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Chapter Seven

Longer Term Capital Expenditure Anticipations

INTRODUCTION

What are the determinants of long-run capital expenditure anticipations? How well can we explain their variance over time? What accounts for differences between firms and between industries? What role do long-run capital expenditure anticipations play in the determination of eventual actual expenditures? How accurate are long-run capital expenditure anticipations? These are the questions we focus on in the analysis of data built around McGraw-Hill capital expenditure surveys for the years 1959-1969.

The underlying data consist of responses to survey questionnaires sent out generally in March of each year. At that time, firms are asked how much they invested in new plant and equipment in the United States in the recently completed year—which we designate as the year t. They are also asked about the dollar amount of plans to invest in new plant and equipment in the immediately ensuing year, $t + 1$, discussed in Chapter 6, and in the three subsequent years, $t + 2$, $t + 3$, and $t + 4$. The focus of our inquiry in this chapter is the anticipations of the year $t + 4$, designated I^t_{t+4}, the superscript referring to the year for which the survey collects information on actual expenditures. (It should be recognized that the anticipations are actually expressed early in the year $t + 1$.)

Along with the survey data on capital expenditures and capital

Note: An earlier version of this chapter was presented to the Tenth CIRET Conference in Brussels, September 1971.

expenditure anticipations, we use responses to questions regarding expected percent changes in the physical volume of sales over the ensuring year and the subsequent three year period

$$s_{t+1}^t = \frac{S_{t+1}^t - S_t}{S_t} \text{ and } s_{t+1,4}^t = \frac{S_{t+4}^t - S_{t+1}^t}{S_{t+1}^t},$$

as well as the ratio of the operating rate of capacity to the preferred utilization of capacity, u^c.

Data from financial sources, particularly Moody's Manuals, are once more used to supplement McGraw-Hill survey responses with additional information as to actual sales, profits after taxes, P, depreciation charges, D, and gross fixed assets, K. The last of these is again used as a deflator for profits, depreciation, and capital expenditure variables.

Complete observations are available for over 400 firms, involving capital expenditures of two or more of each of the eleven years from 1958 to 1968, but some observations have been eliminated because of variables which, as transformed for use in the regressions, had "extreme values" outside of acceptable intervals. A full set of definitions and sources of variables and intervals for acceptable values is presented in the appendix at the end of the chapter.

DETERMINANTS OF LONG-RUN CAPITAL EXPENDITURE PLANS

The long-run capital expenditure plans, which we take to be the four year ahead anticipations, $i_{t+4}^t (= I_{t+4}^t / K_{57})$, are in large part incomplete. Respondents do not know about, or do not report, four years in advance some one-third of capital expenditures ultimately undertaken. Yet these plans reveal essentially the same determinants as those found in our studies of current capital expenditures and the much fuller short-run anticipations.

A pooled individual firm time series regression of long-run capital expenditure plans on sales changes and profits (column 4 of Table 7-1) shows a coefficient of determination of 0.251, and, again, substantial evidence of an accelerator effect in a sum of sales change coefficients of 0.319. Similarly, a strong positive role emerges once more for current and immediately past profits that is greater, if

Table 7-1. Determinants of Long-Run Capital Expenditure Plans

$$i^t_{t+4} = b_0 + \sum_{j=1}^{7} b_j \Delta s_{t+1-j} + \sum_{j=8}^{9} b_j p_{t+8-j} + b_{10} d_{53} + u_t \qquad t = 1958 \text{ to } 1968$$

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Regression Coefficients and Standard Errors						
					Firm Cross Sections		
Variable or Statistic	*Firm Overall*	*Cross section of firm means*	*Firm Time series*	*Industry Time Series*	*Across industries*	*Within industries*	*Industry Cross Section*
Constant	.051	.053	.040	.011	.024	.022	.025
	(.002)	(.018)	(.003)	(.013)	(.003)	(.004)	(.013)
Δs_t	.080	.027	.061	.082	.061	.062	.049
	(.012)	(.077)	(.010)	(.045)	(.012)	(.012)	(.077)
Δs_{t-1}	.076	.033	.039	.073	.051	.047	.103
	(.012)	(.088)	(.010)	(.040)	(.012)	(.012)	(.076)
Δs_{t-2}	.105	.219	.063	.081	.081	.076	.057
	(.012)	(.082)	(.009)	(.038)	(.012)	(.012)	(.072)
Δs_{t-3}	.086	.008	.050	.073	.065	.063	.042
	(.012)	(.080)	(.010)	(.035)	(.012)	(.012)	(.069)
Δs_{t-4}	.085	−.015	.049	.081	.072	.062	.120
	(.012)	(.076)	(.010)	(.034)	(.012)	(.012)	(.061)
Δs_{t-5}	.102	.315	.044	.139	.087	.073	.205
	(.012)	(.085)	(.010)	(.041)	(.012)	(.012)	(.070)
Δs_{t-6}	.057	.110	.013	.090	.047	.034	.170
	(.012)	(.074)	(.010)	(.041)	(.012)	(.012)	(.076)
p_t	.111	.348	.195	.302	.088	.089	.213
	(.035)	(.230)	(.027)	(.164)	(.033)	(.032)	(.249)
p_{t-1}	.075	−.213	.206	.226	.045	.059	−.125
	(.036)	(.241)	(.028)	(.172)	(.034)	(.034)	(.262)
d_{53}	–	–	–	–	.751	.797	.592
	–	–	–	–	(.054)	(.065)	(.181)
$\Sigma\Delta s$ Coefficients	.591	.696	.319	.618	.465	.416	.746
	(.029)	(.074)	(.034)	(.114)	(.029)	(.030)	(.133)
Σp Coefficients	.187	.135	.401	.528	.132	.148	.088
	(.015)	(.032)	(.027)	(.102)	(.014)	(.015)	(.061)
$n(-220)$	2591	410	2591	108	2656	2653	108
r.d.f.	2581	400	2172	89	2635	2538	87
$\hat{R}^2$	.278	.327	.251	.754	.277	.223	.539
F	111.54	23.11	82.11	34.29	102.23	73.94	12.35

$F[(2) - (3) - (4)] = 11.98$; $F_{.01} = 2.41$. $F[(6) - (7) - (8)] = 2.86$; $F_{.01} = 2.32$.

anything, than for current expenditures in determining the timing of long-run anticipations of capital expenditures. The importance of both sets of variables and of the coefficient of determination is again considerably greater in industry time series, where individual firm errors and disturbances appear to wash out.

Cross sections using as observations the means of each firm's observations over all years, as well as those which use means of observations of all firms within an industry in a given year (with observations pooled for all years), also appear to wash out errors and random disturbances. In particular, they show higher coefficients for sales change or accelerator coefficients, as was noted in the relations seeking to explain actual capital expenditures. Profits coefficients, however, are markedly smaller in the cross sections, again suggesting that interfirm differences in profits do not explain much of the long-run or "permanent" rate of investment.

Expressed capital expenditure anticipations are not merely a projection of current or immediately past actual expenditures. Past changes in sales, and to a lesser extent profits, consistently show positive effects on capital expenditure anticipations over and above the role of past actual capital expenditures (themselves, of course, influenced by past sales changes and profits). This is what might be expected from our underlying distributed lag model. The effects of current and some past sales changes and profits will be embodied partly in current capital expenditures and partly in future expenditures, and hence in anticipations of those expenditures.[1]

To illustrate, we note in the firm time series of Table 7-2 that, while the simple coefficient of determination, $\hat{r}^2_{i_t, i^t_{t+4}}$, involving only current expenditures and anticipations of the future, is 0.287, the coefficient of determination in the multiple regression is 0.370, reflecting significant positive regression coefficients for both sales change and profits variables. At the level of the individual firm, immediately past capital expenditures and past sales changes and profits all contribute to the explanation of anticipations of capital expenditures four years hence. When we turn to industry time series, which pool the individual firm observations in each year, we find a larger portion of capital expenditure anticipations explained by past

[1] The regressions based on the cross section of firm means seem to indicate that firms with greater investment over the entire period also expect to invest more in almost as large a measure and that the systematic components of sales changes and profits which might affect expenditure anticipations are fully accounted for (or more than fully accounted for) in actual expenditures. This result may be treated with some reservations, though, since in observations which involve means of expenditures and anticipations over eleven years, mean current expenditures relate in large part to the same years as mean forward anticipations.

Table 7-2. Role of Current Capital Expenditures

$i^t_{t+4} = b_0 + \sum_{j=1}^{7} b_j \Delta s_{t+1-j} + \sum_{j=8}^{9} b_j p_{t+8-j} + b_{10} d_{53} + b_{11} i_t + u_t$ t = 1958 to 1968

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Regression Coefficients and Standard Errors						
					Firm Cross Section		
Variable or Statistic	*Firm Overall*	*Cross section of firm means*	*Firm Time series*	*Industry Time Series*	*Across industries*	*Within industries*	*Industry Cross Section*
Constant	.020 (.002)	.009 (.011)	.026 (.003)	.003 (.011)	.013 (.003)	.008 (.003)	.013 (.009)
Δs_t	.027 (.010)	−.020 (.049)	.038 (.009)	.041 (.038)	.026 (.010)	.026 (.010)	.064 (.050)
Δs_{t-1}	.016 (.009)	−.081 (.056)	.018 (.009)	−.004 (.035)	.009 (.010)	.011 (.010)	−.024 (.051)
Δs_{t-2}	.050 (.009)	.096 (.053)	.043 (.009)	.026 (.033)	.040 (.010)	.039 (.010)	.011 (.047)
Δs_{t-3}	.051 (.010)	.033 (.051)	.040 (.009)	.011 (.030)	.047 (.010)	.049 (.010)	.008 (.045)
Δs_{t-4}	.050 (.010)	.031 (.049)	.038 (.009)	.028 (.029)	.049 (.010)	.043 (.010)	.077 (.040)
Δs_{t-5}	.053 (.010)	.094 (.055)	.033 (.009)	.073 (.035)	.052 (.010)	.044 (.010)	.141 (.046)
Δs_{t-6}	.028 (.010)	.015 (.047)	.010 (.009)	.049 (.034)	.027 (.010)	.020 (.010)	.104 (.050)
p_t	.103 (.027)	.432 (.147)	.150 (.025)	.149 (.139)	.094 (.027)	.093 (.027)	.005 (.164)
p_{t-1}	−.049 (.029)	−.451 (.154)	.100 (.027)	.103 (.144)	−.048 (.028)	−.054 (.029)	.129 (.173)
d_{53}	– –	– –	– –	– –	.240 (.047)	.373 (.056)	−.331 (.146)
i_t	.611 (.016)	.848 (.035)	.355 (.018)	.588 (.092)	.578 (.016)	.566 (.017)	.727 (.067)
$\Sigma\Delta s$ Coefficients	.275 (.024)	.168 (.052)	.219 (.032)	.225 (.113)	.249 (.025)	.232 (.026)	.380 (.093)
Σp Coefficients	.053 (.012)	−.019 (.022)	.251 (.026)	.252 (.095)	.046 (.012)	.040 (.013)	.134 (.040)
$n(-220)$	2591	410	2591	108	2656	2653	108
r.d.f.	2580	399	2171	88	2634	2537	86
$\hat{R}^2$	.545	.726	.370	.830	.508	.453	.803
$\hat{r}^2_{i_t, i^t_{t+4}}$	.509	.711	.287	.811	.469	.414	.752
F	312	110	129	49	249	193	37

$F[(2)-(4)-(3)] = 32.38$; $F_{.01} = 2.32$. $F[(6)-(7)-(8)] = 4.34$; $F_{.01} = 2.25$.

expenditures, but past sales changes and profits continue to play a significant role. In industry cross sections, the profits coefficients are again lower, but coefficients of determination and regression coefficients of past capital expenditures and past sales changes are high.

When short-run capital expenditure anticipations are introduced as an independent variable (Table M7-3), they show substantial correlations with the long-run capital expenditure anticipations only in individual firm regressions. In the industry regressions, both time series and cross sections, they have little or nothing to add to the positive relation between actual expenditures and long-run anticipations. Thus, short-run anticipations apparently involve only firm-related variance; they have nothing to add to systematic differences among observations representing means for broad industry groups.

Some additional explanatory value is found in the utilization of capacity and expected sales change variables introduced in the regressions shown in Table M7-4—at least in the firm time series. In the industry time series, they seem to offer little explanation not already accounted for by either past actual sales change or capital expenditure variables.

THE ROLE OF LONG-RUN CAPITAL EXPENDITURE PLANS AS DETERMINANTS OR FORECASTS OF ACTUAL EXPENDITURES

Do long-run capital expenditure plans show any effect, beyond those of exogenous sales changes and profits, upon the capital expenditures finally undertaken? This is the next question we try to answer. That answer bears on the value of anticipations as forecasts because they embody information we are unable to find in readily measurable determinants of investment. Also, there may be something sufficiently rigid about the planning process so that plans once made (and expressed) could affect ultimate expenditures indpendently of the exogenous determinants of such expenditures.

Evidence on this matter from the time series—of particular relevance here—is positive, as seen in Table 7-5.[2] We may observe that the coefficient of long-run capital expenditure anticipations is a fairly significant 0.241 in the firm time series and 0.331 in the industry time series in regressions including the full set of past sales change and profits variables. The cross section results show still larger coefficients of long-run capital expenditure anticipations and, furthermore, smaller sales change and profits coefficients. Apparently, the long-run anticipations pick up more significance in interfirm

[2] Tables M7-3 and M7-4 appear only in microfiche.

Table 7-5. Role of Long-Run Capital Expenditure Plans

$$i_t = b_0 + \sum_{j=1}^{7} b_j \Delta s_{t+1-j} + \sum_{j=8}^{9} b_j p_{t+8-j} + b_{10} d_{53} + b_{11} i_t^{t-4} + u_t \qquad t = 1962 \text{ to } 1968$$

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Regression Coefficients and Standard Errors						
	Time Series		*Firm Overall, Time Series Observations Only*	*Firm Cross Sections*		*Industry Cross Section*	*Firm Overall, All Observations*
Variable or Statistic	*Firm*	*Industry*		*Across industries*	*Within industries*		
Constant	.014	−.004	.016	−.000	−.001	.001	−.004
	(.007)	(.019)	(.004)	(.005)	(.006)	(.010)	(.005)
Δs_t	.084	.183	.075	.061	.053	.122	.063
	(.019)	(.071)	(.018)	(.017)	(.017)	(.073)	(.017)
Δs_{t-1}	.080	.120	.084	.069	.069	.044	.085
	(.019)	(.079)	(.018)	(.017)	(.017)	(.090)	(.017)
Δs_{t-2}	.082	.193	.058	.038	.031	.106	.059
	(.020)	(.083)	(.018)	(.017)	(.018)	(.091)	(.017)
Δs_{t-3}	.027	.104	.019	.007	.014	−.083	.020
	(.019)	(.070)	(.018)	(.017)	(.018)	(.081)	(.017)
Δs_{t-4}	.049	.061	.039	.008	.010	−.003	.033
	(.018)	(.055)	(.018)	(.018)	(.019)	(.073)	(.017)
Δs_{t-5}	.055	.055	.061	.047	.048	.006	.049
	(.019)	(.072)	(.019)	(.019)	(.019)	(.086)	(.018)
Δs_{t-6}	.048	.082	.049	.028	.028	−.013	.031
	(.017)	(.057)	(.018)	(.017)	(.018)	(.081)	(.017)
p_t	.094	.056	−.080	−.091	−.084	−.057	−.098
	(.047)	(.218)	(.044)	(.042)	(.043)	(.253)	(.043)
p_{t-1}	.363	.232	.272	.255	.292	.027	.279
	(.050)	(.218)	(.047)	(.045)	(.046)	(.265)	(.046)
d_{53}	–	–	–	.733	.692	1.018	.638
	–	–	–	(.080)	(.100)	(.239)	(.081)
i_t^{t-4}	.241	.331	.660	.536	.517	.628	.545
	(.048)	(.213)	(.034)	(.033)	(.034)	(.139)	(.034)
$\Sigma\Delta s$ Coefficients	.425	.798	.384	.258	.253	.178	.341
	(.069)	(.171)	(.038)	(.038)	(.041)	(.130)	(.037)
Σp Coefficients	.457	.287	.192	.164	.208	−.030	.182
	(.058)	(.178)	(.020)	(.020)	(.021)	(.063)	(.020)
$n(-107)$	1172	68	1172	1225	1223	68	1225
r.d.f.	893	48	1161	1207	1146	50	1213
$\hat{R}^2$	.275	.774	.484	.475	.410	.749	.499
F	35.19	20.85	110.85	101.02	74.00	17.55	111.82

$F[(5) - (6) - (7)] = 2.69$; $F_{.01} = 2.25$.

Note: Tables M7-3 and M7-4 appear only in microfiche.

differences in expenditures that are not embodied in the ex post variables in the regressions.

The elimination of variables measuring sales changes and profits subsequent to the expression of expenditure anticipations is illuminating. As shown in Table M7-6, coefficients of determination are much lower. It is clear that firms tailor their actual expenditures to circumstances not reflected in their long-run anticipations.

Direct measures of the forecasting accuracy of long-run capital expenditure plans by individual firms (Table M7-7) prove them almost worthless as forecasts of actual expenditures. The adjusted coefficient of determination in the individual firm time series relating capital expenditures to their anticipations some three or four years previously is only 0.039, and the regression coefficient, while quite significantly positive, is only 0.342. When we turn to the industry time series, we find a coefficient of determination of 0.404 and a high regression coefficient of 1.593.

An explanation for the poor forecasts may begin with the fact that means of reported plans were only about two-thirds of the actual expenditures to which they purported to relate. The variation of plans, as measured by their standard deviation, was also about two-thirds of actual expenditures in the firm time series. In the industry time series observations, the standard deviation was only 0.016 for anticipations and 0.040 for the actual expenditures. In the aggregate time series, where each observation is the mean of observations for all firms, the standard deviation of the anticipations variable was only 0.010, as against 0.032 for actual expenditures, and the regression coefficient an even higher 2.338. Aggregate or mean expenditure plans, after washing out individual firm differences, varied in the same direction but clearly much less than the actual expenditures they anticipated.

In the cross sections (and the overall regressions, reflecting largely cross-sectional variance and covariance) coefficients of anticipated long-run expenditures are closer to unity, and coefficients of determination are higher. These results suggest that, while of little value in forecasting fluctuation in actual expenditures, the incomplete capital expenditure plans of firms and industries differ from each other at any given time to about the same degree as subsequent expenditures.

Another attempt to explain our poor results in firm time series explores the possibility that expressed expenditure plans may not relate correctly to the dates to which they are presumed to apply. Firms projecting higher expenditures for some four years from now may not be wrong in their anticipation that expenditures will be higher, but may be quite wrong in predicting their timing, so that their "four year plans" prove to be inaccurate forecasts of the specific year four years hence to which they are slated to relate. To evaluate this possibility, a weighted, moving average of three years of expenditures is used as a capital expenditure variable and related to the anticipations formulated four years before the year on which the moving average is centered. However, regressions of this moving average variable on long-run anticipations and on previous sales changes and the depreciation ratio (Table M7-8) do not markedly alter the picture. In the firm time series, the coefficient of determination and the regression coefficient of capital expenditure anticipations remain small; in the industry time series, the latter is brought closer to unity, but the former is also reduced.

Our price deflation, finally, could be another factor causing some havoc. On the implicit assumption that capital expenditure anticipations are expressed in terms of prices at the time anticipations are formulated, our deflator used for anticipations relates to the quarter before the anticipations were revealed, while that used for the actual capital expenditures four years later relates to the year of those expenditures. But perhaps our price deflators, involving averages of indexes for different components of the broad industry groups into which the firms are categorized, are inappropriate. Perhaps, indeed, respondents' answers incorporate anticipated price changes, and these anticipations are correct. It would then be appropriate to use the same deflator for both actual and anticipated expenditures or to use no deflator at all, thus measuring the usefulness of long-run capital expenditure anticipations as forecasts of the money value of capital expenditures.

This latter relation between undeflated variables is shown in section B of Table M7-7. Coefficients of determination in the time series do prove generally higher. But at the individual firm level, the great bulk of the time series variance in capital expenditures remains unexplained by capital expenditure plans.

Confirmation of the poor quality of long-run plans as direct forecasts of capital expenditures is offered in Table 7-9,[3] which presents Theil inequality coefficients by industry year, by year, by industry, and for all observations. In each year, the inequality coefficient was less than unity when all of the observations were included, but not usually by much. In three of the ten industries, the inequality coefficients for all years were actually slightly above unity and only in two industries, primary metals and utilities, were they substantially below unity. In no less than nineteen of the seventy industry years were the inequality coefficients greater than one.

[3] Tables M7-6, M7-7, M7-8, and M7-10 appear only in microfiche.

Table 7-9. Long-Run Capital Expenditure Realizations: Inequality Coefficients (*U*), by Year and Industry

$$U = \left[\frac{\Sigma (a\text{-}p)^2}{\Sigma a^2} \right]^{1/2}, \text{ where } a = i_t - i_{t-4} \text{ and } a - p = i_t - i_t^{t-4}$$

(1) Year	(2) Primary Metals	(3) Metal-working	(4) Chemical Processing	(5) All Other Manufacturing	(6) Mining	(7) Utilities	(8) Petro-leum	(9) Railroads	(10) Stores	(11) Trans-portation	(12) All Industries
1962	.542	.861	.945	1.260	.978	.865	1.148	.836	1.188	1.368	.979
1963	.624	1.061	.797	1.159	.729	.605	2.462	1.580	1.086	.899	.988
1964	.828	.877	1.046	1.065	1.243	.867	.843	.994	.962	1.259	.965
1965	.917	.921	.982	.942	1.383	.820	.971	.994	.907	1.117	.951
1966	.918	.970	.920	.936	.893	.660	.910	.972	1.077	1.307	.966
1967	.766	.919	.935	.842	1.015	.813	.962	1.003	.604	7.131	.895
1968	.903	.973	.884	.864	.058	.848	.800	.688	.990	2.175	.956
All Years	.763	.935	.926	.976	1.012	.787	1.007	1.018	.998	1.173	.953

Note: Tables M7-6 through M7-8 appear only in microfiche.

Overall the figure was a scantily encouraging 0.953 (Tables 7-9 and M7-10).

The means and standard deviations (presented in Table M7-7) reveal a major source of our difficulty. Since reported anticipations of capital expenditures four years in the future turned out to be about one-third lower than the actual expenditures subsequently reported, the inequality coefficients show a substantial "bias" component that becomes relatively larger as observations are grouped into means for industry years or for years. The smaller standard deviation of anticipations similarly contributes to substantial variance components, which also become relatively larger where grouping lowers the covariance components. In general, however, reported plans for capital expenditures four years ahead show no consistent pattern of incompleteness, and on the individual firm level, the bulk of the large inequality coefficients is due to low covariance of plans and expenditures, as already shown.

SUMMARY AND CONCLUSIONS

Highlights in our analysis include the following:

1. Reported long-run (four years ahead) capital expenditure plans are seriously incomplete and understate actual expenditures by almost a third. Thus, without blowup by use of regression estimates or otherwise, they are hardly better than current expenditures as predictors of future expenditures by individual firms. In industry and aggregative averaging, however, errors tend to wash out somewhat.
2. Capital expenditures are clearly related much more closely to current and past sales changes and profits (which account for much more of the variance over time in firms' capital expenditures) than to their previously expressed long-term anticipations.
3. Long-run anticipations do continue to evidence some relation to actual capital expenditures in time series regressions including a complete set of past sales change and profits variables. They account most substantially for capital expenditure differences in cross sections between firms and industries. Thus, past plans do apparently embody information of commitment or independent influence on expenditures beyond that found in past sales and profits variables.
4. Like actual capital expenditures, longer term capital expenditure anticipations may be explained in terms of actual and expected sales changes, profits, and utilization of capacity. Accelerator

coefficients are generally significant, but profits variables show a larger role in the timing of capital expenditure anticipations, as evidenced by their higher coefficients in individual firm time series.

5. Past actual capital expenditures as well as short-run anticipations add significantly to the explanation of long-run anticipations. Sales change and profits variables, in their turn, contribute to the explanation of long-run capital expenditure anticipations over and above the explanation offered by actual expenditures and short-run anticipations.
6. One may conclude from all this that long-run capital expenditure plans offer little security against the winds of change in the economic climate. Firms adjust their actual expenditures to recent sales change and profits experience whatever their previous plans. Perhaps it is the recognition that actual expenditure will be tailored to later developments that explains why firms fail to articulate or report long-run plans for major, and apparently varying, portions of the capital expenditures they ultimately undertake.

APPENDIX
DEFINITIONS AND SOURCES OF VARIABLES AND INTERVALS FOR ACCEPTABLE VALUES

Symbol	*Description*[a]	*Source*[b]	*Acceptable Interval*[c]
$i_t = \frac{I_t}{K_{57}}$	Capital expenditures in 1954 dollars as ratio of 1957 gross fixed assets	MH/FD	[0.6, 0)
$i_{tAV} = (i_{t+1} + 2i_t + i_{t-1})/4$	Weighted, centered average capital expenditure ratio		
$i^t_{t+1} = \frac{I^t_{t+1}}{K_{57}}$	Capital expenditure anticipations one year ahead as ratio of 1957 gross fixed assets	MH/FD	[0.6, 0)
$i^t_{t+4} = \frac{I^t_{t+4}}{K_{57}}$	Capital expenditure anticipations four years ahead as ratio of 1957 gross fixed assets	MH/FD	[0.7, 0)

Symbol	*Description*[a]	*Source*[b]	*Acceptable Interval*[c]
$\Delta s_t = \frac{3(S_t - S_{t-1})}{S_{56}+S_{57}+S_{58}}$	Relative sales change ratio, price-deflated, 1956-1958 denominator	FD	[0.7, −0.6]
$p_t = \frac{P_t}{K_{57}}$	Net profits in 1954 dollars as ratio of 1957 gross fixed assets	FD	[0.7, −0.4]
$d_{53} = \frac{D_{53}}{K_{53}}$	Depreciation charges as ratio of 1953 gross fixed assets	FD	[0.2, 0]
$s^t_{t+1,4} = \frac{S^t_{t+4} - S^t_{t+1}}{S^t_{t+1}}$	Long-run expected sales change over three years[d]	MH	[1, −0.6]
$s^t_{t+1} = \frac{S^t_{t+1} - S_t}{S_t}$	Short-run sales expectations = expected percent change in physical volume of sales from McGraw-Hill survey, converted to pure decimal	MH	[0.7, −0.6]
$u^c_t = \frac{u^a_t}{u^p_t}$	Ratio of actual to preferred rate of capacity utilization	MH	[1.3, 0.3]

[a]The variables I_t and I^t_{t+4}, except where indicated otherwise, and I^t_{t+1}, P, and S were price-deflated, all except the last by a capital goods price index relating to the period of the ex post variable or, in the case of anticipatory variables, to the period in which the anticipations were formulated. Sales (S) were deflated by indexes relevant to the industry group in which firms were classified. The survey questions as to expected sales changes relate to the "physical volume of sales" and responses were therefore not price-deflated. Depreciation charges (D) and gross fixed assets (K) were also not price-deflated.

[b]MH = McGraw-Hill surveys; FD = Financial data, generally from Moody's; MH/FD = Numerator from McGraw-Hill, denominator from financial data.

[c][U, L] = Closed interval, including upper and lower bounds.
[U, L) = Interval including upper bound but not lower bound.

[d]See summary symbols and descriptions in Appendix A list at end of text.