necessary stock adjustment has probably been achieved indirectly via capital gains. This may explain why so little of the terms of trade gain resulting from the fall in oil prices in 1986 was translated into an improvement in the current account.

II. Financial Wealth

The underlying hypothesis of this paper is that the private sector has a desired net financial wealth/income ratio which is positively related to the relative real rate of return on net financial wealth. It may also be a function of the level of real income itself. Chart 1 shows the behavior of this ratio over the period 1970 to 1983. 1/ The ratio appears to have been fairly stable with two notable exceptions. The first was a large fall in the ratio during 1973-74, followed by a recovery in 1975-76. The second was the sharp increase in the ratio in 1983. Movements in this ratio will reflect not only consideration of desired net wealth holdings, but also shocks to income as well as unexpected asset revaluations or inflation. Measuring the relative rate of return to financial wealth is fraught with difficulty. The competing rate of return, that to physical capital, is a conceptual minefield, principally owing to the problems associated with measurement of the capital stock. The real rate of return to net financial wealth may be represented as the nominal return less the (expected) rate of inflation. The nominal return to wealth is the (known) dividend or interest payment plus the (expected) capital gain (if any). Here the measurement problem relates to expectations both for asset prices and inflation. Theories of the determination of expectations range from the forward looking or "rational" to the backward looking varieties of which the adaptive model is one example. Since only a portion of financial assets are capital uncertain in nominal terms whereas they are all uncertain in real terms the expedient adopted in this paper was to ignore asset price expectations altogether. Although this would not be a problem for the period covered by the 1970s, it may however be more serious for the 1980s (see below). While forward looking models of expectations are frequently assumed for asset prices, models of general inflation expectations are often backward looking. This reflects the view that agents in asset markets are more assiduous information gatherers than agents in goods markets, for whom rules of thumb may be the more usual method of projecting the future. Accordingly, in what follows, a backward looking model has been assumed for inflation expectations, which are thereby proxied by current and/or lagged values of the actual inflation rate. It so happens that the 1973-74 period was

1/ In the charts that follow, income is proxied by nominal GDP. The regressions reported in this paper use the definition of income described in Appendix I. For graphical purposes nominal GDP and income are largely indistinguishable.

one where the rate of inflation more than doubled, from around 7 percent during 1970-72 to over 15 percent in 1974. By 1976 the rate of inflation had fallen back to under 10 percent. The rise in the inflation rate in 1973-74 will not only have reduced the perceived expected return to financial assets, but it will have simultaneously fulfilled the downward adjustment to desired wealth by eroding the real value of wealth. Apart from being related to the rise in the rate of inflation, the fall in the ratio of net wealth to income in 1973-74 will also have resulted from the fall in real income that followed the first oil price shock. An unexpected fall in real income would lead to a temporary decline in the ratio as expenditure would respond only with a lag thereby depleting asset stocks. The return of the ratio to normal in 1975-76 would be consistent with the fall in inflation and consequent rise in the perceived real return on the one hand and the adjustment in the growth of spending in line with lower real income on the other. The rise in the ratio in 1983 may have resulted from a rise in the perceived real return on wealth that probably occurred at about this time. The rate of inflation, which had returned to 13 percent in 1982, thereafter began a steady decline which did not end until 1986. More importantly, declining interest rates in the bond market held open the prospect of lucrative capital gains. Until the early 1980s the bond market had been relatively insignificant in size, but by 1983 this was no longer the case. The rapid adjustment in the net wealth income ratio, faster than could be achieved by expenditure reductions alone, is testimony to the fact that these capital gains duly occurred.

So far we have considered the behavior of net financial wealth. Net wealth comprises total financial assets less financial liabilities. Being a measure of net worth it is the concept of wealth that is relevant for expenditure, discussed below in section III. Since a large part of private sector liabilities is represented by bank credit and since, for the period being considered, this credit was rationed by virtue of the system of "encadrement" enforced by the authorities in France, it will be argued in section IV that it is gross wealth (GW), or net wealth (NW) plus liabilities (CR), that is relevant for money demand. We thus have:

$$(1) \quad GW = NW + CR$$

Chart 2 shows the behavior of gross wealth in relation to income over the same period as in Chart 1. It is immediately apparent that the proportionate variance of this ratio is much lower than that for net wealth. This no doubt reflects the relative stability of credit (CR) that is ensured by virtue of encadrement. Thus the majority of the variance in gross wealth, which we shall argue in section IV is a major element of money demand, derives from the behavior of net wealth. The determination of the latter depends upon the relationship between income and expenditure to which we now turn in section III.

CHART 1

NET WEALTH TO INCOME RATIO

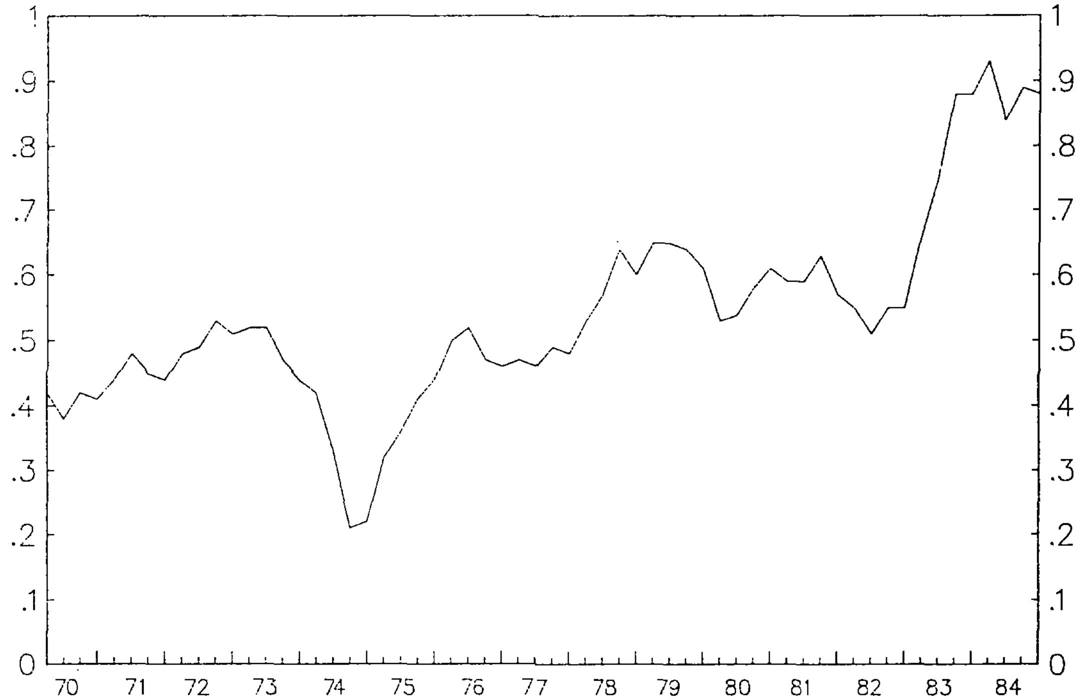
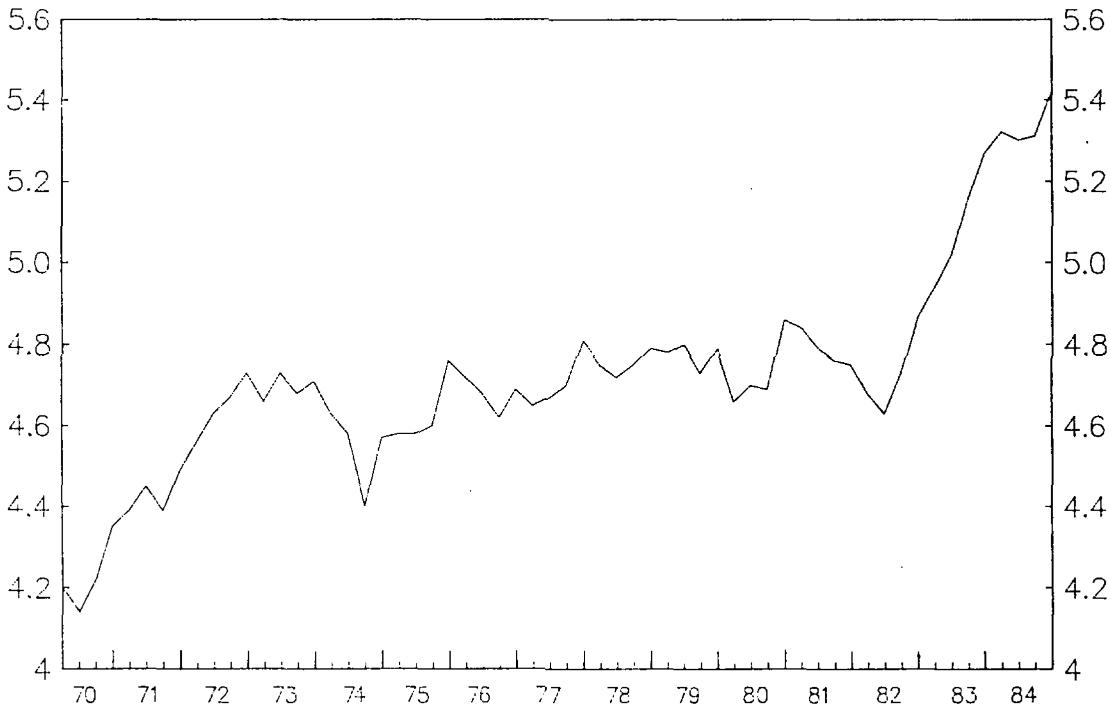


CHART 2

GROSS WEALTH TO INCOME RATIO



III. Private Sector Expenditure

Following a related project undertaken by Bennett (1986 a.) which sought to uncover wealth effects from recently published balance sheet data for the United Kingdom, 1/ the starting point of the investigation of the relationship between spending and net wealth was that of the aggregated private sector.

The ideas discussed in section II can be embodied in an expenditure function which relates private sector expenditure to real disposable income, real net wealth and the real relative rate of return to financial wealth. Given the difficulty of measuring the real rate of return to physical wealth, it is convenient to assume this to be, for all intents and purposes, constant. We then have:

$$(2) \quad b(L)z_t = a + c(L)yd_t + d(L)nw_t + e(L)(r-\dot{p}^e)_t$$

where z denotes private sector expenditure, yd denotes disposable income, nw denotes net financial wealth, r denotes the rate of interest and $\dot{p}$ denotes the rate of inflation. (L) denotes the lag operator and the superscript "e" denotes expected. Lower case letters signify constant price values and upper case letters current price values. Equation (3) therefore shows that the change in actual nominal net wealth is equal to financial saving plus asset revaluations (REV). The change in real net wealth will of course depend upon the behavior of the price level too.

$$(3) \quad \Delta NW = YD - Z + REV$$

Note that equation (3) determines only the change in actual net wealth, not desired net wealth. We cannot infer desired net wealth holdings as a function of the arguments on the right hand side of equation (2) except in hypothetical equilibrium situations. Nor can we obtain the relationship for desired wealth by regressing wealth on these right hand side variables because we cannot observe desired wealth, only actual wealth. Moreover, to regress wealth on income, interest rates and the inflation rate would amount to estimating a reduced form, not a structural form. For example, interest rates would no longer have an unambiguous sign since they would have a negative revaluation effect and a positive saving effect. Similar arguments apply to the inflation rate. The advantage of econometrically estimating equation (2) is that we thereby obtain some structural parameters. The nature and derivation of the data that is available for the purposes of this econometric investigation is described in Appendix I.

1/ Financial Statistics, August 1981, Central Statistical Office, United Kingdom.

Following the procedure in Bennett (op cit) the initial regressions were conducted allowing each variable up to three lagged values. Nominal interest rates, measured by the three-month money market rate, were entered separately from the rate of inflation, itself taken to proxy an adaptive (backward looking) expectations formation process. Income, expenditure and wealth variables were all initially expressed in logarithms, in order to facilitate the reading of elasticities. The resulting specification was therefore as follows:

$$(4) \quad \log z = a + \sum_{i=1}^{3} b_i \log z_{-i} + \sum_{i=o}^{3} c_i \log yd_{-i} + \sum_{i=1}^{3} d_i \log nw_{-i} + \sum_{i=o}^{3} e_i r_{-i} + \sum_{i=o}^{3} f_i \dot{p}_{-i} + g\ \text{time}$$

The wealth term has been entered without a current value owing to the fact that this will be highly endogenous given equation (2). The specification can alternatively be read as implying that expenditure depends upon current, beginning of period, wealth rather than last period's end of period wealth. A time trend has been included to eliminate the possibility of spurious correlation because of common trending and also to capture the possibility of a trend change in the equilibrium wealth/income ratio. Estimation was conducted over the period 1971 Q1 to 1983 Q4, the longest period available given the lag structure and respective data sets.

The results of fitting this specification by means of ordinary least squares is shown in Table 1. For comparison the equivalent results for the U.K. reported in Bennett (op cit) are shown alongside. It can be seen that the results are remarkably similar. Real income, real wealth and the rate of inflation all have statistically significant positive long-run effects on expenditure. The only disappointment is the rate of interest. This should take a negative coefficient, whereas the estimated long-run coefficient is insignificant and positive. A variety of different interest rates were tried 1/ but uniformly without success. It is well known that empirical work on French expenditure data rarely succeeds in finding interest rate effects. With bank lending largely rationed by virtue of the "encadrement" system of credit controls throughout the estimation period, the liability side of the private sector's balance sheet would not be particularly sensitive to interest rates. Since over 20 percent of gross assets (on average over the estimation period) were held in the form of noninterest bearing M1 money balances, it is perhaps not surprising that it has proved difficult to uncover a role for interest rates.

1/ Bond yield, lending rate, passbook deposit rate and others.

The role of wealth is revealed more clearly if the aggregate equation in Table 1 is cleared of insignificant variables to give:

$$\text{(5)}\quad \log z = \underset{(5.5)}{0.39} + \underset{(16.1)}{0.71} \log z_{-1} + \underset{(4.3)}{0.20} \log yd + \underset{(4.2)}{0.02} \log nw_{-1} + \underset{(3.3)}{0.30}\, \Delta\dot{p} + \underset{(3.7)}{0.19}\, \dot{p}_{-3}$$

Standard error 0.51 percent; Durbin's H statistic 1.63

As a restriction on the equation in Table 1 this version is easily accepted ($\chi^2(16)=5.50$). Splitting the sample into the periods 1971 Q1 to 1977 Q2 and 1977 Q3 to 1983 Q4 and conducting a Chow split sample test for parameter stability does not reveal any problems of this nature ($F(6,40)=2.096$). Durbin's H statistic is below the critical 5 percent value and on this basis the hypothesis of zero first order autocorrelation of the error is acceptable.

What are the properties of this equation? Returning to the theme of the demand for net financial wealth, the equation can be used to derive an implied relationship that should exist between desired net wealth and income under an equilibrium of static steady state. In such an equilibrium where real income is constant and all prices (including asset prices) are constant the desired relationship between wealth and income is given by

$$(1 - \sum_{i=1}^{3} b_i - \sum_{i=0}^{3} c_i) / \sum_{i=1}^{3} d_i$$

The parameters of equation (5) suggest a figure of 4.5, which seems rather high. In the general equation reported in Table 1 this value computes at only 0.5. That equation (5) is an easily accepted restriction on the equation in Table 1 merely indicates that long-run coefficients of this kind are very poorly determined. The coefficient's sensitivity is particularly acute given the low absolute value of the coefficient on wealth. If this were larger, the equation would imply a lower implied wealth/income elasticity. Appendix I discusses the problem concerning the impossibility of deriving a truly consolidated figure for net financial worth for the private sector on French data. If intrasector asset revaluations were inducing measurement error relative to the relevant concept of net worth, this would, under normal assumptions, bias the coefficient on wealth towards zero. It is noteworthy that the coefficient on wealth in the equation reported for the United Kingdom in Table 1 is four times as large. Wealth data used in this latter exercise was fully consolidated.

Table 1. Total Private Sector Expenditure

		1971 Q1 to 1983 Q4 France		1967 Q1 to 1980 Q4 United Kingdom	
		Coefficient	(t-value)	Coefficient	(t-value)
Lagged dependent variable	t-1	0.43	(2.7)	-0.08	(0.4)
	t-2	0.19	(1.0)	-0.11	(0.6)
	t-3	0.06	(0.5)	0.34	(2.2)
	sum	0.69	(5.4)	0.15	(0.5)
Real private income	t	0.18	(2.7)	0.47	(3.6)
	t-1	0.08	(1.0)	0.00	(0.0)
	t-2	-0.05	(0.7)	0.06	(0.2)
	t-3	0.08	(1.0)	0.03	(0.2)
	sum	0.29	(2.5)	0.55	(2.7)
Real private net wealth	t-1	0.03	(2.4)	0.13	(2.1)
	t-2	0.01	(0.4)	-0.07	(0.8)
	t-3	0.01	(0.5)	0.08	(1.3)
	sum	0.04	(3.3)	0.15	(3.0)
Interest rate 1/	t	-0.05	(0.6)	-0.10	(0.4)
	t-1	0.12	(0.9)	-0.20	(1.1)
	t-2	-0.05	(0.4)	0.00	(0.0)
	t-3	0.10	(1.0)	0.00	(0.0)
	sum	0.11	(1.4)	-0.30	(2.0)
Inflation rate 1/	t	0.19	(1.5)	0.10	(1.8)
	t-1	-0.18	(1.0)	0.10	(1.5)
	t-2	-0.17	(1.1)	0.10	(1.2)
	t-3	0.36	(2.9)	0.00	(0.5)
	sum	0.20	(2.2)	0.30	(2.0)
Time trend 1/		-0.12	(2.0)	1.15	(1.3)
Constant		-0.05	(0.2)	0.24	(2.6)
Durbin Watson		2.10		2.07	
Standard error (in percent)		0.55		1.23	

1/ Coefficients multiplied by 100.

Bearing this in mind, it is nonetheless instructive to consider another feature of the long run properties of this model. When the rate of inflation is low a rise in the rate of inflation (and therefore fall in the real interest rate) induces a rise in the financial savings rate. This reflects the necessity to save in order to maintain the real value of the stock of financial wealth. This requirement becomes less the smaller the desired stock of financial wealth and as the rate of inflation rises so the desired stock of financial wealth declines. While the former effect dominates at low orders of inflation the latter dominates at higher rates. Thus, as shown in Chart 3, the financial savings rate first rises and then, at higher rates of inflation, falls again. In fact the savings rate at 40 percent inflation is the same as it is at 1 percent. The maximum savings rate is achieved at around 11 to 12 percent inflation. 1/

The above equation operates with a highly aggregated definition of spending, income and wealth. It is of interest to explore the consequences of disaggregating. Appendix II shows that, while the data appears not to reject the aggregation of spending or indeed wealth, the disaggregation of income seems to lead one rapidly back to conventional models for consumer spending and investment that exclude wealth.

The fact that wealth effects appear only when one operates at a highly aggregated level of inquiry is a conundrum. It may owe something to the Solomon Grundy nature of money at the level of individual subsectors: with spending going on all the time it may often be difficult to keep track of money as it passes from subsector to subsector, "here on Sunday, gone on Monday." An alternative explanation may be that the relationship between net wealth and private sector income tells us not so much about expenditure directly as about the allocation of income between sectors. While expenditure at the disaggregate level may be better correlated with sectoral income than with sectoral wealth, the former may itself be related to the overall financial disposition of the private sector as a whole. Company liquidity will be a function not only of its own net financial worth but also of its ability to raise funds through the issue of equity or via bank borrowing. The latter will be related to the net worth of the household sector amongst other things. Thus an increase in the net worth of households will increase their appetite for equity and/or readiness to place deposits with the banking sector. If company liquidity is tight income to households may be squeezed by the withholding of dividends payments or lower wage settlements. It may also lead to lower overtime payments if production

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1/ This generates a financial surplus over income of about F 30-40 billion in 1986 prices. The calculation assumes for convenience that nominal interest rates are zero. Similar results would, however, follow if nonzero (but constant) nominal interest rates were assumed although the value of the maxima may change. The surplus would also be larger the more rapid the real rate of economic growth (here assumed to be zero) as the private sector would need to accumulate continuously to maintain a given wealth/income ratio.

is slowed. If liquidity is loose, on the other hand, then companies may take a more liberal attitude to dividends and wages. If household expenditure is a function of household income and corporate expenditure is a function of a combination of corporate income and liquidity, then, with an income allocation system such as that described above, one would expect to find an aggregate relationship of the type described by equation (5). Most research tends to concentrate on the the relationships determining household and company expenditure, but relatively little is devoted to the allocation of income itself.

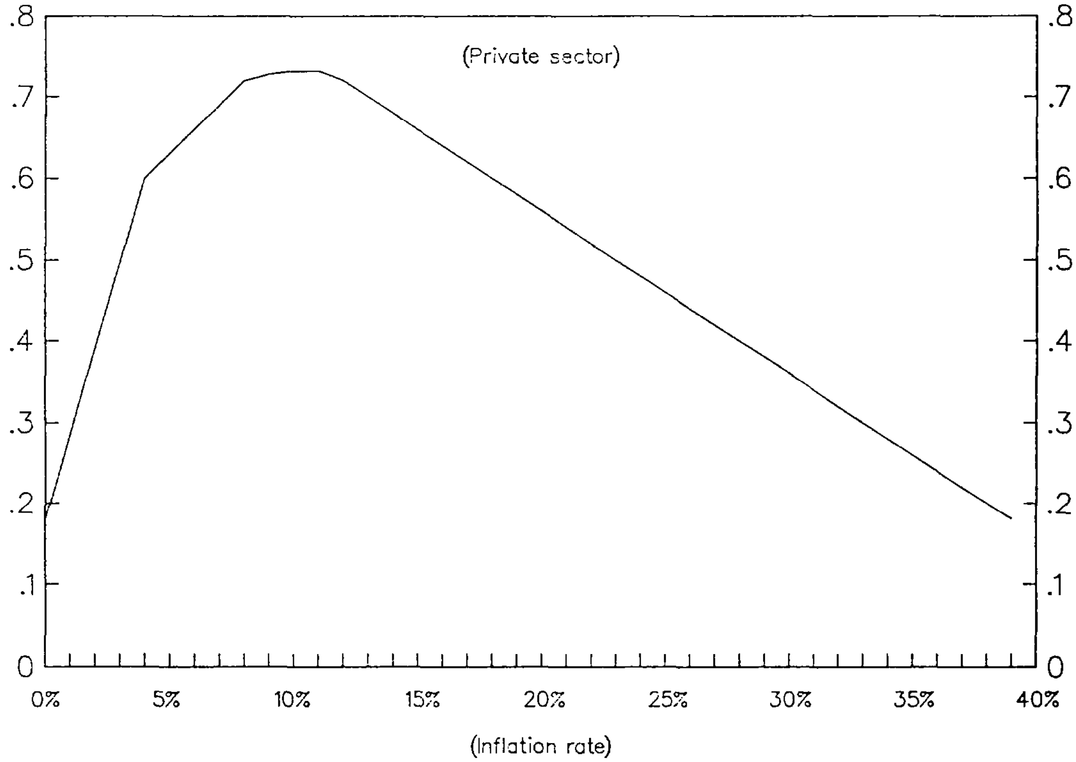
Whatever the reason, the significance of wealth in an aggregate expenditure function deserves attention. What then were the determining factors of aggregate spending over the estimation period? The equation implies that while income is usually the dominant contribution, wealth and inflation effects can sometimes be as important. The table below shows the contribution of each over the period 1973 to 1983. Thus in 1974 the rising inflation rate was responsible for a 2 percent increase in spending, while income growth contributed only 1.5 percent. In 1975 the earlier collapse in real financial wealth knocked 2 percent off spending, almost completely offsetting the positive contribution from real income growth. The wealth effect was reversed in 1976 as asset price recoveries brought about a 2.3 percent increase in spending and combined with the rise in income to generate a huge 5.3 percent spending increase overall. While wealth effects contributed 1 to 1.5 percent annual increase in spending during the remainder of the 1970s, the early 1980s were characterized by relatively weak wealth effects and thereby rather weak spending growth overall. The sharp rise in the value of wealth that occurred in 1983 would not have made itself felt as expenditure until 1984, but the falling inflation rate and therefore rising real prospective return to financial assets more than offset this effect--the financial savings rate actually rising slightly. In 1985, according to provisional figures, 1/ there was another large increase in the value of financial wealth and in 1986 buoyant bond and equity prices will have further added to wealth. This may explain why the rise in real income (fall in oil prices) in 1986 failed to lead to a significant improvement in the financial savings rate in that year.

1/ Bank of France Quarterly Bulletin, June 1986.

CHART 3

FINANCIAL SAVINGS RATIO AND INFLATION

(Financial savings as percent of income)



Private Sector Expenditure

(Annual percent increase)

	Total	Contributions from Income	Wealth	Inflation	Discrepancy
1973	5.9	4.2	1.4	0.9	-0.6
1974	2.6	1.5	-0.8	2.0	-0.0
1975	1.1	2.2	-2.0	1.5	-0.6
1976	5.3	2.8	2.3	0.0	0.2
1977	2.4	1.7	1.1	-0.9	0.6
1978	4.1	3.2	1.0	-0.4	0.4
1979	3.5	2.9	1.5	-0.1	-0.9
1980	1.9	0.6	0.1	1.0	0.2
1981	1.2	0.7	0.1	0.9	-0.5
1982	2.4	1.9	-0.1	-0.3	0.9
1983	0.4	1.1	0.7	-0.6	-0.8

IV. The Demand for Money

The second part of this paper deals with the demand for money. 1/ The starting point of the investigation was that the demand for money would reflect both transactions and portfolio considerations. The prior belief was that the former would dominate for M1R and the latter would

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1/ The French authorities have recently adopted an entirely new set of definitional criteria for their monetary aggregates. In order to avoid instant obsolescence, therefore, it is necessary that this research into money demand be at least consistent with these new aggregates, as opposed to the older definitions. The problem with the new definitions is that, at the time of writing, data only existed from the last quarter of 1977 to the first quarter of 1986, 34 observations in total. If this is to be related to the data for financial wealth, the number of common observations drops to 29 and use of the income data compiled in section III would further curtail this figure to a mere 25. These are insufficient data to explore their statistical properties with any confidence. Data for the monetary aggregates on the old definitions, by contrast, exists for the period of the last quarter of 1969 to the last quarter of 1985, 65 observations in total, of which 60 can be related to the wealth data and 56 to a combination of this and the income data. In Appendix III it is argued that M1R and M3R bear a sufficiently close relationship to their new definitions (M1 and M3) for data on the former to be usable as a proxy for the latter. M2R and M2, however, are not so conveniently related. In consequence this study concentrates on the demand for M1R and M3R.

dominate for M3R. It turned out, rather surprisingly, that the opposite was the case. Since, as already noted, bank credit to the private sector would have been rationed throughout the estimation period it was felt permissable to estimate a conditional demand function, conditional in the sense of Pollak (1969). Pollak shows that the demand for an unrationed good is a function of all unrationed goods prices, of total expenditure on unrationed goods and rations of each of the rationed goods. Applying this result to our case and treating bank credit as a negative asset, the demand for money is thus related to the rates of return of each of the positive assets and to end of period wealth gross of lending (i.e., holdings of positive assets). In addition, any other factors which affect the allocation of wealth between money and other assets, in particular, transactions demand, must be included.

Developments in the share of M1R and M3R in wealth gross of lending (i.e., gross wealth) can be seen in Charts 4 and 5. Chart 4 shows that the share of M1R has displayed a trend decline, but a decline that has been remarkably steady over the period. At 26 percent of gross wealth in 1970, its share had fallen to 17 percent by 1984. About half of gross wealth is represented by M3R, the remainder of gross wealth comprising bonds and similar nonmonetary assets. The share of M3R shifted up in the mid-1970s and then remained largely flat until 1980, at which point it began to decline quite sharply, as can be seen in Chart 5. This may well reflect the rapid expansion in the bond market in France that began around this time. Bonds would have been important substitutes for non-M1R type assets in M3R. Charts 6 and 7 show the corresponding ratios for income. As with wealth, M1R shows a clear trend decline. This is very much as one would expect. Continuous improvements in payments and transactions technology would result in a steady process of economization of non-interest-bearing M1R money balances. The ratio of M3R to income, by contrast, shows a rising trend until 1978 when it levels off. In 1980 it falls back to the levels of 1973/74.

To get a better understanding of the processes determining the behavior of these aggregates it is necessary to explore these relationships more rigorously. Following Grice and Bennett (1984) a generalized lag distribution is assumed, to give the following starting specification:

$$(6) \quad \log m = a + \sum_{i=1}^{3} b_i \log m_{-i} + \sum_{i=0}^{3} c_i \log gw_{-i} + \sum_{i=0}^{3} d_i \log yd_{-i} + \sum_{i=0}^{3} e_i r^c_{-i} + \sum_{i=0}^{3} f_i r^m_{-i} + g \text{ time}$$

CHART 4

SHARE OF M1R IN GROSS WEALTH

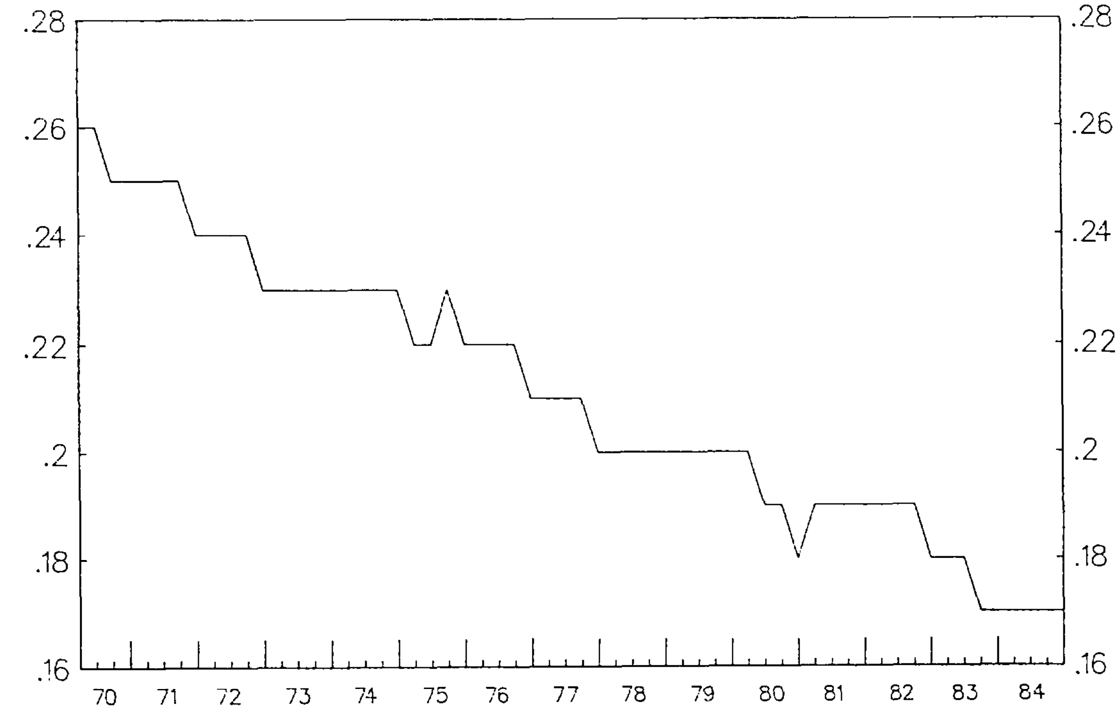


CHART 5

SHARE OF M3R IN GROSS WEALTH

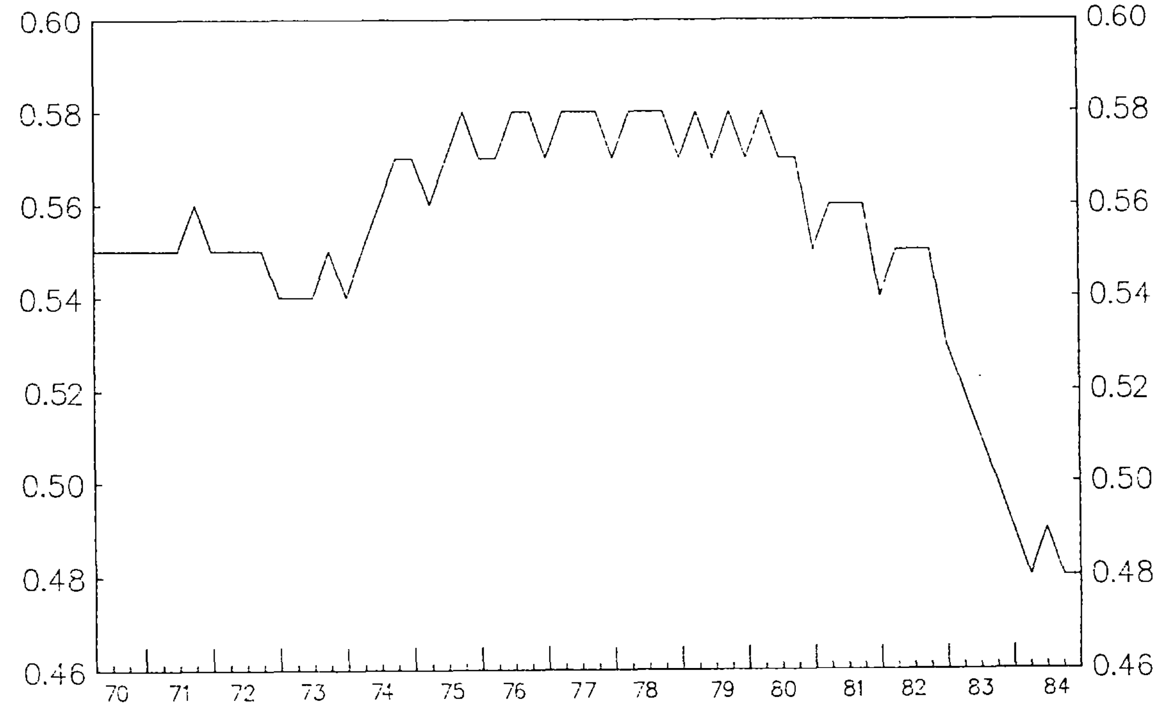


CHART 6

M1R TO INCOME RATIO

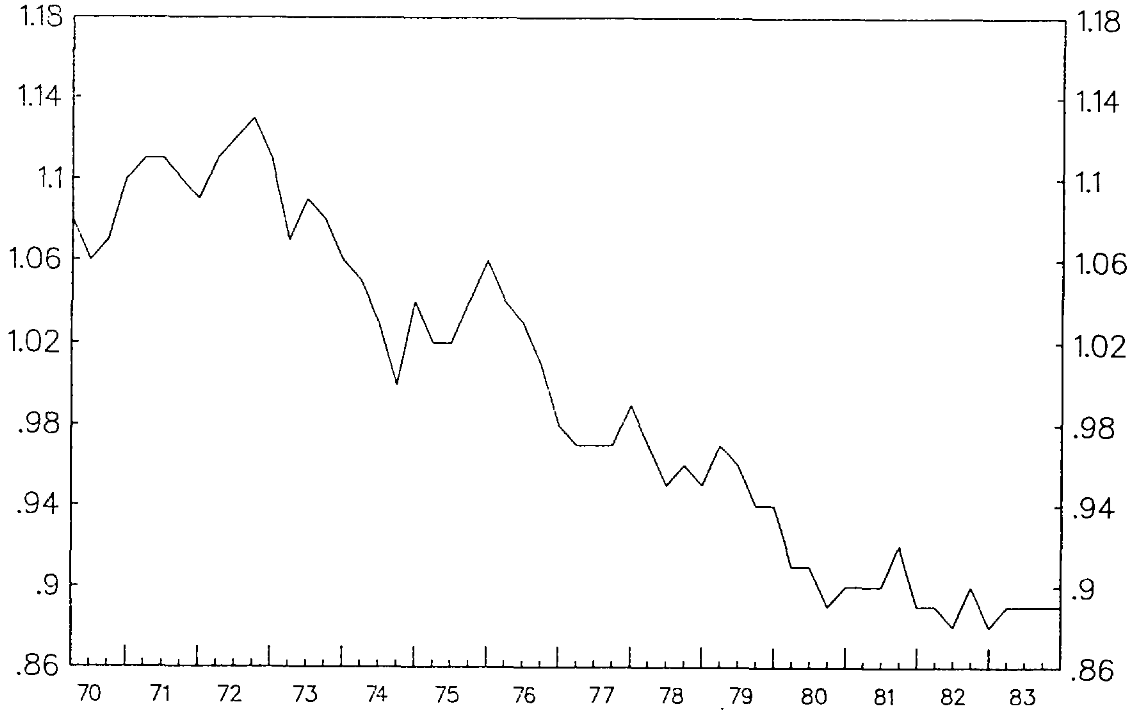
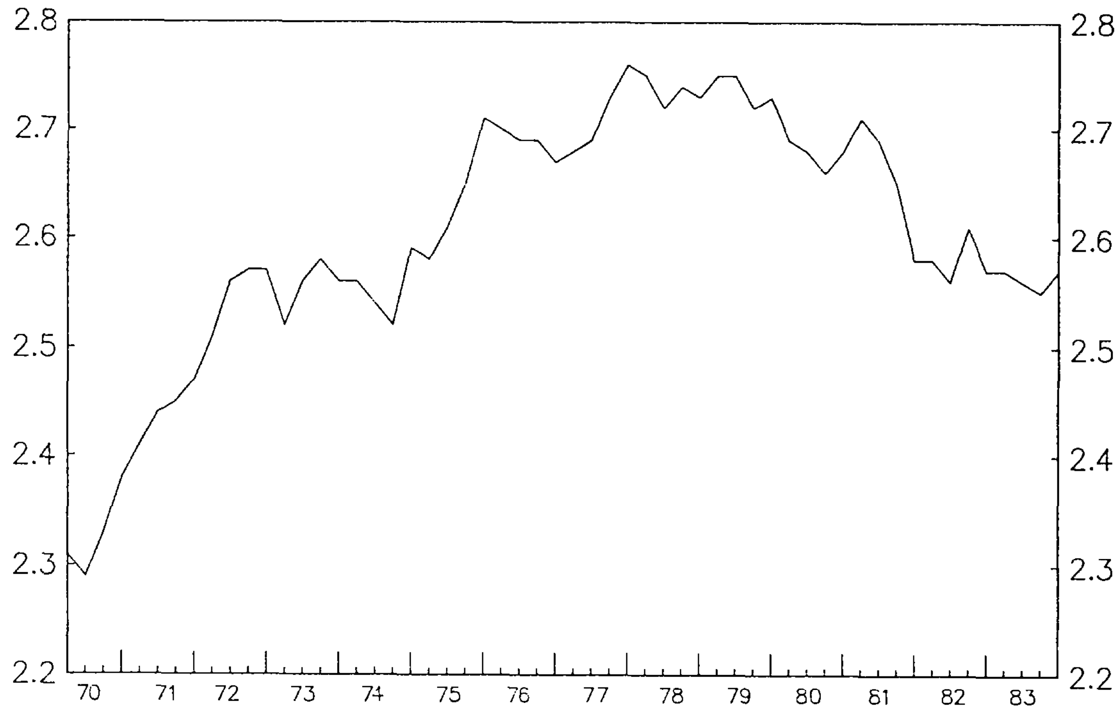


CHART 7

M3R TO INCOME RATIO



As with the expenditure function, each variable is allowed up to three lags. The real money supply is denoted by m, real gross wealth by gw, the rate of return to money by r^m and to competing assets by r^c. In the case of M1R, of course, r^m is zero. The time trend is included, as before, to prevent spurious correlation owing to common trending and to pick up trend changes in payments technology etc. In the case of M1R r^c is represented by the three month money market rate as used in the expenditure function. For M3R r^c is taken as the government bond yield while r^m is measured by the passbook rate. This follows the practice of recently published research into money demand functions in France by Fröchen and Voisin (1986). The Fröchen and Voisin study estimates simple transactions demand functions for M1R, M2R and M3R over much the same period as in this study, about which we shall have more to say in due course.

The effect of fitting equation (6) to M1R and M3R data over the period 1970 Q4 to 1983 Q4 is shown in Table 2. Let us consider the equation for M1R first. To do this it is convenient to examine a more parsimonious representation. Removing statistically insignificant variables gives us:

$$(7) \quad \log m1R = \underset{(0.8)}{0.31} + \underset{(4.3)}{0.47} \log m1R_{-1} + \underset{(3.8)}{0.33} \log yd + \underset{(3.8)}{0.38} \log gw - \underset{(2.3)}{0.25} \log gw_{-1} - \underset{(1.5)}{0.12}\, r^c_{-2} - \underset{(2.8)}{0.25}\, time$$

Standard error 1.05 percent; Durbin's H statistic 0.29

This equation 1/ shows that both transactions and portfolio considerations are relevant and indeed highly significant. The long run elasticity of demand with respect to income is 0.62 and that to financial wealth is 0.25. Their combined elasticity is close to unity at 0.87 so that if both income and wealth move up at the same rate, so will M1R. The opportunity cost, 2/ r^c, is estimated as negative, but it is not particularly significant. The semi-elasticity of demand with respect to this is a low 0.2 percent. Finally, the time trend is negative and significant suggesting that it is important to proxy the progress of payments technology as already discussed. The significance of wealth for an aggregate for which we would expect transactions demand to dominate is especially surprising. It might be suspected that gross wealth was only significant because M1R, being a component of gross

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1/ The equation is an acceptable restriction on the general equation reported in Table 4 ($\chi^2(10)=12.78$) and shows no signs of parameter instability within the sample period ($F(7,39)=0.619$).

2/ Interest rates in the Fröchen and Voisin study are entered as logarithmic in a generally logarithmic specification. Linear values have nonetheless been retained here to ensure consistency with section III. The results tend to be similar whichever method is used.

Table 2. Demand for Money

(1970 Q4 to 1983 Q4)

		Real M1R		Real M3R	
		Coefficient	(t-value)	Coefficient	(t-value)
Lagged dependent variable	t-1	0.45	(2.8)	0.76	(3.7)
	t-2	0.03	(0.2)	0.15	(0.6)
	t-3	-0.12	(0.8)	0.09	(0.5)
	sum	0.36	(2.2)	1.00	(13.4)
Real private income	t	0.31	2.8)	0.30	(3.4)
	t-1	0.08	(0.6)	-0.08	(0.8)
	t-2	0.11	(0.8)	0.00	(0.0)
	t-3	-0.02	(0.1)	-0.12	(1.3)
	sum	0.48	(2.6)	0.10	(0.6)
Real private net wealth	t	0.38	(3.2)	0.20	(2.2)
	t-1	-0.07	(0.5)	-0.09	(0.9)
	t-2	-0.06	(0.4)	-0.21	(1.9)
	t-3	-0.05	(0.4)	0.00	(0.0)
	sum	0.20	(1.5)	-0.10	(1.5)
Own rate of interest 1/	t			-0.15	(0.7)
	t-1			0.30	(1.0)
	t-2			-0.06	(0.2)
	t-3			0.02	(0.1)
	sum			0.11	(0.6)
Competing interest rate 1/	t	0.03	(0.2)	0.11	(0.3)
	t-1	0.21	(0.9)	-0.27	(0.6)
	t-2	-0.43	(1.9)	-0.27	(0.6)
	t-3	0.27	(1.9)	0.35	(1.2)
	sum	0.08	(0.6)	-0.08	(0.6)
Time trend 1/		-0.42	(2.7)	-0.02	(0.3)
Constant		-0.37	(0.7)	0.22	(0.5)
Durbin Watson		2.23		2.00	
Standard error (in percent)		1.05		0.70	

1/ Coefficients multiplied by 100.

wealth, thereby appears on both sides of the equation giving rise to a spurious positive coefficient. Moreover, if M1R money balances affect expenditure through supply shocks 1/ than net wealth may not be truly exogenous in this equation either. In fact this latter argument would tend to lead one to believe in the existence of a downward rather than upward bias to the estimated coefficient on wealth. The hypothesis is nonetheless worth exploring more rigorously anyway and this is done in Appendix IV. There it is shown that, on statistical criteria at least, there is no reason to doubt the exogeneity of wealth in equation (7).

Before moving on to consider M3R, it is worth commenting briefly on the conventional specification such as that recently estimated by Fröchen and Voisin. This is a simple transactions demand model with real M1R related to GDP and the money market interest rate. Replacing GDP by private disposable income produces a very similar result both in terms of coefficients and fit.

$$(8) \quad \log m1R = \underset{(5.5)}{1.25} + \underset{(10.3)}{0.64} \log m1R_{-1} + \underset{(4.8)}{0.15} \log yd - \underset{(4.2)}{0.28}\, r^{c}$$

Standard error 1.20 percent; Durbin's H statistic 0.47

The interest rate term is here entered linearly rather than in logarithms as in the Fröchen and Voisin study, so the coefficient is not directly comparable, but estimation using the logarithmic version produces an almost identical coefficient to that of Fröchen and Voisin while involving only a slight improvement in fit. If this equation can therefore be taken as reasonably representative of the Fröchen and Voisin equation, it is worth noting that it is, as a restriction on the general equation reported in Table 2, decisively rejected on statistical criteria ($\chi^2(13)=30.38$). Clearly, wealth effects in M1R demand should not be ignored.

Let us now consider M3R. The general estimated equation is reported in Table 2, but, as before, it is convenient to consider a more parsimonious representation: 2/

1/ That is to say, if the portfolio composition between liquid/illiquid assets affects expenditure as well as the overall net asset position, net wealth and M1R would be simultaneously determined. This argument depends upon there being significant transactions costs involved in shifting between liquid and illiquid assets.

2/ This equation is an acceptable restriction on that shown in Table 4 ($\chi^2(15)=16.98$) and shows no evidence of parameter instability within the sample period ($F(6,41)=2.437$).

$$(9)\quad \log m3R = \underset{(1.4)}{-0.32} + \underset{(22.5)}{0.83} \log m3R_{-1} + \underset{(4.0)}{0.28} \log yd + \underset{(3.2)}{0.21} \Delta gw - \underset{(3.1)}{0.21} (r^c - r^m)_{-1} - \underset{(2.5)}{0.09}\ time$$

Standard error 0.68 percent; Durbin's H statistic 0.58

In this case gross wealth is significant but, while it still has an important positive short-run effect, it has no long-run effect. Freely estimated the current and lagged terms take nearly equal and opposite coefficents, permitting the first difference in equation (9). It was also possible to set the coefficients on the rate of return to money (passbook rate) and that of the competing rate (bond yield) to be equal and opposite. With a zero long-run elasticity with respect to wealth, the demand for M3R nonetheless emerges with a 1.6 long-run elasticity with respect to income and a 1.24 long-run semi-elasticity with respect to the own relative rate of return to money. 1/ The zero long-run elasticity with respect to wealth is surprising given the positive long-run effect found for M1R. What this means is that non-M1R assets in M3R, i.e., passbook accounts, term deposits, etc., respond negatively to wealth in the long run, even if they respond positively in the short run. In terms of the portfolio, therefore, these assets are inferior assets--as the portfolio increases so holdings of these assets decrease. The long-run income elasticity, by contrast, is quite high. In fact if both income and wealth change by equal proportions so, approximately, does the demand for (M3R-M1R) assets. Because of what we know about M1R demand we can say that, as the portfolio grows, so there is substitution from passbook and time deposits into checking accounts, leaving the overall total (M3R) unchanged in the long run. This means that the superior assets are bonds and related nonmonetary instruments. But if both income and wealth move up together, the demand for M1R and M3R-M1R assets move up at broadly the same rate and overall there is a slight increase in the share of M3R in wealth. That passbook and term deposits should be regarded as inferior assets relative to the portfolio, if not to income, when checking accounts on the one hand and long-term bonds on the other are both regarded as superior assets is surprising, not to say a little implausible. But this appears to be the result generated by the data.

1/ Long-run coefficients are, however, poorly determined in this equation owing to the very high coefficient on the lagged dependent variable. The sum of coefficients on the lagged dependent variable in the general equation in Table 2 is in fact unity, suggesting long-run instability.

Ratio of M1R to Income

(Annual percent change)

	Total	Contributions from				Discrepancy
		Income	Wealth	Interest rates	Time	
1973	-2.9	-1.7	1.4	-0.0	-1.8	-0.8
1974	-4.1	-0.1	-1.2	-1.0	-1.8	0.0
1975	-2.1	-1.7	1.4	-0.3	-1.8	0.3
1976	-0.5	-0.8	1.4	0.9	-1.8	-0.2
1977	-3.8	-1.5	0.9	-0.4	-1.8	-1.0
1978	-3.5	-3.3	1.6	0.1	-1.8	-0.1
1979	0.3	-0.2	0.8	0.4	-1.8	1.1
1980	-4.2	0.3	-0.3	-0.7	-1.8	-1.7
1981	-1.7	-0.9	0.3	-0.3	-1.8	1.0
1982	-1.8	-1.5	0.8	-0.9	-1.8	1.6
1983	0.3	-0.5	2.7	0.4	-1.8	-0.5

It is of interest to use these equations to decompose the contributions to the changes in the ratio of money to income, the inverse of the velocity of circulation, that occured over the period 1973 to 1983. The table above shows the change in this ratio for M1R. As we have already noted above, there is a trend decline, shown in the table to be around 1.8 percent per annum. Income and wealth movements occasionally cause disturbances from this trend, but in general their contributions have been offsetting. Equation (7) suggests that income demand for M1R is less than unit elastic so that a rise in income produces a fall in the money/income ratio (i.e., a rise in velocity). If there is an equivalent rise in wealth, however, this will offset the fall and leave the ratio unchanged. As was seen in Chart 2, the ratio of gross wealth to income, with a few notable exceptions, was quite stable over the 1973 to 1983 period (as was the case for net wealth). Years when this was not the case include, of course, 1974 when real wealth fell sharply following the oil shock. This, combined with rising interest rates, resulted in one of the two sharpest falls in the money/income ratio of the period. This was reversed in 1976 as interest rates fell and real wealth rose. In 1983 there was a particularly sharp upward movement in wealth relative to income. This, as before, combined with a decline in interest rates to produce one of the only two upward movements in the money/income ratio during the period.

Ratio of M3R to Income

(Annual percent change)

	Total	Contributions from Income	Wealth	Interest rates	Time	Discrepancy
1973	1.2	5.1	1.5	1.6	-2.1	-4.9
1974	0	4.9	-0.8	-0.1	-2.1	-1.9
1975	1.1	1.6	0.8	-0.0	-2.1	0.8
1976	3.6	3.2	0.5	1.6	-2.1	0.4
1977	1.2	1.9	-0.0	1.1	-2.1	0.3
1978	-1.0	0.1	0.4	0.2	-2.1	0.4
1979	1.1	4.8	-0.2	0.3	-2.1	-1.7
1980	-1.4	3.8	-0.8	-1.9	-2.1	-0.4
1981	-2.5	0.6	-0.1	-2.2	-2.1	1.3
1982	-2.8	0.5	0.2	-0.8	-2.1	-0.6
1983	-0.5	1.8	1.2	0.4	-2.1	-1.8

The table for M3R shows a rather more muted role for wealth over the period. The high elasticity accorded to income, by contrast, results in significant changes in the ratio being generated from this source. Because of the long lags involved, the effects of changes in real income often continue to be felt long after the original change in income itself. The rise in the ratio of M3R to income in the period up to 1977 is shown to be the result of a combination of rising real income (to which M3R has a greater than unit elasticity of demand) and a rising relative rate of return to M3R assets. The latter are shown to have a much more powerful influence on M3R than interest rates do on M1R. The decline in the ratio in the 1980 to 1982 period is a reverse of this. Relatively weak real income growth combined with a deterioration in the relative return to M3R assets to reduce the ratio of M3R to income. The deterioration in the relative return to M3R was itself related to the rising return to bonds during this period. Thus the expansion of the bond market was initially at the expense of money demand. In 1983, by contrast, the relative rate of return effect was broadly neutral. While the ratio of M3R to income was largely unchanged in consequence, the ratio of M3R to wealth fell sharply, as we have noted above. This reflected the large increase in wealth relative to income. Thus the continued expansion of the bond market in 1983 was now at the expense of expenditure, not money demand.

V. Conclusion

The research reported in this paper has sought to explore the role of wealth in expenditure and demand for money functions in France (in Hicksian terminology, in both the IS and LM curves). While the results may not be as conclusive, they do contribute at least tentative evidence that wealth effects should not be ignored in either function. The implications for France are various. For fiscal policy the decline in the rate of inflation can be expected to have only a temporary effect on private sector savings, if any, as much of the adjustment of actual to desired wealth will have been brought about already via capital gains. In these circumstances, the reduction in the inflation tax will probably reduce the private sector surplus in the medium term. A requirement for external balance thereby puts added pressure on the fiscal authorities to reduce their financial deficit. For monetary policy the implications are less obvious in the context of the EMS. Nonetheless, factors which affect the demand for financial wealth may also be expected to affect the demand for money, something which should be allowed for in the setting of credit targets. Where the exchange rate is allowed to float and a genuinely independent monetary policy is possible the policy implications are richer, but for the moment this scenario is not a very probable one for France.

The Data

The wealth data for France, known as the "TERF" (Tableau d'Equilibre des Relations Financières), is (end) quarterly and covers the period from the first quarter of 1970 to the last quarter of 1984. The economy is divided into nine different sectors and 22 assets/liabilities are counted. Not all assets held by one sector can be identified as liabilities of other individual sectors. For example, "French bonds" held by the personal sector cannot be subdivided into those issued by the corporate sector and those issued by government. While it is possible, in principle, to arrive at a consolidated estimate of the net financial worth of a sector grouping, for example the private sector (households plus corporations), it is not therefore possible to calculate a consolidated figure for gross financial worth for a sector grouping. Even the former calculation is not without problems. Insofar as the price of financial instruments can vary in the market place, assets are shown inclusive of revaluations. Liabilities, by contrast, are shown at nominal or issue price. This treatment has the consequence that assets and liabilities do not sum to zero across sectors. Sectoral net worths will thereby also not sum to zero. Since most of the work done in this paper is in terms of the private sector, an aggregation of households, enterprises, assurance companies and other private sector bodies, 1/ the inability to compute truly consolidated figures is a drawback but not necessarily without its own advantages. In particular, the resulting figures will reflect some intrasectoral asset revaluations, in particular of equities, which may be expected to influence aggregate spending and money demand behavior. If they do not, however, they will instead impart measurement error relative to the relevant concept of net worth.

The approach to the derivation of the income and expenditure data was to follow exactly the same procedure as that of Bennett (op cit). Thus expenditure was defined as the sum of household consumption and gross fixed capital formation by households and enterprises. It therefore excludes stockbuilding. The price index used for deflating income and for computing the rate of inflation is that of total private expenditure inclusive of stockbuilding. Private sector disposable income is defined as the sum total of private expenditure, inclusive of stockbuilding, plus the private sector's net acquisition of financial assets (the financial surplus) deflated by the private expenditure deflator. Raw data was culled from the French quarterly national accounts. 2/

The monetary data used were end of period seasonally adjusted stocks. The data were drawn from series published by the Bank of France. 3/

1/ Groups S, N and A in TERF terminology.

2/ "Les Comptes Nationaux Trimestriels," séries longues 1963-1983, INSEE, April 1984.

3/ "Statistiques Monétaires" séries rétrospectives 1969-1984, Banque de France, 1985.

Disaggregation of the Expenditure Function

While there appears to be a clear role for wealth at the aggregated level, it is perhaps instructive to consider the consequences of disaggregating. It is desirable that this be done in such a fashion that disaggregated equations sum to the aggregated equation discussed in section III. This would be easiest to achieve with a linear, rather than loglinear, specification. Unfortunately the rather wide variation in the value of real financial wealth during this period means that the loglinear specification cannot be easily approximated by a linear specification and this is confirmed by experiments with the latter which gave distinctly less impressive results. Using a loglinear specification it is nonetheless still possible to retain the adding up property if one makes use of the following transformation

$$\log z = \log c + \log(1+(i/c))$$

The interpretation of the first term on the right hand side is obvious, but that of the second deserves some explanation. Essentially a regression of the latter on the regressors of the aggregate equation will reveal what the addition of fixed investment (i) to consumption (c) contributes to the estimated coefficients in the aggregate equation, by comparison to a regression of consumption only on these regressors. The results of the disaggregated regressions are shown in Table 3. It is apparent that the only significant variable in the consumption equation is the income term. Financial wealth appears to explain very little, while inflation and interest rates, although correctly signed, are insignificant. The regression of the transformed investment variable reveals that it is the addition of investment to consumption that generates the satisfactory overall result. The effect of income in the transformed investment equation is negative, but sufficiently small to leave the overall income term as significantly positive. The financial wealth term is significant and positive and contributes the whole of the effect in the aggregate equation. The rate of interest is also significant and positive, but this is sufficiently offset by the insignificant but negative coefficient in the consumption equation to give an insignificant coefficient in the aggregate equation. The inflation rate is insignificant, although positive and the coefficient sums with that of the consumption equation to give a significant overall coefficient. The standard errors of both the disaggregated equation, at 0.83 percent and 0.57 percent respectively, are higher than that of the aggregate equation, at 0.55 percent, suggesting that the errors in the disaggregated equation are offsetting with consequent advantages to aggregation. 1/

1/ This would alternatively suggest that GLS methods would be appropriate. It would be of interest to use Zellner's test for aggregation bias, but this was beyond the scope of this paper.

Table 3. Private Sector Expenditure

(1971 Q1 to 1983 Q4)

		Total		Consumption		Investment	
		Coefficient	(t-value)	Coefficient	(t-value)	Coefficient	(t-value)
Lagged dependent variable	t-1	0.43	(2.7)	0.37	(1.5)	0.07	(0.4)
	t-2	0.19	(1.0)	0.15	(0.5)	0.04	(0.2)
	t-3	0.06	(0.5)	0.01	(0.0)	0.06	(0.4)
	sum	0.69	(5.4)	0.52	(2.7)	0.17	(1.3)
Real private income	t	0.18	(2.7)	0.22	(0.6)	-0.04	(0.6)
	t-1	0.08	(1.0)	0.07	(2.9)	0.01	(0.1)
	t-2	-0.05	(0.7)	-0.09	(2.0)	0.03	(0.4)
	t-3	0.08	(1.0)	0.18	(1.4)	-0.10	(1.2)
	sum	0.29	(2.5)	0.39	(2.3)	-0.10	(0.9)
Real private net wealth	t-1	0.03	(2.4)	-0.00	(0.0)	0.03	(2.3)
	t-2	0.01	(0.4)	0.01	(0.2)	0.00	(0.1)
	t-3	0.01	(0.5)	-0.00	(0.2)	0.01	(0.8)
	sum	0.04	(3.3)	0.00	(0.0)	0.04	(3.0)
Interest rate 1/	t	-0.05	(0.6)	-0.16	(1.2)	0.11	(1.1)
	t-1	0.12	(0.9)	0.10	(0.5)	0.02	(0.1)
	t-2	-0.05	(0.4)	0.03	(0.1)	-0.08	(0.6)
	t-3	0.10	(1.0)	-0.04	(0.3)	0.14	(1.3)
	sum	0.11	(1.4)	-0.07	(0.6)	0.18	(2.2)
Inflation rate 1/	t	0.19	(1.5)	0.19	(1.0)	-0.00	(0.0)
	t-1	-0.18	(1.0)	-0.24	(0.9)	0.06	(0.3)
	t-2	-0.17	(1.1)	-0.30	(1.2)	0.13	(0.7)
	t-3	0.36	(2.9)	0.40	(2.1)	-0.04	(0.3)
	sum	0.20	(2.2)	0.05	(0.4)	0.15	(1.6)
Time trend 1/		-0.12	(2.0)	0.16	(1.8)	-0.28	(4.4)
Constant		-0.05	(0.2)	0.17	(0.4)	-0.22	(0.7)
Durbin Watson		2.10		1.27		0.84	
Standard error (in percent)		0.55		0.83		0.57	

1/ Coefficients multiplied by 100.

Table 4. Private Sector Expenditure

(1971 Q1 to 1983 Q4)

		Total		Consumption		Investment	
		Coefficient	(t-value)	Coefficient	(t-value)	Coefficient	(t-value)
Lagged consumption	t-1	0.29	(1.3)	0.07	(0.4)	0.22	(1.7)
	t-2	0.24	(1.1)	0.17	(0.9)	0.07	(0.5)
	t-3	0.16	(0.7)	0.33	(1.8)	-0.18	(1.3)
	sum	0.68	(3.5)	0.57	(3.5)	0.12	(1.0)
Lagged investment	t-1	0.04	(0.1)	-0.30	(1.0)	0.35	(1.6)
	t-2	0.25	(0.5)	-0.18	(0.5)	0.43	(1.5)
	t-3	0.19	(0.5)	0.16	(0.5)	0.03	(0.1)
	sum	0.48	(2.0)	-0.33	(1.6)	0.81	(5.6)
Real personal income	t	0.04	(0.3)	0.07	(0.6)	-0.03	(0.4)
	t-1	0.28	(1.6)	0.42	(2.9)	-0.14	(1.3)
	t-2	-0.12	(0.6)	-0.33	(2.0)	0.21	(1.7)
	t-3	0.03	(0.2)	0.20	(1.4)	-0.17	(1.7)
	sum	0.22	(1.4)	0.35	(2.7)	-0.13	(1.3)
Real comany income	t	0.12	(0.8)	-0.13	(1.0)	0.24	(2.6)
	t-1	-0.12	(0.7)	-0.18	(1.2)	0.06	(0.5)
	t-2	-0.07	(0.4)	0.08	(0.6)	-0.15	(1.5)
	t-3	0.04	(0.3)	-0.06	(0.5)	0.10	(1.1)
	sum	-0.03	(0.1)	-0.29	(1.4)	0.26	(1.6)
Real personal net wealth	t-1	-0.06	(0.6)	-0.13	(1.8)	0.08	(1.4)
	t-2	0.04	(0.3)	0.12	(1.2)	-0.08	(1.1)
	t-3	0.09	(0.9)	0.02	(0.3)	0.07	(1.1)
	sum	0.07	(0.7)	0.01	(0.1)	0.06	(1.0)
Real company net wealth	t-1	0.04	(2.7)	0.03	(2.3)	0.01	(1.3)
	t-2	0.00	(0.3)	-0.01	(0.7)	0.01	(1.3)
	t-3	0.01	(0.3)	0.01	(0.9)	-0.01	(0.8)
	sum	0.05	(2.5)	0.03	(2.0)	0.02	(1.4)
Interest rate 1/	t	-0.09	(0.7)	-0.10	(0.9)	0.01	(0.1)
	t-1	0.11	(0.7)	0.05	(0.4)	0.06	(0.6)
	t-2	-0.06	(0.4)	0.02	(0.2)	-0.08	(0.9)
	t-3	0.09	(0.8)	-0.04	(0.4)	0.13	(1.9)
	sum	0.05	(0.4)	-0.07	(0.6)	0.12	(1.4)
Inflation rate 1/	t	0.16	(1.1)	0.14	(1.2)	0.02	(0.2)
	t-1	-0.13	(0.7)	-0.19	(1.2)	0.06	(0.5)
	t-2	-0.17	(1.0)	-0.18	(1.2)	0.01	(0.1)
	t-3	0.33	(1.9)	0.27	(1.9)	0.06	(0.5)
	sum	0.18	(1.4)	0.04	(0.3)	0.15	(1.8)
Time trend 1/		-0.13	(1.2)	-0.05	(0.5)	-0.08	(1.2)
Constant		0.24	(0.5)	0.49	(1.3)	-0.26	(0.9)
Durbin Watson		1.99		2.08		2.26	
Standard error (in percent)		0.57		0.47		0.34	

1/ Coefficients multiplied by 100.

Having considered the disaggregation of the aggregate equation by the components of the dependent variables, the next step is to consider disaggregation of the explanatory variables. In this case the disaggregation has been between household and other, mainly company sector, variables. Thus total income is split into personal disposable income and company sector (calculated by residual) while wealth is similarly calculated. It is noteworthy that the latter is negative for the company sector, reflecting the fact that equity is a liability to the company sector. The lagged dependent variable is also split up between consumption and investment. The same expedient is used as before to ensure summation. Thus lagged investment, "company" income and "company" wealth are all expressed as the logarithm of one plus the ratio of these to consumption, "household" income and "household" wealth respectively. The results of disaggregating the arguments in this way are shown in Table 4. In the equation for aggregate or total private spending, the coefficients on the lagged values are broadly equivalent and it is statistically acceptable to combine them ($\chi^2(3)=1.19$). The majority of the work of the income term appears to be done by personal income, the coefficient on company income being close to zero. However, these coefficients are not well determined, and it is again a statistically acceptable restriction to combine them ($\chi^2(4)=2.99$). The two disaggregated wealth terms offer very similar positive coefficients and their combination is easily accepted ($\chi^2(3)=1.88$). Overall, the aggregated version of the equation shown in Table 1 in section III can be determined to be a statistically acceptable restriction on the disaggregated version for total spending shown in Table 2a ($\chi^2(10)=8.04$).

Restrictions (χ^2) Spending category	Combination of: Lagged Dependent Variables	Income	Wealth	All three
Consumption	15.81	15.65	4.85	39.67
Investment	16.01	14.49	3.17	36.66
Total	1.19	2.99	1.88	8.04
Critical value (5%)	7.81	9.49	7.81	18.31

The position is rather different if total spending is split into consumption and investment. For consumption it is, as one might expect, real personal income that matters. Aggregation with company income, which takes a negative coefficient, is strongly rejected on the likelihood ratio test ($\chi^2(4)=15.65$). Rather curiously, however, consumption appears to be better related to company sector net worth than to personal sector net worth. The two terms may nonetheless be added ($\chi^2(3)=4.85$). They may also be suppressed ($\chi^2(6)=9.15$). In fact it is possible to drop all wealth and company sector variables ($\chi^2(13)=17.61$). A policy of removing insignificant variables would leave one with little more than personal income and lagged consumption. For investment it is a rather similar story. Here it is company income rather than personal income that matters. The two wealth terms again offer broadly similar coefficients and may be summed ($\chi^2(3)=3.17$). They may, however, likewise be suppressed ($\chi^2(6)=9.79$). In fact all personal sector variables and the wealth terms may be dropped ($\chi^2(13)=21.14$). *Thus operating at a highly disaggregated level,* with both the regressand and regressors broken down into their more usual components, one is rapidly led back to the conventional type of specification.

Monetary Data on New and Old Definitions

Of the three main aggregates (new definitions) M1, M2 and M3, the one that has undergone the most drastic transformation relative to its former definition is M2. 1/ M1, which continues to represent cash and checking accounts (which are noninterest bearing by law in France) is very similar in concept to its former definition of M1R. It is larger in level than its former self, but this addition (mainly local authority balances with the Treasury) displays relatively little behavioral variance that is not removed in seasonal adjustment. At the other end of the scale, M3, the widest of the (strictly monetary) aggregates, has mostly undergone shifts of assets within it, rather than seen transfers between it and other aggregates. Its character, accordingly, will have been little changed. M2, by contrast, has seen a more radical redefinition. The old definition, M2R, composed in essence the monetary liabilities of the banking sector (stricto sensu), and excluded identical liabilities of other credit institutions--in particular the savings banks. At the same time as including the latter, as important in the size as the former, in the new definition of M2, the authorities trimmed the qualifying liabilities. While passbook accounts (demand deposits) remained in M2, term deposits were relegated to M3. Thus both by institution and type of security, M2 emerged as radically different from M2R. This is well illustrated in Chart 9. This compares the seasonally adjusted quarter by quarter percentage change in M2 and M2R over the period 1978 to 1985 (the common data set). A contemporaneous relationship between the two exists, but it is extremely ragged and uneven. The relationship between M1 and M1R, by contrast, shown in Chart 8, is revealed as remarkably close, at least until the second half of 1984 when signs of a divergence emerge. By the same token, M3 and M3R, shown in Chart 10, also display an almost exact correlation, again until 1984. This suggests that M1R and M3R data could be used to proxy the new M1 and M3 aggregates without serious misrepresentation. M2R, however, could not be used to proxy M2. Since use of wealth and income data described in section I would restrict the analysis to the end of 1983, this would inadvertently confer the benefit of excluding the 1984/85 period when there is some evidence of divergence between the new and the old definitions. There graphical relationships are confirmed by correlation analysis. The correlation coefficient between the quarterly percentage change in M1 and M1R is 0.89 for the period 1978 to 1983 but falls to 0.70 if the coverage is extended to 1985. The correlation coefficent between M2 and M2R is only 0.58 for the period to 1983, although this rises slightly to 0.63 if this is exended to 1985. Finally, the correlation coefficient between M3 and M3R is 0.93 for the period to 1983, falling slightly to 0.87 if extended to 1985.

1/ For a description of the comparison between new and old definitions see Banque de France, Bulletin Trimestriel, December 1985.

CHART 8

M1 AND M1R COMPARED

(Quarterly percentage change)

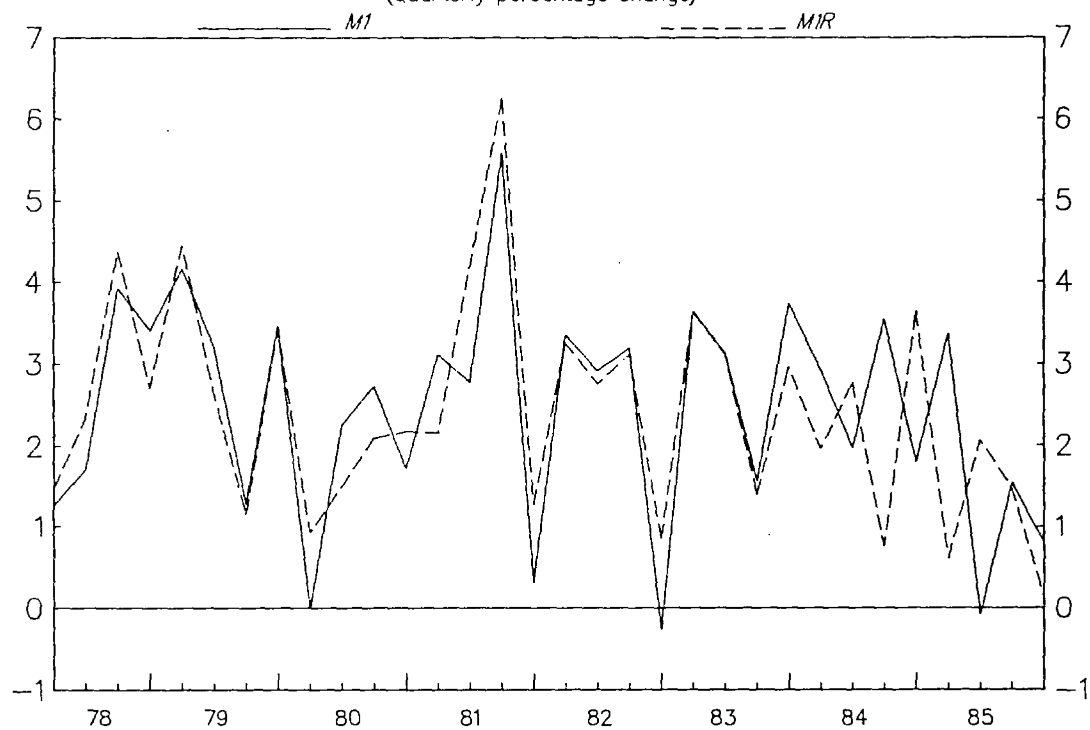


CHART 2a

M2 AND M2R COMPARED

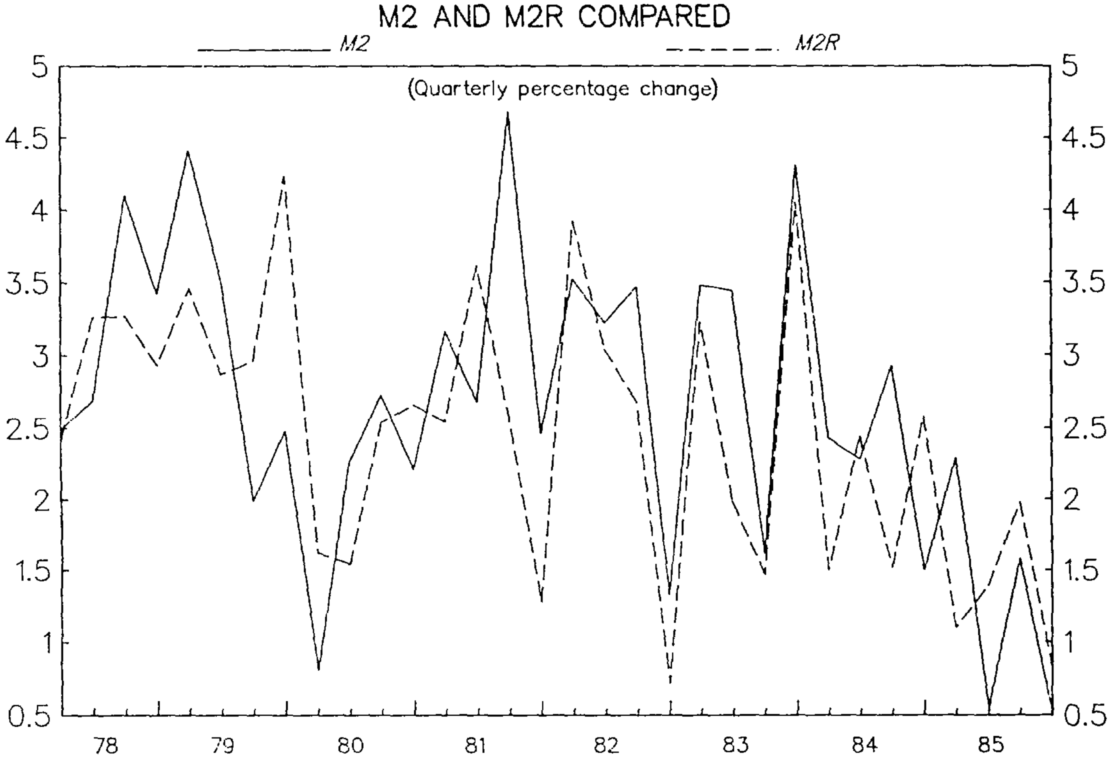
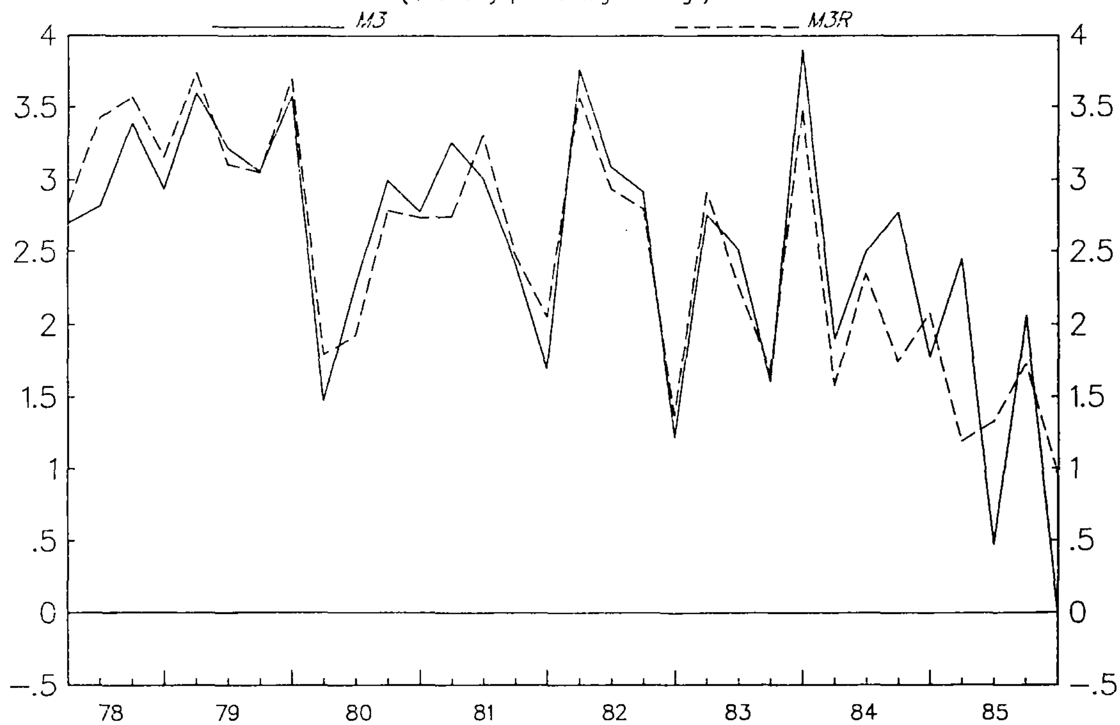


CHART 10

M3 AND M3R COMPARED

(Quarterly percentage change)



The Exogeneity of Wealth

A test for the assumption of the exogeneity of a regressor was developed by Wu (1973) and formalized by Hausman (1978). This test is performed by regressing the suspected variable (i.e., the regressor suspected of endogeneity) on all the independent (truly exogenous) variables in the equation plus selected instruments. The error term from this latter equation can then be entered into either the second stage of this two stage least square (2SLS) process, or into the original equation. The test then consists of computing either (i) the difference in log likelihoods of the original uninstrumented equation (i.e., equation (7) of section IV) and the second stage (including the first stage error term) of the 2SLS regression or (ii) the t value associated with the error term when entered into the original equation. If either is significant the hypothesis of exogeneity is rejected. The two tests are equivalent. The problem with the test is that it is not very powerful. The strength of the test depends upon the quality of the instruments chosen for the suspected variable. Fortunately we very conveniently have a set of instruments available for wealth from section III. By virtue of equation (2) in section III the change in net wealth and thereby gross wealth is negatively related, by identity, to expenditure. Expenditure will itself be endogenous, of course, but the right hand side variables of equation (5) in section III, which determines expenditure, can reasonably be considered exogenous. Some of them already appear in equation (7) but those that remain can be considered as suitable instruments. The first stage regression of gross wealth on the predetermined variables of equation (7) and the instruments chosen from equation (5) is shown below:

$$
\begin{aligned}
\text{(1a)}\quad \log gw = \underset{(3.4)}{1.71} &+ \underset{(1.3)}{0.18} \log mlR_{-1} &&+ \underset{(0.8)}{0.10} \log yd \\
&+ \underset{(6.5)}{0.79} \log gw_{-1} &&- \underset{(1.9)}{0.24}\, \overset{c}{r}_{-2} \\
&+ \underset{(3.3)}{0.40}\, time && \\
&- \underset{(1.3)}{0.02}\, nw_{-1} &&- \underset{(2.1)}{0.32} \log z_{-1} \\
&- \underset{(3.0)}{0.72}\, \Delta\dot{p} &&- \underset{(1.9)}{0.25}\, \dot{p}_{-3}
\end{aligned}
$$

Standard error 1.28 percent; Durbin's H statistic 4.38

It is noteworthy that the instruments all take negative coefficients (although this being a reduced form it is difficult to sign expected coefficients) and their t values suggest that they are of good quality. When the error term from this equation is included in equation (7) and the regression rerun the error term attracts an insignificant coefficient (t value of 0.5). The coefficient on gross wealth (which in this regression is the same as that which would be estimated in straightforward 2SLS) actually rises slightly.

Before one can accept the hypothesis of exogeneity for gross wealth, however, it is necessary to conduct one further test, this time to check for the absence of overidentifying restrictions applied to the instrumental variables. Essentially this is to check whether the instruments used in equation (1a) should have been used in equation (7) directly. If they should there is a danger that the instrumented value of gross wealth only retains its positive coefficient because it is correlated with missing variables. This would, of course, invalidate the Wu-Housman test. A test for this was devised by Sargan (1964). This can be conducted by computing the error term from an equation with coefficients equal to those of the second stage of a 2SLS regression using the instruments selected for equation (1a). While the coefficients are those of the second stage 2SLS regression, the variables they multiply to generate the errors are those of equation (7). That is to say, the instrumented values of gross wealth are replaced by the actual values. This error term is then regressed on all the right hand side variables in equation (1a), the first stage of the 2SLS process. It should be uncorrelated, and the relevant test statistic TR^2, where T is the number of observations, and is distributed as χ^2 with degrees of freedom equal to the number of instruments. The test is in fact passed quite easily ($\chi^2(4)=1.97$).

References

Bank of France, "Statistiques monétaires, series rétrospectives 1969-1984," Direction Generale des Etudes (1985).

____________, Quarterly Bulletin, No. 57 (December, 1985).

____________, "Tableau d'Equilibre des Relations Financières," Cahiers Economiques et Monétaires, No. 23 (1986).

____________, Quarterly Bulletin, No. 59 (June, 1986).

Bennett, A., "Expenditure, Wealth and the Rate of Interest," Economic Modelling, Vol. 3, No. 1 (January, 1986) pp. 72-81.

__________, "Wealth and the dynamics of macroeconomic adjustment," Economic Modelling, Vol. 4, No. 1 (January, 1986) pp. 3-18.

Blinder, A. and Solow, R., "Does Fiscal Policy Matter" Journal of Public Economics, Vol. 2 (1973) pp. 319-337.

Camilleri, A., Nguyen, D. and Campbell, R., "Policy Changes and External Disturbances in a Small Open Economy: Stability and Dynamic Responses," International Economic Review, Vol. 25, No. 1, (1984), pp. 123-158.

Fröchen, P., and Voisin, P., "La stabilité des équations de demande de monnaie: le cas de France de 1970 à 1984," Cahiers Economiques et Monétaires, Banque de France, No. 21 (1986).

Grice, J., and Bennett, A., "Wealth and the demand for £M3 in the United Kingdom 1963-1978," Manchester School, No. 3 (September 1984) pp. 239-271.

Hausman, J., "Specification tests in Econometrics," Econometrica, Vol. 46, No. 6 (1978) pp. 1251-1272.

Institut national de la statistique et des études économiques, "Les comptes nationaux trimestriels, séries longues 1963-1983," Archives et Documents, No. 103, INSEE (April 1984).

Pollak, R., "Conditional Demand Theory and Consumption Theory" Quarterly Journal of Economics, Vol. 83, No. 1 (1969) pp. 60-78.

Sargan, J., "Wages and prices in the United Kingdom: a study in econometric methodology," in Econometric Analysis for National Economic Planning, edited by Hart, P., Mills, G. and Whitaker, J. (London, Butterworths, 1964).

Sargent, T. and Wallace, N., "Some Unpleasant Monetarist Arithmetic" Federal Reserve Bank of Minneapolis Quarterly Bulletin (1981).

Vines, D. and McCallum, J., "Cambridge and Chicago on the Balance of Payments" Economic Journal, Vol. 19, No. 362 (1981), pp. 439-453.

Whittaker, R., Wren-Lewis, S., Blackburn, K. and Currie, D., "Alternative Financial Policy Rules in an Open Economy Under Rational and Adaptive Expectations," Economic Journal, Vol. 96 (September 1986) pp. 680-695.

Wu, D.,"Alternative tests of Independence between Stochastic Regressors and Disturbances," Econometrica Vol. 41, No. 4 (1973) pp. 733-750.