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Alternative Forecasts of Saving 1947-56

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In a review of Robert Ferber's A Study of Aggregate Consumption Functions, published in the American Economic Review, September 1954, pp. 667-671, I presented computations of the errors of three naive forecasts and four formula forecasts for the years 1947-1953. These computations have now been extended through 1956, and are shown in Table 1 attached. (The figures for 1953 have been recomputed on the basis of revised data.) In extending these computations, it was found that the third and fourth lines for formula 2.10 were in error in the original Table. Had these been correctly computed, the first-difference version of formula 2.10 would have had the lowest average error of all formulas in 1948-53, as it does for 1948-56. With this correction, the general pattern of results remains much the same as before. The peak-income formula 2.22 is easily the best of the regular 1923-40 regressions, so far as post-war predictions are concerned. But it is not the best predictor among the regular "recomputed regressions" or among the first-difference regressions of either variety. Naive forecasts are as good as any of the 1923-40 regular regressions, with the possible exception of the peak-income formula 2.22. But on the basis of each of the three other methods of calculations, any of the formulas predicts better than any of the naive methods. First-differencing is clearly a superior procedure, judging from the results of the 1923-40 regressions. But its superiority is not clear in the case of the "recomputed regressions."

Table 1.   Alternative Forecasts of Saving 1947-56

	1947	1948	1949	1950	1951
ACTUAL AGGREGATE PERSONAL SAVING, (S)	3.9	10.5	6.7	11.2	17.0

NAIVE FORECASTS S* (PERCENTAGE ERRORS IN PARENTHESES)

	1947	1948	1949	1950	1951
$S^* = S-1$ Projection of aggregate personal saving	(-207.7)12.0	(62.8)3.9	(-56.7)10.5	(40.2)5.7	(34.1)11.2
$S^*/Y=(S/Y)-1$ Projection of saving-disposable income ratio	(-230.8)12.9	(59.0)4.3	(-56.7)10.5	(53.9)7.4	(27.1)12.4
$S^*/NP=(S/NP)-1$ Projection of per capita real saving	(-259.0)14.0	(59.0)4.3	(-58.2)10.6	(58.4)5.9	(27.6)12.5

FORMULA FORECASTS S* (PERCENTAGE ERRORS IN PARENTHESES)

(Ferber formula 2.4) $S^*/NP=a+b\ Y/NP$

	1947	1948	1949	1950	1951
1923-40 regression	(-300.0)15.6	(-68.6)17.7	(-158.2)17.3	(-82.1)20.4	(-31.2)22.3
Recomputed regressions	(-300.0)15.6	(7.6) 9.7	(- 47.8) 9.9	(8.0)10.3	(31.8)11.6
1923-40 regression of first differences	(-151.3) 9.8	(52.4) 5.0	(-47.8) 9.9	(7.1)10.4	(28.8)12.1
Recomputed regressions of first differences	(-151.3) 9.8	(50.5) 5.2	(-44.8) 9.7	(- 0.9)11.3	(28.8)12.1

(Ferber formula 2.8) $\dfrac{S^*}{NP} = a + b_1\ \dfrac{Y}{NP} + b_2\left(\dfrac{Y}{NP}\right)-1$

	1947	1948	1949	1950	1951
1923-40 regression	(-225.6)12.7	(-53.3)16.1	(-128.4)15.3	(-73.2)19.4	(-17.1)19.9
Recomputed regressions	(-223.1)12.6	(0.0)10.5	(- 40.3) 9.4	(-14.3)12.8	(35.9)10.9
1924-40 regression of first differences		(43.8) 5.9	(- 44.8) 9.7	(3.6)10.8	(32.9)11.4
Recomputed regressions of first differences		(43.8) 5.9	(- 41.8) 9.5	(- 0.9)11.3	(37.6)10.6

(Ferber formula 2.10) $\dfrac{S^*}{P} = a + b_1\ \dfrac{Y}{P} + b_2 N$

	1947	1948	1949	1950	1951
1923-40 regression	(-241.0)13.3	(-41.0)14.8	(-109.0)14.0	(-51.8)17.0	(- 5.9)18.0
Recomputed regressions	(-246.2)13.5	(30.5) 7.3	(- 14.9) 7.7	(18.8) 9.1	(41.8) 9.9
1923-40 regression of first differences	(-148.7) 9.7	(19.0) 8.5	(- 32.8) 8.9	(12.5) 9.8	(34.7)11.1
Recomputed regressions of first differences	(-148.7) 9.7	(16.2) 8.8	(- 23.9) 8.3	(7.1)10.4	(38.8)10.4

(Ferber formula 2.22) $\dfrac{S^*}{Y} = a + b\ \dfrac{Y/NP}{(Y/NP)}\circ$

	1947	1948	1949	1950	1951
1923-40 regression	(-17.9) 4.6	(16.2) 8.8	(- 14.9) 7.7	(0.0)11.2	(42.9) 9.7
Recomputed regressions	(- 17.9) 4.6	(17.1) 8.7	(- 6.0) 7.1	(0.0)11.2	(42.9) 9.7
1924-40 regression of first differences		(14.3) 9.0	(- 37.3) 9.2	(3.6)10.8	(45.9) 9.2
Recomputed regressions of first differences		(14.3) 9.0	(- 37.3) 9.2	(1.8)11.0	(47.1) 9.0

	1952	1953	1954	1955	1956	Average of Absolute Values of Percentage Errors of Forecast 1947-56	1948-56
	16.9	19.7	17.9	16.6	20.8		
	(-0.6)17.0	(14.2)16.9	(-10.1)19.7	(- 7.8)17.9	(20.2)16.6	45.4	27.4
	(-5.9)17.9	(8.6)18.0	(-11.7)20.0	(-14.5)19.0	(15.4)17.6	46.4	25.9
	(-5.3)17.8	(12.7)17.2	(-12.3)20.1	(- 9.6)18.2	(17.8)17.1	50.0	26.8
	(-37.3)25.2	(-32.0)26.0	(-47.5)26.4	(-76.5)29.3	(-52.9)31.8	88.6	65.1
	(21.9)13.2	(22.3)15.3	(9.9)16.3	(-10.2)18.3	(6.7)19.4	46.6	18.5
	(4.7)16.1	(- 2.5)20.2	(-11.2)19.9	(-28.9)21.4	(8.2)19.1	34.3	21.3
	(5.3)16.0	(- 7.1)21.1	(-10.6)19.8	(-33.7)22.2	(6.7)19.4	35.1	22.2
	(-22.5)20.7	(-23.9)24.4	(-30.7)23.4	(-62.7)27.0	(-38.5)28.8	67.6	50.0
	(24.9)12.7	(14.7)16.8	(12.8)15.6	(-18.7)19.7	(4.8)19.8	39.0	18.5
	(- 4.1)17.6	(- 4.6)20.6	(- 7.8)19.3	(-30.7)21.7	(10.1)18.7		20.3
	(- 4.1)17.6	(- 5.6)20.8	(- 6.7)19.1	(-31.9)21.9	(11.5)18.4		20.4
	(- 7.7)18.2	(- 9.1)21.5	(-19.0)21.3	(-45.2)24.1	(-25.5)26.1	55.5	34.9
	(31.4)11.6	(25.9)14.6	(12.3)15.7	(- 9.0)18.1	(15.4)17.6	44.6	22.2
	(4.1)16.2	(- 2.0)20.1	(- 4.5)18.7	(-24.7)20.7	(11.5)18.4	29.5	16.2
	(1.8)16.6	(- 8.1)21.3	(- 6.1)19.0	(-32.5)22.0	(10.6)18.6	29.4	16.1
	(40.8)10.0	(34.0)13.0	(38.5)11.0	(14.5)14.2	(32.2)14.1	25.2	26.0
	(38.5)10.4	(29.4)13.9	(32.4)12.1	(3.6)16.0	(23.6)15.9	21.1	21.5
	(- 4.7)17.7	(- 6.6)21.0	(3.4)17.3	(-18.7)19.7	(21.6)16.3		17.3
	(- 4.7)17.7	(- 6.1)20.9	(2.8)17.4	(-31.9)21.9	(21.1)16.4		18.6

Explanation of Table 1

Symbols. S   aggregate personal saving
          Sa forecast value of S
          Y   aggregate disposable income
          N   midyear population
          P   consumers' price index 1935-39 = 100
          $(X)_{-1}$ value of x in preceding year. For 1947, this is taken to be 1946

          $(X)_0$ highest previous value of x, excluding the years 1941-1946,
                   except that, following Ferber, the 1946 value is used as the
                   highest value prior to 1947.

Forecasts by alternative methods have been made comparable by expressing all
of them as forecasts of aggregate personal saving. All forecasts are computed
on the assumption that the values of all variables other than S are known in
advance.

Percentage errors of forecast are $100 \frac{S-Sa}{S}$. Thus over-estimates appear with a

negative sign. Averages of these errors, with signs disregarded, are given in
the last two columns.

Naive forecasts. Three different forecasts of saving are obtained from alterna-
tive definitions of the variable whose value in the preceding year is taken as the
forecast.

Formula forecasts

   Formulas selected. Four of the formulas studied by Ferber have been selected
   for these calculations. All formulas that fail to make allowance for price and
   population effects have been excluded. All formulas involving "time" as a
   variable have been excluded, on the principle that "time" is an unsatisfactory
   explanatory variable, especially ambiguous because of the gap due to the war.
   Of the two M-D type formulas that would not be excluded by these criteria, 2.21
   and 2.22, only 2.22 has been presented. 2.21 leads to very similar but not quite
   as good forecasts.

Regressions used. Only regressions that use all the data from 1923-40 are included. "Recomputed regressions" have the following periods of fit:

Forecast year	Period of fit	
	Formulas 2.8 and 2.22 first differences	All other "recomputed regressions"
1947		1923-40
1948	1924-40	1923-40, 1947
1949	1924-40, 1948	1923-40, 1947-48
1950	1924-40, 1948-49	1923-40, 1947-49
1951	1924-40, 1948-50	1923-40, 1947-50
1952	1924-40, 1948-51	1923-40, 1947-51
1953	1924-40, 1948-52	1923-40, 1947-52
etc.		

The shorter periods of fit for the first difference versions of 2.8 and 2.22 were necessitated by their use of lagged variables.

First difference regressions were fit with no constant term, since a constant term would imply a time trend in the saving variable.