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Revisions in Investment Anticipations

BY MID-1970, IT WAS CLEAR that the year would not be a banner period for business investment in plant and equipment. Throughout the year, planned expenditure increases, announced in successive reports, became more and more modest. The 12 percent rise from 1969 to 1970 foreseen in some private surveys in the fall of 1969, and the 10 percent increase projected in the survey released by the Office of Business Economics and the Securities and Exchange Commission (OBE-SEC) in March 1970, shrank to 7.8 percent in the June survey, and the planned increase was pegged at 6.6 percent in the survey released early in September. With the price deflator for fixed investment rising at an annual rate of nearly 5 percent during the first half of 1970, the prospect at the beginning of the fourth quarter is for very little, if any, increase over 1969 in real terms. In fact, the deflated total of fixed investment recorded in the national income and product accounts—an aggregate conceptually different from that measured by the OBE-SEC survey—indicated that in real terms seasonally adjusted expenditures for the first half of 1970 were below the 1969 average.

The aggregate figures hide a good deal of variation among industries. There is a sharp contrast between manufacturing industries, for which a year-to-year rise of only 1 percent is foreseen, and all other industries, for which an increase of more than 10 percent is projected. Public utilities, hard pressed by insufficient capacity, continued in September to project a substantial rise of 16.5 percent—$1.9 billion—but this is slightly less than

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the amount reported three months earlier. The air transportation industry maintained its plans for an increase of more than 20 percent, while the already large increase previously reported by communications firms was to be stepped up (this was the only major industry group reporting an increase in plans between the June and September surveys).

On the other side, in September, manufacturers of durable goods planned to invest less in 1970 than they did in 1969, with major downward revisions from earlier plans reported by the primary metals, machinery, aircraft, and stone, clay, and glass industries. Even in the earlier surveys, manufacturers of autos, aircraft, steel, and stone, clay, and glass products foresaw year-to-year decreases. In September, manufacturers of nondurable goods still projected a small increase, but the plans of producers of food and beverages, paper, petroleum, rubber, and miscellaneous nondurable goods were revised downward. The railroad industry, which reported plans for a large increase in the March survey, in September foresaw no overall change from 1969, while the originally planned increase by transportation firms other than rail and air was reversed to a large decrease.

Whether even the modest plans projected for the second half of 1970 will be realized must be determined by examining the fundamental factors discussed in my earlier report—growth of output, capacity utilization, profits, stock prices, bond yields and credit availability, and the absence of the investment tax credit.[1] In view of these factors, it would not be at all surprising if even the scaled-down plans reported by manufacturers were not realized. This conclusion is borne out especially by data on capacity utilization in manufacturing, which is reported by the Federal Reserve Board to have reached a nine-year low of 78 percent in the second quarter. Rather than attempt a detailed exposition of economic factors that would work for or against realization of these projections, I explore here the more limited question of whether there are any simple systematic regularities in the time series on investment plans two quarters ahead and one quarter ahead, and on the realizations themselves, that can be exploited to improve the chances of correct forecasting. For example, can anything be inferred about the likelihood that the $32.15 billion annual rate of spending projected for manufacturers in the fourth quarter of 1970

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1. "Plant and Equipment Spending in 1969 and 1970," *Brookings Papers on Economic Activity* (1:1970), pp. 127–32.

will actually be realized, from the fact that expectations two quarters ahead have exceeded realizations for thirteen quarters in a row by amounts ranging from $0.45 billion to $2.11 billion?[2]

All of the numbers from the OBE-SEC survey have been revised within the past year, and they have also been carefully adjusted to eliminate systematic biases in survey response. The quarterly projections are adjusted, industry by industry, to eliminate biases having to do with (1) seasonality (the raw anticipations typically exceed expenditures in the first quarter and fall substantially short of expenditures in the fourth quarter); (2) the length of the planning horizon (the further ahead the quarter being projected the greater the tendency to underestimate expenditures); and (3) the size of firms (large firms tend to overestimate while small firms tend to underestimate). The methods used insure that, for any given planning horizon and industry, the average ratio (over the period 1947–69) of anticipated to realized investment will be unity, and that any statistically significant deviations of the ratio from unity that can be associated with seasonality or a time trend (linear or quadratic) will be eliminated. Such a trend allows for learning as well as changes in the firm-size composition of the sample.[3]

The corrected anticipations post an impressive forecasting record, especially at turning points, but at the same time it is hard to avoid the view that something systematic is still being missed, at least for some of the manufacturing industries. The previously cited run of thirteen consecutive overestimates on two-quarters-ahead expectations occurs in the *corrected* data; it is preceded by a string of fourteen underestimates in fifteen quarters. Furthermore, there is a run of eighteen consecutive overestimates between 1958 and 1962.

I have studied only the aggregates for all industries, manufacturing, and nonmanufacturing. All the regressions cover the longest available sample period—from the first quarter of 1948 through the second quarter of 1970. The results are summarized in Tables 1 and 2. The variables used in the regressions are defined as follows:

2. The expectations published in September for the October–December quarter are considered to be "two quarters ahead" because they are projected from actual expenditures for the April–June quarter.
3. The precise methods used are described in *Survey of Current Business*, Vol. 50 (February 1970), pp. 36–39.

I = realized expenditures for the period in question t,

$IA1$ = one-quarter-ahead anticipated expenditures for period t, reported in period $t-1$,

$IA2$ = two-quarters-ahead anticipated expenditures for period t, reported in period $t-2$,

I_{-1}, I_{-2}, and I_{-3} = realized expenditures in period $t-1$, $t-2$, and $t-3$, respectively,

$IA1_{-1}$ = one-quarter-ahead anticipated expenditures for period $t-1$, reported in period $t-2$.

In all cases the dependent variables are the differences between realizations and anticipations: $(I-IA1)$ or $(I-IA2)$. Thus, a positive revision or

Table 1. Estimates of Errors in Anticipations of Investment in Plant and Equipment One Quarter Ahead, First Quarter 1948 to Second Quarter 1970[a]

Seasonally adjusted annual rates in billions of current dollars[b]

Variables and summary statistics	All industries		Manufacturing		Nonmanufacturing	
	Equation (1)	*Equation (2)*	*Equation (1)*	*Equation (2)*	*Equation (1)*	*Equation (2)*
Constant	0.171	0.162	0.278	0.217	−0.128	−0.122
	(0.221)	(0.219)	(0.134)	(0.118)	(0.166)	(0.166)
IA1	−0.249	−0.270	−0.114	−0.374	−0.260	−0.336
	(0.084)	(0.075)	(0.102)	(0.071)	(0.080)	(0.093)
IA2	0.234	. . .	0.087	. . .	0.255	. . .
	(0.084)		(0.102)		(0.080)	
I_{-1}	. . .	0.463	. . .	0.673	. . .	0.412
		(0.121)		(0.120)		(0.131)
I_{-2}	. . .	−0.204	. . .	−0.318	. . .	−0.072
		(0.073)		(0.073)		(0.088)
Summary statistics						
R^2	0.165	0.224	0.145	0.369	0.110	0.141
Standard error	0.817	0.792	0.524	0.453	0.590	0.583
Durbin-Watson statistic	1.28	2.30	1.37	2.43	1.88	2.40

Note: Here and in Table 2, figures in parentheses are standard errors of the coefficient estimates.

a. The dependent variable is $(I-IA1)$ (see text for definition of the variables and equations). All variables in each equation refer to the indicated industry.

b. Corrected for systematic biases in survey response.

Table 2. Estimates of Errors in Anticipations of Investment in Plant and Equipment Two Quarters Ahead, First Quarter 1948 to Second Quarter 1970[a]

Seasonally adjusted annual rates in billions of current dollars[b]

Variables and summary statistics	All industries		Manufacturing		Nonmanufacturing	
	Equation (3)	Equation (4)	Equation (3)	Equation (4)	Equation (3)	Equation (4)
Constant	0.268	0.289	0.395	0.389	−0.229	−0.226
	(0.304)	(0.303)	(0.185)	(0.168)	(0.215)	(0.237)
$IA2$	−0.123	0.053	−0.313	−0.118	−0.524	−0.160
	(0.147)	(0.078)	(0.156)	(0.069)	(0.132)	(0.103)
$IA1_{-1}$	0.375	...	0.520	...	0.675	...
	(0.200)		(0.231)		(0.170)	
I_{-2}	−0.276	0.149	−0.243	0.570	−0.146	0.198
	(0.106)	(0.152)	(0.119)	(0.144)	(0.126)	(0.168)
I_{-3}	...	−0.228	...	−0.491	...	−0.034
		(0.104)		(0.104)		(0.125)
Summary statistics						
R^2	0.117	0.130	0.147	0.284	0.171	0.209
Standard error	1.097	1.089	0.699	0.641	0.757	0.823
Durbin-Watson statistic	1.05	1.27	0.74	1.18	1.37	1.33

a. The dependent variable is $(I - IA2)$ (see text for definition of the variables and equations).
b. Corrected for systematic biases in survey response.

anticipation error corresponds to an underestimate. The basic hypotheses I wished to explore included:

(a) That the error in one-quarter-ahead anticipations might be highly correlated with the error for the previous quarter;

(b) That the error in two-quarters-ahead anticipations might be highly correlated with previous errors (note, however, that the latest error available when $IA2$ is published is $I_{-2} - IA2_{-2}$);

(c) That in an examination of the error in on-equarter-ahead antici-pations, the difference between $IA2$ and $IA1$ might carry some informa-tion, and that this revision might catch a new trend but not carry it far enough quantitatively; and

(d) That anticipations might be "regressive," in the sense that some constant rate of growth might be expected, so that in periods of higher growth the anticipations would regress toward the lower growth rate, leading to underestimates (positive errors), and vice versa.

For hypothesis (a), a significant serial correlation was found only for manufacturing; the results are not reported because other, more complex equations performed better. In the case of hypothesis (b), a significant correlation between $(I - IA2)$ and $(I_{-2} - IA2_{-2})$ was found for all industries taken together and manufacturing, but not for nonmanufacturing. Again, the result is not reported because other regressions performed better.

Hypothesis (c) is reflected in equation (1), with the results reported in Table 1. The coefficients were just the opposite of my expectations. They indicate that if *IA1* exceeds *IA2*, the realization is likely to lie between them, except for the effect of the non-zero constant; in general the results are unimpressive.

Hypothesis (d) is reflected in equations (2), (3), and (4), with the results reported in Tables 1 and 2. In the case of one-quarter-ahead expectations, the introduction of I_{-1} and I_{-2} produced the desired results, with the best results for manufacturing. For two-quarters-ahead anticipations, two different measures of recent growth were tried, $IA1_{-1}$ and I_{-2}, and I_{-2} and I_{-3}. Again, the only results inspiring any degree of confidence were for manufacturing, with the best measure apparently the change between I_{-3} and I_{-2}.

This investigation probably cannot be fruitfully carried much further. It might be useful to examine the individual industries within manufacturing to see which, if any, dominate the results. Table 3 sets out the implications of equations (1) through (4) for the last half of 1970. Except for the manufacturing regression, I have no confidence that anything useful is revealed.[4] Perhaps linear regression over the whole sample period is too dull an instrument.

If there is any trustworthy result from this exercise, it is the indication that the reported prospective rebound of manufacturing investment in the

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4. It should be noted that in all the equations except (1), the results are quite likely to be affected by lagged values of one component of the dependent variable appearing on the right-hand side of the equation, in conjunction with serial correlation of the disturbances.

fourth quarter of 1970 is unlikely to occur. I base this conclusion at least as much on the unbroken string of overestimates in the two-quarters-ahead expectations as on any of the specific numerical results.

Table 3. Investment in Plant and Equipment, First and Second Quarters 1970, and Projections for Third and Fourth Quarters 1970

Seasonally adjusted annual rates in billions of current dollars

Quarter	All industries	Manu-facturing	Non-manufacturing
Actual 1970:1	78.22	32.44	45.78
Actual 1970:2	80.22	32.43	47.79
Expected 1970:3			
Reported	81.05	31.21	49.84
Projected			
Equation (1)	80.78	30.82	49.91
Equation (2)	80.51	31.27	49.36
Expected 1970:4			
Reported	82.24	32.15	50.09
Projected			
Equation (3)	80.64	29.77	49.91
Equation (4)	81.01	31.31	49.75

Sources: Actual and reported—*Survey of Current Business*, Vol. 50 (September 1970), p. 18; projected—equations (1) through (4) (see text).

Discussion

THOMAS JUSTER NOTED THAT realized investment could fall short of anticipations as the result of two very different kinds of causes—(1) cutbacks of demand due to disappointing markets, and (2) supply shortages that delayed deliveries, installation, or construction. Both of these will generate observations of downward revisions, but different variables are needed to explain them.

There was some discussion of how the supply limitations might be detected in the data. It was noted that if supply factors were preventing investors from realizing their plans, that would lead investment plans to be pushed into the future. The same thing that made actual investment fall

below last quarter's anticipations would lead to even higher plans for the subsequent quarters. On the other hand, the demand-induced cutbacks would be likely to be accompanied by weakening of plans for future quarters. In addition, two possible indicators of supply limitations were suggested—the capacity utilization rate of capital goods producers and the index of the National Association of Purchasing Management on lead time for equipment.

James Duesenberry and Walter Heller noted that the cost of executing capital projects has probably exceeded businessmen's expectations during the recent period of inflation. That should have tended to push realized outlays above anticipations. Presumably, it has been swamped by other factors causing downward revisions of plans.