

A Note on Leser's Paper "A New Basic Model of the Irish
Economy" (ESRI Memo. No. 41)

by

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Conrad Leser is our most ingenious model-maker.

His latest, consisting of four behavioural equations and one identity, yields coefficients of determination (R^2) exceeding .93 for all four endogenous variables, prima facie a very satisfactory result as these variables are first differences (Δ). The high R^2 s are helped, it is true, by two dummy variables z and z' to take care of exceptional figures, e.g. due to the incidence of import levies in 1956. The time unit is a year and the data refer to the years 1953-65 which yield 12 sets of first differences.

The object of the present note is to test the model during the years 1947-1953 by comparison of actual and estimated values of Leser's four endogenous variables in these years: a test by rerecast. Basic data are given in Tables 1 and 2. For algebraic convenience we change Leser's notation (Memo 41, page 3) as indicated in tables, using Y and X for endogenous and exogenous variables respectively. In our notation Leser's equations (page 5) are (omitting dummies and error terms):-

$$\begin{aligned} Y_1 &= 1.200 + 0.8238X_1 + 0.5574X_2 \\ Y_2 &= 1.623 + 0.5491X_1 + 0.9214X_2 + 1.7976X_3 \\ Y_3 &= -3.980 + 0.9762Y_2 \\ Y_4 &= -32.520 + 0.6469Y_3 + 508.81X_4 \end{aligned}$$

The notation makes plain the recursive character of the model. Also, each equation is identified. The reduced form is as follows:-

$$\begin{aligned} Y_1 &= 1.200 + 0.8238X_1 + 0.5574X_2 \\ Y_2 &= 1.623 + 0.5491X_1 + 0.9214X_2 + 1.7967X_3 \\ Y_3 &= -2.396 + 0.5360X_1 + 0.8995X_2 + 1.7548X_3 \\ Y_4 &= -34.070 + 0.3467X_1 + 0.5819X_2 + 1.1352X_3 \\ &\quad + 508.81X_4 \end{aligned}$$

The calculated values of the Y are found by substitution of the X as given in Table 2. Calculated and actual values of the Y are given in Table 3.

The comparisons are generally disappointing, even when allowance is made for the effects on imports especially of the Korean War. An obvious difficulty in this reverse forecasting is that, as Table 1 shows, most of the data, at the Δ level, fluctuate for year to year in quite fantastic degree. ΔM is a case in point: there must be a great accumulation and decumulation of import stocks going on all the time. Rather similarly with ΔY (for all its appearance of regularity at the Y level): the values are seen to range from £7m to £58m.

To eliminate partly accidental year-to-year fluctuations we compare ΣY , calculated and actual, using Table 3

	Calc.	Act.
	£m	£m
ΣY_1	97.7	55.2
ΣY_2	175.9	169.6
ΣY_3	147.8	144.1
ΣY_4	_____	<u>103.6</u>
Total		472.5

We give the total only as a curiosity: it compares very well! By this aggregate test Y_2 (GNP less government current expenditure) and Y_3 (personal disposable income) emerge very well; not so Y_1 (imports) and Y_4 (personal expenditure).

In forecasting it is a sound practice to compare the efficiency of any serious model with that of a naive model. We do this with our rerecasts. The naive model is as follows:-

$$\begin{aligned}
 M &= 0.39Y; & Y &= 3.0D \text{ (D = money)}; & C &= 0.73Y; \\
 Z &= 1.15C \text{ (Z = personal income)}; & G &= 0.118Y; \\
 T &= 0.055C \text{ (T = taxation on personal income)}. \\
 Y_1 &= \Delta M; & Y_2 &= \Delta Y - \Delta G; & Y_3 &= Y^d = \Delta Z - \Delta T; & Y_4 &= \Delta C
 \end{aligned}$$

The coefficients were based on experience in 1953 - 1955. The naive model uses one exogenous variable (money = currency + current accounts) instead of Leser's four and six coefficients instead of Leser's sixteen. Ceteris paribus

Leser's model should therefore yield much more accurate results than the naive model.

Absolute values of deviations from actual for both models are shown in Table 4. Six year average changes compare as follows (£ million);-

	Leser	Naive	Actual year-to-year
Y ₁	14.2	15.6	21.6
Y ₂	14.3	15.4	28.3
Y ₃	6.5	8.8	24.0
Y ₄		7.9	17.3

Three out of four rerecasts are more accurate by Leser; still, the superiority is not so marked as one would wish.

This investigation was undertaken to appraise the forecasting power of Leser's model which the writer hoped to use in conjunction with money variables in a more extended model. Rerecasting may not be fair to the model. A very general impression prevails that the structure of the Irish economy changed drastically in 1958. If this be so, the coefficients have probably changed also, even if the model is functionally sound. While sympathizing with Leser's having to use annual data for as long a period as possible, one must question the validity of his straddling two distinct periods (i) 1953 - 1957 and (ii) 1958 - 1965 with his data. For all their brevity in years it might be well to estimate and compare the coefficients for the two periods 1947 - 1958 and 1958 - 1966 using Leser's model.

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R. C. Geary

Table 1. Basic Data

Values in £m

Years	$\Delta M(Y_1)$	ΔY	ΔT	ΔZ	$\Delta Y^d(Y_3)$	$\Delta C(Y_4)$	ΔG	$\Delta I(X_1)$	ΔX	ΔB_a	$(Y_d)_{-1}$	$(C)_{-1}$	$\Delta e(X_3)$
1952-53	9.3	46.9	0.8	34.4	33.6	28.8	5.4	-0.1	11.2	2.8	388.9	352.7	6.1
1951-52	-30.7	57.9	1.8	31.2	29.4	13.4	2.6	4.0	22.0	4.3	359.5	339.3	5.7
1950-51	47.5	21.4	2.2	27.2	25.0	25.4	8.8	13.0	16.1	-2.7	334.5	313.9	7.2
1949-50	30.9	7.0	0.6	12.7	12.1	14.4	3.4	10.3	10.4	-5.3	322.4	299.5	2.6
1948-49	-6.4	26.2	1.4	22.3	20.9	7.4	-0.9	13.3	3.5	3.1	301.5	292.1	3.1
1947-48	4.6	33.2	1.9	25.0	23.1	14.2	3.7	9.4	14.8	6.4	278.4	277.9	6.9

Notes

Principal source of data: NIE 1964, Appendix 4. Notation: Memo. No. 41, page 3; T = Taxation on personal income (Z)

Table 2. Exogenous Variables

Values in £m

Years	X ₁	X ₂	X ₃	X ₄
1952-53	-0.1	14.0	6.1	.093083
1951-52	4.0	26.3	5.7	.056189
1950-51	13.0	13.4	7.2	.061584
1949-50	10.3	5.1	2.8	.071030
1948-49	13.3	6.6	3.1	.031177
1947-48	9.4	23.2	6.9	.001796

Notes: see Table 1. $X_2 = \Delta X + \Delta B_a$,
 $X_4 = [(Y_d - C) / Y_d]_{-1}$

Table 3. Comparison of Calculated and Actual Endogenous Variables (£m)

Years	Y ₁		Y ₂		Y ₃		Y ₄	
	Calc.	Act.	Calc.	Act.	Calc.	Act.	Calc.	Act.
1952-53	8.9	9.3	25.4	41.5	20.8	33.6	28.3	28.8
1951-52	19.2	-30.7	38.3	55.3	33.4	29.4		13.4
1950-51	19.4	47.5	34.0	12.6	29.3	25.0	17.7	25.4
1949-50	12.5	30.9	17.0	3.6	12.6	12.1	11.8	14.4
1948-49	15.8	-6.4	20.6	27.1	16.1	20.9	-6.2	7.4
1947-48	21.9	4.6	40.6	29.5	35.6	23.1	-8.6	14.2

Notes: Y₁, Y₃, Y₄, actual, see Table 1. $Y_2 = \Delta Y - \Delta G$

Table 4. Absolute Values of Deviations from Actual using Leser's (L) and a Naive (N) Model

£ million

Years	Y ₁		Y ₂		Y ₃		Y ₄	
	L	N	L	N	L	N	L	N
1952-53	0.4	0.6	16.1	19.3	12.8	13.5	0.5	10.4
1951-52	11.5	22.6	17.0	36.8	4.0	12.6		1.9
1950-51	28.1	39.4	21.4	5.9	4.3	8.1	7.7	10.0
1949-50	18.4	24.7	13.4	10.2	0.5	0.2	2.6	3.1
1948-49	9.4	5.6	6.5	0.1	4.8	3.6	13.6	15.0
1947-48	17.3	0.6	11.1	20.3	12.5	14.7	22.8	6.8

Exchange of Views on Memorandum between
R. C. Geary and C.E.V. Leser

R. C. Geary to C.E.V. Leser, 3 February 1968

I would be very glad to have your observations on the enclosed. Have I made a blunder in applying your model to 1947 - 1953? I enclose also a copy of your Memo. No. 41.

I had been hoping to extend your model to include banking and other monetary entities. At the same time I had been reading much relevant US and UK work. I am left with the depressing feeling that the present approach to forecasting through behavioristic models at the macro level has no great future and a fresh start must be made, perhaps by aggregation of micro-models. Many analysts still make play with individual coefficients which, as you are so painfully aware (through my insistence), I regard as invalid, except in simple regression. The point is not at issue here: we need agree only that forecasting is one important objective of model-making. Would you care to comment?

C.E.V. Leser to R. C. Geary, 19 February 1968

As to your note, first of all a minor point. If the data in Table 2 are correct, Y_4 calc. for 1951-52 should read not 254 but 17.7, the deviation in Table 4 not 12.0 but 4.3, with corresponding alterations on p.2 (68.4 becomes 60.7; 489.8 becomes 482.1) and on p.3 (9.9 becomes 8.6).* The model comes out a little better though there is no fundamental change in the conclusions. I can see no objection to testing the model on 1947-53 beyond the limitations of such a procedure which you yourself pointed out.

Your general point about the usefulness of macro models is rather too big an issue to discuss seriously in a letter, I realise that my work on macro-models has been largely experimental, and I have not yet got a final answer to the problems involved. As pointed out, however, the model was not primarily designed for short-term forecasting; about forecasting models I have said in my Econometrica paper (ESRI Reprint No. 16) and my basic position has not changed so far.

* These corrections have been made. R.C.G.