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The Source of Regressiveness in Surveys of Businessmen's Short-Run Expectations

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Analyses of several surveys of businessmen's short-run expectations have consistently revealed a surprising degree of inaccuracy in the forecasts. Accordingly economists have tended to write them off as containing little useful information. As a result, the resources allocated to several such surveys have been sharply reduced. The analysis of one survey, the Canadian Employment Forecast Survey, has for instance been all but abandoned. When judged against this background, Hart's gallant attempt at rehabilitating the railroad shippers' forecasts undoubtedly represents an original and significant undertaking. However, we feel that his analysis, for all its ingenuity, has merely succeeded in scratching the surface of a very complex and interesting problem: why are the reported anticipations of all these surveys so systematically yet preposterously regressive? We propose to show that an answer to this question will have to be found along lines quite different from those suggested by Hart, and that this redirection in turn raises serious questions concerning the appropriateness of Hart's correction and the interpretation of his corrected series.

The Issues that Need to be Explored

The essence of Hart's approach is that since the poor forecasting record of the shippers' survey can be traced to the reasonably stable systematic understatement of the change over the four quarters previous to the time for which the forecast is made, we can more closely approximate future change by correcting the original forecasts for this understatement. The resultant series—Hart's "reconstituted" anticipations—is, by construction, free of the systematic bias. The most obvious use would be as an improved predictor of future changes, and we shall test whether such series provide better forecasts than can otherwise be obtained. But Hart proposes that, whether or not the corrected series can provide good predictions, they have a second use of possibly even greater potential value as measures of businessmen's short-run expectations. For a knowledge of prevailing business anticipations can be used to predict changes in other

NOTE: This paper originated as a comment on Albert Hart's paper in this volume. For useful and stimulating assistance, we are greatly indebted to James W. Harpel. We also wish to express our thanks to Michael C. Lovell for reading the manuscript and making many valuable suggestions.

production and investment variables which depend on plans made in the light of these anticipations. Here, however, an explanation must be furnished to show why a manipulation of the original series provides a more accurate picture of businessmen's expectations than the original forecasts themselves.

Hart's justification for his "correction" arises from his unwillingness to believe that the regressive anticipations which surveys report could possibly be the expectations on the basis of which current operating decisions are made. He therefore has suggested several hypotheses which attempt to explain regressiveness as the consequence of distortions picked up in the transmission and aggregation of the individual responses. We shall examine these hypotheses, and shall then test the underlying assumption made by Hart and other previous analysts that the source of the regressive behavior of the aggregate forecasts is to be found in the collection and collation of the survey responses rather than in the respondents' anticipations themselves. In so doing, we shall attempt to isolate the source of the regressiveness to be explained.

The Forecasting Value of "Reconstituted" Anticipations

Hart's paper provides the reader with a bewildering array of statistics bearing on the forecasting quality of the *H*-series. There are several different tests, whose relation to each other is not always clear, and for each test several results are usually given, each result being based on a different subsample of the observations, selected according to various criteria. We have therefore endeavored to sift out the relevant results and to present them in a systematic and compact form in Table 1. There is only one test for which all the data available for the interwar period have been used. In every other case we are forced to rely on the results of tests which omit the last two years, 1940 and 1941, and trust Hart's judgment that the omission does not significantly affect the outcome.

Like previous analysts of the shippers' forecasts, Hart tests predictive value by verifying whether his "corrected" series gives a more accurate prediction than is provided by simple extrapolative formulas based exclusively on the past behavior of the variable to be forecasted. As can be seen from Table 1, Hart has carried out basically four tests, differing from each other in terms of the variable to be predicted (column 2) and of the variables used in the extrapolative formula (column 6). For each test, two measures of predictive accuracy are provided. The first consists of a comparison of the simple correlation between the variable to be predicted and the *H*-prediction (column 5) with the correlation between the same dependent variable and the extrapolative forecast (column 7)—a comparison, in other words, of the gross predictive values of the two types of forecast. The second measure (column 8) is the partial correlation of the

TABLE 1

Tests of the Predictive Value of Hart's "Reconstituted" Shippers' Forecasts

Test Number (1)	*Variable to Be Predicted* (2)	*Form of H-predictor* (3)	*Number of Observations* (4)	*Gross Predictive Value of H-forecast* (r^2) (5)	*Variables Used in Naïve Model* (6)	*Gross Predictive Value of Naïve Model Forecast* (r^2 or R^2) (7)	*Net Forecasting Value of H-prediction* (8)
1	A_t/A_{t-4}	H_t/A_{t-4}	46	0.82	A_{t-1}/A_{t-5}	0.72	
					A_{t-1}/A_{t-5}, A_{t-2}/A_{t-6}	.74	0.343
			54	.81	A_{t-1}/A_{t-5}	.71	
					A_{t-1}/A_{t-5}, A_{t-2}/A_{t-6}	.74	.32
2	${}^5A_t$	$(H_t/A_{t-4}){}^5A_{t-4}$	47	.921	${}^5A_{t-1}$	.936	.18
3	A_t/A_{t-1}	$(H_t/A_{t-4})(A_{t-4}/A_{t-1})$	46	.34	normal seasonal variation	.56	
4	${}^5A_t/{}^5A_{t-1}$	$(H_t/A_{t-4})({}^5A_{t-4}/{}^5A_{t-1})$	46	.09	${}^5A_{t-1}/{}^5A_{t-2}$, ${}^5A_{t-2}/{}^5A_{t-3}$	.18	.006

Sources in Hart's paper: Test 1—pp. 212-213, especially footnote 16; Test 2—pp. 219-221; Test 3—pp. 223-224; Test 4—pp. 225-226.

H-prediction in a multiple correlation involving both the extrapolative variables and the H-prediction as independent variables—an index, in other words, of the net forecasting value of the H-prediction.[1]

The outcome of the first test (in which the variable to be predicted is the four-quarter change) is quite favorable to the H-prediction. The figures of column 5 are appreciably higher than those of column 7, and the figures of column 8 are fairly impressive, implying a partial correlation of close to 0.6.

Similar results have been obtained by Douglas Hartle in a study of the Canadian Employment Forecast Survey.[2] While his analysis is primarily concerned with the important question of separating the sampling errors in the survey from the forecast errors in the population, it does provide evidence on the regressiveness of the survey forecasts. The substantial underestimation of actual four-quarter change by the forecasts is indicated by the following regression equation of forecasted on actual change:[3]

$$(1) \qquad (E_t/A_{t-4})-1 = 0.29[(A_t/A_{t-4})-1]+0.008$$

The corresponding equation reported by Hart for the railroad shippers' forecast is:[4]

$$(2) \qquad (E_t/A_{t-4})-1 = 0.44[(A_t/A_{t-4})-1]+0.27$$

It is evident that the underestimation of forthcoming change is, if anything, even more pronounced in the Canadian survey than in the shippers' survey.[5] When the coefficients of equation 1 are used to correct this systematic bias in reported expectations, the correction appreciably improves the original predictions of employment, raising the correlation with actual change from 0.26 for the unadjusted data to 0.47 for the "reconstituted" forecasts.[6] Furthermore, a test analogous to the first

[1] The figures in column 8 are partial determination coefficients—that is, partial correlation coefficients squared.

[2] Douglas Hartle, "Predictions derived from the Employment Forecast Survey," Canadian Dept. of Labor, May 1957, mimeographed. (This paper has since been published in the August 1958 issue of the *Canadian Journal of Economics and Political Science*, but all references here are to the mimeographed version.)

[3] The Canadian survey requested respondents to make two four-quarter change forecasts of employment, one for three months ahead and one for six months ahead. Equation 1 is computed from a scatter of 31 six-month forecasts made in quarter t–2, plotted against the corresponding actual changes in Hartle, Chart 2.

[4] Computed from Hart's equation on p. 212 and footnote 14.

[5] The higher regression coefficient of equation 2 may partly reflect Hart's exclusion of observations at or near major turning points. More important, however, a large standard error is associated with the regression coefficient of equation 1. The correlation coefficient is small, even though significant at the 0.001 level, so that the two estimates of the regression coefficient of (E_t/A_{t-4}) on (A_t/A_{t-4}) obtained by alternately minimizing the variation of (E_t/A_{t-4}) and (A_t/A_{t-4}) are materially divergent from one another. By using the computation procedures of the principal components technique a more accurate representation of the average understatement of four-quarter change could be obtained; this procedure would yield a regression coefficient closer to that obtained for the shippers' forecasts.

[6] Coefficients of determination for 31 observations.

test in Table 1 shows that the correlation between actual change and the corrected forecasts is substantially higher than for the predictions obtained by extrapolating the previous actual change.[7]

Clearly the "reconstituted" series represent a great improvement over the unadjusted anticipations, for the uncorrected published forecasts perform appreciably worse than even the naïve-model forecasts. At the same time, however, it should be remembered that the naïve model used in this test is indeed naïve. The extrapolative prediction is roughly equivalent to forecasting shipments or employment in the next quarter by an extrapolation of the level of the current quarter, adjusted for seasonal variation by the ratio of the levels of the corresponding quarters of the year before.[8] This is obviously a most primitive way to adjust for seasonal variation. The favorable results of the first test can thus be of limited significance at best.

The results of the second test indicate that a forecast based on a projection of the seasonally adjusted level of shipments of the previous quarter (A_{t-1}) has appreciably higher gross predictive value than Hart's H-prediction. And column 8 shows that even the net forecasting value, though significant, is modest. These conclusions are confirmed by the last two tests, which are in effect variations of the second. The third test shows that normal seasonal variation accounts for a greater part of the unadjusted quarter-to-quarter fluctuations of shipments than does the H-prediction. The last test shows that the H-series is of little use in predicting quarterly change arising from forces other than the recurrent seasonal variation. The simple correlation between the seasonally adjusted quarterly change and the H-prediction is only 0.3, somewhat less than that for an extrapolative model based on a projection of previous seasonally adjusted changes; the partial correlation confirms that the H-forecast has essentially no net predictive value.

It is evident that the series manufactured by Hart represents a considerable improvement over the published anticipations. However, its

[7] The coefficient of determination of the relation between actual change and the corrected forecasts is 0.38 (for 39 observations), compared with 0.13 for the extrapolative predictions. The past change in this instance is $[(A_{t-2}/A_{t-6})-1]$, rather than $[(A_{t-1}/A_{t-5})-1]$ as in Table 1, since the employment forecasts corrected are six-month forecasts.

[8] Using the superscript f to denote a forecast, the extrapolative formula used as a naïve model prediction in Hart's first test is basically of the form $A^f_t/A_{t-4}=A_{t-1}/A_{t-5}$ which implies $A^f_t=A_{t-1}(A_{t-4}/A_{t-5})$. By the same token, when the extrapolative model relies on A_{t-2}, the adjustment for seasonal variation is performed by the ratio, A_{t-4}/A_{t-6}. To the extent that A_{t-4}/A_{t-5} (or A_{t-4}/A_{t-6}) does reflect a trend in addition to purely seasonal and random factors, the forecast is not, strictly, a seasonally adjusted projection of the level of the current quarter. However, projecting the trend which existed between two quarters a year ago is hardly a sensible procedure. This interpretation of the naïve forecast used as an alternative in the first test is, of course, only approximately valid. The extrapolative forecast is not strictly of the above form since the regression of A_t/A_{t-4} on A_{t-1}/A_{t-5} will in actuality involve a constant term and slope coefficient which are not precisely zero and one, respectively.

record does not appear to necessitate a significant revision of the conclusion of Hultgren, Ferber, and other previous analysts that, at least in the interwar period, the shippers' forecasts are of little use in predicting shipments.[9]

It should be recognized that the fact that E_t is known substantially earlier than A_{t-1} means that the tests hitherto discussed underestimate the usefulness of the H-index as a forecasting device. However, since the tests of Table 1 indicate that E_t contains little information about forthcoming changes in shipments from the current rate, the practical forecasting usefulness of any "reconstituted" anticipations must lie primarily in its being a proxy for information on current developments.[10] Not that the forecasts merely mirror the rate of activity at the time of the survey. Indeed, as Hart has pointed out, the movement of the shippers' forecast cannot be fully accounted for by the previous course of shipments. It appears, however, that the nonextrapolative element in the forecast, whether or not it is a reliable indication of the mood of the respondents, does not on balance contain much information of significant net forecasting value.

"Reconstituted" Anticipations as Measures of Expectations

We now turn to Hart's claim that a "corrected" series can represent a truer measure of businessmen's expectations than the original published anticipations. Hart's reasoning is that the systematic regressive bias in the forecasts is picked up during the collection and aggregation of the individual responses. The most direct test of this hypothesis would be to examine Hart's presumption that the anticipations of individual responding firms are nonregressive. Unfortunately no information about the forecasts made by individual firms is available for the shippers' survey. We do have such information, however, for a number of surveys conducted by Dun and Bradstreet, and we propose to rely rather heavily on the evidence thus provided.

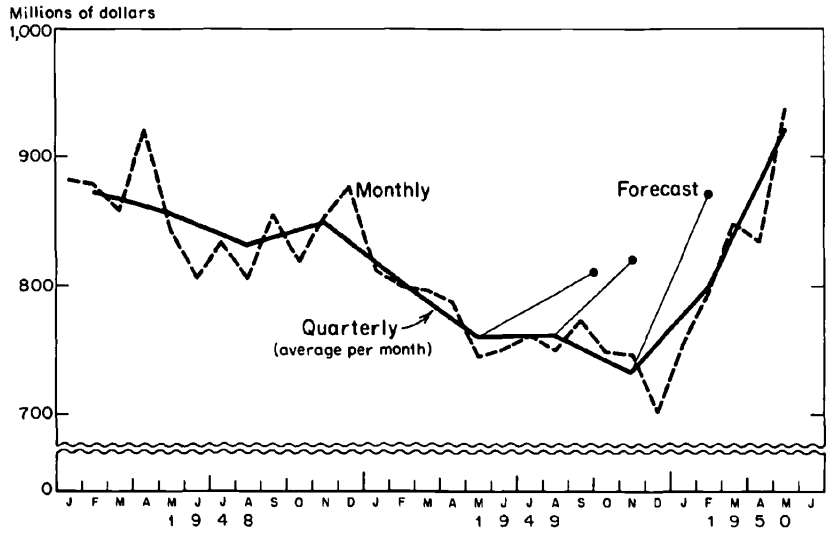
[9] We have not made tests analogous to the last three of Table 1 for the Canadian Employment Forecast Survey. However, in a forthcoming book to be published by the University of Toronto Press, Hartle has tested the forecasting value of the survey when compared to naïve models using seasonally adjusted data. His preliminary results indicate that our conclusion also applies to his survey.

[10] Hartle has advanced some interesting evidence on this point. He found that the size of the understatement of actual changes in the Canadian employers' survey seemed to be a function of cyclical changes in employment. When $[(A_t/A_{t-4})-1]$ was increasing between surveys, the magnitudes of the four-quarter changes were understated by the forecasts. Conversely, even though the forecasts understated $A_t/A_{t-4}-1$ on the average (as indicated in equation 1), E_t/A_{t-4} tended to become larger than A_t/A_{t-4} when the rate of change of A_t/A_{t-4} was negative. (Hartle, pp. 16-18 and Chart 2.) This behavior corresponds to expecting change in employment to be a fraction of actual four-quarter changes lagged one to two periods—or, in other words, to recognizing only part of recently occurred changes. (Cf. Kenneth J. Arrow and Marc Nerlove, "A Note on Expectations and Stability," *Econometrica*, April 1958, pp. 297–300.)

The Dun and Bradstreet survey is similar to the shippers' and employers' surveys in several essential respects. Respondents are asked to report anticipations for the forthcoming quarter in terms of the change expected from the corresponding quarter of the year before.[11] The same dismal forecasting record is displayed.[12] Most significantly, the predictive record

CHART 1

Monthly Manufacturers' Sales in the Fabricated Metal Products Industry, 1948–1949



of the survey is characterized by the same occurrence of regressive one-quarter forecasts arising from systematically downward-biased predictions of four-quarter change.

Chart 1, collated from the responses of the fabricated metal products industry, illustrates this regressiveness. The dash line indicates monthly

[11] In the early surveys, including two of those analyzed below, the Dun and Bradstreet survey experimented with asking respondents to forecast for periods other than simply the forthcoming quarter. Respondents were asked, in the April 1948 survey, to forecast sales for the year 1948 and, in the May 1949 survey, to forecast sales for the next six months. In every case, however, the reference point was the corresponding period of the year before. The form in which $[(A_{t-1}/A_{t-5})-1]$ was reported also varied. In the April 1948 survey respondents reported the change in sales between the first quarter of 1947 and the first quarter of 1948; in all other surveys, respondents reported current sales in the month in which the survey was made over sales in the same month of the preceding year.

[12] Cf. Franco Modigliani and Owen H. Sauerlender, "Economic Expectations and Plans of Firms in Relation to Short-Term Forecasting," *Short-Term Economic Forecasting*, Studies in Income and Wealth, Vol. 17, Princeton University Press for the National Bureau of Economic Research, 1955, pp. 299-303.

sales adjusted for seasonal variation; the solid continuous line superimposed on the monthly indicator shows the movement of average sales per month in each quarter, also seasonally adjusted. Each of the three forecasts available is shown as a floating point tied back by a thin line to the average level of sales in the previous quarter.[13] These forecasts, all made following a sustained fall in sales, exhibit the same trend-reversing patterns characteristic of the shippers' forecasts: the expected change in sales from the level of the year before $[(E_t/A_{t-4})-1]$ is smaller than the seasonally adjusted change that has already occurred $[({}^sA_{t-1}/{}^sA_{t-4})-1]$ so that the forecast implies the expectation of a sudden reversal of the existing trend. Such regressiveness was characteristic of the forecasts of other industries covered by the surveys.[14] This is illustrated in Chart 2 which shows, for each industry covered by the survey, the average four-quarter change in sales expected by the respondents in August 1949 plotted against the average past change reported by them.[15]

If the average past change reported by the respondents were the change that had occurred between the reference date of the forecast and the time the forecast was made, then Chart 2 would clearly indicate the regressiveness of the survey. Recall that extrapolation of level means

$$(3) \qquad {}^sE_t = {}^sA_{t-1}$$

where, as in Hart's paper, the s is used to denote seasonally adjusted data. From this it is evident that if (3) holds, then

$$(4) \qquad ({}^sE_t/{}^sA_{t-4})-1 \equiv (E_t/A_{t-4})-1 = ({}^sA_{t-1}/{}^sA_{t-4})-1$$

where the first identity follows from the obvious fact that quarters t and $t-4$ represent the same season of the year. Extrapolation of trend, on the other hand, means ${}^sE_t > {}^sA_{t-1}$ when ${}^sA_{t-1} > {}^sA_{t-4}$, and conversely, or

$$(5) \qquad (E_t/A_{t-4})-1 \gtreqless ({}^sA_{t-1}/{}^sA_{t-4})-1 \text{ as } ({}^sA_{t-1}/{}^sA_{t-4})-1 \gtreqless 0$$

By the same token, reversal of trend, or regressiveness, means ${}^sE_t < {}^sA_{t-1}$ when ${}^sA_{t-1} > {}^sA_{t-4}$, and conversely, or

$$(6) \qquad (E_t/A_{t-4})-1 \lesseqgtr ({}^sA_{t-1}/{}^sA_{t-4})-1 \text{ as } ({}^sA_{t-1}/{}^sA_{t-4})-1 \gtreqless 0$$

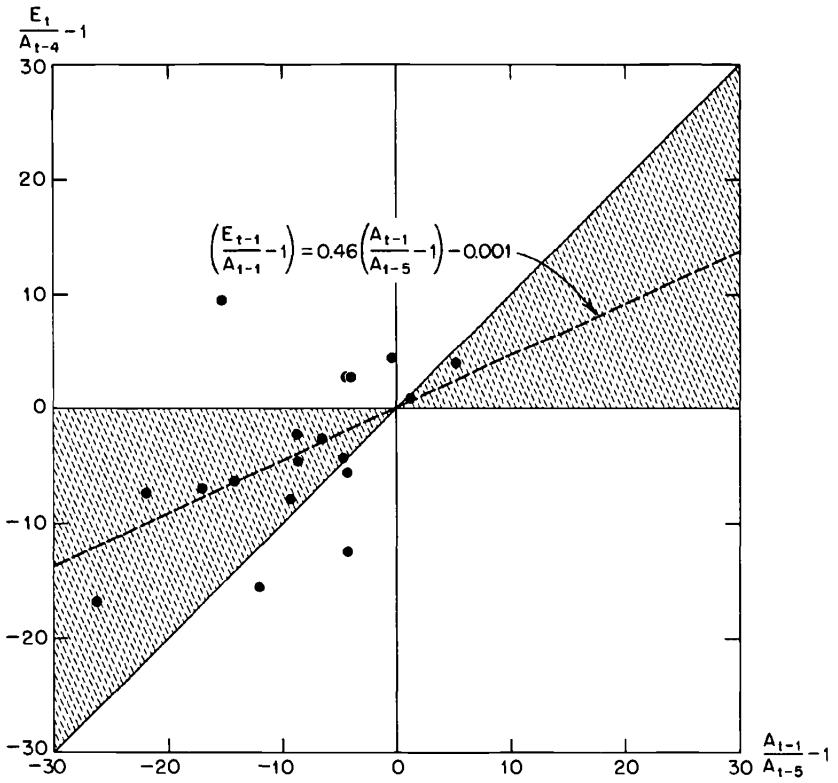
[13] The floating point tied back by a thin line follows Hart's usage.

[14] For nondurable goods industries, the results of an additional survey conducted in April 1948 is available. In spite of the fact that any regressiveness in this survey is obscured to some extent because respondents were asked to forecast sales for the entire year (as a ratio to 1947 sales), the regressive pattern held in this survey as well.

[15] The points in the scatter of Chart 2 are weighted averages of the individual responses in each industry. One industry, the primary metal producers, is omitted. This industry was sharply "antiregressive" in the August survey, forecasting a decline in sales of 36 per cent for the last quarter of 1949 from the last quarter of 1948—more than double the 16 per cent decline from August 1948 to August 1949 reported by the responding firms. This unusual forecast, however, was obviously shaped by the impending steel strike which began on October 1. As a result of the work stoppage, steel output dropped from about 85 per cent of rated capacity in late September to close to 8 per cent in the first two weeks of October, and seasonally adjusted manufacturers' sales of iron and steel declined 40 per cent. (Cf. *Survey of Current Business*, Dept. of Commerce, October and December 1949.)

CHART 2

Forecast Change and Past Change in Sales in Each Industry in the August 1949 Survey



Thus, plotting $[(E_t/A_{t-4})-1]$ against $[({}^sA_{t-1}/{}^sA_{t-4})-1]$, equation 4 would be represented by a straight line at 45° through the origin. Points falling on or close to this line would represent industries which, on the average, anticipate a continuation of the present level. Similarly, since the region defined by equation 5 is the portion of the plane falling between the 45° line and Y-axis in the northeast and southwest quadrants, points falling in this region would represent industries which anticipate a continuation of the previous trend. All remaining points would correspond to industries anticipating a reversal of trend.[16]

[16] More precisely, those observations falling between the 45° line and the X-axis (corresponding to the shaded area in Chart 2) represent regression in the original sense of wiping out some of the increase or decrease which occurred between $t-4$ and $t-1$. Those falling in the northwest and southeast quadrants also represent anticipated reversals of trend—reversals so sharp as to more than offset the movement recorded in the preceding quarters.

Unfortunately we do not know the average value of $[({}^{s}A_{t-1}/{}^{s}A_{t-4})-1]$ for the sample of firms responding in each industry. However, the survey did request each respondent to report the change which had occurred between $t-1$ and $t-5$, and we may reasonably suppose that (A_{t-1}/A_{t-5}) will not, as a rule, differ significantly from $({}^{s}A_{t-1}/{}^{s}A_{t-4})$. As a first approximation, then, we can use $[(A_{t-1}/A_{t-5})-1]$ as a proxy for the change occurring between the benchmark date of the forecast and $t-1$. Chart 2 can therefore be interpreted much as if $[({}^{s}A_{t-1}/{}^{s}A_{t-4})-1]$ were plotted on the horizontal axis. But we must now be somewhat more cautious in our interpretation.

In the first place, even though $[(A_{t-1}/A_{t-5})-1]$ should be close to $[({}^{s}A_{t-1}/{}^{s}A_{t-4})-1]$, the difference between the two is not likely to be purely random. Because trends typically last well over a year, it follows that change over four consecutive quarters will often be larger than the change which occurred over three of those quarters, so that the relation between the two will be of the form

$$(7) \qquad (A_{t-1}/A_{t-5})-1 = (1+k)[({}^{s}A_{t-1}/{}^{s}A_{t-4})-1]$$

where k is a positive number. If trends were linear and of indefinite length, the four-quarter change would be $\frac{4}{3}$ as large as the three-quarter change so that the value of k would be $\frac{1}{3}$. But since in fact trends are far from continuous—especially for individual firms or small aggregates of firms—k is likely to be, on the average, a good deal smaller than $\frac{1}{3}$, though almost certainly positive. Solving equation 7 for $[({}^{s}A_{t-1}/{}^{s}A_{t-4})-1]$ and substituting the result in equation 4, the condition for extrapolation of the existing level—the borderline, in other words, between extrapolation and reversal of trend—becomes

$$(8) \qquad (E_t/A_{t-4})-1 = [1/(1+k)][(A_{t-1}/A_{t-5})-1]$$

The line dividing the regions will thus be inclined at somewhat less than 45 degrees.[16a]

[16a] It should be reiterated that whether any given observation should be classified as either extrapolative or regressive depends upon the relative level of that firm's sales in $t-5$ and $t-4$. Not having this information for each firm, we are forced to draw a boundary line corresponding to the average relationship between ${}^{s}A_{t-5}$ and ${}^{s}A_{t-4}$ in each industry. Our proposition is thus that, on the average, this *average* boundary line is inclined at not much less than 45°. It should be noted, however, that the slope of the borderline can in certain circumstances be greater than unity—or even negative. In the usual case described above, ${}^{s}A_{t-4}$ is between ${}^{s}A_{t-5}$ and ${}^{s}A_{t-1}$, and k is positive. If, however, ${}^{s}A_{t-5}={}^{s}A_{t-4}$, then k is zero and the boundary line is the 45° line. Again, if ${}^{s}A_{t-4}$ is outside rather than between ${}^{s}A_{t-5}$ and ${}^{s}A_{t-1}$, k will be negative and, providing that ${}^{s}A_{t-5}$ is between ${}^{s}A_{t-4}$ and ${}^{s}A_{t-1}$, the slope of the boundary will be greater than unity. In the rare case where ${}^{s}A_{t-5}$ and ${}^{s}A_{t-4}$ are on opposite sides of ${}^{s}A_{t-1}$, $k<-1$ so that the borderline corresponding to extrapolation of level is actually negatively sloped. Such exceptions frequently occur at or shortly after major turning points in the business cycle, since at such times the change which occurred from $t-4$ to $t-1$ may well be in the opposite direction to what occurred between $t-5$ and $t-4$.

The second point to be kept in mind in interpreting this chart, is that, once we replace $({}^{s}A_{t-1}/{}^{s}A_{t-4})$ with (A_{t-1}/A_{t-5}), the position of an observation no longer tells us with certainty whether the anticipations are extrapolative or regressive. A dot falling in the trend reversal area is likely to represent a regressive expectation, especially if it is far from the boundary, but it might on occasion correspond to an extrapolative anticipation if it happens that the seasonally adjusted change from $t-5$ to $t-4$ were abnormally large compared with the change from $t-4$ to $t-1$. Similarly, a dot in the extrapolative region might occasionally correspond to a regressive anticipation if the change from $t-5$ to $t-4$ were in the direction opposite to that from $t-4$ to $t-1$ and sufficiently large. But such pathogenic instances seldom occur. Though inferences about individual observations must be subject to some uncertainty, it is clear that if most of the dots fall in one particular region we can be confident that the anticipations are prevailingly of the type thus indicated.

Looking at Chart 2 in the light of these considerations, there can be little doubt that the anticipations are prevailingly regressive. Out of 18 observations only 3 fall in the extrapolative region as against 15 falling in the trend reversal region, 11 of which are regressive in the original, narrow sense. This count would be essentially unchanged if the boundary had a slope as low as 0.85.

This visual impression is fully confirmed by regression analysis. The regression of expected four-quarter change on recent past change is:[17]

$$(9) \qquad (E_t/A_{t-4})-1 = 0.46[(A_{t-1}/A_{t-5})-1]-0.001$$

This result is representative of the relation between the average expected change and the average past change for individual industries in the other Dun and Bradstreet surveys.

Equation 2 indicates that, on the average, the anticipated change is only about half as large as we should expect if anticipations tended to represent an extrapolation of the recent level. The regression coefficient is strikingly similar to that reported by Ferber for the shippers' forecasts and to the systematic downward bias estimated by Hart.[18] There seems therefore, to be ample ground for confidence that evidence from the Dun and Bradstreet surveys can be utilized to test Hart's hypothesis and, more generally, to throw light upon the source of regressiveness in the shippers' and similar surveys.

[17] The coefficient of determination is 0.51, which is significant at the 5 per cent level.

[18] Both coefficients were about 0.44. Robert Ferber, *The Railroad Shippers' Forecasts*, Bureau of Economic and Business Research, University of Illinois, 1953, pp. 70-71, equations 4.1.6 and 4.1.7; and *supra* equation 2.

Previous Explanations of Regressiveness

In suggesting that the systematic, regressive bias in surveys of short-run business expectation is picked up in the transmission and aggregation of the individual responses, previous analysts have had to advance hypotheses to explain how such a "transmitting error" might have arisen. The explanation which historically has received the most favorable review is that advanced by Robert Ferber and Millard Hastay, who suggested that the understatement of four-quarter change in the published shippers' forecasts arose from the inclusion of a large group of respondents in the sample who arbitrarily reported an anticipation of "no change." For this hypothesis to be operationally valid, the proportion of individual respondents arbitrarily forecasting "no change" should be roughly constant from survey to survey and should be at least as large as the size of the downward bias in the surveys.[19] The available evidence indicates that this proportion is neither large nor constant. A breakdown of the respondents in each Dun and Bradstreet survey into the proportions expecting an increase in sales, a decrease in sales, and no change, is available since the inception of the surveys. Over this period the proportion of respondents who forecasted no change in sales never exceeded 30 per cent and varied substantially from survey to survey, reaching a minimum of 12 per cent.[20] Thus, even if all the respondents who reported "no change" had been doing so arbitrarily, the proportion of such forecasts would still be much too small and variable to account for the known understatement of the survey. Moreover, an analysis of the four surveys for which we have data on individual responses indicates that many respondents who make such a forecast also report no change in actual sales over the preceding four quarters. The fact that the proportion of respondents reporting "no change" in the past is a sensible function of the business cycle suggests that such respondents do expect that sales will continue to be unchanged from the previous year's level. Since the size of the rest of the group forecasting "no change" also fluctuates with the movement of seasonally adjusted sales, it is likely that a number of these forecasts are also not just arbitrary responses. Although a number of "no change" forecasts are probably made arbitrarily from time to time, all the available evidence

[19] This is of course a necessary but not a sufficient condition. As it happens this condition seems to be satisfied in both the Canadian and the Illinois employment forecast surveys, and it has been suggested that the Ferber–Hastay hypothesis therefore applies to these surveys. Hartle has in fact used this hypothesis as the basis of his intriguing explanation of the lesser degree of understatement in the employment anticipations (see Ferber's paper and Hartle's comment in this volume). But in addition to this condition, the Ferber-Hastay hypothesis requires that the nonarbitrary forecasts in each survey be nonregressive. This we shall later show is not true for the Canadian survey.

[20] The figures quoted are based on an analysis of data through April, 1954, which were made available to the authors in convenient summary form through the courtesy of Millard Hastay. A less systematic examination of later surveys does not suggest significantly different conclusions.

suggests that such forecasts do not represent a significant fraction of the total. For the Dun and Bradstreet survey, the Ferber–Hastay hypothesis thus does not appear to provide an explanation of even just an important part of the downward bias and regressiveness of the forecasts, and there seems little ground for supposing that this ingenious hypothesis might fare better when applied to the shippers' forecasts.

Hart has suggested that the aggregate industry forecasts published by the shippers' survey are regressive because the original four-quarter expectations of firms—expectations which are themselves nonregressive—get repeatedly squashed and distorted as they pass through the various stages preceding publication. Michael Lovell's evidence indicates that such purposeful understatement does occur in the aggregation of the replies, and it is probable that this "sin of commission" also arises in the replies of the traffic managers themselves. Anticipated carloadings seldom are the basis for operating decisions, and there may in some cases be little communication between the traffic manager and executives responsible for planning and forecasting.[21] In such an event, it is questionable whether the traffic manager's forecast would reflect the operating expectations; his forecasts might be made simply as a "conservative" extrapolation of recent shipments tempered by what he hears about the outlook for his firm.[22] Even in those cases where information on his firm's operating expectations is furnished to the traffic manager, considerable distortion might still arise, since the traffic manager wishing to be conservative quite conceivably might cut down his forecast as he translates the firm's operating expectations into a forecast of carloadings.[23]

[21] Interviews conducted by the Merrill project with executives directly or indirectly responsible for forecasting and planning activity in their firms revealed that, in many instances, these executives were not aware of the shippers' forecasts or of the participation of the traffic manager in the survey. Modigliani still has a vivid recollection of one instance in which the president of a medium-sized company summoned the traffic manager in the midst of the interview and castigated him for not telling him about his participation in the shippers' survey.

[22] That the forecasts might be made in this fashion need not imply that the traffic manager had no evidence about his firm's operations other than a record of carloadings, which is what Hart seems to suggest. Nor need such an explanation—even if it purported to explain all the regressiveness of the survey—require for its validity that extrapolative naïve-model projections better the predictive performance of the shippers' forecasts, corrected or uncorrected. (However, cf. Hart's last two paragraphs of the section "Statistical Conservatism.")

[23] As Hart has pointed out, this "conservative" editing of the original anticipations can give rise to regressive forecasts and at the same time be "reasonable" only if the editors confuse one-quarter change with four-quarter change through an inability to differentiate between seasonal fluctuations and nonseasonal movements. An interesting though scarcely conclusive test of the importance of this will be provided by an examination of the April 1948 Dun and Bradstreet survey, which asked respondents to forecast sales for the entire year. Since some of the confusion about the seasonal component of change should thus be avoided, we should expect that the April survey should be significantly less regressive than the others if "conservative" editing were an important cause of regressiveness.

The hypothesis thus has an appealing a priori plausibility. Can it explain a significant part of the regressiveness of the survey forecasts? To answer this question, we must analyze the anticipations of the individual respondents. If these expectations exhibit little of the regressiveness associated with the published forecasts, then we can safely conclude that the regressiveness is introduced during the transmission and aggregation of the individual responses. But if the individual firm's anticipations are themselves significantly regressive, then, to the extent that they are, any distortions which arise in the survey procedures must be that much less significant in accounting for the bias in the aggregate forecasts.

Are the Expectations of Individual Firms Really Nonregressive?

Information on individual responses is not available for the shippers' survey. However, the forecasts of individual establishments together with a record of actual changes in their employment were available to Hartle in his analysis of the Canadian employers' survey. He reports that the signs of the errors in the forecasts of employment made by each establishment tended to be the same at each target date, which implies that the errors in the aggregate forecasts were a reflection of similar errors in the individual responses. Even more revealing, he found that the establishments sampled at each time persistently underestimated the magnitudes of the nonseasonal changes in their future employment.[24] These findings are not by themselves conclusive evidence that the expectations of the respondents are biased. Hartle made a survey of firms in the employment survey's sample which suggests that many of the firms do not use predictions of their future employment in making their operating plans.[25] The forecasts of employment made by personnel managers consequently may often reflect operating expectations only to a limited extent, so that distortions could conceivably be introduced by personnel managers in their transmission of the anticipations of their firms.

Fortunately a much more conclusive test can be carried out with data available for some of the Dun and Bradstreet surveys.[26] Of all current variables, expectations about future sales are the most likely basis of businessmen's operating plans as well as the source from which forecasts of shipments and of employment are most likely to be derived. The anticipations of sales collected by Dun and Bradstreet are obtained by personal

[24] Hartle, pp. 43-46.

[25] See Hartle's comment in this volume.

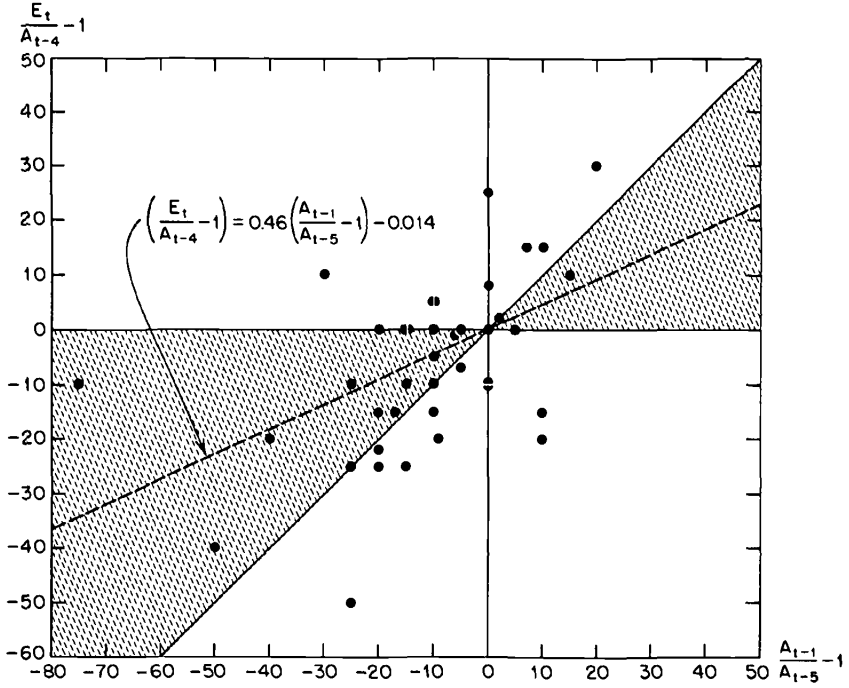
[26] The data consists of a complete record of the individual responses to all questions asked in the surveys taken in April of 1948 and in May, August, September, October, and November of 1949, made available to the Merrill project through the courtesy of Dun and Bradstreet. The identity of the individual respondents was not disclosed, each firm being identified only by a code number. The responding firms were, however, classified by a two digit SIC classification and, in some cases, were further broken down by approximate sales volume.

interview, reportedly from persons responsible for their firm's plans and expectations about the future, and we may consequently be confident that most of the reported forecasts represent the original operating expectations of the respondents.

Chart 3 shows a scatter of the four-quarter change in sales anticipated by 39 firms in the machinery industry which were sampled by the Dun and Bradstreet survey of October 1949, plotted against the past change reported

CHART 3

Forecast Change and Past Change in Sales for Individual Respondents in the Machinery Industry in the October 1949 Survey



to the survey by these respondents. One thing that is immediately apparent from this graph is that the individual anticipations do not bear a common mechanical relation to past change. The scatter is substantial: the correlation coefficient is only 0.51 which, though highly significant, is still small. In spite of this wide scatter, the trend-reversing tendency of the anticipations is immediately apparent. Out of 39 observations only 10, about a quarter, fall in the clearly extrapolative region—a proportion even larger than is typical. By contrast, 21 observations fall in the trend reversal region, 16 of which are regressive in the classic sense. Of the remaining 8,

3 fall on the borderline represented by the 45° line; the remaining five are unclassifiable since they report no change in the past. The overall impression engendered by this distribution is fully confirmed by the regression equation:

$$(10)' \qquad (E_t/A_{t-4})-1 = 0.46[(A_{t-1}/A_{t-5})-1]-0.014$$

The regression coefficient is much less than unity and is quite close to the value recurring in the analysis of the relation between anticipated and actual change.

Graphs similar to Chart 3 could be exhibited for all the industries and surveys for which the required information is available. That such graphs would all reveal much the same relation between anticipated and past change is indicated by Table 2, which presents the constant terms, slope

TABLE 2

Parameters of the Regressions of $[(E_t/A_{t-4})-1]$ on $[(A_{t-1}/A_{t-5})-1]$ in Selected Industries and Surveys

INDUSTRY		DATE OF SURVEY	CORRELATION COEFFICIENT	REGRESSION EQUATION:	
SIC No.	*Description*			*Slope Parameter*	*Constant Term*
28	Chemicals	5–49	0.52	0.74	−0.004
		8–49	.55	.47	+ .012
		11–49	.72	.45	+ .030
34	Fabricated metal products	8–49	.78	.72	− .013
		11–49	.43	.44	+ .075
35	Machinery	8–49	.75	.63	− .037
		11–49	.54	.37	+ .004
36	Electrical machinery	8–49	.52	.44	− .022

parameters, and correlation coefficients of the regressions of $[(E_t/A_{t-4})-1]$ on $[(A_{t-1}/A_{t-5})-1]$ among individual respondents for a sample of some of the large industry subsamples.

A useful summary view of the regressive nature of the response is provided in Table 3, which presents for each survey a cross-tabulation of the expected four-quarter change in sales against the direction of the past change in sales for all respondents who provided a quantitative answer to both questions. It includes four of the six surveys for which such information was available to us. One of the remaining surveys was conducted in September 1949 and asked the same anticipatory question as the August survey; the other was made in October and asked the same question as the November survey. It seemed unlikely that the replies to these surveys could provide much useful additional evidence, and they were therefore not tabulated. The industries covered are all those available.

There is a correspondence between the entries in Table 3 and the

TABLE 3

Cross-Tabulation of Individual Responses

DATE OF SURVEY	NUMBER OF RESPONDENTS	DIRECTION OF PAST 4-QUARTER CHANGE REPORTED BY RESPONDENTS	4-QUARTER CHANGE FORECAST BY RESPONDENTS: DOWN *More Than Past*	DOWN *Equal to Past*	DOWN *Less Than Past*	NO CHANGE	UP *Less Than Past*	UP *Equal to Past*	UP *More Than Past*
			(PERCENTAGES OF RESPONDENTS)						
April 1948	145	Up		8.3		11.7	16.6	16.6	9.7
		No Change		1.4		17.2		4.8	
		Down	2.8	2.1	1.4	5.5		2.1	
May 1949	240	Up		5.8		6.7	9.2	6.3	6.7
		No Change		4.2		4.2		3.8	
		Down	17.1	9.6	7.5	11.3		7.9	
August 1949	467	Up		3.6		5.6	6.4	9.2	8.8
		No Change		2.4		4.1		3.9	
		Down	11.6	11.8	13.1	9.0		10.7	
November 1949	417	Up		3.4		8.4	10.1	6.5	8.4
		No Change		2.2		8.4		6.7	
		Down	3.1	5.5	9.8	12.2		15.3	
All Surveys Combined	1,269	Up		4.4		7.4	9.3	8.6	8.4
		No Change		2.5		7.0		4.9	
		Down	8.8	8.2	9.6	10.1		10.7	

regions of Charts 2 and 3, which we have attempted to make clear in our arrangement of Table 3. For instance, the entries in the upper right and lower left corners of each component table correspond to the regions bounded by the 45° line and the vertical axis in the northeast and southwest quadrants of Chart 3. These entries indicate the number of respondents who reported that $[(E_t/A_{t-4})-1]$ would have the same sign and be of greater magnitude than $[(A_{t-1}/A_{t-5})-1]$. The sum of these figures (9.7 per cent plus 2.8 per cent in the April 1948 survey) thus represents the total number of responses which are clearly extrapolative.

The frequency of such extrapolative forecasts is rather small, ranging from a minimum of 11.5 per cent in the November survey to a maximum of 24 per cent in the May survey and averaging about 17 per cent. Much larger is the frequency of respondents who expect a reversal of the recent trend. These respondents, whose responses are tabulated in six entries in each table making up Table 3, account for an average of 51.5 per cent of the respondents in the samples.[27] Of these responses, about three quarter are regressive in the classic sense of the word: the expected four-quarter change is in the same direction as past change but of a lesser (though not necessarily nonzero) magnitude.

The remaining five entries in each table, which generally account for somewhat over 30 per cent of the total respondents, fall into two groups. First is a group for whom $[(E_t/A_{t-4})-1]$ and $[(A_{t-1}/A_{t-5})-1]$ are equal, corresponding to responses on the 45° boundary line in Chart 3. Although by no means negligible, the number of such respondents seems small, ranging from 12 per cent of the sample in November to 21 per cent in August. One might have anticipated that this type of response would be frequent, both because it corresponds roughly to an extrapolation of level and because it is the easiest response for a respondent who, whether from uncertainty or lack of interest, prefers to make an arbitrary projection of his record of past four-quarter change. The fact that a number of respondents report expected change equal to past change for all the variables surveyed by Dun and Bradstreet indicates that some of these responses do originate in "psychological inertia." But the frequency of such responses is evidently not large; the great diversity of the patterns of responses

[27] The six entries are: (1) up in the past, less up expected; (2) up in the past, no four-quarter change expected; (3) up in the past, decrease expected; (4) decrease in the past, less down expected in the future; (5) decrease in the past, no four-quarter change expected; (6) decrease in the past, increase expected. Actually, the proportion of responses which are regressive may be even greater than 51.5 per cent. Both the surveys of May 1949 and August 1949 were made several quarters after an important cyclical turning point so that, particularly in the industries most widely represented in each survey sample, the movement in sales between $t-4$ and $t-1$ was in the opposite direction to that which had previously occurred between $t-5$ and $t-4$. As a consequence, a number of forecasts which we have classified as extrapolative or nonclassifiable are, in these two surveys, probably regressive. (Cf. *Survey of Current Business*, December 1953, Tables 2 and 5, pp. 21–28).

strongly suggests that the respondents customarily endeavor to give honest and thoughtful answers to the questions of these surveys.[28]

The last remaining group of respondents are those who report no change over the previous year and who therefore cannot be classified in terms of extrapolation or reversal of trend. There is a strong tendency for these respondents to expect no change in the future. Firms reporting no past change account for nearly 30 per cent of the no change expectations even though they represent only 14 per cent of the total responses. This should scarcely be surprising. Evidence from Table 3 on the variation of the proportion of total respondents reporting no past change also suggests that such reports—and the forecasts associated with them—are very seldom arbitrary. The largest frequency of reports of no past change occurred in the first survey, when the level of activity of nondurable industries had increased only moderately over the previous year. In the surveys of May and August, 1949, when the level of manufacturing activity had declined rather severely from the previous year, the proportion fell to 12 and 10 per cent. And, as the rate of decline in manufacturing activity leveled off, the proportion of respondents reporting no past change increased to 17 per cent in the November survey.

The regressive tendency of individual anticipations indicated by Table 3 can be made even more vividly apparent by analyzing the entries of the table in a somewhat more summary fashion. Table 4 presents this summary by contrasting the past change reported by the respondents with the anticipated direction of change from current levels implied by their four-quarter expectation. The relation of the difference between ${}_sE_t$ and ${}_sA_{t-1}$ to that between $[(E_t/A_{t-4})-1]$ and $[(A_{t-1}/A_{t-5})-1]$ has to be qualified by the considerations discussed in Section 4, but, subject to these qualifications, the impression given by this table is clear. Of the 1,086 respondents in all four surveys for whom such a division is relevant, somewhat more than 60 per cent report anticipations which are regressive.

[28] Some more direct evidence is available on this point. Modigliani has had occasion to talk to some of the Dun and Bradstreet interviewers and was assured, in every case, that the respondents took the questionnaire seriously and frequently looked up figures from their records. Respondents have the option of not answering a question at all, or of indicating the expected direction of change but not quantifying the answer, and a number avail themselves of this opportunity. A cursory analysis of the number of refusals yields patterns which correspond to what one would expect from businessmen who took the questionnaire seriously. The smallest refusal rate is typically for the price question: refusals to answer run about 5 per cent or less, and refusals to quantify are only slightly more frequent. For the sales question, the rate of refusal is somewhat higher, about 15 per cent, but the difference is mostly due to the greater frequency of "no answer." The largest refusal rate occurs for new orders in nondurable goods industries, where it comes close to 50 per cent, for the fairly obvious reason that the question is often not relevant. The fact that almost as many respondents do not report the past change in new orders bears this out. Finally, a high and variable number of firms, ranging from 20 to 40 per cent, refuse to give definite answers to the profit question, though a large proportion of these refusals represent an understandable reluctance to quantify.

TABLE 4

Implied Expected Change in Sales from Current Level in Relation to Past Four-Quarter Change, All Dun and Bradstreet Surveys

	DIRECTION OF PAST CHANGE:	
	Up	*Down*
PERCENTAGE OF RESPONDENTS EXPECTING DIRECTION OF $[({}_sE_t/{}_sA_{t-1})-1]$ to be:		
Same as past, or no change	44	36
Opposite to past	56	64
Number of respondents	484	602

Both the limited information available for the Canadian employers' survey and the extensive evidence available for the Dun and Bradstreet survey point clearly to only one conclusion. The short-run anticipations which individual firms report to surveys of businessmen's expectations of the four-quarter change in operating variables tend, on the average, to be quite strikingly regressive.[29]

This is a surprising result. It evidently contradicts the presumption upon which Hart and other previous analysts have based their attempts to explain the regressiveness in these surveys. For if we accept Hart's claim that the operating expectations of businessmen cannot possibly be regressive, we are forced to conclude that what people claim to expect is not what they "really" expect. This distinction between real and reported anticipations seems, when viewed in the light of the evidence on the care with which respondents generally reported their anticipations, to be more an invitation to metaphysical dispute than an operationally significant proposal. Yet if we reject this distinction, we must accept the implication that individual anticipations really are regressive. This implication in turn seems to contradict common sense notions about the relationship between operating plans and expectations.

We thus seem to have reached an impasse. How can the evidence we have introduced be reconciled with our a priori notions of what businessmen's expectations should be? In a forthcoming article we shall show that

[29] It should be reiterated that one of the Dun and Bradstreet surveys which provide evidence for this striking regressiveness asked respondents to predict sales for the entire year (compared, of course, to those of the previous year). Indeed, there are some indications that regressiveness may prevail even for expectations of yearly sales, which do not involve comparison with same time last year. For instance, Robert Eisner, analyzing the relation between the expected change in sales from 1949 to 1950 and the actual change from 1948 to 1949, for a sample of some 160 firms, found that the correlation was negative (though not significant at the 5 per cent level). (See "Expectations, Plans and Capital Expenditures: A Synthesis of Ex Post and Ex Ante Data" in *Expectations, Uncertainty and Business Behaviour*, Social Science Research Council, 1958, Table 2, p. 172.)

it is primarily our prior conceptions of what constitute reasonable anticipations, and not the implications of the evidence, which must be modified. We shall show, in fact, not only that it is reasonable to regard individual firms' anticipations as regressive but also that such regressive expectations conform to the movement of those firms' sales. The change consequently necessary in our conception of the way in which individual anticipations are formed raises significant questions about the way in which the forecasts provided by surveys of businessmen's short-run anticipations can be utilized and improved. These questions, too, will have to be discussed elsewhere.

COMMENT

ALBERT G. HART AND MARSHALL KOLIN, Columbia University

On several of the points raised by John Bossons and Franco Modigliani, we may open by recording our agreement.

1. The net predictive value of the "reconstituted" *H*-prediction (except as this may serve as a proxy for *ex post* information which is published only with a lag) is admittedly modest.
2. The "rolling-mill hypothesis" fails to fit the Dun and Bradstreet survey. Thus we need either an independent special explanation for the regressiveness of the Dun and Bradstreet results or some explanation which will cover the regressiveness of both sets of figures.
3. The suggestion that regressiveness in individual forecasts may have roots in regressiveness of individual experience brings an important new element into the discussion, though we see very different applications than Bossons and Modigliani indicate.

SIGNIFICANCE OF PREDICTIVE VALUE

The central point of the paper to which Bossons and Modigliani are reacting is not the use of shippers' forecasts to find out what was going to happen, but their use to find out what shippers' "really" expect to happen. The basic hypothesis that the reconstituted *H*-prediction pictures what they "really" expect *requires* "failures" of forecasting at turning points. To give an analogue, suppose we set up a poll of certain unfortunate commuters, asking them how many minutes they predict morning trains will take between Stamford and Grand Central Station. We will expect their forecasts to have predictive value—better than that of the official time table, and comparable to that of a naïve-model hypothesis based on the previous day's running time, though perhaps with systematic biases. We will expect the forecasts to be related to recent experience, becoming more pessimistic when the New Haven Railroad goes into one of its spells

of late arrivals.[1] But we will not expect the commuter forecasts to tell us on which days the New Haven will outdo itself by having a string of derailed freight cars block the tracks for several hours, or how great the delays will be on such days. If we want to test the bias of commuter forecasts, we should compare forecasts with outcomes only for days when there are no derailments. We should not ignore derailments. They may affect, for example, the way forecasts are framed for the ensuing week. But we should give them separate treatment: merely lumping the two kinds of delay-experience together will obscure rather than clarify our analysis.

THE DUN AND BRADSTREET EVIDENCE

Transforming the four-quarter forecasts reported by Dun and Bradstreet into one-quarter forecasts from the date of estimation yields regressive aggregates. These aggregates, however, are probably dominated by responses from small firms, whereas the shippers' forecast aggregates are dominated by responses from large firms. A special explanation for the Dun and Bradstreet regressiveness—which would not apply to the shippers' forecast, and which would leave us in need of still another special explanation for the employment-intentions surveys—might be based on the presumption that small firms are much more likely than large firms to have frequent quarter-to-quarter reversals of direction in their sales. We are finding evidence of such a difference by size of firm in a study of sales experience in the steel industry now in progress at Columbia University.

The fact of a general tendency of forecasters to underestimate the change from a base date in the past to a reference date in the future is well established, and a general explanation for this tendency has been well roughed out by Theil.[2] But the grossness of the understatement, leading to implicit forecasts of reversal of the recent movement, remains puzzling. We are unconvinced by the Bossons–Modigliani suggestion that this result rests on regressiveness of individual-firm experience. But this debate must be adjourned to an occasion when a sufficient body of data on individual-firm experience is on the table.

BUSINESS-CYCLE IMPLICATIONS OF "REGRESSIVENESS"

Bossons and Modigliani seem to imply that any preference for an extrapolative over a regressive model of what businessmen "really" expect can only be sentimental. But have they considered the implications of the

[1] A more fundamental test of whether commuters "really" expect the trip to take abnormally long is whether at least some of them act upon their forecasts by leaving the house abnormally early for the station (or by arranging to avoid early appointments at the office). If current expectations are "really" more pessimistic than last month, there will be an increased proportion of commuters making such provision for extra slow commuting.

[2] H. Theil, *Economic Forecasts and Policy*, North–Holland Publishing Company, Amsterdam, p. 154.

hypothesis that expectations are "really" regressive? By "really expect," we might appropriately mean "place bets upon" through forward-looking action, whatever verbalizations may be found in a survey.

Now if expectations are really regressive in this sense, we must infer that the whole course of a business upswing is a series of agreeable surprises, which keep things going up despite a tendency of business to reverse the upswing by decisions to cut back inventory, staffing, procurement, and the like. Admitting that it is hard to systematize the use of business-cycle evidence in this connection, we assert that our preference for nonregressive models is not sentimental. Rather, it reflects the large body of facts which lead most analysts of fluctuations to give much weight to "cumulative" elements in expansion and contraction, and to doubt the inherent stability of the business process. In the light of these facts, how can expectations simultaneously be regressive and be linked up with the decision processes which generate business fluctuations?

REPLY BY MR. BOSSONS AND MR. MODIGLIANI

It is true that small firms are somewhat more likely than large firms to have frequent quarter-to-quarter reversals of direction in their sales, and it is generally recognized that the forecasting errors of smaller firms are larger than those of large firms. We doubt, however, that the "extra" regressiveness in forecasts made by smaller firms is sufficient to provide an explanation of the regressiveness of the aggregate Dun and Bradstreet forecasts. An examination of several of the larger industries in the August 1949 survey—which in its reporting of responses and its position in the cycle is the most "typical" survey for which we have individual data—indicates no obvious systematic tendency for forecasts to become more regressive as the size of firm decreases. For the August survey as a whole, roughly 55 per cent of the responses of firms in the largest size-class in each industry were regressive—a somewhat greater proportion, in other words, than the 48.4 per cent of all responses in the survey sample which were regressive. Although we have not tallied the responses by size group for other surveys, a cursory investigation indicates that the responses of the larger firms are equally regressive in the April 1948 and November 1949 surveys.

Hart's attempt at avoiding a metaphysical dispute over what respondents mean by their forecast, by defining "real" expectations as what businessmen would place bets upon, is interesting though perhaps less operational than it sounds. Unfortunately, a survey of verbalized expectations cannot help us measure the distribution which is attached to a point forecast by the respondent or the utility function with which he evaluates this distribution. It cannot, therefore, help us measure what bets the respondents will place as a result of their stated anticipations. Because of the limited space here available, we shall have to leave to a later article

a discussion of the relationship of regressive expectations to operating decisions through the course of the business cycle. We should state that we have considered the implications of truly regressive expectations, and that we do not regard such expectations (even defined as point forecasts a la Hart) as incompatible with the actual movements of inventories and other operating variables. But this we will have to substantiate in another place.