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The Balance of Payments as a Monetary Phenomenon: A Review and Consideration of Irish Evidence 1960-1978

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Abstract: This paper briefly sketches alternative approaches to balance of payments theory and notes the salient features of "the" monetary approach. Some alternative models associated with the monetary approach are distinguished and existing evidence relating to them is reviewed. Annual and quarterly Irish evidence for these models over the period 1960—1978 are presented and assessed and some policy conclusions are offered.

The classical origins of international monetary theory are commonly attributed to David Hume, who refuted the mercantalist belief that a persistent balance-of-payments surplus was attainable through import-competing and export-promoting policies. Hume showed that the money stock adjusted to the demand for it via accommodating adjustments in international payments and that such adjustments represented transitory flow disequilibria which ceased once stock equilibrium in the money market was attained. The relatively unintegrated state of international capital markets led Hume to concentrate on the trade account as the locus of payments adjustment and to advance, as an account of the adjustment process, the "price-specie-flow" mechanism, i.e., an excess of credit would pressure domestic prices upwards, induce an adverse movement on the trade account, a consequential specie outflow, thereby restoring the money stock to its desired level and prices to their international level.

Hume's analysis conceded popularity to the elasticities approach (Robinson, 1937). This partial equilibrium approach concentrated on the import/export sectors of the economy. It implied, in contrast with Hume's analysis, that relative national traded-goods prices could be permanently altered by devaluation, which in turn would induce persistent trade surpluses provided the Marshall-Lerner-Robinson condition was met. The approach was criticised by Johnson

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(1977) for ignoring cross-price[1] and income elasticities and, arising from its partial equilibrium framework, treating flow equilibria in the traded-goods market as continuing rather than symptoms of transient stock dis-equilibria in the money market.

The Keynesian multiplier approach (Harberger, 1950; Laursen and Metzler, 1950) extended the elasticities approach by including both income and price as arguments in the demand for traded goods. The trigger mechanism for payments adjustments, devaluation, is common to both approaches but in the former, domestic income is determined by Keynesian multiplier effects operating on induced expenditure changes on traded-goods. Like its parent, the Keynesian multiplier approach remained subject to the criticism of confusing stock and flow disequilibria. Its application in the post-World War II period proved unsatisfactory due to the invalidity of its implicit assumption of excess resource capacity in the traded-goods sectors.

The nature and importance of that assumption was more fully elucidated in the absorption approach (Alexander, 1952) which, taking the trade balance as the difference between income and absorption, switched focus from the elasticities of the components of trade with respect to devaluation to a consideration of the effects of devaluation-induced inflation on absorption relative to income. Like its predecessors, excepting Humean analysis, this approach also treated payments imbalances as continuing flow phenomena and thereby failed to accord the necessary role to appropriate credit policies required for successful devaluation. The recognition of separate internal and external balance objectives and the necessity for separate policy instruments directed at both, received attention in the Economic Policy approach (Meade, 1951). This approach viewed monetary and/or fiscal instruments as best directed at the level of domestic expenditure and devaluation and/or trade controls as best directed to controlling its internal/external composition. It was extended to embrace the capital account by Mundell (1968) who noted that while monetary and fiscal policy operated in the same direction on the trade account, they operated in opposite directions on the capital account and could, therefore, be appropriately mixed to achieve external balance at full employment.

The monetary approach, popularised by Johnson (1976, 1977, 1977(a)) revived classical international monetary theory by viewing payments imbalances as essentially monetary phenomena, symptomatic of transient stock disequilibria in the money market. The money market is viewed as a mirror image of all other markets taken jointly and an excess flow supply of credit as revealing itself in an excess domestic flow demand for goods, services and securities which spills into external markets and has as its counterpart an equilibrating reserve outflow from the domestic money market. Viewed from this perspective,

[1]Johnson, *op. cit.*, is careful to absolve Robinson from this criticism.

the domestic demand for money and supply of credit are of paramount concern in studying external payments imbalances.

The monetary approach differs from Keynesian alternatives in treating the money sum of external transactions in preference to the constituents of such transactions as providing the more fertile ground for investigation and in viewing a longer time frame than conventional Keynesian analysis as more appropriate for policy formation. Keynesian prescriptions, it contends, rely for potency on accommodating sterilisation operations, while the monetary approach in eschewing short policy horizons denies the potential success of such operations. Moreover, while both approaches are reconcilable in a general equilibrium context, the quasi-general equilibrium models associated with both approaches differ sharply. Monetary approach models suggest that a rise in domestic income/prices or a fall in domestic interest rates should, by increasing the demand for money, induce, *ceteris paribus*, a positive reserve inflow. "Keynesian" models, in contrast, imply opposite predictions for these variables: — an increase in (domestic) prices or a fall in interest rates, being perceived as relative price movements, induce, *ceteris paribus*, reserve outflows on current and capital account respectively; an increase in domestic income, via the propensity to import, also induces a *ceteris paribus* reserve outflow.[2] In the absence of a satisfactory synthesis of both models[3], these conflicting predictions provide the basis for discriminating hypotheses between the competing reduced forms of the two approaches.

The monetary approach differs from its classical parent in not requiring temporary relative national price level changes as necessary to the adjustment mechanism. Indeed, relative price constancy, inferred from the doctrine of Purchasing Power Parity, is often regarded as the norm. This assumption, while carrying implications for the correct specification of the monetary sector, is not, however, necessary to the modern monetary approach. The approach shares in common with "monetarist" doctrines the belief in the existence of well-defined, stable money demand functions. Additionally, domestic credit supply (or more frequently the domestic source component of the monetary base) is treated as an exogenous policy control variable but in common with price (and interest rate) parity assumptions, this is not necessary for the approach; its importance relates to the appropriate specification of the monetary sector. In particular the approach is capable of accommodating credit as an exogenous variable or as determined by reference to a policy reaction function ascribed to the monetary authorities.[4]

[2]The existence of such Keynesian adjustment mechanisms is not denied by the monetary approach. The standard deductions derived from casting them in partial equilibrium models are. See Bilson, 1979, for a fuller account.

[3]An attempted reconciliation is provided by Frenkel, Helliwell and Gylfason, 1980.

[4]See Hamada, 1976, for a detailed treatment.

The monetary approach to the balance of payments (M.B.P.) is sufficiently broadly based[5] to embrace a variety of particular models. Section I classifies some M.B.P. models and reviews the empirical evidence relating to them. Section II presents annual and quarterly estimates of Irish reserve flows over the period 1960-78. Section III examines the sensitivity of the results to alternative variable definitions, evaluates the comparative performance of the models outlined in Section I and discusses the support for the M.B.P. coefficient predictions. Section IV presents a summary and conclusion.

II. SELECTED M.B.P. MODELS AND EMPIRICAL EVIDENCE

A. The Models

While it is possible to discern a wide variety of models consonant with the monetary approach, we confine our attention beneath to fixed and managed-floating exchange rate models which treat the monetary sector as recursive to the rest of the economy.[6,7] Table A provides a key to the classification system for the models considered. The estimating forms of the models are derived from equations (1)-(6).

$$M^d = P^{a_1} Y^{a_2} \exp^{a_3 r} \quad (1)$$

$$M^s = h(\bar{R} + \bar{D}) \quad (2)$$

$$M^d = M^s \quad (3)$$

$$P = eP^* \quad (4)$$

$$M^{*d} = P^{*b_1} Y^{*b_2} \exp^{b_3 r^*} \quad (5)$$

$$M^{*d} = M^{*s} \quad (6)$$

where M^d = Money Demand
$\bar{R}$ = International Component of the Money Base
P = Price level
r = Interest Rate
e = Exchange Rate, i.e., the domestic currency price of a unit of foreign exchange
M^s = Money Supply
$\bar{D}$ = Domestic Credit Component of the Money Base
Y = Real Income
h = Money Multiplier

An asterisk denotes foreign or "rest-of-world" variables.

[5]For a fuller account of the monetary approach see Mussa, 1974, Branson 1975, Whitman 1975, Johnson 1976, Hahn 1977, Tsiang 1977, Helliwell 1978, Coughlan 1978, Finn 1982 and Rabin and Yeager 1982.

[6]An analysis of floating rate models is provided by Bilson 1979.

[7]Monetary approach studies which treat the monetary sector as non-recursive are reviewed in Kreinin and Officer 1978. See also Miller, 1980, and Blejer and Leiderman 1981.

Table A: *Classification of the models*

Model	*Exchange rate regime*	*Domestic monetary equilibrium*	*Purchasing power parity*	*External monetary equilibrium*	*Additional restrictions imposed*	*Dependent variable*
I (a)	Fixed	Imposed	Not Imposed	Not Imposed	None	$\dot{R}$
I (b)	Fixed	Imposed	Imposed	Not Imposed	None	$\dot{R}$
I (c)	Managed floating	Imposed	Imposed	Not Imposed	None	$\dot{R} - \dot{e}$
II (a)	Fixed	Imposed	Imposed	Imposed	None	$\dot{R}$
II (b)	Fixed	Imposed	Imposed	Imposed	(1) Identical Inter-Country Money Demand Elasticities	$\dot{R}$
II (c)	Managed Floating	Imposed	Not Imposed	Imposed	(1) Identical Inter-Country Interest Rate Elasticities (2) Price Homogeneity of money demand, i.e., Unitary Price Elasticities	$\dot{R} - \dot{e}$

$$\dot{R} = a_1\dot{P} + a_2\dot{Y} + a_3\dot{r} + a_4\dot{h} + a_5\dot{D} \qquad \text{I(a)}$$

$$\dot{R} = a_1\dot{e} + a_1\dot{P}^* + a_2\dot{Y} + a_3\dot{r} + a_4\dot{h} + a_5\dot{D} \qquad \text{I(b)}$$

$$\dot{R} - \dot{e} = a_1\dot{P}^* + a_2\dot{Y} + a_3\dot{r} + a_4\dot{h} + a_5\dot{D} \qquad \text{I(c)}$$

$$\dot{R} = a_1\dot{e} + a_2\dot{Y} - \frac{a_1 b_2}{b_1}\dot{Y}^* + a_3\dot{r} - \frac{a_1 b_3}{b_1}\dot{r}^* + \frac{a_1}{b_1}\dot{M}^* + a_4\dot{h} + a_5\dot{D} \qquad \text{II(a)}$$

$$\dot{R} = a_1\dot{e} + a_2(\dot{Y} - \dot{Y}^*) + a_3(\dot{r} - \dot{r}^*) + b_4\dot{M}^* + a_4\dot{h} + a_5\dot{D} \qquad \text{II(b)}$$

$$\dot{R} - \dot{e} = a_2\dot{Y} - b_2\dot{Y}^* + b_5\dot{M}^* + a_6\dot{D} \qquad \text{II(c)}$$

Where $R = [\bar{R}/(\bar{R} + \bar{D})]$. $\dot{\bar{R}}$; $\dot{D} = [\bar{D}/(\bar{R} + \bar{D})]$. $\dot{\bar{D}}$ and a dot over a variable denotes a percentage rate of change except $\dot{R}$ which is the absolute one period change in the percentage interest rate.

Theoretical considerations dictate the following *a priori* coefficient values:

$$a_1,\ b_1,\ b_4 = 1;\ a_4,\ a_5 = -1;\ a_2,\ a_6,\ b_2,\ b_5 \approx 1;\ a_3,\ b_3 < 0.$$

Model I(a) is derived by solving equations (1)-(3). Model I(b) additionally imposes purchasing power parity (equation 4). In Model I(c), a variant of I(b) used to embrace fixed rate studies involving occasional realignments or managed-floating studies, the exchange rate coefficient is restricted to its *a priori* value of +1 and taken to the left hand side to form a composite dependent variable measuring exchange market pressure. Model II(a) is obtained by solving equations (1)-(6). Model II(b) is a restricted version of II(a) which imposes identical intercountry money demand elasticities. Solving equations (1)-(6) but excluding (4), i.e., purchasing power parity, imposing price homogeneity (a_1, b_1 1) and identical inter-country interest rate elasticities ($a_3 = b_3$) gives,[8]

$$\dot{R} - \dot{e} = (\dot{P} - \dot{P}^* - \dot{e}) + a_2\dot{Y} - b_2\dot{Y}^* + a_3(\dot{r} - \dot{r}^*) + b_4\dot{M}^* + a_5\dot{D} \qquad (7)$$

Model II(c) is then derived by solving equation (7) implicitly for the real exchange rate and uncovered interest differential in terms of $\dot{M}^*$ and $\dot{D}$. Model II(c) is commonly referred to as the Girton and Roper (G-R) model and the values of b_5 and a_6 coefficients serve as indicators of monetary independence.

The *a priori* signs of the money demand elasticities in these monetary approach models are the opposite to those suggested by "Keynesian" or "elasticity" alternatives and form a basis for discriminating hypotheses between the two approaches. The *a priori* magnitudes posited for the money demand elasticities enjoy widespread agreement and provide an additional basis for validating the monetary approach models. The position in relation to the money supply variables and, in particular, in relation to the domestic credit offset coefficients, a_5, is less clear-cut. Kreinin and Officer state:

[8]Some consequences of confusing the assumption of identical inter-country interest rates with identical inter-country interest rate elasticities are treated by Karacaoglu, 1980.

Table B: Empirical results of M.B.P. studies

Author	*Model method*	*Domestic Ecy Foreign Ecy*	*Data type Period*	*Equation* *Dependent variable*	*Independent variables*	*Constant*	F.F.	D.W.	$R^2/\bar{R}^2$
Aghlevi and Khan 1977	I(a) O.L.S.	39 Countries U.S.A.	Cross Sectional Annual Compound (1957-66)	R_2	$0.2569\ P_1 + 1.0276\ Y_2$ (3.39) (3.67)	$-\ 0.1214\ r_3$ (2.00) $-\ 0.1452\ h$ (0.58) $-\ 0.4150\ D_2$ (6.62)	$-\ 4.2476$ (2.74)	%Δ	n.a.	/.6244
Bean 1976	I(a) O.L.S.	Japan	Quarterly 1959-1970	R_1	$1.3\ P_1 + 0.6\ Y_2$ (6.3) (6.7)	$-\ 0.1\ r_2$ (1.6) $-\ 0.8\ h$ (5.4) $-\ 0.7\ D_1$ (8.8)		%Δ	2.03	.65/
	I(b) O.L.S.	Japan U.S.A.	Quarterly 1959-1970	R_1	$1.1\ P_2 + 0.6\ Y_2$ (6.8) (7.4)	$-\ 0.1\ r_2$ (2.1) $-\ 0.9\ h$ (5.4) $-\ 0.7\ D_2$ (8.8)		%Δ	1.86	.64/
Connolly and da Silvera 1979	I(c) O.L.S.	Brazil U.S.A.	Annual 1962-1975	$R_2 - e$	$1.2\ P_4^* + 1.5\ Y_1$ (2.0) (2.5)	$-\ 1.00\ D_2$ (13.1)		%Δ	$\widetilde{2.00}$	.91/
Cox 1978	II(b) O.L.S.	Canada U.S.A.	Monthly 1963-1969	R_1	$+\ 0.96(Y_1 - Y_1^*)$ (4.44)	$-\ .91(h - h_1^*)$ (11.77) $-\ 1.0_0\ D_3$ (17.51) $+\ 1.3\ M_1^*$ (8.19)		%Δ	1.83	.83/
Farrell 1980	II(c) O.L.S.	Mexico U.S.A.	Annual 1946-1975	$R_1 - e$	$+\ 1.86\ Y_1 - 1.81\ Y_1^*$ (3.21) (1.56)	$-\ .95\ D_1$ (6.3) $+\ 1.53\ M^*$ (3.06)		%Δ	1.91	.76/.73
Genberg 1976	I(a) T.S.L.S.	Sweden	Quarterly 1950-1968	R_1	$0.8\ P_1 - 0.02\ Y_3$ (3.9) (.01)	$-\ 0.0\ r_2 + 0.0\ M_{-1}$ (.02) $-\ 0.5\ h$ (1.7) $-\ 1.1\ D_1$ (3.0)	$+\ .03$ (0.06)	%Δ	n.a.	n.a.
Genberg 1978	I(b) O.L.S.	17 Countries U.S.A.	Cross Sectional 1 year	R_2 0.1e (2.1)	$+0.8\ P_1^* - 0.1\ Y_3$ (0.4) (0.4)	$-\ 1.2\ D_2$ (13.4)	$+\ .04$ (0.5)	Δ of %Δ	n.a.	/.94
Girton and Roper 1977	II(c) O.L.S.	Canada U.S.A.	Annual 1952-1974	$R_1 - e$	$+\ 2.8\ Y_1 - 2.8\ Y_1^*$ (3.0) (3.6)	$-\ 1.0\ D_1$ (12.7) $+\ 1.1\ M^*$ (4.9)	$-\ .04$ (1.1)	%Δ	$\widetilde{1.80}$	.92/
Guitain 1976	I(a) O.L.S.	Spain Trade Partners	Annual 1955-1971	R_1 /eP_3^* (/)	$-\ 0.5\ P_1$ (1.9) / Y_2 (/)	$-\ 0.9\ D_1$ (12.2)	$+\ 25.1$ (/)	Mixed	3.144	/.97
Jager 1978	I(a) T.S.L.S.	Netherlands	Quarterly 1967-1976	R_1	$+\ 0.27\ P_1 + 0.53\ Y_2$ (0.62) (2.12)	$-\ 0.14\ r_2$ (4.99) $-\ 0.75\ h$ (2.68) $-\ 0.99\ D_1$ (11.32)	$+\ 0.014$ (1.24)	%Δ	$\widetilde{2.12}$	/.94
Kemp and Wilford 1979	I(a) O.L.S.	Bolivia	Annual 1956-1973	R_1	$+\ 0.62\ P_1 + 0.77\ Y_2$ (4.51) (3.82)	$-\ 0.52\ h$ (0.72) $-\ 1.00\ D_1$ (4.88)		%Δ	1.53	.82/
	I(a) O.L.S.	Peru	Annual 1956-1973	R_1	$+\ 0.93 + 1.17\ Y_2$ (2.19) (2.12)	$-\ 1.47\ h$ (3.04) $-\ 1.07\ D_1$ (4.85)		%Δ	2.24	.79/
	I(a) O.L.S.	El Salvador	Annual 1957-1973	R_1	$1.10\ P_1 + 0.64\ Y_2$ (1.35) (2.35)	$-\ 0.55\ h$ (1.43) $-\ 0.91\ D_1$ (6.95)		%Δ	2.56	.82/
	I(b) O.L.S.	Columbia U.S.A.	Annual 1957-1973	R_1	$0.40\ P_1^* + 0.71\ Y_2$ (0.59) (4.53)	$-\ 0.49\ h$ (2.74) $-\ 0.81\ D_1$ (5.32)		%Δ	1.91	.86/
	I(b) O.L.S.	Venezuela U.S.A.	Annual 1957-1973	R_1	$1.04\ P_1^* + 0.60\ Y_2$ (1.10) (1.67)	$-\ 1.00\ h$ (3.27) $-\ 1.09\ D_1$ (17.55)		%Δ	1.91	.97/
Putnam and Willford 1978	I(b) G.L.S.	Austria U.S.A.	Annual 1952-1971	R_1	$1.30\ P_1^* + 0.60\ Y_2$ (2.37) (3.25)	$-\ 0.20\ r^*$ (1.42) $-\ 0.78\ h$ (4.77) $-\ 1.40\ D_1$ (9.61)		%Δ	n.a.	.80/
	I(b) G.L.S.	Belgium U.S.A	Annual 1952-1971	R_1	$0.59\ P_1^* + 0.56\ Y_2$ (1.88) (4.54)	$-\ 0.10\ r^*$ (1.35) $-\ 0.41\ h$ (2.49) $-\ 0.93\ D_1$ (12.96)		%Δ	n.a.	.84/
	I(b) G.L.S.	Denmark U.S.A.	Annual 1952-1971	R_1	$1.33\ P_1^* + 0.40\ Y_2$ (2.51) (2.05)	$+\ 0.17\ r^*$ (1.13) $-\ 0.89\ h$ (5.46) $-\ 0.96\ D_1$ (13.36)		%Δ	n.a.	.81/
	I(b) G.L.S.	France U.S.A.	Annual 1952-1971	R_1	$0.41\ P_1^* + 1.21\ Y_2$ (1.00) (6.21)	$-\ 0.03\ r^*$ (3.45) $+\ 0.36\ h$ (1.53) $-\ 0.78\ D_1$ (9.59)		%Δ	n.a.	.85/
	I(b) G.L.S.	Germany U.S.A.	Annual 1952-1971	R_1	$1.09\ P_1^* + 0.72\ Y_2$ (2.89) (6.49)	$-\ 0.06\ r^*$ (0.65) $-\ 0.27\ h$ (2.45) $-\ 1.11\ D_1$ (19.01)		%Δ	n.a.	.95/
	I(b) G.L.S.	Italy U.S.A.	Annual 1952-1971	R_1	$1.67\ P_1^* + 1.13\ Y_2$ (4.29) (7.27)	$-\ 0.22\ r^*$ (2.40) $-\ 0.48\ h$ (8.80) $-\ 0.90\ D_1$ (11.44)		%Δ	n.a.	.85/
	I(b) G.L.S.	Netherlands U.S.A.	Annual 1952-1971	R_1	$1.22\ P_1^* + 0.58\ Y_2$ (3.34) (4.83)	$-\ 0.15\ r^*$ (1.80) $-\ 0.64\ h$ (4.73) $-\ 1.08\ D_1$ (27.82)		%Δ	n.a.	.97/
	I(b) G.L.S.	United Kingdom U.S.A.	Annual 1952-1971	R_1	$0.51\ P_1^* + 0.85\ Y_2$ (2.56) (5.27)	$-\ 0.05\ r^*$ (0.89) $-\ 0.31\ h$ (4.42) $-\ 0.87\ D_1$ (15.30)		%Δ	n.a.	.93/
Modeste 1981	I(c) O.L.S.	Argentina U.S.A.	Quarterly 1972-1978	$R_2 - e$	$1.10\ P_1^* + 0.87\ Y_3$ (0.32) (1.86)	$-\ 1.46\ D_2$ (4.38)		%Δ	1.60	.55/
Willford and Zecher 1979	I(a) O.L.S.	Mexico	Annual 1955-1975	R_1	$0.657\ P_1^* + 1.097\ Y_2$ (4.18) (6.19)	$+\ 0.046\ r$ (.257) $-\ 0.661\ h$ (7.18) $+\ 0.964\ D_1$ (11.76)		%Δ	2.30	.92/
Zecher 1976	I(a) O.L.S.	Australia	Annual 1955-1971	R_1	$1.4\ p_1 + 0.9\ Y_1$ (2.6) (3.5)	$-\ 0.1\ r_1$ (0.8) $-\ 1.1\ h$ (5.1) $-\ 1.2\ D_1$ (8.0)		%Δ	2.13	/.93
	I(a) O.L.S.	Australia	Quarterly 1955-1971	R_1	$0.7\ P_1 + 1.1\ Y_1$ (3.7) (6.5)	$-\ 0.4\ r_1$ (1.1) $-\ 0.9\ h$ (12.8) $-\ 1.1\ D_1$ (20.9)		%Δ	1.69	/.89

Notes: The values in parentheses below the coefficients indicate (absolute values of) the t-statistics of the corresponding estimates. R^2 and $\bar{R}^2$ indicate, respectively, the coefficient of determination and the coefficient of determination adjusted for degrees of freedom. D.W. is the Dublin-Watson coefficient. F.F. is the functional form. %Δ indicates a percentage change formulation and Δ of %Δ indicates first differences of percentage changes. R_1 (R_2) is the foreign source component of the money base (supply) D_1 (D_2) is the domestic source components of the money base (supply), D_3 is the domestic source component of the monetary base (adjusted for the influence of expectations and monetary interdependencies. h (h_1^*) is the money base multiplier (adjusted for the influence of expectations and monetary interdependencies). M (M_1) is the money base (adjusted for the influence of expectations and monetary interdependencies). e is the domestic currency price of foreign exchange. P_1 is a consumer price index. P_2 is a foreign consumer price index expressed in terms of domestic currency i.e. $P_2 = P^*e$. P_3 is an export price index. P_4 is a wholesale price index. Y_1 is real permanent income. Y_2 is real current income. Y_3 is an index of industrial production. r is an unspecified interest rate. r_1 is a two year government bond interest rate. r_2 is a treasury bill rate. An asterisk indicates a foreign or "rest of world" variable. The subscript -1 indicates the variable in question is lagged one period. A bar over the Dublin-Watson coefficient indicates the equation in question has been corrected for autocorrelation.

> The income/absorption theory of balance-of-payments adjustment postulates that an increase in the money supply or its growth rate, other things being equal, worsens the balance of payments, but not sufficiently to cancel completely the initiating change in the money supply. ... Thus a negative estimate of the offset coefficient does not by itself distinguish the monetary approach from the income/absorption approach to the balance of payments; only an estimate of -1 can make that distinction. [pp. 52-531.]

Hodgson and Schneck suggest that a distinction exists between "strong" and "weak" versions of the monetary approach in the recent literature. While strong version suggests, *inter alia*, perfect credit offsets (i.e., $a_5 = -1$) the weak version ...

> ... does not predict specific magnitudes for the coefficients of the model; a domestic-credit coefficient with a value significantly different from zero, but not in the neighbourhood of -1.0 (or even a coefficient that shifts over time) could be interpreted as offering support for a "weak" but not for a "strong" version of the monetary approach. [p. 942].

The former view appears more reasonable to us and is adopted in assessing the empirical evidence.

B. The Empirical Evidence

The empirical findings in relation to the above models are summarised in Table B which notes, when significant, variations in their empirical implementation. Where particular studies have reported more than one equation, we have chosen the "preferred" equation or, where no preferred equation is indicated, we have striven to choose a "representative" equation favouring those which employ broader money stock definitions and balance-of-payments as against current-account measures of reserve flows. It is worth noting that the results discussed below are robust with respect to variations in the particular equations chosen.

Since "monetary approach" and "Keynesian" models make opposing predictions as to the direction of the relationship between reserves and the money demand variables (Y, P, r), non-directional two-tailed tests are employed in testing these coefficients[9]. One-tailed tests are employed in testing the coefficients of the money supply variables and exchange rate. The estimated coefficients are, in all cases, tested for significance at the 5 per cent confidence level.

Ten of the twenty-six price coefficient (elasticity) estimates are insignificant.[10] The remaining sixteen significant estimates are all positively signed and, there-

[9]Some of the reported coefficients, deemed significant in the original studies on the basis of one-tailed tests, are rendered insignificant by this procedure.

[10]Two of the insignificant estimates — the "home" price estimate for Guitain and the price estimate of Putnam and Wilford for Belgium — are significant on the basis of a one-tailed test.

fore, supportive of the monetary approach. Their values range from .26 to 1.67 and twelve of the sixteen significant estimates support the homogeneity postulate ($a_1 = 1$). This support must, however, be interpreted with caution in view of some relatively large standard errors and attendant risks of Type II errors. A price elasticity estimate is also indirectly available from the exchange rate coefficient reported by Genberg 1978. It is positively signed and significant but fails to support the homogeneity postulate.

Eight of the thirty-one (twenty-eight domestic and three foreign) income elasticity estimates are insignificant[11]. The remaining twenty-three significant estimates are all positively signed and, therefore, supportive of the monetary approach. They range in value from .53 to 2.8 and sixteen of the significant estimates support the homogeneity postulate (i.e. $a_2, b_2 = 1$). This support must be interpreted with the same caution noted in relation to the price estimates.

Twelve of the sixteen interest elasticity estimates are insignificant.[12] The remaining four significant estimates are negatively signed and supportive of the monetary approach. They range in value from -.03 to -.22.

Four of the twenty-three reported money multiplier coefficients are insignificant. The remaining nineteen significant estimates are signed in accordance with monetary approach predictions and range in value from -0.5 to -1.47. Twelve of the coefficients are not significantly different from the unitary values posited by the monetary approach (i.e., $h = -1$, $h^* = \times 1$). In view of the implicit Keynesian alternative hypotheses (i.e., $-1 < h < 0, 0 < h^* < 1$), the potential for committing type II errors in accepting the monetary approach hypotheses is considerable.

All of the twenty eight domestic credit offset coefficients (a_5, a_6) are negatively signed and significant and range in value from -.41 to -1.46. The reservations made in relation to the money multiplier coefficients are also relevant here. The degree of support for perfect credit offsets ($a_5, a_6 = -1$), however, is much stronger than for the money multiplier coefficients as only six of estimated coefficients are significantly different from -1.[13]

The three foreign money supply coefficients (b_4, b_5) estimates are all positively signed, significant and insignificantly different from their *a priori* values (+1).

Six of the reported regressions include a constant term which in all cases but one is statistically insignificant.

[11]Three of the insignificant estimates — Kemp and Wilford for Peru, Putnam and Wilford for Denmark and Modeste for Argentina — are significant on the basis of one-tailed tests.

[12]One of the insignificant estimates — Aghlevi & Khan — is significant on the basis of a one-tailed test.

[13]The 95 per cent confidence interval marginally encloses — 1 in five cases — Genberg 1978, Putnam and Wilford for Germany, Italy and the Netherlands and Zecher's quarterly estimate for Australia. The reported (positive) sign of the credit offset coefficient for Mexico by Wilford and Zecher is, presumably, a misprint.

Genberg 1976 tests the possibility that money balances adjust to their desired level via a partial adjustment process by including a lagged money stock variable in the estimated equation. As its coefficient is statistically insignificant, this possibility is rejected.

No systematic effect on the sign, significance or magnitudes of the coefficient estimates can be inferred for the alternative operational definitions of the explanatory variables employed, with the exception that permanent income elasticity estimates are generally, but not uniformly, greater than current income elasticity estimates.

The coefficients of determination, although variable, are generally high, and Durbin Watson (D.W.) statistics in all cases, where reported, either indicate an absence of autocorrelation or are inconclusive.

The tracking performance of the reported equations has not, in general, been evaluated. Only one study[14] provides summary tracking statistics. Five studies[15] provide a simulation plot of predicted against actual reserves and one further study[16] provides a brief discussion of some simulation errors. While the evidence on tracking performance is limited it is, none the less, impressive.

On the basis of the estimated signs of the (price, income and interest rate) variables, the foregoing studies are more favourable to the monetary approach than to Keynesian alternatives. The magnitudes of the estimated coefficients relative to their *a priori* value provides an additional, but less striking, degree of support for the monetary approach. The degree of support for the M.B.P. prior values in relation to the money multiplier and domestic credit offset coefficients is subject to reservation, as noted already. Finally, the *a priori* coefficient values for the foreign money supply variables are strongly supported. In assessing this evidence, however, it must be borne in mind, as Magee has noted, that simultaneous equation problems arising from either sterilisation[17] or the endogeneity of the money demand arguments bias the estimated coefficients favourably toward the M.B.P. hypothesis; accordingly, the degree of support indicated above may, in fact, be overstated.

The studies reviewed do not provide a basis for a comparative evaluation of the alternative models[18] nor has the robustness of equation performance with respect to the choice of variable concept or definition been systematically tested in the context of particular or individual equations. These issues are subject to consideration in Section III.

[14]Genberg, 1976.
[15]Genberg, 1976, Aghlevi and Khan 1977, Connelly and da Silvera 1979, Girton and Roper 1977 and Modeste 1981.
[16]Wilford and Zecher.
[17]Only two of the reported studies, Genberg 1976 and Jager 1978, test for sterilisation.
[18]An empirical comparison for some alternative specifications is provided in the study by Putman and Wilford 1978.

III. EMPIRICAL IMPLEMENTATION FOR THE REPUBLIC OF IRELAND

A. Some Country-Specific Considerations

The Republic of Ireland conforms in remarkable degree to the stylised small open economy. Its total share of EEC GNP is less than 1 per cent. Its trade (imports plus exports) to GNP ratio is approximately 115 per cent. Ireland's trade dependence on the UK, its major trading partner, as measured by the UK share in Irish trade, declined from 60 per cent in 1960 to 48 per cent in 1978. Throughout this period free capital (and labour) mobility existed between Ireland and the UK and the Central Bank of Ireland operated a one-to-one no-margins parity link to sterling.[19] Prior to 1970, the external monetary reserves of the banking system were held jointly by the Central Bank and the commercial banks. With the passing of the Basle agreement in November 1968[20], the commercial banks' external reserves, other than working balances, were transferred to the Central Bank. The transfer was completed in 1970. The Central Bank, moreover, did not possess effective monetary policy instruments[21] until the passing of the 1971 Central Bank Act and only began to exercise the considerable additional powers conferred on it in relation to domestic credit control from 1972/3 onwards. The external reserves of the consolidated banking system were supplemented from 1974 onwards by external borrowings by the Irish government which were considerable in relation to historical experience.

Empirical justification for applying the monetary approach to the Irish balance of payments arises from the findings of Browne and O'Connell (1978, 1978(a)) that the demand for broad money in Ireland is stable and that the Irish-UK capital markets are perfectly integrated. Indirect evidence from Geary and Geary and McCarthy is supportive of purchasing power parity.

The foregoing considerations are discussed and augmented by Finn, 1981 and have the following implications for the models outlined in Section II. First, while the effective Irish exchange rate varied over the sample period, the no-margins parity link to sterling implies that all such variations were exogenously determined by movements of the UK exchange rate *vis-à-vis* third countries. For this

[19]Sterling currency circulated freely alongside the Irish pound throughout the period. The parity link was ended in 1979 in consequence of Ireland's membership of the European Monetary System (EMS).

[20]In order to protect the reserve currency status of sterling following the 1967 devaluation, the UK government guaranteed the value of sterling held in London by central banks.

[21]The Central Bank did not possess the power to impose statutory reserve requirements until the passing of the 1971 Act. Its capacity to engage in open market operations was limited by the failure of an active domestic money market to emerge until the early 1970s. The range of assets eligible for rediscounting was also restricted over much of the period. See Moynihan, 1975, and Gibson 1977, for a fuller account.

reason, models I(c) and II(c) which endogenise the exchange rate are not tested. Second, the empirical confirmation of perfectly integrated Irish-UK capital markets allows us to impose interest rate parity by setting $r = r^*$ where r^*, the foreign interest rate, is a UK interest rate and to modify models II(a) and II(b) accordingly, viz:—

$$\dot{R} = a_1\dot{e} + \frac{a_1}{b_1}\dot{M}^* + a_2\dot{Y} - \frac{a_1 b_2}{a_2}\dot{Y}^* + (a_3 - \frac{a_1 b_3}{b_1})\dot{r} + a_4\dot{D} \qquad \text{II(a)}'$$

$$\dot{R} = a_1\dot{e} + b_4\dot{M}^* + a_2(\dot{Y} - \dot{Y}^*) + a_4\dot{D} \qquad \text{II(b)}'$$

The interest rate coefficient in model II(a)′ is now indeterminate in sign while the interest rate variable in model II(b)′ is eliminated. Third, if the UK is treated as the rest of the world (ROW) in relation to Ireland, then due to the Irish parity link to sterling the exchange rate variable in model II(a)′ and model II(b)′ vanishes. If the ROW definition is expanded to include trading partners other than the UK, the exchange rate variable is retained in both models. In view of the decreasing trade dependence on the UK throughout the sample period, both definitions are employed beneath. Fourth, throughout the sample period the Central Bank was capable of mobilising the external assets of the commercial banks.[22] In such circumstances, as noted by Veil, the official settlements' balance provides an inadequate measure of foreign-exchange market pressure. For this reason the balance of non-monetary transactions (adjusted for valuation changes), R_1, which for convenience we term "gross" reserves, is chosen in preference to it.[23] Fifth, public-sector foreign borrowing adds directly to the banking systems' foreign assets but not to its foreign liabilities. As the gross reserves measure, $\dot{R}_1$, treats such borrowings as autonomous, it may blur the underlying relationship between reserves and domestic credit postulated by the monetary approach.[24] Not all such borrowings, on the other hand, may be regarded as official compensatory financing for balance-of-payments purposes. We have treated Irish gilt purchases by foreign residents as "autonomous" inflows and deducted the remainder of public-sector foreign borrowing from gross reserves, R^1, to obtain an alternative measure, R_2, which, for convenience,

[22]Commercial banks transferred their (net) external assets to the Central Bank in return for interest-bearing deposits on a substantial basis during 1968–70. This transfer was motivated by the Basle Agreement — see footnote 20. For an account of the breakdown of the financing of the balance of payments deficits as between the Central Bank and Commercial Banks towards the end of the sample period, see Kenneally, 1980.

[23]The valuation changes arise in respect of non-sterling foreign currency and gold holdings by the Central Bank. Valuation changes for licensed banks' external assets are not available. As the licensed banks' external assets are predominantly sterling, the effect of this omission is likely to be negligible.

[24]See Coughlan, 1981, for a fuller account. Kenneally 1980 provides an account of the recent history of the "gross" and "net" reserves series in Ireland.

we term "net" reserves. This measure is similar to that employed by Jonson and meets certain objections to monetary approach studies raised by Coughlan. These measures are discussed more fully by Kenneally. As neither measure is precise, the results in relation to both are presented beneath.

B. Estimation Results

Models I(a), I(b), II(a)′ and II(b)′, which are increasingly restrictive in terms of the assumptions applied, were estimated. The estimated equations differ from the equations given above only by the inclusion of seasonal dummies (in the quarterly equations) and two additional dummies to pick up anticipated breaks in the Irish pound - UK sterling link. The first, in 1975, did not materialise and the second, in 1978, materialised in 1979.

In addition to the two previously mentioned ROW and balance-of-payments measures, two alternative price (CPI and GNP deflator) and income (current and permanent) measures were tested to gauge the sensitivity of the results to the variable concept or definition used.

Given the assumed exogeneity of the money demand arguments which, with the exception of domestic income, is, as noted above, independently supported and that the monetary authorities did not possess effective credit control instruments with which to engage in sterilisation operations[25], the model equations were estimated by generalised least squares (GLS).

Some general findings which permit certain abridgements in the reported results and parsimony in their intepretation are: first, likelihood ratio tests on the equality of the estimated $\dot{e}$ and $\dot{P}^*$ coefficients of model I(b) were in all cases accepted at the 5 per cent significance level. The reported results, accordingly, are given only for the restricted version of that model, viz:—

$$\dot{R} = a_1(\dot{P}^* + \dot{e}) + a_2\dot{Y} + a_3\dot{r} + a_4\dot{D} \qquad \text{I(b)}'$$

Second, likelihood ratio tests on the estimated coefficients of model II(a)′ in all cases but three supported the existence of identical inter-country money demand elasticities. As the prior imposition of identical inter-country money demand elasticities in model II(b)′ is the only difference between it and model II(a)′, the reported results for each of these models are confined to those equations which do support/do not support the restriction, respectively. Third, disequilibrium versions of each of the model equations incorporating, both separately and jointly, partial adjustment to monetary equilibrium and of actual to desired demand for money balances in the home and foreign market

[25]Moynihan 1975, a former Central Bank governor notes "the Central Bank Act of 1942 did not include a single clause that could be invoked by the Central Bank as conferring specific power to restrain the growth of bank credit in the state ..." p. 461. The principal provisions of the 1942 Act remained unaltered until 1971.

were tested.[26] Since in no case, without exception, could evidence in favour of such adjustment processes be adduced, the reported results are confined to the equilibrium versions of the model equations. Fourth, the estimated results proved insensitive to the alternative price measures (GNP deflators and Consumer Price Indices) employed. For this reason the reported results are confined to the broader — GNP deflator — measure.[27] Fifth, on a quarterly basis, the real income estimates were in all cases insignificant and invariant with respect to the income concept (current or permanent) employed. The reported quarterly results are, accordingly, confined to equations employing the current income measures.

The results for each of the models are presented in Tables 1-4. The "best" equation for each model is selected from these tables to form a basis for model comparison. Based on the selected equations, model rankings for both balance-of-payments measures on annual and quarterly data are presented in Tables 5, 6, 8 and 9. Fit ($\bar{R}^2$, F and DW) and tracking statistics (RMSE, MAPE and TP) are used as choice criteria in selecting the "best" equation and ranking the models, with preference given to tracking statistics in the event of conflict and RMSE taken as the most stringent of the tracking statistics. A plot of the tracking performance of the "best" annual equation in each of Tables 5 and 6 (that is for the "gross" and "net" reserves measures, respectively) is provided for inspection in Figures 1 and 2, respectively. The tracking performance of the "best" quarterly equations in each of Tables 8 and 9 (for "gross" and "net" reserves, respectively) is provided in Figures 3 and 4. Tables 7 and 10 present estimated annual and quarterly money demand equations, respectively, to serve as a frame of reference in the ensuing discussion. A full listing of the variables and sources is given in the Appendix.

IV. RESULTS AND DISCUSSION

A. Sensitivity of the Results to Variable Concept and Definition

A formal examination of the sensitivity of the results in relation to the two domestic credit measures employed is not possible given that two different dependent variables are at stake, in order to ensure consistency in the money supply definition. The estimated equations (Tables 1-4), however, permit the following general conclusions. First, the more comprehensive of the two "rest of world" variable definitions generally resulted in gains in explanatory power and tracking performance. The gains are, in all cases, slight, reflecting, no doubt, the

[26]These are available from the authors on request.

[27]The broader measure confirms that suggested by Cassel "The whole theory of Purchasing Power Parity essentially refers to the internal value of the currencies concerned, and variations in this value can be measured only by general index figures representing as far as possible the whole mass of commodities marketed in the country" G. Cassel, 1928, pp. 24-25.

Table 1: *Results for model I(a)*

	Fit stats			*Track stats*				*Equation*											*GLS stats*	
(a) Annual equation no.	$\bar{R}^2$	F	D.W.	RMS	MAE	TP	*Dependent variable*	$\dot{P}$	$\dot{y}_c$	$\dot{y}_p$	$\dot{r}$	$\dot{D}_1$	$\dot{D}_2$	D175	C	Q3	Q4	D478	A1 M1	A2 M2
(1.1)	0.65	7.3	2.09	1.8	1.6	5/9	$\dot{R}_1$	0.30	0.44		0.01	-0.53		0.07	0.02				-.6	-.3
								(2.3)	(2.0)		(2.4)	(4.7)		(2.4)	(2.2)					
(1.2)	0.54	4.9	2.04	1.7	1.5	6/9	$\dot{R}_1$	0.30		0.21	0.01	-0.52		0.03	0.03				-.2	
								(2.1)		(0.7)	(1.8)	(4.3)		(1.2)	(2.1)					
(1.3)	0.96	7.6	1.99	1.8	1.6	6/8	$\dot{R}_2$	0.11	0.58		0.01		-0.62	0.04	0.03				-.74	-.17
								(0.9)	(3.5)		(3.2)		(9.4)	(2.0)	(3.4)					
(1.4)	0.91	36.3	1.99	1.9	1.5	6/8	$\dot{R}_2$	0.15		0.59	0.01		-0.64	0.04	0.03				-.4	
								(1.0)		(2.3)	(2.2)		(8.1)	(1.5)	(2.3)					
(b) Quarterly equation no.																				
(1.5)	0.59	14.4	2.01	1.1	0.9	20/33	$\dot{R}_1$	0.04	0.001		0.001	-0.50			0.01	0.02	0.02	0.04		
								(0.7)	(0.02)		(1.0)	(6.9)			(2.4)	(4.5)	(5.8)	(3.5)	-.3	-.2
(1.6)	0.65	18.3	1.94	1.1	0.9	19/33	$\dot{R}_2$	-0.004	0.03		0.001		-0.58		0.01	0.01	0.02	0.05	.3	
								(0.06)	(0.7)		(0.9)		(8.9)		(2.2)	(3.9)	(5.3)	(4.3)		

Table 2: Results for model I(b)

	Fit stats			*Track stats*				*Equation*												*GLS stats*	
(a) Annual Equation	$\bar{R}^2$	F	D.W.	RMS	MAE	TP	*Dependent variable*	$\dot{P}_1$*	$\dot{P}_2$*	$\dot{y}_c$	$\dot{y}_p$	$\dot{r}$	$\dot{D}_1$	$\dot{D}_2$	D175	C	Q3	Q4	D478	A1 M1	A2 M2
(2.1)	0.77	12.4	1.96	1.9	1.7	4/9	$\dot{R}_1$	0.35 (3.0)		0.56 (3.1)		0.01 (2.8)	-0.56 (6.0)		0.04 (1.4)	0.02 (2.6)				-.8	-.3
(2.2)	0.86	21.9	1.87	1.6	1.3	5/9	$\dot{R}_1$		0.40 (5.1)	0.43 (3.2)		0.01 (3.2)	-0.57 (9.1)		0.01 (0.5)	0.03 (3.5)				-.7	
(2.3)	0.67	8.0	1.93	1.9	1.6	5/9	$\dot{R}_1$	0.43 (2.8)			0.51 (1.7)	0.01 (2.2)	-0.62 (5.1)		0.01 (0.3)	0.03 (2.1)				-.5	
(2.4)	0.83	17.1	1.86	1.8	1.5	5/9	$\dot{R}_1$		0.46 (4.9)		0.51 (2.5)	0.01 (2.5)	-0.61 (-8.1)		-0.003 (0.1)	0.02 (2.4)				-.6	.1
(2.5)	0.97	110.7	1.92	2.0	1.8	6/8	$\dot{R}_2$	0.22 (1.7)		0.63 (4.3)		0.01 (4.3)		-0.66 (10.5)	0.02 (0.8)	0.03 (4.0)				-.96	-.26
(2.6)	0.98	147.4	1.91	2.1	1.8	5/8	$\dot{R}_2$		0.24 (2.5)	0.60 (4.7)		0.01 (5.2)		-0.67 (14.0)	0.01 (0.4)	0.03 (4.6)				-1.1	-.3
(2.7)	0.94	52.3	1.97	2.2	1.8	6/8	$\dot{R}_2$	0.30 (1.7)			0.70 (2.8)	0.01 (2.9)		-0.71 (8.1)	0.01 (0.3)	0.03 (2.5)				-.7	
(2.8)	0.95	71.1	1.98	2.3	1.9	5/8	$\dot{R}_2$		0.34 (2.6)		0.72 (3.4)	0.01 (3.4)		-0.72 (11.3)	-0.001 (0.03)	0.03 (2.6)				-.7	
(b) Quarterly equation no.																					
(2.9)	0.59	14.3	1.95	1.0	0.9	20/33	$\dot{R}_1$	0.11 (1.2)		-0.01 (0.1)		0.002 (1.2)	-0.51 (7.2)			0.01 (2.5)	0.01 (3.7)	0.02 (5.3)	0.04 (3.8)	.3	
(2.10)	0.59	14.4	1.95	1.0	0.9	19/33	$\dot{R}_1$		0.12 (1.4)	-0.003 (0.1)		0.001 (1.0)	-0.51 (7.3)			0.01 (2.3)	0.01 (4.0)	0.02 (5.5)	0.04 (3.8)	.2	
(2.11)	0.65	18.5	1.95	1.1	0.9	20/33	$\dot{R}_2$	0.04 (0.5)		0.04 (0.8)		0.001 (1.0)		-0.59 (9.5)		0.01 (2.2)	0.01 (3.9)	0.02 (5.2)	0.04 (4.3)	.3	
(2.12)	0.65	18.3	1.94	1.1	0.9	19/33	$\dot{R}_2$		0.01 (0.1)	0.04 (0.7)		0.001 (0.9)		-0.59 (9.3)		0.01 (2.2)	0.01 (4.2)	0.02 (5.3)	0.0 (4.3)	.3	

Table 3: *Results for model II(b)*

	Fit stats			*Track stats*				*Equation*												*GLS stats*	
(a) Annual Equation no.	$\bar{R}^2$	F	D.W.	RMS	MAE	TP	*Dependent variable*	ċ	$\dot{M}_1$*	$\dot{M}_2$*	$\dot{y}_c$-$\dot{y}_{c1}$*	$\dot{y}_c$-$\dot{y}_{c2}$*	$\dot{y}_p$-$\dot{y}_{p1}$*	$\dot{y}_p$-$\dot{y}_{p2}$*	$\dot{D}_1$	$\dot{D}_2$	D175	C	Q3	Q4	D478	A1 M1	A2 M2
(3.1)	0.86	28.1	2.1	2.4	1.9	5/9	$\dot{R}_1$		0.22		0.56				-0.52		0.09	0.04				-1.1	-.8
									(5.0)		(4.2)				(8.7)		(7.8)	(9.1)					
(3.2)	0.82	20.2	1.99	2.3	1.9	5/9	$\dot{R}_1$		0.25				0.66		-0.57		0.09	0.04				-1.0	-.7
									(4.5)				(3.3)		(7.3)		(6.7)	(8.3)					
(3.3)	0.84	18.7	2.07	1.5	1.2	5/9	$\dot{R}_1$	0.83		0.08				0.35	-0.42		0.03	0.04				-.8	-.3
								(3.6)		(1.1)				(1.6)	(6.6)		(1.3)	(7.9)					
(3.4)	0.95	85.8	1.96	2.2	1.6	6/8	$\dot{R}_2$		0.22		0.46					-0.67	0.02	0.05				-.8	-.3
									(3.4)		(2.6)					(12.0)	(1.1)	(8.6)					
(3.5)	0.99	254.5	2.01	2.1	1.6	4/8	$\dot{R}_2$	0.16		0.18		0.42				-0.63	-0.004	0.05				1.0	
								(0.5)		(1.9)		(1.9)				(9.8)	(0.2)	(15.4)					
(b) Quarterly equation no.																							
(3.6)	0.61	18.3	2.01	1.0	9.9	21/33	$\dot{R}_1$		0.11		-0.01				-0.55			0.01	0.01	0.02	0.05		
									(2.0)		(0.2)				(7.5)			(3.0)	(4.8)	(4.6)	(4.2)	-.3	-.1
(3.7)	0.66	19.3	2.02	1.0	0.8	21/33	$\dot{R}_1$	-0.13		0.19		-0.002			-0.58			0.01	0.01	0.02	0.05		
								(0.9)		(2.8)		(0.1)			(8.3)			(2.7)	(5.2)	(5.2)	(4.3)	-.3	-.3
(3.8)	0.68	24.7	1.97	1.0	0.8	20/33	$\dot{R}_2$		0.13		0.004					-0.64		0.01	0.01	0.01	0.05	.2	
									(2.4)		(0.1)					(10.2)		(2.6)	(4.5)	(4.0)	(4.9)		
(3.9)	0.70	22.5	1.99	1.0	0.8	19/33	$\dot{R}_2$	-0.22		0.20		0.004				-0.64		0.01	0.01	0.01	0.05		
								(1.5)		(3.1)		(0.1)				(10.5)		(2.2)	(4.7)	(4.2)	(4.9)	-.3	-.1

Table 4: *Results for model II(a)*

	Fit stats			*Track stats*				*Equation*												*GLS stats*	
Annual equation no.	$\bar{R}^2$	F	D.W.	RMS	MAE	TP	*Dependent variable*	$\dot{e}$	$\dot{M}_1^*$	$\dot{M}_2^*$	$\dot{y}_c$	$\dot{y}_{c2}^*$	$\dot{y}_p$	$\dot{y}_{p1}^*$	$\dot{y}_{p2}^*$	$\dot{r}$	$\dot{D}_1$	$\dot{D}_2$	D175	C	A1 M1	A2 M2
(4.1)	0.98	121.8	2.23	2.1	1.9	3/9	$\dot{R}_1$	1.2 (9.5)		0.001 (0.03)	0.34 (5.8)	-0.78 (6.5)				0.004 (6.7)	-0.45 (18.5)		-0.01 (1.0)	0.06 (10.9)	-1.7	-.8
(4.2)	0.98	179.0	1.98	2.3	1.8	5/8	$\dot{R}_2$		0.20 (4.5)				0.75 (5.0)	-0.99 (2.8)		0.01 (3.3)		-0.72 (18.7)	0.04 (1.8)	0.06 (4.6)	-1.2	-.6
(4.3)	0.97	80.0	2.51	2.4	1.8	5/8	$\dot{R}_2$	0.40 (2.0)		0.11 (1.7)			0.67 (4.1)		-0.96 (2.4)	0.01 (3.6)		-0.67 (17.6)	-0.004 (0.2)	0.06 (4.0)	-.9	

Table 5: *Model ranking - annual - $\dot{R}_1$ (gross reserves)*

			Fit stats			*Track stats*				*Equation*									*GLS stats*	
Equation no.	*Rank*	*Model*	$\bar{R}^2$	F	D.W.	RMS	MAE	TP	*Dependent variable*	*Independent Variables*							D175	C	A1 M1	A2 M2
(5.1)	(1)	II(b)	0.84	18.7	2.07	1.5	1.2	5/9	$\dot{R}_1$	0.83 $\dot{e}$ (3.6)	+ 0.08 $\dot{M}_2^*$ (1.1)	+ 0.35 $(\dot{y}_p - \dot{y}_{p2}^*)$ (1.8)				- 0.42 $\dot{D}_1$ (6.0)	+ 0.03 (1.3)	+ 0.04 (7.9)	-.8	-.3
(5.2)	(2)	I(b)	0.86	21.9	1.87	1.6	1.3	5/9	$\dot{R}_1$	0.40 $\dot{P}_2^*$ (5.1)		+ 0.43 $\dot{y}_c$ (3.2)		0.01 $\dot{r}$ (3.2)		- 0.57 $\dot{D}_1$ (9.1)	+ 0.01 (0.5)	+ 0.03 (3.5)	-.7	
(5.3)	(3)	I(a)	0.54	4.9	2.04	1.7	1.5	6/9	$\dot{R}_1$	0.30 $\dot{P}$ (2.1)		+ 0.21 $\dot{y}_p$ (0.7)		0.01 $\dot{r}$ (1.8)		- 0.52 $\dot{D}_1$ (4.3)	+ 0.03 (1.2)	+ 0.03 (2.1)	-.2	
(5.4)	(4)	II(a)	0.98	121.8	2.23	2.1	1.9	3/9	$\dot{R}_1$	1.2 $\dot{e}$ (9.5)	0.001 $\dot{M}_2^*$ (0.03)	0.34 $\dot{y}_c$ (5.8)	- 0.78 $\dot{y}_{c2}^*$ (6.5)	0.004 $\dot{r}$ (6.7)		- 0.45 $\dot{D}_1$ (18.5)	- 0.01 (1.0)	+ 0.06 (10.9)	-1.7	-.8

Table 6: *Model ranking - annual - $\dot{R}_2$ (net reserves)*

			Fit stats			*Track stats*			*Equation*								*GLS stats*	
Equation no.	*Rank*	*Model*	$\bar{R}^2$	F	D.W.	RMS	MAE	TP	*Dependent variable*	*Independent Variables*					D175	C	A1 M1	A2 M2
(6.1)	(1)	I(a)	0.96	76	1.99	1.8	1.6	6/8	$\dot{R}_2$	0.11 $\dot{P}$ (0.9)	+ 0.58 $\dot{y}c$ (3.5)	+ 0.01 $\dot{r}$ (3.2)	- 0.62 $\dot{D}_2$ (9.4)	+ 0.04 (2.0)	+ 0.03 (3.4)	-.74	-.17	
(6.2)	(2)	I(b)	0.97	110.7	1.92	2.0	1.8	6/8	$\dot{R}_2$	0.22 $\dot{P}_1^*$ (1.7)	+ 0.63 $\dot{y}c$ (4.3)	+ 0.01 $\dot{r}$ (4.3)	- 0.66 $\dot{D}_2$ (10.5)	+ 0.02 (0.8)	+ 0.03 (4.0)	-.96	-.26	
(6.3)	(3)	II(b)	0.99	254.5	2.01	2.1	1.6	4/8	$\dot{R}_2$	0.16 $\dot{e}$ (0.5)	+ 0.18 $\dot{M}_2^*$ (1.9)	+ 0.42 $(\dot{y}_c - \dot{y}_{c2}^*)$ (1.9)		- 0.63 $\dot{D}_2$ (9.8)	+ 0.004 (0.2)	+ 0.05 (15.4)	1	
(6.4)	(4)	II(a)	0.98	179.0	1.98	2.3	1.8	5/8	$\dot{R}_2$	0.20 $\dot{M}_1^*$ (4.5)	+ 0.75 $\dot{y}p$ (5.0)	- 0.99 y_{pl}^* (2.8)	+ 0.01 $\dot{r}$ (3.3)	- 0.72 $\dot{D}_2$ (18.7)	+ 0.04 (1.8)	+ 0.06 (4.6)	-1.2	-.6

Table 7: *Results for annual money demand*

	Fit stats			*Track stats*			*Equation*				*GLS stats*	
	$\bar{R}^2$	F	D.W.	RMS	MAE	TP	*Dependent variable*	*Independent Variables*			C	A1 M1	A2 M2
	0.95	102.9	2.18	2.7	2.3	3/12	$\dot{M}^d$	0.92 $\dot{P}$ (16.3)	+ 1.01 $\dot{y}p$ (2.3)	+ 0.01 $\dot{r}$ (3.7)	+ 0.01 (0.3)	.29	.71

Table 8: *Model ranking - quarterly - $\dot{R}_1$ (gross reserves)*

			Fit stats			*Track stats*					*Equation*					*GLS stats*	
Equation no.	*Rank*	*Model*	$\bar{R}^2$	F	D.W.	RMS	MAE	TP	*Dependent variable*	*Independent Variables*	C	Q3	Q4	D478		A1 M1	A2 M2
(8.1)	(1)	II(b)	0.66	19.3	2.02	1.0	0.8	21/33	$\dot{R}_1$	$-0.13\,\dot{c}$ (0.9) $+0.19\,\dot{M}_2^{\bullet}$ (2.8) $-0.002\,(\dot{y}_c-\dot{y}_{c2}^{\bullet})$ (0.1) $-0.58\,\dot{D}_1$ (8.3)	+0.01 (2.7)	+0.01 (5.2)	+0.02 (5.2)	+0.05 (4.3)		-.3	-.3
(8.2)	(2)	I(b)	0.59	14.4	1.95	1.0	0.9	19/33	$\dot{R}_1$	$0.12\,\dot{P}_2^{\bullet}$ (1.4) $-0.003\,\dot{y}_c$ (0.1) $+0.001\,\dot{r}$ (1.0) $-0.51\,\dot{D}_1$ (7.3)	+0.01 (2.3)	+0.01 (4.0)	+0.02 (5.5)	+0.04 (3.8)		.2	
(8.3)	(3)	I(a)	0.59	14.4	2.01	1.1	0.9	20/33	$\dot{R}_1$	$0.04\,\dot{P}$ (0.7) $+0.001\,\dot{y}_c$ (0.02) $+0.001\,\dot{r}$ (1.0) $-0.50\,D_1$ (6.9)	+0.01 (2.4)	+0.02 (4.5)	+0.02 (5.8)	+0.04 (3.5)		-.3	-.2

Table 9: *Model ranking - quarterly - R_2 (Net Reserves)*

			Fit stats			*Track stats*					*Equation*					*GLS stats*	
Equation no.	*Rank*	*Model*	$\bar{R}^2$	F	D.W.	RMS	MAE	TP	*Dependent variable*	*Independent Variables*	C	Q3	Q4	D478		A1 M1	A2 M2
(9.1)	(1)	II(b)′	0.68	24.7	1.97	1.0	0.8	20/33	$\dot{R}_2$	$0.13\,\dot{M}_1^{\bullet}$ (2.4) $+0.004\,(\dot{y}_c-\dot{y}_{c1}^{\bullet})$ (0.1) $-0.64\,\dot{D}_1$ (10.2)	+0.01 (2.6)	+0.01 (4.5)	+0.01 (4.0)	+0.05 (4.9)		.2	
(9.2)	(2)	I(b)	0.65	18.5	1.95	1.1	0.9	20/33	$\dot{R}_2$	$0.04\,P_1^{\bullet}$ (0.5) $+0.04\,\dot{y}_c$ (0.8) $+0.001\,\dot{r}$ (1.0) $-0.59\,\dot{D}_2$ (9.5)	+0.01 (2.2)	+0.01 (3.9)	+0.02 (5.2)	+0.05 (4.3)		.3	
(9.3)	(3)	I(a)	0.65	18.3	1.94	1.1	0.9	19/33	$\dot{R}_2$	$-0.004\,\dot{P}$ (0.06) $+0.03\,\dot{y}_c$ (0.7) $0.001\,\dot{r}$ (0.9) $-0.58\,\dot{D}_2$ (8.9)	+0.01 (2.2)	+0.01 (3.9)	+0.02 (5.3)	+0.05 (4.3)		.3	

Table 10: *Results for quarterly money demand*

	Fit stats			*Track stats*					*Equation*						*GLS stats*	
	$\bar{R}^2$	F	D.W.	RMS	MAE	TP	*Dependent variable*	*Independent Variables*							A1 M1	A2 M2
	0.75	25.8	1.98	1.3	1.2	18/33	$\dot{M}^d$	$.09\dot{P}$ (1.4) $0.13\,\dot{y}_c$ (1.7) $+0.001\,\dot{r}$ (0.7) $+0.77\,\dot{M}_{-1}$ (9.1) -0.02 (3.9)	+0.03 (4.9)	+0.04 (7.1)	+0.03 (4.5)	+0.06 (4.4)			-.6	-.3

NOTES TO TABLES:

FIT STATS = fit statistics.
$\bar{R}^2$ = coefficient of determination correct for degrees of freedom.
F = the F statistic.
D.W. = the Durbin Watson statistic.
TRACK STATS = track statistics.
RMS = Root mean square percentage error.
MAE = Mean absolute percentage error.
TP = X/Y where X = number of turning points tracked by the simulated series; y = number of turning points in the actual series.
C = constant term.
GLS STATS = Generalised Least Square statistics.
A1/A2 = Autoregressive parameters (rounded up)*.
M1/M2 = Moving average parameters (rounded up)*.
*Stability conditions were met for all equations.

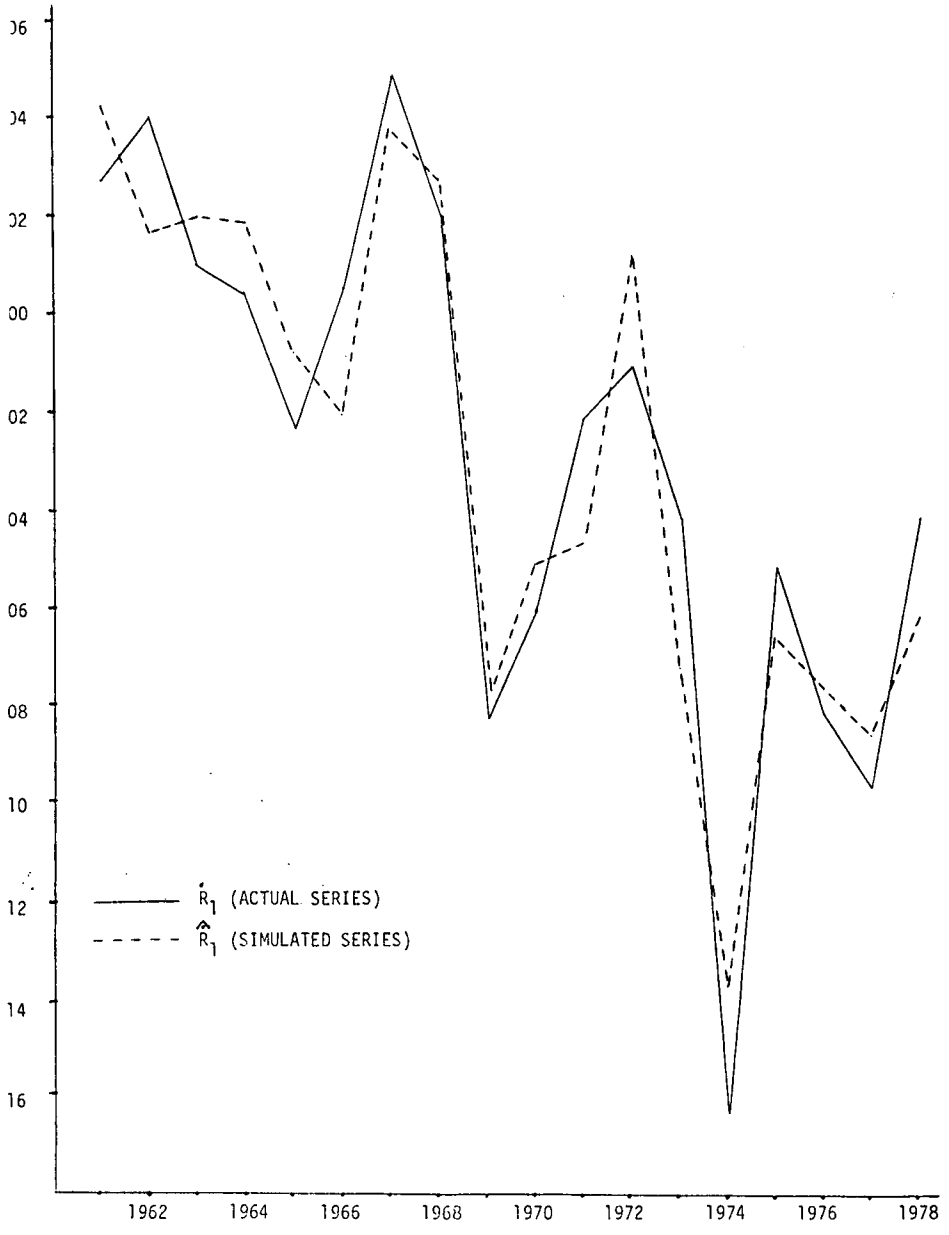
high share of the UK in Irish trade and capital transactions. Second, the use of permanent as opposed to current income measures in the annual equations generally resulted in higher individual coefficient estimates but lower coefficient significance and explanatory power. The quarterly real income estimates, as noted earlier, are in all cases insignificant and invariant with respect to the real income measure adopted. Third, also noted earlier, the results proved insensitive to the choice of price index.

B. Model Comparison

The selected annual model equations for both balance-of-payments measures (Tables 5 and 6) each display a high explanatory power and good tracking performance (see Figures 1 and 2). The model rankings are close and sensitive to both the choice of balance-of-payments concept and the criterion statistic on which the models are ranked. The selected quarterly model equations for both balance-of-payments measures (Tables 8 and 9) are also associated with high explanatory power and tracking ability (see Figures 3 and 4) which leave the models closely ranked. Indeed, the performances of models I(a) and I(b)′ are virtually identical. The model rankings coincide with the annual model rankings for the gross reserves equations and the most restrictive model specifications perform best. The quarterly rankings, moreover, are insensitive to the choice of balance-of-payments concept and criterion statistic.

C. MBP Coefficient Predictions

The reduced form coefficient estimates for the selected model equations permit three general conclusions. First, none of the equations meets the strict MBP joint predictions in terms of prior coefficient magnitudes or significance. Second, the annual coefficient estimates for the money demand variables are more supportive of the monetary approach than are the corresponding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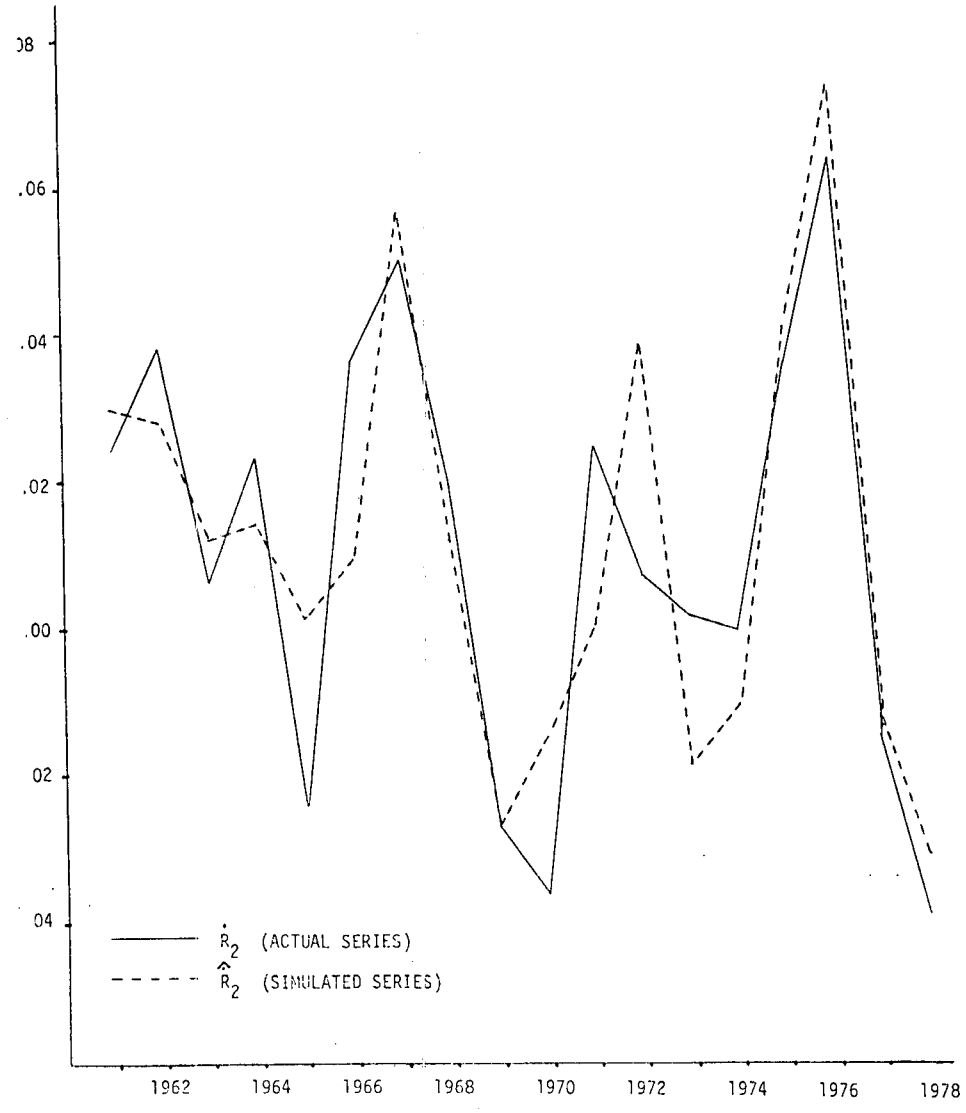
1962
1964
1966
1968
1970
1972
1974
1976
1978
$\dot{R}_1$ (ACTUAL SERIES)
$\hat{\dot{R}}_1$ (SIMULATED SERIES)

Graph 1



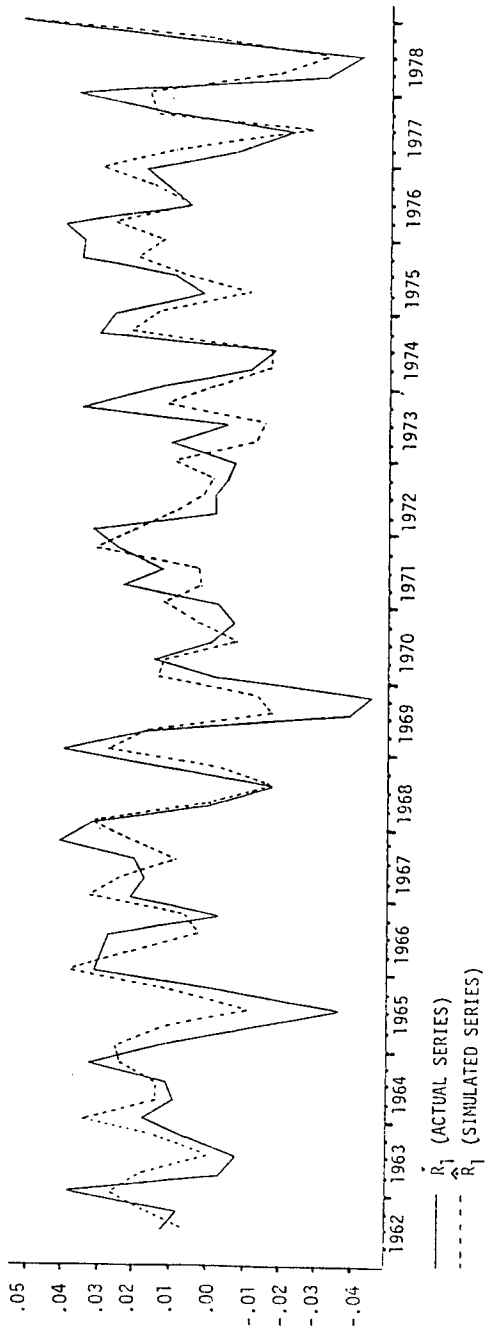
Graph 2

quarterly estimates. The annual and quarterly money supply coefficient estimates are similar. Third, with the exception of the estimated credit offset coefficients in the quarterly equations, there is no general relationship between the model rankings and the accord between the coefficient magnitudes and significance and their *a priori* values.[28]

Some specific results in respect of the selected annual equations are:

(i) The price and exchange rate coefficients are all positively signed but

[28]The model rankings are sensitive to the choice of criterion statistic.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1962
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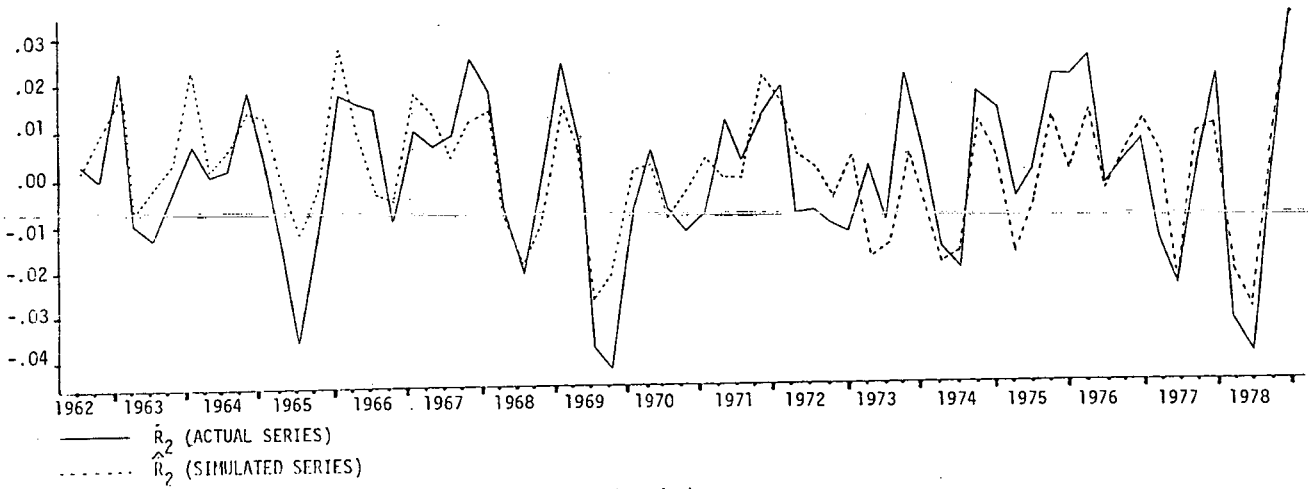
1978
$\dot{R}_1$ (ACTUAL SERIES)
$\hat{R}_1$ (SIMULATED SERIES)

Graph 3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1978
$\dot{R}_2$ (ACTUAL SERIES)
$\hat{\dot{R}}_2$ (SIMULATED SERIES)

Graph 4

significant only for the gross reserves definition of the dependent variable (Table 5). These estimates, with one exception (Table 5, Model II(b)′), are significantly different from their *a priori* value of +1. The price coefficient estimate from the annual money demand equation (Table 7) is both significant and insignificantly different from its prior magnitude of +1.

(ii) The income coefficients are all positively signed and, with three exceptions (Tables 5 and 6, Model II(b)′ and Table 5, Model I(a)), are significant. Of these significant estimates, all but two (the foreign income coefficient, Table 5 Model II(a)′ and the home income coefficient, Table 6 Model II(a)′) differ significantly from +1. The income elasticity of the estimated annual money demand equation is both significant and insignificantly different from +1.

(iii) The reduced form annual interest rate coefficient estimates are, with one exception (Table 5, Model I(a)), significant. The estimates are all positive, contrary, with the exception of Model II(a)′,[29] to strict MBP predictions. The interest rate coefficient estimate for the annual money demand equation (Table 7) is, however, also positive and significant and thereby supports the interest coefficient estimates reported for the MBP model equations.[30]

(iv) The annual foreign money supply coefficient estimates are positively signed but significant only for "net" reserves measure of the balance of payments (Table 6). The significant estimates all differ significantly from their *a priori* magnitudes of +1.

(v) The annual credit offset coefficients are correctly signed and highly significant for both balance-of-payments measures but are significantly greater than their prior values of -1 in all cases. The estimated credit offsets to "net" reserves, Table 6, are higher than the estimated offsets to "gross" reserves, Table 5, for each of the models.

(vi) The 1975 dummy varies in sign and significance. The 1978 dummy was invariably insignificant and hence omitted. The constant term is always small and significant.

The principal results for the selected quarterly equations are: (i) The quality of individual parameter estimates deteriorates markedly and systematically. In particular, the coefficients of the money demand variables (prices, income, exchange rate and interest rate) appearing in the reserve flow equations (Tables 8 and 9) are invariably insignificant and inconsistent with both MBP predictions and the annual estimations.

(ii) The foreign money supply and domestic credit offset coefficients are all correctly signed and significant. The coefficient magnitudes are similar to the

[29]The interest rate coefficient for Model II(a)′ is indeterminate in sign. See page 49.

[30]A positive interest rate elasticity is a finding common to a number of UK studies cited by Savage, who in common with the Governor of the Bank of England, provides a rationalisation in terms of the speculative demand for money.

corresponding estimates for the annual equations but, in all cases, differ significantly from their *a priori* values.

(iii) In sharp contrast with the quarterly reserve flow equations, the estimated quarterly money demand equation supports the presence of a partial adjustment to desired money balances. The estimated price, income and interest rate coefficients are both insignificant and inconsistent with the annual money demand coefficient estimates.

(iv) The constant term is small, significant and consistent with the annual estimate. The equations display a significant and similar pattern of seasonality in all cases and the 1978 dummy is significant and closely approximates its prior magnitude, i.e., £200m.[31]

From the foregoing review of the balance-of-payments equations, it is evident that the foreign money supply and domestic credit offset coefficients are similar as between the annual and quarterly equations; on the other hand, the annual and quarterly money demand coefficients are inconsistent with each other — the quarterly estimates displaying a general deterioration in coefficient magnitude and significance. These results do not sit comfortably within either the equilibrium or disequilibrium versions of the tested model equations and suggest a more complex dynamic specification may be required to characterise the adjustment process adequately. One possible explanation for some of the above results along these lines may be an asymmetry in the adjustment process to monetary equilibrium through the balance of payments.[32] As a simplified illustration let the "true" model be, $\dot{R} = \psi[\dot{M}^d - \dot{D}] + (1 - \psi)R_{-1}$ where; $0 < \psi < 1$ when $D < M^d$ and $\psi = 0$ when $D > M^d$. The assumptions concerning the adjustment parameter, ψ, might be justified on the basis that excess credit balances are both individually known and immediately available for disposal in line with monetary approach predictions, whereas credit shortages involving rationing devices — delayed loan processing, increased collateral requirements, reduced loan to request ratios — may occasion temporary credit market search during which liquidity-constrained spending makes the partial adjustment mechanism more appropriate.

If the above equation is freely estimated over a sample period containing mixed credit regimes, it is quite possible that the lagged dependent variable will be rejected on statistical grounds and the coefficient estimates for the equilibrium version of the equation will be biased downwards. These

[31]This figure is given in the *Economist* magazine 2/12/78 and confirmed unofficially by the Department of Finance.

[32]This is ultimately an empirical question but one which lies beyond the scope of this paper which is confined to a consideration of the standard prototype models outlined. We raise it in view of our findings and because it is an interesting hypothesis, to our knowledge, as yet untested in monetary approach studies.

circumstances could account for: (a) the insignificance of partial balance-of-payments adjustment to monetary equilibrium, (b) the inconsistencies between money demand and balance of payments equations, and (c) would be consistent with partial endogeneity of the money demand variables. The above scenario involves an appeal to special assumptions for which we have no evidence and, moreover, would not account for all the results in a satisfactory way. As such, we present it not as an actual explanation of the results, but as an interesting hypothesis for investigation.

V. SUMMARY AND CONCLUSIONS

Discriminating hypotheses between Keynesian and Monetary approaches to the balance of payments are generally cast in terms of the signs postulated for key economic variables of their respective reduced forms. Monetary approach models additionally require that the coefficients of the relevant variables take specific values or lie within an interval determined by received monetary theory or received evidence of demand for money studies.

A number of specific models consistent with the monetary approach were distinguished and the evidence relating to them reviewed. This evidence is largely favourable to the monetary approach. It is particularly striking in relation to the signs of the coefficients of the key variables; less so, but none the less impressive, in relation to the magnitudes of the key variables. When fitted to Irish data, these models display a high explanatory power and track Irish balance of payments history quite well. The results are, however, less favourable to the monetary approach than the weight of published evidence. This is surprising in view of the remarkable degree of conformity of the Irish economy to the stylised small open economy. On annual data, the price and income coefficient estimates tend to be supportive of the monetary approach. However, interest rate, credit offset and foreign money supply coefficient estimates lend countervailing support to Keynesian alternatives. On quarterly data, the degree of support for the monetary approach lessens; none of the money demand arguments are significant but the foreign money supply and domestic credit offset coefficients are similar to the annual estimates. Moreover, estimated annual and quarterly money demand functions are inconsistent both with each other and with the estimated coefficient magnitudes for the reserve equations. These results may suggest partial, perhaps temporary, endogeneity of the domestic money demand variables which, together with the balance of payments, serve as levers to equilibrate the domestic money market. As noted earlier, endogeneity of the domestic money demand variables biases the estimated coefficients favourably towards the monetary approach. This explanation, on its own, is, therefore, inadequate to explain the results. The results may be compatible, however, with partial endogeneity of one or more of

the money demand arguments combined with an asymmetrical balance of payments response to excess credit, demand and supply.

While MBP predictions of perfect reserve offsets to credit expansion are not supported by our findings, the importance of credit policy as a balance of payments instrument is confirmed by the estimates.

Short-term balance-of-payments or reserve objectives (for intervention purposes) which are generally formulated in terms of "gross" reserves may be achieved, as in recent Irish experience, by public sector foreign borrowing. Such borrowing increases "gross" reserves but has no instantaneous effect on "net" reserves since it affects foreign assets and liabilities equally. The domestic credit counterpart to such borrowing, however, leads over time, according to our findings, to a 65 per cent reduction in "net" reserves. This tradeoff between short- and long-run balance-of-payments objectives highlights the importance of harmonisation of domestic monetary and fiscal policy, not only to ensure consistency in the pursuit of short-term balance-of-payments objectives but also to ensure consistency between the pursuit of short- and long-term balance-of-payments objectives.

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APPENDIX

	Variable	*Definition*	*Data Source*
1.	e	Trade weighted average of the domestic currency price of the rest of the world (ROW)[1] money (end of period)	CSO (1) for trade weights[2] OECD (1) for exchange rates
2.	P	Irish implicit GNP deflator	CSO (3): 1960-1962 CB: 1962-1978
3.	P_1*	UK Implicit GDP price deflator	OCED (1)
4.	P_2*	Trade weighted average of implicits GNP/GDP deflators of ROW countries, expressed in domestic currency	CSO (1): for trade weights OECD (1): for exchange rates of UK, USA and W. German prices. B and F: for other ROW country price indices.
5.	m_1*	UK broad money supply (period average)	B and F
6.	m_2*	Trade weighted average of broad money supply of ROW countries. (Period average money supply for UK and Belgium, end of period for other ROW countries.)	B and F: for UK and Belgium money stock OECD (1) for USA money stock. IFS: for other ROW money stocks.
7.	m^d	Irish broad money supply (period average)	CB
8.	Y_c/Y_P	Irish current/permament[3] Real GNP	CSO (3): 1960-62 CB: 1962-78

9.	Y_{c1}^*/Y_{P1}^*	UK Current/permanent[3] Real GDP	OECD (1)
10.	Y_{c2}^*/Y_{P2}^*	Trade weighted average of current/permanent[3] real GNP/GDP of ROW countries	OECD (1): UK, USA and W. Germany B and F: other ROW countries
11.	r	UK long-term yield on government bonds (end of period) for annual regressions Irish discount rate (end of period) for quarterly regressions	OECD (1): long-term rate. IFS: discount rate
12.	D175	Dummy variable for 1975	/
13.	D478	Dummy variable for 1978, quarter four.	/
14.	Q2, Q3, Q4	Seasonal dummy variables for quarter two, three and four, respectively	/
15.	$\bar{R}_2$	R_1 - GFB - SSB (Corresponding to External Finance measure of the balance of payments)	
16.	$\bar{R}_1$	Net External Assets of the consolidated banking system adjusted for valuation changes (corresponding to the Balance on Non-monetary transactions concept of the balance of payments). Period average measure.	CB

17.	GFB	Net Direct Foreign Borrowing by the Irish government, at historical exchange rates.	DF
18.	SSB	Net Direct Foreign Borrowing by the semi-state bodies, at historical exchange rates.	CSO (2)
19.	$\bar{D}_2$	D_1 + GFB + SSB	
20.	$\bar{D}_1$	Net domestic assets of the consolidated banking system. (period average).	CB

Abbreviations:

B and F: Butter, den F.A.G. and Fase, M.M.G.: "The Demand for money in EEC countries" mimeographed, Netherlands Bank, NU October 1980; CB: Central Bank of Ireland; internal folder of statistics; CSO (1): Central Statistics Office; Irish Trade Statistics. CSO (2): Central Statistics Office; Irish Statistical Bulletin. CSO (3): Central Statistics Office: National Income and Expenditure. DF: Department of Finance: IFS: IMF; International Financial Statistics. OCED (1): OECD: Main Economic Indicators, Historical Statistics. OECD (2): OECD: National Accounts of OECD Countries.

NOTES TO APPENDIX

1. ROW includes the UK, USA, W. Germany, France, Belgium and the Netherlands. This choice is based on a 3 per cent cut-off point in relation to the proportion of total Irish trade, in any given year, with any given country.
2. Trade weights are total trade weights and are end of period.
3. Permanent Income is defined as a one-period linear distributed lag of the relevant current real income measure. Lag-length chosen on the basis of the explanatory power of the resulting equation.