Monetarism in Ireland: A Simple Statistical Approach

R. C. GEARY*
The Economic and Social Research Institute, Dublin

Précis: This paper deals with the relationship in Ireland between money and prices during the period since 1960. It is shown that the causal relationship is from money to prices very much more than the other way about. Chain of causality is verified by analysing each half of the whole period 1960-1979. Based on data for the later half it is found that an annual rise of one per cent in money will be followed by a rise of about ¾ per cent a year later.

This paper gives the results of a statistical examination of the theory associated with the name of Milton Friedman, in its application to Ireland. It may be remarked that in testing a general theory, well investigated at other time and place, in a particular case (i.e., money theory in Ireland), statistical rigour may be relaxed and simple methods used. Simplicity has the merit of appeal to decision makers and the general public.

Some of the scepticism about the Friedman thesis centres on the classical identity —

$$MV = PT, \tag{1}$$

where M is quantity of money, V is its velocity of circulation, P price per transaction and T transactions, all in a given period.[1] P obviously depends on the values of V and T as well as on M. In what follows, the relations between these variables are examined statistically, using Irish data for the years 1960-1979; 1960 was selected as the beginning of the economic upsurge. As usual with economic time series, one has to choose between short periods of greater stability but larger errors (and hence doubt about significance) and long periods with economic variation and smaller errors of estima-

1. PT symbolically is $\sum_{i=1}^{N} P_i T_i$ where T_i is the quantum of transaction i, P its price. N number of transactions in period.

tion. We shall find the short period of twenty years, with the year as time unit, justified by the analysis.

Taking log differentials of (1) —

$$\frac{\delta M}{M} + \frac{\delta V}{V} = \frac{\delta P}{P} + \frac{\delta T}{T} \qquad (2)$$

In Table 1 $\delta x/x$ is taken as the finite difference percentage $100\,(x_t - x_{t-1})/x_{t-1}$, t being time in years. In the search for relationship, this difference percentage approach is much more rigorous than by use of raw data, when very high correlations may be found between a pair of variables only because (as almost invariably happens in latter years, mainly due to inflation) both are increasing sharply. The ccs are near unity but may be without significance of relationship.

As to the statistics used in Table 1, money (M) was M3 for most of the time; up to and including 1966 it was the sum in December of currency and non-government current accounts. V is what is described as "turnover" by CBI (Central Bank of Ireland); it is regarded as a proxy for velocity of circulation of money, though it does not take into account movement of currency, which is not available. P is the CPI which was shown in Geary (1944/45) to be close to a general transaction price index in Ireland, a similar result being found about the same time for the UK. Of course, nothing is known directly about quantum of transactions T. Its percentage difference is derived from (2) above. Percentage changes for real GDP are given as the last column of the table for investigation of possible relationship to changes in quantum of transactions.

As descriptive features of Table 1, the considerable increases in the 1970s compared with the 1960s in year-to-year percentage changes in P, M, V and T will be noted, but not in those for real GNP (Y). This would not be inconsistent with the first four variables being related but, of course, more proof is needed. The primary tau values (i.e., the number of sign changes in the sequence of $(x_t - \bar{x})$) in P and M are respectively 5 and 3, with one sided null hypothesis probabilities (NHP) of .0154 and .0007. Both series must accordingly be regarded as autoregressed, which means that we expect lagged values to be positively correlated, if this be the case with simultaneous values, or vice versa. The phenomenon of greater values in the 1970s compared with the 1960s has led to these two periods being examined separately, as well as 1960-61 to 1978-79 as a whole, in what follows.

NHP significance is indicated by numbers, as follows —

No.	NHP
0:	$> .1$
1:	$< .1, > .05$
2:	$< .05, > .01$
3:	$< .01, > .001$

Table 1: *Percentage year to year changes in consumer price index (P), money supply (M) turnover in current accounts of Associated Banks (V), derived transactions (T) and gross domestic product (Y).*

Years of Change	CPI P	Money M	Turnover V	Transactions T	GDP Y
	1	2	3	4	5
1960-61	2.7	6.4	4.9	8.6	4.7
1961-62	4.2	7.7	1.7	5.2	2.6
1962-63	2.5	9.8	0.0	7.3	4.0
1963-64	6.7	13.4	0.4	7.1	5.7
1964-65	5.0	5.3	0.4	0.7	1.3
1965-66	3.0	7.8	−4.9	−0.1	1.2
1966-67	3.2	9.6	13.0	19.4	4.9
1967-68	4.7	14.9	5.0	15.2	6.5
1968-69	7.4	12.6	12.0	17.2	4.8
1969-70	8.2	(11.0)	1.0	3.8	2.9
1970-71	9.0	(9.9)	1.3	2.2	3.5
1971-72	8.6	10.2	32.8	34.4	6.0
1972-73	11.4	22.6	21.3	32.5	4.2
1973-74	17.0	21.1	29.4	33.5	3.7
1974-75	20.9	19.5	29.5	28.1	2.1
1975-76	18.0	17.6	14.4	14.0	1.6
1976-77	13.6	15.4	12.3	14.1	5.6
1977-78	7.6	19.1	−1.5	10.0	n.a.
1978-79	13.2	29.6	6.9	23.3	n.a.

Basic sources: *Reports of Central Bank of Ireland* (cols. 2-4), *Irish Statistical Bulletin* (col. 1), *National Income and Expenditure* 1977 (col. 5).

Notes:
Col. 1: Based on annual averages of quarterly indexes.
Col. 2: Based on M3 from 1966 on: 1970 figure (not available due to bank strike) interpolated.
Col. 3: Based on non-government Associated Bank current account figures: debits/current accounts averages.
Col. 4: Derived: col. 2 + col. 3 −col. 1.
Col. 5: Based on gross domestic product at constant market prices.

The (PM) ccs and their significance are as follows —

	cc	significance
(PM_{-1})	.88	3
(PM)	.70	2
$(P_{-1}M)$	.44	0

Correlations are derived from percentage changes, as shown on Table 1, the −1 subscript indicating the year previous. Significance was derived from asymptotic normal theory. The P and M series in Table 1 were regarded as samples from populations in which the elements of the later half were 2.68 and 1.79 times respectively those in the earlier half, these being the ratios

of the means from columns 1 and 2 of Table 1; otherwise the four sections of the variables were regarded as random samples with the same mean and variance. The calculation of population cc, namely ρ, was a complicated piece of algebra which need not be reproduced here. Suffice to state that, assuming the four subsamples to be drawn at random from a rectangular universe and using the foregoing ratios (i.e., 2.68 and 1.79), ρ = .253. (As a check, two samples of 100 each were drawn from the same rectangular population and the lower 50 elements of each were all multiplied by 2.68 and 1.79 respectively. The cc found was .246, almost exactly the same as the foregoing theoretical value.) Significance was assessed using the asymptotic formula for the standard deviation, namely —

$$sd = (1 - \rho^2)/\sqrt{n}$$

and assuming that normal theory applied.

Even on the testing percentage change basis the relationship between quantity of money (M) and the price level (P) is strong, with money (because prior in time) as the cause of price and not the other way about. The fact that the simultaneous as well as the money-lagged relationship is significant may mean that the effect of the money change on price acts, on average, in less than a year; or it may be simply due to both series being autoregressed, as shown above. Little interest attaches to the length of the time-lag; enough that the money level very probably affects the price level.

As the fact of autoregression and the necessity of recourse to asymptotic theory might have imparted some doubt to the latter inference, it was decided to divide the data in Table 1 for P and M into two equal parts —

I: 1960-61 to 1969-70 inclusive,
II: 1969-70 to 1978-79 inclusive,

ten in each with the middle 1969-70 figures in common. The results are more emphatic for these half periods than for the whole period of 19 percentage changes —

	cc	significance
I (PM_{-1})	.78	3
II (PM_{-1})	.80	3
I (PM)	.50	0
II (PM)	.42	0
I $(P_{-1}M)$	−.37	0
II $(P_{-1}M)$	−.11	0

The consistency of the cc values in the two periods is also pleasing: nearly the same for (PM_{-1}) and the pairs for (PM) and $(P_{-1}M)$ not very different, both not significant, and both $(P_{-1}M)$ ccs negative. In this time-divided case, significance was adjudged in relation to cc population value zero. There

can be little doubt about the quantity of money's positively affecting the price level a year later in Ireland. The simple regression coefficient for P on M_{-1} in period II (1969-70 to 1978-79) is 0.76 so that a rise (or fall) of 1 per cent in the value of money in a particular year is likely to be followed by a rise (or fall) of ¾ per cent in the price index a year later.

Interest also attaches to the relationship between changes in the velocity of circulation (V) and in money and prices. As statistics of M and V have very large parts in common, positive correlation between them is to be expected but it would be impossible to assess its significance. Simultaneous relationships between percentage changes in price and velocity in the two periods are as follows —

	cc	significance
I (PV)	.13	0
II (PV)	.53	0

While relationship in period I was insignificant beyond a doubt, the comparatively high cc value in period II will be noted. It is quite near the .1NHP value (for 8 df) of .55, i.e., of significance 1. Apart from the statistical showing, perhaps an increase in velocity of circulation is to be expected in a period of galloping inflation, namely the 1970s. The showing of the 1960s of little, if any, relationship between velocity and price and a strong relation between money and price favours the simple theory of the money level being the cause of the price level.

A calculation from Table 1 shows that over the whole period 1960-1977 the average annual percentage changes in Y and P were respectively 3.8 and 8.5, total 12.3, nearly equal to 12.5 which is the average annual percentage growth rate of M. This fact supports the monetarist view that changes in V are comparatively irrelevant, also indicated in the last paragraph. As the product of Y and P should be close to GDP at current prices we are reminded of the statistical showing of the near-constancy of the ratio of gross domestic expenditure to the money level, which was a regular feature in the reports of CBI up to about 1970.

Except for its entering into identity (1) there has been no interest in quantum of transactions and this paper does not enhance the importance of the concept. Following are the ccs for (TY) in the two periods —

	cc	significance
I (TY)	.79	3
II (TY)	.30	0

We find a strong relationship in the 1960s (when changes in transaction level were comaparatively small) becoming much weaker, or vanishing, in the 1970s.

In a recent study C. A. Sims (1980) analyses six quarterly time series with lags for Western Germany (1953-1976) and USA (1949-1975). The

series used are money, real GNP, unemployment, wages, general and import price levels. While the author does not supply the regression relations (he is more concerned with more subtle aspects like testing for homogeneity in two divisions of the whole period, forecast percentage and standard errors for specified quarters ahead), he positively states that "The money supply has a direct impact on wages, but not on prices" in both countries, hence differing from the result found here for Ireland. One would have expected a close relationship between wages and prices, causatively operating (through lags) both ways. So the Irish result may have been money causing wages and wages causing prices. Sims also finds in the two countries that unemployment is not important in explaining the wage equations but it has some effect on prices. Here again one observes a break between wages and prices.

Splitting his sample in two nearly equal parts (in fact at 1965) Sims finds no significant difference between the two parts of the sample, for both countries, as was found for Ireland. However, in Western Germany and USA unequal divisions of the whole period resulted in significant differences.

While the relationship between money and price has been shown to be impressive there is no suggestion that money is the sole factor influencing the price level. It may well be that both factors have a common cause. In fact, it has been shown that there is a close correspondence between general price movements in Ireland and the UK and the same may obtain between monetary phenomena (Geary and Pratschke, 1968). To state that in Ireland inflation can be controlled by curbing the money supply is not a logically convincing argument for this course of action's being adopted. Unemployment and inflation are both social evils but unfortunately measures designed to lessen one are likely to exacerbate the other, assuming always that the majority of the general public who could afford to do so are not to be asked to accept some sacrifice for the common good.

The main interest here may be statistical, namely the firm establishment of a likely direction of causation in a particular case, so rare and so difficult in practice.

REFERENCES

GEARY, R. C., 1944/45. "Some Thoughts on the Making of Irish Index Numbers", *Journal of the Statistical and Social Inquiry Society of Ireland*, Vol. XVII.

GEARY, R. C., and J. L. PRATSCHKE, 1968. *Some Aspects of Price Inflation in Ireland*, Dublin: The Economic and Social Research Institute, Paper No. 40.

SIMS, C. A., 1980. "Macroeconomics and Reality", *Econometrica*, Vol. 48, No. 1, January.