

# *Money, Interest and Economic Activity in Ireland*

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## *Introduction\**

RECENT studies have provided evidence that economic activity in Ireland responds to changes in certain monetary aggregates.<sup>1</sup> Thomas F. Hoare, for example, employs a "Monetarist Model of Income Determination" to investigate the linkages between money, autonomous expenditure and aggregate income. Hoare's model relates nominal income ( $Y$ ) to current and lagged values of a composite variable ( $Q$ ) which is equated to the sum of exports, net external capital flows and changes in the banking system supply of domestic credit, the latter element of  $Q$  being equal to the money stock minus the banks' net external assets.<sup>2</sup> In the present paper, we investigate these macroeconomic relationships in a model similar to Hoare's but which gives explicit recognition to the openness of the Irish economy and the consequent endogeneity of monetary aggregates.

Mundell [7] has established that in a relatively small economy with large trading partners, and fixed exchange rates,<sup>3</sup> changes in the domestic money stock

\*I wish to thank my colleagues N. J. Gibson, J. C. Glass and G. R. Steele for useful discussion and advice. Any errors are, of course, my own.

1. See T. H. Hoare [3].

2. Hoare's model is identical to that used by J. J. Polak, [9] and, subsequently, by M. V. Holtrop [5].

3. Although the exchange rate between the Irish Pound and non-sterling currencies may be flexible, the Irish Authorities still maintain a fixed parity with their major trading partner the United Kingdom.

are independent of open market operations carried out by the Central Bank.<sup>4</sup> Given the high degree of capital mobility which exists between Ireland and the United Kingdom, the correct exogenous variable, in relation to the domestic economy, is the market rate of interest rather than the money supply or the volume of domestic credit.<sup>5</sup> It is well documented that, as a consequence of fixed parity and capital mobility, domestic interest rates in Ireland must be closely related to rates in the United Kingdom. For example,

Given the desirability of maintaining . . . freedom of funds, and given that it is part of national economic policy to maintain a fixed parity with sterling, the corollary is that it is not possible for interest rates in this country (Ireland) to be significantly lower for any extended period than those obtaining in Britain.<sup>6</sup>

Throughout this paper we shall assume that Irish interest rates are determined exogenously to the domestic economy and instead of looking directly at money-income relationships we consider the "monetary" and "real" consequences for economic activity of a change in market rates.

### *Money and Income*

Milton Friedman [1] describes the major issue in monetary theory as the responsiveness of output and money prices to the emergence of an excess supply of nominal money balances.

For monetary theory, the key question is the process of adjustment to a discrepancy between the nominal quantity of money demanded and the nominal quantity supplied. Such a discrepancy could arise from either a change in the supply of money (a shift in the supply function) or a change in the demand for money (a shift in the demand function).<sup>7</sup>

In the context of the quantity-theory approach such a discrepancy manifests itself in the expenditure and portfolio allocation decisions of economic units.<sup>8</sup> The quantity-theory view of the transmission mechanism involves a much broader

4. This implies that monetary policy (defined as open market operations) has no effect upon domestic income. Consequently Hoare's conclusion that his model "is especially useful in monetary policy formation, since it provides a method for estimating the change in bank credit conducive (given exports and the net capital inflow) to the realisation of specific national income objectives" [3] p. 102, is based on the invalid assumption that the Central Bank can effectively control the volume of domestic credit.

5. Variables such as output, exports and inflation may, of course, exert influences on the money supply. Hence given interest rates, the nominal money stock may increase as the result of, say, an increase in exports.

6. *Central Bank of Ireland Quarterly Bulletin*, Spring 1973, p. 37.

7. M. Friedman [1], p. 51.

8. In its short-run version the Quantity Theory says nothing about the manner in which changes in nominal income are disaggregated into changes in output and changes in money prices.

range of channels than the, so-called, "Credit" and "New" views.<sup>9</sup> These latter approaches envisage monetary impulses being transmitted through the decision-making process via changes in the rates of return on assets traded on organised financial markets and the consequent adjustment of investment portfolios. Friedman, on the other hand, employs a much wider definition of "interest". He defines an interest rate "as a pure number relating the price of services to the value of the source yielding the services".<sup>10</sup> Hence the balance sheet, or portfolio, relevant to the adjustment process is extended to include "money and claims on business enterprises, . . . consumer durable goods, . . . clothing, . . . food and . . . the present value of the future earning power of the members of . . . households."<sup>11</sup> Hence, monetary impulses are transmitted via changes in a broad range of yields comprised of a vector of observable market rates together with a vector of implicit unobservable returns relating to the service flows yielded by non-financial assets and commodities. In a small economy with a high degree of capital mobility one component of this broad range, observable market yields, is determined exogenously to the domestic money stock. Hence the nominal money supply emerges as an endogenous quantity fluctuating in response to exogenous changes in market interest rates. A key issue in this type of economy centres on the direction of the money stocks response to interest rate changes. If the money-interest relationship is positive then a rise in market rates will expand the money stock, create an excess supply of nominal balances and indirectly lead to an expansion of output and/or money price levels.<sup>12</sup> This conclusion is illustrated by the following explanatory model of the monetary sector.

$$\frac{MD}{P} = l \left[ \frac{Y}{P}, r \right] ; l_1 > 0 < l_2 \quad (1)$$

$$MS = h[r] ; h_1 > 0 \quad (2)$$

$$MD \equiv MS \quad (3)$$

$$r \equiv \bar{r} \quad (4)$$

where,

$MD$  = The demand for nominal money balances

$MS$  = The supply of nominal money balances

$Y$  = Nominal income

$P$  = The general money price level

$r$  = The market rate of interest

and,

$$l_1 = \partial(MD/P) / \partial(Y/P) \text{ etc.}$$

9. See Yung C. Park [8] for a detailed account of alternative transmission processes.

10. M. Friedman and D. Meiselman [2] p. 218.

11. *Ibid.*, p. 218.

12. Subject to the specification of the "real" sector equations a rise in  $r$  may have a deflationary effect via a decline in investment. Cf. section IV below.

Equation (1) relates the demand for real money balances to real income and market interest rates. Equation (2) is the money supply function. Equation (3) is the money market clearing identity and equation (4) defines  $r$  as being equal to the exogenously given rate  $\bar{r}$ . Assuming that the real income elasticity of demand for real balances is unity, we can rewrite (1) as,

$$MD = Y \cdot l_1[\bar{r}] ; l_1 < 0 \quad (1a)$$

where  $l_1$  designates a different function form from  $l$ . The simple model comprised of equations (2), (3), (4) and (1a) is illustrated diagrammatically by Figure I.

The rectangular hyperbola  $MD(r_1)$  gives the demand for nominal balances at each level of  $Y$  with  $r$  fixed at  $r_1$  while the horizontal line  $MS(r_1)$  gives the nominal money supply at the same market rate. The equilibrium level of income with  $r = r_1$  is  $Y_1$ . A rise in the rate of interest from  $r_1$  to  $r_2$  will shift the demand curve to, say,  $MD(r_2)$ . That is, at each level of income a lower quantity of *real* balances are desired. Assuming that  $h_1 \geq 0$  the  $MS$  function will shift to  $MS(r_2)$  or stay at  $MS(r_1)$ . In either case an excess supply of nominal money balances is created and  $Y$  is consequently increased to  $Y_2$  or  $Y_3$ .

An essential feature of the above model is that the demand for money is a demand for *real* balances. Hence a rise in  $r$  will reduce the real demand and leave an excess supply of nominal balances which is manifested in the effective demand for goods and services and, consequently, in the level of economic activity. If, on the other hand, the nominal stock of money responded negatively to changes in market interest rates the  $MS$  curve would shift to the left and possibly reduce nominal income.

The central issue, therefore, is the relationship between the exogenously determined interest rate and the domestic money stock. In order to gain a deeper insight into the relation between interest and money in a small open economy it is instructive to first look at the external process of interest rate determination. That is, to examine the forces which impose a particular market rate on a small economy.

### *Money and Interest*

Figure II illustrates the demand and supply for "loanable funds" or "credit" in the United Kingdom. The curve  $DD$  gives the total<sup>13</sup> demand for credit at each rate of interest while the curve  $SS$  gives the total supply of credit. Equivalently,  $DD$  is the aggregate supply of securities and  $SS$  corresponds to the aggregate demand for securities. Hence, the rate  $r_1^*$  is the market rate which equates the aggregate demand for credit with the aggregate supply. Alternatively,  $r_1^*$  is the rate at which the market is content to absorb the existing supply of non-monetary financial assets. It is, therefore, the long-run equilibrium rate of interest. When

13. Inclusive of the private, public and foreign sectors.

FIGURE I

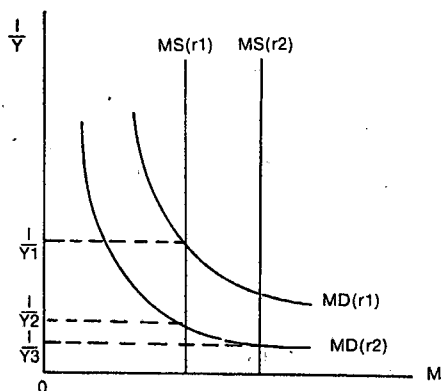


FIGURE II

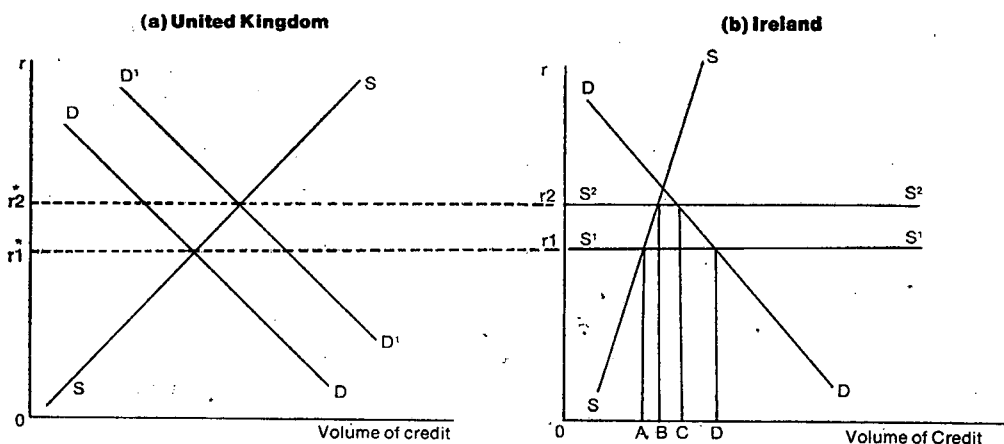
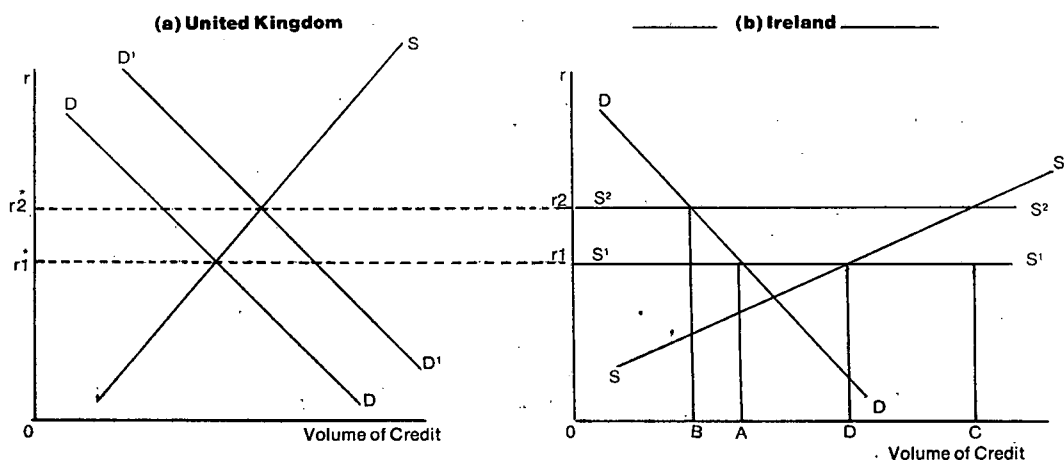


FIGURE III



the market rate is equal to the long-run equilibrium rate both the volume of credit and the money stock are constant over time.<sup>14</sup>

For simplicity we assume that part *a* of Figure II represents the United Kingdom ("rest of the world") and part *b* represents Ireland. The Irish domestic money stock is defined as being equivalent to the sum of domestic bank assets (*DA*) and the banking sector's net external assets (*R*).<sup>15</sup> That is,

$$MS \equiv DA + R \quad (5)$$

The curve *DD* in Figure IIb gives the total demand for funds from all sectors in Ireland and *SS* relates the supply of *domestic credit* to the rate of interest.<sup>16</sup> Assuming the United Kingdom to be in a position of long-run equilibrium a market rate of  $r_1$  is imposed on Ireland giving a total demand for credit from all sectors of *OD*. Of this *OA* is financed domestically and *AD* by borrowing externally. Hence *OA* equals total domestic non-monetary claims plus foreign assets. Note that the effective supply curve facing Irish borrowers is  $S^1S^1$ . That is, at each given rate of interest the supply of credit to borrowers is perfectly elastic.<sup>17</sup>

Now suppose that for some undetermined reason, such as rising investment expectations or increased Government borrowing, the United Kingdom demand curve *DD* shifts to  $D^1D^1$ , giving a new long-run equilibrium rate of  $r_2^*$ . As the market rate rises towards  $r_2^*$  the total volume of credit expands and, consequently, so does the money stock.<sup>18</sup>

A higher market rate in Ireland ( $r_2$ ) means that the total demand for credit falls from *OD* to *OC* of which *OB* is financed from domestic sources and *BC* is financed abroad. Although the total volume of credit has fallen by *CD* domestic non-monetary claims and foreign assets have expanded and external liabilities have fallen. Consequently the nominal money stock increases.<sup>19</sup>

Hence, an increase in the exogenously determined interest rate has two possible effects on economic activity.

- (i) A "real" effect which is reflected by the fall in the demand for credit.

14. Alternatively credit and money may expand at a constant rate equal to the long-run growth rate of the economy.

15. This definition corresponds to the conventional  $M_2$  monetary aggregate which is comprised of currency plus total (current and deposit) bank deposits. See *Report of the Central Bank of Ireland 1963-64*, pp. 80-81.

16. It is important to note that *SS* refers to funds which are supplied to all sectors from domestic sources.

17. It is assumed that the Irish market is so small in relation to the rest of the world that Irish borrowers can raise funds externally without altering existing market rates.

18. Patrick Hendershott and George Horwich [4] pp. 431-434.

19. It is assumed that changes in total foreign assets/liabilities are reflected in *R*.

- (ii) A "monetary" effect which emanates from the expanded money stock.

These effects work in opposite directions. An increase (decrease) in  $r$  reduces (increases) the total demand for credit from all sources. Hence the "real" effect is deflationary.<sup>20</sup> Alternatively, an increase (decrease) in  $r$  expands (contracts) the nominal money stock which, given the analysis of Section II, is expansionary. Section IV attempts to accumulate empirical evidence on the net impact of these divergent effects.

Figure III illustrates an alternative case in which the imposed market rate is initially above the Irish long-run equilibrium rate. In this case an increase in  $r$  actually reduces the nominal money stock.<sup>21</sup>

It is arguable that the long-run equilibrium interest rate in Ireland will be greater than that in the United Kingdom. That is, Figure II is closer to the actual position than Figure III. Both the range and size of United Kingdom intermediaries together with the flexibility of United Kingdom markets enables London to reap the advantages of administrative economy and financial expertise on a much greater scale than can be obtained in Dublin. Consequently borrowers can be accommodated at lower rates in a large international market than in a small domestic market.<sup>22</sup>

#### *An Expanded Monetarist Model*

The model developed by Polak [9] and subsequently employed by Holtrop [5] and Hoare [3] starts from the basic equation

$$Y_t = Y_{t-1} + \Delta M_t \quad (6)$$

which, assuming constant velocity,<sup>23</sup> expresses income in period  $t$  as the sum of income in period  $t-1$  and the change in the nominal money stock ( $\Delta M_t$ ).<sup>24</sup> The other equations of the model are,

$$\Delta M_t \equiv \Delta R_t + \Delta DA_t \quad (7)$$

$$\Delta R_t \equiv X_t - IM_t + K_t \quad (8)$$

20. It is assumed that the fall in the demand for credit reflects, in part, a fall in investment.

21. When the market rate exceeds the equilibrium rate the net effect on  $M$  of an increase in the former will depend upon the relative interest elasticities of the demand and supply curves.

22. See Basil J. Moore [6].

23. The assumption of constant velocity is both theoretically and empirically unfounded and is a major weakness of (3), (9) and (5). The model employed in the present paper could be modified to include a velocity function of the form  $V_t = V(r_t^1 Y_t)$ .

24.  $t$  is chosen so as to equal the fraction of a year equal to the inverse of income-velocity. If  $v = 2$ ,  $t =$  six months. See Hoare [3], p. 94.

$$IM_t = mY_t \quad (9)$$

$$\Delta DA_t = \Delta \bar{DA}_t \quad (10)$$

$$K_t = \bar{K}_t \quad (11)$$

$$X_t = \bar{X}_t \quad (12)$$

where,

$DA$  = Domestic assets held by the banks

$R$  = Net external assets

$X$  = Exports

$IM$  = Imports

$K$  = Net capital inflow of the non-bank sector.

Equation (7) defines the change in the nominal money stock and the sum of changes in the banking sector's net foreign assets and the supply of domestic credit.<sup>25</sup> Equation (8) disaggregates  $\Delta R_t$  into the balance of trade (exports minus imports) and the net capital inflow of the non-bank sectors. Equation (9) expresses imports as a linear function of income, the marginal propensity to import ( $m$ ) being assumed constant, and equations (10), (11) and (12) designate bank credit, capital flows and exports as exogenous.

The model can be reduced to,

$$(1+m)Y_t = Q_t + Y_{t-1} \quad (13)$$

where,

$$Q_t \equiv \bar{X}_t + \bar{K}_t + \Delta \bar{DC}_t \quad (14)$$

The solution for  $Y_t$  from (13) is,<sup>26</sup>

$$Y_t = a_1 Q_t + a_2 Q_{t-1} + a_3 Q_{t-2} + \dots \quad (15)$$

where,

$$a_1 = (1+m)^{-1},$$

$$a_2 = (1+m)^{-2}, \text{ etc.}$$

An alternative method of developing Polak's model is to replace equations (10) and (11) with behavioural relationships which determine both the volume of domestic credit and external capital flows. Changes in the volume of domestic credit ( $\Delta DA$ ) can be sub-divided into changes in the private sector's liability to the banks on the one hand and changes in bank lending to the government on the other. That is,

$$\Delta DA_t \equiv \Delta BLP_t + \Delta BLG_t \quad (10a)$$

where,

25. See *Report of the Central Bank of Ireland 1963-1964*, table VIII, pp. 80-81.

26. Hoare [3], p. 94.



$\Delta BLP$  = The change in bank lending to the private sector

$\Delta BLG$  = The change in the banks' holding of government debt.

In the spirit of the general theory of asset choice we assume that  $\Delta BLP_t$ ,  $\Delta BLG_t$  and  $K_t$  are determined by the portfolio behaviour of the banking and non-bank private sectors in relation to variables such as income and interest rates. Using the standard "stock adjustment" model<sup>27</sup> we can derive general composite relationships of the form

$$\Delta DA_t = f[Y_t^1 \hat{r}_t^1 DA_{t-1}^1 \dots] \quad (16)$$

and,

$$K_t = k[\hat{r}_t \dots] \quad (17)$$

where  $\hat{r}_t$  = A vector of market interest rates.

Substituting equations such as (16) and (17) into (15) and solving for  $Y_t$  yields relationships which may be expressed in general terms as follows,<sup>28</sup>

$$Y_t = g[\hat{r}_t^1 \hat{r}_{t-1}^1 \bar{X}_t \bar{X}_{t-1}^1 DA_{t-2}^1 \dots] \quad (18)$$

Linear equations of the form,<sup>29</sup>

$$\Delta Y_t = \Pi_0 + \Pi_1 \Delta rs_t + \Pi_2 \Delta rl_t + \Pi_3 \Delta rs_{t-1} + \Pi_4 \Delta rl_{t-1} + \Pi_5 \Delta X_t + \Pi_6 \Delta X_{t-1} + \Pi_7 \Delta DA_{t-2} \quad (19)$$

were fitted to Irish data for the period 1947-1970.<sup>30</sup> The results are presented in Table I. The banks' domestic assets ( $DA$ ) are defined as follows,<sup>31</sup>

$$\Delta DA_t \equiv \Delta M_t - \Delta R_t \quad (20)$$

where,

$$\Delta M_t = \Delta CURP_t + \Delta DD_t + \Delta TD_t \quad (21)$$

and,

$CURP$  = Currency held by the non-bank public

$DD$  = Demand (current) deposits of the Associated banks

$TD$  = Time deposits of the Associated banks

$R$  = Net external assets of the Associated banks, the Central Bank and Departments.

$TOF$  = Total other factors.<sup>32</sup>

27. See K. F. Wallis [10].

28. Hoare (3) p. 94.

29. Note that  $DA_{t-1}$  will be related to  $\hat{r}_{t-1}$  by equations (15) and (16) etc.

30. First differences are used to overcome the problem of a common trend in the variables producing high correlations and inhibiting efficient estimation of the influences of individual variables.

31. *op. cit.* Table VIII.

32. This component is relatively small and is subsequently ignored.

TABLE 1: *Estimated Effects of Interest Rate Changes on Income Annual Data 1947-1970.*<sup>33</sup>  
 Dependent Variable =  $\Delta Y_t$

Independent Variables	R1	R2	R3
Constant	8.651 (1.30)	7.007 (1.01)	10.841 (1.46)
$\Delta rs_t$	2.993 (0.77)	5.363 (1.40)	
$\Delta rl_t$	11.910 (1.39)		11.000 (1.20)
$\Delta rs_{t-1}$	-0.731 (2.20)	-7.114 (2.08)	
$\Delta rl_{t-1}$	-15.847 (1.28)		-22.552 (1.64)
$\Delta X_t$	0.800 (2.34)	0.890 (2.56)	1.136 (3.27)
$\Delta X_{t-1}$	1.793 (4.763)	1.949 (5.33)	1.460 (4.11)
$\Delta DA_{t-2}$	0.694 (2.53)	0.542 (1.98)	0.545 (1.81)
$R^2$	0.85	0.83	0.80
F. statistic	15.60	18.59	15.65
D.W.	1.78	1.83	2.09

Figures in parentheses are  $t$  statistics.

*Data and Sources:*  $Y$  = Gross Domestic Expenditure from *National Income and Expenditure* (CSO).  
 $rs$  = United Kingdom Treasury Bill Rate from *Bank of England Statistical Abstract*.  
 $rl$  = Annual rate on Irish 3½ per cent Exchequer Bonds 1970 (1947-1962) and 6 per cent Exchequer stock 1980-1985 (1963-1970).  
 Sources—Central Bank of Ireland.  
 Exports ( $X$ ) and Money Stock data were taken from the Central Bank's, *Quarterly Bulletin*.

All regressions<sup>34</sup> indicate a positive relationship between changes in current income ( $\Delta Y_t$ ) and current interest rates on the one hand and a negative relationship between  $\Delta Y_t$  and lagged rate changes on the other. Furthermore, the impact of lagged changes tends to be more powerful and significant than the impact of current changes, with coefficients on the latter being insignificantly different from zero. One interpretation of these results is as follows:

33. The estimation period was not extended beyond 1970 because of the bank dispute of 1971.

34. Given the specification of the model the use of annual data implies a velocity of unity. This assumption is employed as a "working hypothesis" necessitated by the lack of data, on  $Y$  and  $\bar{r}$ , with a frequency of less than a year.

- (a) The "monetary" effects of a change in interest rates tend to be much weaker than the "real" effects when both are considered over a period of two years.
- (b) The "real" effect, although stronger in the "long-run" operates more slowly than the "monetary" effects, the former being dominant in the period after the changes in interest rates and the latter in the period in which the change takes place.

### Conclusions

The Expanded Monetarist Model developed above is much more applicable to Ireland than the version employed by Hoare [3] in that it explicitly allows for the volume of domestic assets and the money stock to be determined endogenously rather than exogenously by the Central Bank. The model, is therefore, much more in line with the accepted theoretical literature than is the Bank's version.

The results presented in Table I suggest that exogenously determined interest rate changes may have important and divergent effects on both current and future changes in nominal income. In an economy such as Ireland's, however, these effects are more relevant to stabilisation policy generally rather than to monetary policy specifically.

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