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The Structure and Realization of Business Investment Anticipations

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Our paper presents an analysis of the results of the Department of Commerce–Securities and Exchange Commission annual survey of business investment anticipations, giving the data on an aggregative basis by industry division, 1947-57. We also show a cross-sectional analysis in terms of frequency distributions of individual company deviations from anticipations by industry, size of firm, and scale of investment, 1950-56, with some data for 1949 where they were readily available. We hope thereby to highlight some of the basic factors which affect accuracy and the tendency to spend more or less than anticipated. This approach has sometimes been used in the past.¹ But we bring together results for several years to permit a check on earlier findings, to make possible at least a limited comparison of years in different stages of the business cycle, and to give a tentative explanation of the main factors underlying the performance of the survey.

Our findings are subject to the following qualifications:

1. The Commerce–SEC series applies to one-year investment anticipations obtained early in each year. The factors relevant to the realization of such anticipations are not necessarily the same as those most pertinent to the realization of longer-range expectations.

2. The predominant trend since 1947, when the annual series was started, was upward. In 1949 and 1954, investment decreased 5 and 6 per cent in current dollars, and the gross national product less than 1 per cent. While these declines were slightly larger if deflated, and also from the

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¹ See Irwin Friend and Jean Bronfenbrenner, "Business Investment Programs and Their Realization," *Survey of Current Business*, December 1950, and "Plant and Equipment Programs and Their Realization," *Short-Term Economic Forecasting*, Studies in Income and Wealth, Vol. 17, Princeton University Press for the National Bureau of Economic Research, 1955. Also Vito Natrella, "Forecasting Plant and Equipment Expenditures from Businessmen's Expectations," *Proceedings, Business and Economic Statistics Section*, American Statistical Association, 116th Annual Meeting, 1956; and Murray Foss and Vito Natrella, "Ten Years' Experience with Business Investment Anticipations," *Survey of Current Business*, January 1957.

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highest to the lowest quarter, their mildness limits our assessment of the survey under different economic conditions.

3. There were widespread shortages of particular kinds of labor and materials, and the rise in construction and equipment costs was almost uninterrupted. Delays and shortages may always be encountered in a period of heavy fixed investment when plant construction in particular is important, but they obstruct a statistical analysis of factors governing the demand for investment and particularly the realization of investment expectations.

4. Rapid tax amortization programs, in 1951-53 especially, also introduced abnormal influences on investment.

5. Unweighted data are used in several of the tables. While an individual firm analysis can clarify some underlying relationships, weights are needed to bridge the gap between an essentially atomistic approach and the dollar totals. This is especially important in investment analysis, for firms are not of equal weight, and size of company appears to affect the planning and realization of investment.

6. The breakdowns of the company data are restricted in their scope and do not take into account, except in a limited way, fundamental determinants of investment on the demand side.

Survey Results

Table 1 presents summary results of the survey for the aggregate and for six major industry divisions, 1947-57.

TABLE 1
Business Investment, Actual and Anticipated, by Industry, 1947-1957
(actual investment in previous year=100)

| <i>Investment</i> | <i>Manufac- turing</i> | <i>Mining</i> | <i>Rail- roads</i> | <i>Other Transpor- tation</i> | <i>Public Utilities</i> | <i>Commercial and Other</i> | <i>All Industries</i> |
|-------------------------------|----------------------------|---------------|------------------------|---------------------------------------|-----------------------------|-------------------------------------|---------------------------|
| 1947: | | | | | | | |
| Actual | 126 | 123 | 161 | a | 183 | 132 | 134 |
| Anticipated | 104 | 109 | 175 | a | 163 | 112 | 115 |
| Actual as % of anticipated | 121 | 113 | 92 | a | 112 | 118 | 117 |
| 1948: | | | | | | | |
| Actual | 112 | 116 | 144 | 88 | 141 | 122 | 119 |
| Anticipated | 104 | 100 | 176 | 98 | 121 | 125 | 115 |
| Actual as % of anticipated | 108 | 116 | 82 | 90 | 116 | 97 | 103 |
| 1949: | | | | | | | |
| Actual | 87 | 92 | 102 | 74 | 117 | 95 | 94 |
| Anticipated | 87 | 102 | 110 | 93 | 117 | 93 | 95 |
| Actual as % of anticipated | 100 | 90 | 93 | 80 | 100 | 102 | 99 |

[table continues on next page]

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Table 1, *continued*

| <i>Investment</i> | <i>Manufac- turing</i> | <i>Mining</i> | <i>Rail- roads</i> | <i>Other Transpor- tation</i> | <i>Public Utilities</i> | <i>Commercial and Other</i> | <i>All Industries</i> |
|-------------------------------|----------------------------|---------------|------------------------|---------------------------------------|-----------------------------|-------------------------------------|---------------------------|
| 1950: | | | | | | | |
| Actual | 113 | 92 | 84 | 85 | 101 | 96 | 102 |
| Anticipated | 93 | 88 | 69 | 67 | 94 | 88 | 89 |
| Actual as % of anticipated | 122 | 105 | 123 | 126 | 108 | 110 | 115 |
| 1951: | | | | | | | |
| Actual | 145 | 131 | 133 | 123 | 111 | 107 | 124 |
| Anticipated | 145 | 131 | 133 | 141 | 112 | 110 | 129 |
| Actual as % of anticipated | 100 | 100 | 100 | 87 | 99 | 97 | 97 |
| 1952: | | | | | | | |
| Actual | 107 | 106 | 95 | 101 | 106 | 98 | 103 |
| Anticipated | 108 | 107 | 100 | 119 | 108 | 90 | 104 |
| Actual as % of anticipated | 99 | 99 | 95 | 84 | 98 | 108 | 100 |
| 1953: | | | | | | | |
| Actual | 102 | 100 | 94 | 104 | 117 | 113 | 107 |
| Anticipated | 100 | 103 | 93 | 101 | 114 | 100 | 102 |
| Actual as % of anticipated | 102 | 97 | 101 | 103 | 103 | 113 | 105 |
| 1954: | | | | | | | |
| Actual | 93 | 99 | 65 | 97 | 93 | 103 | 95 |
| Anticipated | 93 | 103 | 72 | 96 | 97 | 103 | 96 |
| Actual as % of anticipated | 100 | 96 | 91 | 101 | 95 | 100 | 99 |
| 1955: | | | | | | | |
| Actual | 104 | 98 | 108 | 106 | 102 | 115 | 107 |
| Anticipated | 97 | 92 | 89 | 99 | 104 | 107 | 101 |
| Actual as % of anticipated | 107 | 107 | 121 | 107 | 98 | 107 | 106 |
| 1956: | | | | | | | |
| Actual | 131 | 130 | 133 | 107 | 114 | 117 | 122 |
| Anticipated | 131 | 119 | 142 | 111 | 116 | 112 | 122 |
| Actual as % of anticipated | 100 | 109 | 94 | 96 | 98 | 104 | 100 |
| 1957: | | | | | | | |
| Actual | 107 | 100 | 113 | 103 | 127 | 94 | 105 |
| Anticipated | 110 | 98 | 119 | 107 | 124 | 94 | 106 |
| Actual as % of anticipated | 97 | 102 | 95 | 97 | 102 | 100 | 99 |

NOTE: Actual as percentage of anticipated is based on unrounded indexes.

^a Included with commercial and other.

Source: The Department of Commerce—Securities and Exchange Commission annual surveys of plant and equipment expenditure anticipations, for this and the following tables unless otherwise noted.

The record for all industries combined, the survey's emphasis, is quite favorable. Actual expenditures were within 3 per cent of anticipated in seven of the eleven years; only in 1947 and 1950 were deviations large.

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The direction of change was correctly anticipated in every year except 1950, including the downturn years, 1949 and 1954.

The results by major industry division also appear good, although deviations are usually larger than for the total. Manufacturing, accounting for about two-fifths of total outlays over the period, shows deviations of 3 per cent or less in seven of the years. Actual expenditures came close to anticipations in 1951-52 and 1956-57 when large increases were projected and carried out. The two years of downturn in total output and plant and equipment expenditures also turned out well. However, predictions for 1950 and 1955, which saw an upward change in direction from the previous year, showed less than average (median) accuracy. The large deviation in manufacturing in 1950 appears to have been attributable mainly to the outbreak of the Korean hostilities in July, although this is not necessarily true for all industries combined.²

Railroads exhibit the largest deviations of any of the major industry divisions, while mining, nonrail transportation, and commercial firms show median deviations higher than the average. The record on direction of change shows that manufacturing and mining firms have missed twice each; and rails, other transportation, and public utilities once each.

Underestimates (actual in excess of anticipated) predominate in the total and in manufacturing, mining, and the commercial group, while overestimates are more prevalent in both transportation groups. Public utility estimates reveal no distinct tendency.

Results by Individual Firms

Earlier evaluations of investment anticipations surveys demonstrated that individual firms do not anticipate with anything like the accuracy that characterizes the aggregate, and that individual firm deviations are in large part offsetting. In 1956, for example, when the deviation in manufacturing as a whole was under 1 per cent, actual outlays for only 30 per cent of the manufacturers came within 20 per cent of anticipated expenditures.

These unweighted results reflect the predominance of small firms in the sample. The importance of large firms in the dollar aggregates is indicated

² On the basis of the current seasonally adjusted series, actual II 1950 outlays were substantially above the first quarter, and showed an annual rate of expenditure almost the same as the 1949 total, in contrast with the greater than 10 per cent decline that was anticipated for the year. The survey that was reported in June of 1950, moreover, indicated that further increases were being scheduled for the third quarter.

Considered by itself, the annual survey for manufacturing in 1955 missed the direction of change. Viewed in the light of the quarterly information that was simultaneously provided, the survey correctly indicated that the downturn in investment would come to a halt in I 1955 and that a sharp rise would follow. The projected figure for the full year 1955 was about 4 per cent higher than the seasonally adjusted first quarter, which was the sixth successive quarter of decline.

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by the fact that in 1956 the 250 largest concerns, with assets over \$100 million, accounted for about 60 per cent of total corporate manufacturing assets. Large firms anticipate much more accurately than small companies. Therefore when weights are added to the distribution for 1956, about five-eighths of manufacturers' anticipated expenditures fall within the 20 per cent range of realization and the extremes of the distribution of company deviations are considerably less important.

There still remains an appreciable amount of dispersion, and it is important to determine whether the deviations are random or systematic. We begin our investigation of causal relationships with an examination of the structure of anticipations broken down by asset size of firm.

SIZE OF FIRM

In Table 2 frequency distributions of deviations from planned investment by size of firm, including both Commerce and SEC companies,

TABLE 2
Deviations of Actual Investment from Anticipated, by Size of Firm
and Deviation, Manufacturing, 1949-1956
(as % of all firms)

| <i>Deviation and Firm Size^a</i> | 1949 | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | Median |
|---|------|------|------|------|------|------|------|------|--------|
| <i>Actual more than anticipated</i> | | | | | | | | | |
| Small firms | 60 | 76 | 63 | 51 | 65 | 62 | 71 | 65 | 64 |
| Medium-sized firms | 61 | 74 | 64 | 53 | 64 | 58 | 62 | 59 | 61 |
| Large firms | 43 | 51 | 59 | 42 | 48 | 44 | 51 | 46 | 47 |
| <i>Actual within 20% of anticipated</i> | | | | | | | | | |
| Small firms | 22 | 17 | 23 | 24 | 23 | 20 | 21 | 23 | 22 |
| Medium-sized firms | 33 | 24 | 35 | 37 | 36 | 33 | 32 | 40 | 34 |
| Large firms | 48 | 40 | 50 | 52 | 47 | 49 | 47 | 55 | 48 |
| <i>Actual 60% or more above anticipated</i> | | | | | | | | | |
| Small firms | 32 | 52 | 34 | 35 | 36 | 35 | 43 | 37 | 36 |
| Medium-sized firms | 18 | 39 | 23 | 19 | 22 | 22 | 26 | 21 | 22 |
| Large firms | 10 | 15 | 17 | 10 | 13 | 8 | 11 | 6 | 11 |
| <i>Actual 40% or more below anticipated</i> | | | | | | | | | |
| Small firms | 16 | 11 | 16 | 15 | 14 | 17 | 12 | 16 | 16 |
| Medium-sized firms | 9 | 6 | 8 | 13 | 8 | 11 | 8 | 8 | 8 |
| Large firms | 9 | 1 | 5 | 7 | 2 | 7 | 6 | 5 | 5 |

^a In this and the following tables "small firms" are those with total assets of less than \$10 million, "medium-sized firms" those with total assets of \$10 million to \$49.9 million, and "large firms" those with total assets of \$50 million and over.

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1949-56, are summarized for certain standards of performance. These data reveal that:

1. On the average, large firms (assets of \$50 million and over) showed some tendency to overestimate, while more than three-fifths of small (assets under \$10 million) and medium-sized firms underestimated their expenditures. Among the former, the proportions are similar in the downturn years of 1949 and 1954 and the steel strike years of 1952 and 1956.

2. In every year the proportion of firms whose actual outlays were within 20 per cent of anticipated expenditures increased as size of firm increased.

3. In every year large positive and negative deviations decreased in importance as size of firm increased. While the extremes of the distributions carry little weight in the dollar aggregates, they are a manifestation of small firm behavior, particularly when such companies definitely alter their views about income and sales, as they did in 1950 and 1955.

One reason for the relatively better performance of large firms is capital budgeting, which becomes more prevalent as size of firm increases. The existence of large deviations among large firms and the information offered by company executives in interviews conducted by Commerce and the SEC and by other investigators make it clear that budgets may be flexible instruments. But their use presupposes some willingness to disregard short-run fluctuations in demand. In response to our 1955 questionnaire large firms less often attributed changes from anticipations to unexpected changes in sales, profits, and working capital requirements than small firms did.³

Large firms have an advantage in that their reported expenditures usually involve several projects, where there may be offsetting errors. They are better able to allow for replacement and unexpected breakdowns. Most important, large firms engage in large scale programs more often.

SCALE OF INVESTMENT

Table 3 gives data on deviations from anticipated investment, broken down by size of firm and scale of investment, for 1950-56 for manufacturing, electric and gas utilities, and railroads. A limited amount of information for 1949 is also provided in footnote b of the table.

Scale of investment refers to the ratio of anticipated expenditures to gross fixed assets at the beginning of the year. The anticipated rather than the actual expenditure is used for classifying because we are primarily interested in evaluating the reliability of the figures reported early each year in the annual survey. Some spurious inverse correlation is apparent

³ Murray Foss and Vito Natrella, "Investment Plans and Realization—Reasons for Differences in Individual Cases," *Survey of Current Business*, June 1957.

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TABLE 3. Deviations of Actual Investment from Anticipated, by Size of Firm, Deviation, and Scale of Investment, Manufacturing, Public Utilities, and Railroads, 1950-1956
(as % of all firms)

| Industry, Firm Size, and Scale of Investment ^a | Actual More than Anticipated | | | | | | Actual within 20% of Anticipated | | | | | | | | | |
|---|------------------------------|------|------|------|------|------|----------------------------------|--------|------|------|------|------|------|------|------|--------|
| | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | Median | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | Median |
| Manufacturing^b | | | | | | | | | | | | | | | | |
| Small firms: | | | | | | | | | | | | | | | | |
| Less than 5% | 79 | 70 | 73 | 71 | 68 | 79 | 71 | 71 | 19 | 21 | 16 | 17 | 16 | 13 | 22 | 17 |
| 5-9.9% | 74 | 57 | 52 | 62 | 64 | 63 | 60 | 64 | 17 | 20 | 29 | 26 | 32 | 33 | 28 | 28 |
| 10% and over | 73 | 52 | 49 | 43 | 43 | 51 | 52 | 51 | 34 | 37 | 42 | 33 | 30 | 34 | 48 | 34 |
| Total | 76 | 60 | 60 | 63 | 63 | 68 | 61 | 63 | 20 | 27 | 27 | 23 | 23 | 24 | 34 | 24 |
| Medium-sized firms: | | | | | | | | | | | | | | | | |
| Less than 5% | 80 | 74 | 61 | 78 | 68 | 73 | 75 | 74 | 18 | 16 | 31 | 32 | 24 | 23 | 22 | 23 |
| 5-9.9% | 72 | 70 | 51 | 62 | 50 | 62 | 64 | 62 | 28 | 43 | 39 | 31 | 33 | 33 | 46 | 33 |
| 10% and over | 62 | 51 | 40 | 47 | 50 | 45 | 47 | 47 | 38 | 38 | 33 | 49 | 52 | 48 | 49 | 48 |
| Total | 74 | 64 | 51 | 63 | 58 | 62 | 59 | 62 | 25 | 34 | 34 | 37 | 35 | 33 | 40 | 34 |
| Large firms: | | | | | | | | | | | | | | | | |
| Less than 5% | 73 | 70 | 77 | 63 | 60 | 74 | 65 | 70 | 18 | 40 | 14 | 35 | 30 | 30 | 42 | 30 |
| 5-9.9% | 47 | 71 | 40 | 49 | 42 | 61 | 51 | 49 | 46 | 48 | 63 | 48 | 54 | 51 | 54 | 51 |
| 10% and over | 36 | 51 | 35 | 36 | 37 | 29 | 34 | 36 | 50 | 54 | 57 | 54 | 57 | 57 | 54 | 54 |
| Total | 51 | 60 | 42 | 47 | 45 | 53 | 44 | 47 | 38 | 50 | 52 | 48 | 49 | 48 | 52 | 49 |
| All firms: | | | | | | | | | | | | | | | | |
| Less than 5% | 78 | 72 | 67 | 73 | 67 | 76 | 72 | 72 | 18 | 21 | 22 | 25 | 21 | 20 | 24 | 21 |
| 5-9.9% | 65 | 66 | 49 | 60 | 53 | 62 | 59 | 60 | 31 | 38 | 40 | 33 | 38 | 37 | 41 | 38 |
| 10% and over | 54 | 52 | 42 | 44 | 44 | 43 | 44 | 44 | 42 | 42 | 43 | 45 | 47 | 46 | 49 | 45 |
| Public utilities | | | | | | | | | | | | | | | | |
| Less than 5% | 34 | 55 | 50 | 38 | 28 | 70 | 45 | 45 | 17 | 64 | 50 | 64 | 58 | 45 | 46 | 50 |
| 5-9.9% | 50 | 52 | 38 | 41 | 32 | 37 | 46 | 41 | 72 | 64 | 57 | 66 | 78 | 76 | 77 | 72 |
| 10% and over | 59 | 25 | 31 | 40 | 31 | 29 | 35 | 31 | 70 | 77 | 71 | 86 | 78 | 71 | 76 | 76 |
| Total | 51 | 38 | 35 | 40 | 31 | 38 | 42 | 38 | 64 | 72 | 66 | 79 | 76 | 70 | 73 | 72 |
| Railroads^c | | | | | | | | | | | | | | | | |
| Less than 2% | 80 | 62 | 67 | 83 | 50 | 66 | 70 | 67 | 20 | 11 | 29 | 40 | 31 | 24 | 8 | 24 |
| 2-3.9% | 64 | 46 | 39 | 64 | 32 | 51 | 58 | 51 | 36 | 54 | 50 | 58 | 62 | 43 | 46 | 50 |
| 4% and over | 50 | 30 | 33 | 49 | 22 | 54 | 30 | 30 | 55 | 48 | 58 | 64 | 39 | 46 | 40 | 48 |
| Total | 69 | 39 | 42 | 62 | 40 | 59 | 49 | 49 | 31 | 43 | 50 | 56 | 43 | 34 | 34 | 43 |

^a In this and the following tables, scale of investment is measured by the ratio of anticipated capital outlays to gross fixed assets at the beginning of the year. The sample includes Securities and Exchange Commission registrants only, because gross fixed asset data were lacking for most of the nonregistered companies.

^b In 1949, 61 per cent of the small and medium-sized firms combined and 49 per cent of the large firms had actual expenditures more than anticipated; 26 per cent and 43 per cent, respectively, had actual expenditures within 20 per cent of anticipated.

^c Because their outlays were generally lower relative to gross fixed assets, the scale of investment classes used for railroads differs from the other groups in this and the following table.

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TABLE 4

Distribution of Firms by Size of Firm and Scale of Investment, Manufacturing,
Public Utilities, and Railroads, 1950-1956
(as % of all firms)

| <i>Industry, Firm Size, and Scale of Investment</i> | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 |
|---|------|------|------|------|------|------|------|
| <i>Manufacturing</i> | | | | | | | |
| Small firms: | | | | | | | |
| Less than 5% | 59 | 40 | 49 | 49 | 52 | 47 | 36 |
| 5-9.9% | 26 | 26 | 23 | 29 | 31 | 29 | 28 |
| 10% and over | 15 | 34 | 28 | 22 | 17 | 24 | 36 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Medium-sized firms: | | | | | | | |
| Less than 5% | 50 | 24 | 33 | 38 | 41 | 40 | 29 |
| 5-9.9% | 31 | 34 | 32 | 31 | 33 | 38 | 30 |
| 10% and over | 19 | 42 | 35 | 31 | 26 | 22 | 41 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Large firms: | | | | | | | |
| Less than 5% | 30 | 15 | 14 | 23 | 24 | 26 | 15 |
| 5-9.9% | 37 | 31 | 30 | 34 | 43 | 38 | 32 |
| 10% and over | 33 | 54 | 56 | 43 | 33 | 36 | 53 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| <i>Public Utilities</i> | | | | | | | |
| Less than 5% | 15 | 12 | 5 | 8 | 7 | 13 | 8 |
| 5-9.9% | 44 | 35 | 24 | 24 | 44 | 50 | 44 |
| 10% and over | 41 | 53 | 72 | 68 | 49 | 37 | 48 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| <i>Railroads</i> | | | | | | | |
| Less than 2% | 48 | 17 | 21 | 23 | 48 | 52 | 26 |
| 2-3.9% | 33 | 25 | 28 | 38 | 34 | 34 | 30 |
| 4% and over | 19 | 58 | 51 | 39 | 18 | 14 | 44 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

in the results since the measure of scale contains in the numerator the same figure that is contained in the denominator of the measure of realization. The designations "small," "medium," and "large" refer to the classifications established in Table 3.

The data for manufacturing are summarized below:

1. Firms reporting large-scale programs invariably show smaller deviations than firms anticipating medium and small-scale programs.

2. In six of the eight years firms anticipating large-scale programs spent less than planned; companies anticipating lesser programs almost always spent more than planned.

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3. Size of firm and scale of investment are closely correlated. If Table 3 is read so that size is held constant, companies with large-scale programs had a better record in anticipations in practically every year.

4. In each year, the larger the firm, the more frequent were large-scale programs (see Table 4).⁴ This is a major factor in the relatively better performance of large companies and their characteristic of spending less than planned. The size-of-firm effect remains, however. When anticipated scale of investment is held constant, a higher proportion of large firms' deviations usually fall within the ± 20 per cent intervals (Table 3).

5. Regardless of firm size, when small-scale programs were anticipated, they were invariably exceeded. When large-scale programs were anticipated by small and medium firms they show no particular tendency to exceed or fall short. But large programs of large companies have almost always fallen short of expectations.

The same characteristics of the ratios that were evident in manufacturing appear in utilities and railroads. The medium and large programs of both groups show little difference in the proportion falling within the 20 per cent limits. The utilities almost always spent less than planned, especially when they had large programs. The rails tended to exceed anticipations when the anticipated programs were small; otherwise they exhibit no persistent tendencies.

PLANT AND EQUIPMENT OUTLAYS

Separate plant and equipment data are not currently published by Commerce and the SEC because of inadequate reporting by a relatively small but important group of the very largest firms. They predominate in steel, petroleum, and chemicals, where the distinction is often not easy to make. The discussion that follows is based on the unpublished reports.

In Table 5 manufacturing firms are classified according to scale of investment and proportion of plant in total anticipated 1956 expenditures. Within each firm-size class the large-scale anticipations contain a much higher proportion of plant than the small-scale programs. For all firms combined, 21 per cent of small-scale programs consist of 25 per cent or more of plant; 28 per cent of medium-scale programs, and 57 per cent of large-scale programs. We could not at this time make a similar investigation for other years. However, unpublished figures for the manufacturing aggregate show that the ratio of construction to total outlays in 1954 and 1955 generally increased with size of firm.

This breakdown suggests why large-scale programs tend to come relatively close to realization. New plants or major additions involve large outlays, considerable advance planning, and extensive forward commitments because they take long to build. Investigators found that

⁴ Plant and equipment expenditures refer to gross and not net investment.

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TABLE 5

Distribution of Firms by Size of Firm, Scale of Investment, and Proportion of Plant Outlay to Total Investment, Manufacturing, 1956
(as % of all firms)

| Firm Size and Scale of Investment | PLANT OUTLAYS AS % OF TOTAL INVESTMENT | | | | Total |
|--------------------------------------|--|-------------------|---------|----------------|-------|
| | Zero | Less than 24.9 | 25-49.9 | 50 and over | |
| Small firms: | | | | | |
| Less than 5% | 47 | 36 | 10 | 7 | 100 |
| 5-9.9% | 45 | 29 | 20 | 6 | 100 |
| 10% and over | 19 | 21 | 29 | 31 | 100 |
| Total | 36 | 29 | 20 | 15 | 100 |
| Medium-sized firms: | | | | | |
| Less than 5% | 38 | 38 | 17 | 7 | 100 |
| 5-9.9% | 19 | 56 | 18 | 7 | 100 |
| 10% and over | 7 | 38 | 32 | 23 | 100 |
| Total | 19 | 44 | 23 | 14 | 100 |
| Large firms: | | | | | |
| Less than 5% | 24 | 48 | 28 | | 100 |
| 5-9.9% | 8 | 55 | 22 | 15 | 100 |
| 10% and over | 10 | 31 | 35 | 24 | 100 |
| Total | 12 | 40 | 30 | 18 | 100 |
| All firms: | | | | | |
| Less than 5% | 41 | 38 | 15 | 6 | 100 |
| 5-9.9% | 28 | 44 | 20 | 8 | 100 |
| 10% and over | 12 | 30 | 31 | 26 | 100 |
| Total | 25 | 37 | 23 | 15 | 100 |

during the Korean mobilization scheduled construction time for new plant averaged nine months in manufacturing and mining industries.⁵ The actual time was considerably longer, as construction progress records under the rapid tax amortization program indicate.⁶ Average construction time exceeds nine months in industries like iron and steel, nonferrous metals, chemicals, and petroleum refining. In the integrated iron and steel industry, for example, scheduled construction time for facilities such as blast furnaces, coke ovens, and open-hearth furnaces was estimated at approximately fifteen months under very favorable supply conditions.⁷

INDUSTRY COMPARISONS

To judge from the industry averages, manufacturing firms project outlays more closely than either utilities or railroads. The distribution of company deviations, however, shows quite a different pattern. Average experience for 1950-56 shows that 72 per cent of the utilities, 49 per cent

⁵ Thomas Mayer and Sidney Sonenblum, "Lead Times for Fixed Investment," *Review of Economics and Statistics*, August 1955.

⁶ *Expansion Progress*, Office of Defense Mobilization, various issues, 1952-55.

⁷ "Investment Costs and Capacity in Iron and Steel," Office of Business Economics, Dept. of Commerce, September 1953 (unpublished).

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of the largest manufacturers, and 43 per cent of the railroads had deviations falling within ± 20 per cent (Table 3).

With scale of investment and size of firm held constant, utilities still rank ahead of railroads and manufacturing for each scale-of-investment class; the latter industries are not much different in the proportion of firms whose deviations fell within the ± 20 per cent band.

Separate breakdowns were prepared for individual manufacturing industries including iron and steel, electrical machinery, machinery except electrical, chemicals, and petroleum. A persistent understatement of anticipated small-scale programs was found in all the above industries except petroleum, in which firms on the average were about equally divided between those exceeding and those falling short of small-scale anticipations. In large-scale programs the steel and petroleum industries showed a distinct tendency to spend less than planned. Electrical machinery and chemicals showed no particular tendency in this regard, and machinery except electrical fell in between the other groups.

REASONS FOR OVER- AND UNDERESTIMATES

Firm size and size of anticipated expenditure were obviously the most important factors associated with how closely firms realize their reported plans. But other characteristics, associated with whether firms spend more or less than planned, were brought to light.

1. The clearest tendency is a characteristic of firms, regardless of size, to spend more than they anticipate when the anticipated outlay is small. Although large firms have not been immune in this respect, small-scale anticipations of large manufacturers have had a very small weight in large company programs. In 1950, for example, anticipated small-scale expenditures accounted for 15 per cent of expected dollar expenditures of large companies, or about half the corresponding proportion of firms shown in Table 4. Because small firms usually report relatively small programs, a comparison of their plans and results generally shows the actual expenditure higher than anticipated.

2. When large manufacturing firms reported anticipations of large programs, they almost always spent less than planned. Because of the predominance of large programs among large manufacturing firms, such companies spent slightly less on the whole than anticipated in four of the five years, 1952-56.

Special questionnaires support the notion that a major reason why the largest manufacturers persistently overestimate their expenditures on large-scale projects is that postwar supply conditions have made it impossible for them to realize the time schedules of construction progress and equipment deliveries that underlie their investment anticipations. The

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underlying schedules may be unrealistic because they assume conditions of excess capacity in capital-goods industries. Engineers may use such schedules to win executive approval of their projects. Conversely they may be imposed on engineers by management. Or large companies, being cognizant of the unsettled supply conditions, may have included unusually large contingency allowances in their projects. Gort found that electric utilities included contingency allowances in their budgets at the beginning of the year, but we have no direct evidence of this in manufacturing.⁸

The fact that overstatement characterizes utilities and large manufacturing firms, but not railroads, suggests that the longer lead time for the programs of the former makes them more vulnerable to delays. It is significant that large-scale anticipations of small firms, involving presumably shorter construction times, do not fall short on the average.

The tendency of companies to exceed anticipations when the anticipation is relatively small may result from a number of factors. The 1949 and 1955 studies found that the necessity of cutting costs in the face of intensified competition led to unanticipated expenditures, as did unexpected machinery breakdowns. The 1955 study revealed that some firms were submitting anticipations before the board of directors or the executive committee had met, so that only figures for the ensuing few months were available.

The understatement may also arise because of inadequate allowance for price increases. If firms projected a physical volume of investment at prevailing prices, some understatement must have resulted if real spending for capital goods is relatively inelastic, since capital goods prices rose almost steadily after the war.

While unexpected price increases undoubtedly contributed to the understatement, we are not inclined to assign a major role to this factor. In a recent paper⁹ Modigliani and Weingartner criticized us for minimizing the role of unexpected price change and took issue with a suggestion made in March 1956 *Survey of Current Business* that the appropriate base period for projecting prices into the year ahead is around the beginning of the year.¹⁰ But such a base period seems reasonable for the typical firm, whose capital outlays are comparatively small. Naturally, where large projects are duly weighted, the appropriate time period must precede the start of the year because of the time requirements in planning, letting contracts and so forth. Actually, the difference in capital goods costs at the start of any of the postwar years and average costs in the final quarter

⁸ Michael Gort, "The Planning of Investment: A Study of Capital Budgeting in the Electric Power Industry. II," *Journal of Business of the University of Chicago*, July 1951.

⁹ Franco Modigliani and H. M. Weingartner, "Forecasting Uses of Anticipatory Data on Investment and Sales," *Quarterly Journal of Economics*, February 1958.

¹⁰ Murray F. Foss, "Business Expectations for 1956—Investment Outlays and Sales," *Survey of Current Business*, March 1956.

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of the preceding year (the rough approximation used by Modigliani and Weingartner) is quite small.

The chief argument against emphasizing the price effect is the amount of the understatement. Actual expenditures by small companies exceeded anticipations by approximately 10 per cent over the past five years, and this is substantially more than can be accounted for by price changes. During the same period, actual aggregate outlays by the largest firms fell slightly short of anticipations, so that a positive price effect, if it exists, must be more than offset by opposing forces.

A final possibility is that firms report as anticipations primarily what has been contracted for, or what remains to be done on projects in process. The 1955 questionnaire showed that some firms, usually smaller ones, have little basis for making a forecast. Actual expenditures are related not to firmly held anticipations but to current income or cash position. These factors appear to explain why aggregate expenditures in the second half of the year have usually been understated, a bias even more evident in anticipations of more than one year.

Cyclical Patterns of Over- and Underestimates

EXPANSION VERSUS CONTRACTION

The relative importance of large- and small-scale anticipations varies over the cycle (see Table 4), so that cyclical patterns of overstatement and understatement may greatly affect the confidence that can be placed in the annual anticipations.

The 1950-56 average experience, expressed in terms of the medians in Table 3 indicates the performance of companies in the years of sharp upturn, 1950 and 1955, and the one year of mild downturn shown, 1954:

1. *Small programs.* In 1950 and 1955 the proportion of manufacturing firms spending more than planned is above the average regardless of size of firm, though the excess is small for the largest firms. All sizes fall below the average in 1954.

2. *Large programs.* Those of small manufacturers appear to vary cyclically, like the small programs just noted. Those of medium and large manufacturers are usually close to the average in 1950, 1954, and 1955; the largest deviation, in 1955, is contracyclical. When firms of all sizes are combined, the proportion of firms anticipating large-scale programs in the downturn year of 1949 and spending more than planned is larger than the average.

3. *Medium programs.* There is some evidence of cyclical variability but no distinct pattern by size of firm.

In terms of scale of investment, patterns of cyclical variability in utilities

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and rails are less clear than in manufacturing. For rails there appears to be a cyclical pattern.

DIRECTION OF CHANGE

The ability of an aggregate series to forecast direction of change is extremely important, but for the individual firm it is only a rough measure of predictive ability. Direction of change in the aggregate has been missed even though about three out of four manufacturing companies were able to anticipate direction properly. Nevertheless individual firm data provide an indication of small firm behavior and give further evidence of the tendency of companies to spend more than their reported anticipations.

Information on direction of change for 1950-56 is shown in Table 6. At

TABLE 6
 Anticipated and Actual Direction of Change from Actual Investment by
 Firms in Previous Year, Manufacturing, 1950-1956
 (per cent)

| <i>Firms</i> | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 |
|---|------|------|------|------|------|------|------|
| Anticipating increase: | | | | | | | |
| Experiencing increase | 29 | 50 | 27 | 36 | 27 | 35 | 47 |
| Experiencing decrease | 6 | 9 | 8 | 8 | 8 | 7 | 8 |
| Anticipating decrease: | | | | | | | |
| Experiencing decrease | 38 | 26 | 48 | 38 | 47 | 36 | 30 |
| Experiencing increase | 27 | 15 | 17 | 18 | 18 | 22 | 15 |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Correctly anticipating direction of change | 67 | 77 | 75 | 73 | 74 | 71 | 77 |
| Anticipating increase Correctly | 82 | 86 | 77 | 81 | 77 | 83 | 84 |
| Anticipating decrease Correctly | 64 | 41 | 65 | 56 | 65 | 58 | 45 |
| Correctly | 58 | 64 | 74 | 67 | 72 | 62 | 67 |

Figures will not necessarily add to totals because of rounding.

no time did the proportion of correct anticipations of direction of change fall below 67 per cent; the proportions are lowest for 1950 and 1955. These data are, of course, dominated by small companies. While large companies are somewhat better at anticipating, there is relatively little difference by size of firm.

Except for 1951 and 1956, when aggregate investment increases of 45 and 31 per cent, respectively, were projected by manufacturers, more than half of the anticipations were expectations of decrease. An examination of large firm expectations would show a much more nearly equal distribution in this respect. Projections of decreases were correct less often than those of increases—another aspect of the tendency of firms to understate anticipations. Expectations of increase were correct most often in 1951 and

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the turning point year of 1955; least often, in the downturn year of 1954 and the steel strike year of 1952.

Effect of Structural Factors on Survey Results

Like other investigators, we found that departures from sales and profits expectations were the primary influences that gave rise to changes from investment expectations.¹¹ On an aggregative basis a high coefficient of correlation can be obtained by relating deviations from annual sales anticipations with deviations from annual investment anticipations, for manufacturing as a whole, 1948-56.¹² On an individual industry basis we may note a similar association. Table 7 presents a comparison of the signs

TABLE 7
Comparison of Investment and Sales Deviations, Fourteen Manufacturing Industries, 1952-1956

| <i>Industries</i> | 1952 | 1953 | 1954 | 1955 | 1956 ^a |
|--|------|------|------|------|-------------------|
| Investment higher, sales higher than anticipated | 1 | 9 | 2 | 11 | 3 |
| Investment higher, sales lower than anticipated | 6 | 3 | 4 | 1 | 3 |
| Investment lower, sales higher than anticipated | 3 | 1 | 0 | 2 | 3 |
| Investment lower, sales lower than anticipated | 4 | 1 | 8 | 0 | 3 |
| Number with like signs | 5 | 10 | 10 | 11 | 6 |

^a Excludes two industries where one of the deviations was less than 0.5 per cent.

of the deviations for individual two-digit manufacturing industries, 1952-1956. Reasons for the poor associations in 1952 and 1956 are suggested below. The questionnaires analyzing the realization of the 1949 and 1955 investment anticipations of individual firms demonstrated that departures from sales expectations were important causal influences.

While recognizing the importance of sales and profits deviations, we feel that the particular context in which these deviations occur must also be considered. We therefore suggest, on the basis of the discussion in the preceding pages, how departures from sales expectations may be modified.

THE TENDENCY TOWARD UNDERSTATEMENT

The understatement bias works in a contracyclical fashion when business is declining. The tendency of some firms to underestimate their expenditures cushions the negative influence of sales disappointments

¹¹ See, for example, the previously cited works by Friend and Bronfenbrenner, and by Foss and Natrella.

¹² $r=0.88$ for the nine observations.

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upon the realization of investment plans. However when sales turn out better than expected, the deviation from planned investment is accentuated by this practice.

In 1957, for the first time, a limited attempt was made to correct for understatement by small manufacturers. We quote from the March 1957 *Survey of Current Business*: "The adjustment amounted to a 10 per cent increase, which was roughly the average annual understatement of the small firms, considered as a group, over the past five years. The adjustment was uniformly applied to the planned expenditures of the small size classes in each industry. The correction added \$0.3 billion to total anticipated manufacturing investment as reported in this review; this constitutes 2 per cent of manufacturing investment and 0.8 of 1 per cent of aggregate investment this year."

THE PREVALENCE OF LARGE-SCALE PROGRAMS

The cross-sectional data indicate that large-scale programs in manufacturing, when anticipated by large and medium-sized firms, have shown some insensitivity to cyclical change, though the test was necessarily limited by the period under consideration. The insensitivity would be suspect if firms anticipating large outlays experienced consistently smaller sales deviations than firms expecting lesser expenditures. Therefore we ran a comparison test. Companies were classified by two-digit manufacturing industries; firm size had to be disregarded as an independent variable because of the small numbers involved. We found that median sales deviations of firms engaged in large programs were virtually as great as (within 1 per cent) or greater than sales deviations of firms engaged in medium or small programs, in seven out of nine industries in 1954 and 1955, and six out of nine industries in 1956.

PLANT AND EQUIPMENT SUPPLIES

The plant and equipment supply situation is difficult to treat, partly because it does not readily lend itself to measurement under normal circumstances. About the only "supply-requirements" information available is that compiled by the government during war and mobilization periods, when allocations systems are in effect. Also, "aggregate supply" data may be misleading because of the crucial importance of particular kinds of materials or labor.

Supply conditions have less influence on the realization of investment anticipations as the period under consideration lengthens. We are dealing here with anticipations for one year—a comparatively short time given the timing factors relevant to planning and executing of fixed investment, especially in heavy manufacturing industries and public utilities.

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Questionnaires have helped to illuminate the role of supply conditions.¹³ In the 1955 survey, among firms that spent less than anticipated, delay in deliveries and construction progress was by far the most important factor cited, and its importance increased with size of firm and size of program. Although direct evidence is lacking, materials shortages in 1952 and 1956 largely explain the poor association between investment and sales deviations, as indicated in Table 7. Among firms that exceeded plans, unexpectedly high sales and profits received the most emphasis.

In the 1949 study the relative importance of supply conditions and demand was reversed. Firms that exceeded their plans mentioned better-than-expected supplies more often than better-than-expected profits or sales. Firms that fell short of anticipated investment stressed disappointing sales, profits, and working capital rather than supply difficulties. The changing importance of supply conditions in two different phases of the cycle indicates how they may play a modifying and partially compensatory role in affecting the realization of short-run investment plans.

STAGE OF COMPLETION

The stage of the individual firm's investment cycle, and the amount of work that remains to be done at the start of the year, have a bearing on the extent to which programs are realized. The expenditure anticipation may be thought of as consisting of outlays to complete (or extend) projects started earlier and outlays for new projects. The carryover portion is the more certain, less flexible part. A large volume of work remaining to be done at the start of the year is a stabilizing influence on an investment anticipation, especially when it represents the completion phase of a major project.

At the end of 1953, for example, a sizable allowance for projects carried over from the Korean mobilization period was included in the 1954 anticipations (which constituted a decrease). The necessity for completing such work will not prevent a reduction of outlays below anticipations when sales turn out badly, but it limits the size of the reduction. By way of contrast, the end of 1949 saw postwar low points in unfilled orders and goods-in-process inventories in durable-goods industries, and probably the lowest volume of work carried over in the postwar period. As Table 4 shows, the importance of small-scale programs was then relatively high, and that of large-scale programs relatively low. The anticipation for 1950 was especially vulnerable to a shift in sales from expectations and a large deviation developed, even before the Korean outbreak.

¹³ The 1955 questionnaire also demonstrated that slow deliveries and construction progress were an important explanation for what appeared to be an anomaly in the individual company data and, oftentimes, industry data: shortfalls in investment coupled with an excess of actual overanticipated sales.

C O M M E N T

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On the basis of seven years' experience with investment anticipations, the following pattern emerges for manufacturing firms:

1. Small and medium-sized firms with small or medium-sized programs understate their expenditures in 60 to 70 per cent of the cases, and those with large programs understate about as often as they overstate.
2. Large firms with small programs understate their expenditures in about 70 per cent of the cases, those with medium-sized programs understate about as often as they overstate, and those with large programs overstate in about two-thirds of the cases.

The pattern suggests that, while small and medium-sized firms tend to understate expenditures, large firms do not. Possibly the latter make more adequate provision for routine replacement needs, which are predictable only on the average. Probably a more important reason is that businessmen tend to report only fairly certain projects, and large companies tend to make firm decisions further ahead than do small firms. There is less chance that a large company will make substantial outlays before the end of a year on a project not certain at its beginning. One test of this reasoning would be to note whether small and medium-sized firms are more inclined than large firms to anticipate expenditures for the second half of a year unrealistically lower than those for the first half.

Secondly, there may be a general tendency toward overstatement of large programs, possibly due, as Foss and Natrella argue, to the delays in equipment deliveries and plant construction progress frequently encountered in the postwar capital goods market. If so, an offsetting of biases would occur in large programs of small and medium-sized firms, only the negative bias in their smaller programs, and only the positive bias in the large programs of large firms. But is the superior accuracy of the large programs of small and medium-sized firms entirely due to the netting out of opposing biases? (For large firms the large programs are not significantly more accurate than the medium-sized ones.) I think not. First, a 20 per cent error in estimating the cost of a program is obviously much more serious when the project is large relative to fixed assets than when it is relatively small. More important, a company is less free to exceed a large program by a large percentage, even in response to highly favorable developments, because there is a limit to how far any firm wants to commit itself in a single year. At the same time it is not clear that a large program is more likely to fall short by a large *percentage* than a small program.

Some light can be thrown on the role of supply factors in the over-estimation of large programs by examining the behavior of such programs in 1949 and 1954 when the supply situation was somewhat easier than in

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most of the postwar period.¹ The relative superiority of the large programs appears to be as great for medium-sized firms in these two years as in the other years studied, but somewhat less for small firms. The tendency for large firms to overstate large programs was less in 1949 but not in 1954.

Turning now to the effect of unexpected movements in sales and profits on the realization of investment programs, I suggest that the understatement bias should be eliminated before attempting to measure this effect. In the two years of minor recession, 1949 and 1954, the downward pressure of sales movements was offset by the usual bias toward underestimation and thus largely concealed. In the two years of upturn, 1950 and 1955, the upward pressure of sales movements was exaggerated by the tendency to underestimate. Fluctuations in the supply situation in expansions and contractions have also served to limit sales-induced deviations from investment programs in the postwar period. It is not clear how important this countercyclical force will be under normal supply conditions.

Other factors have a bearing on the precise effect of sales deviations. If programs generally are relatively large, unexpected gains in sales are likely to have less effect (and unexpected declines more) than if programs are small. The work of Robert Eisner with the 1950 McGraw-Hill data and my own work with the 1949 Commerce-SEC data indicate that sales deviations should have stronger effects when expansionary investment represents a high proportion of the total. Finally, while the effect of liquidity is hard to quantify, I believe that high liquidity will accentuate the effects of an unexpected increase in sales, while a tight cash position will accentuate the effects of an unexpected decline. Perhaps the only conclusion to be drawn now with any conviction is that expenditures are likely to exceed anticipations when sales rise unexpectedly if existing capacity is rather fully utilized, if programs are small, and if the supply situation and level of liquidity permit.

¹ Foss and Natrella do not give the appropriate breakdown for 1949, and I am drawing on my own work for that information.

