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Volume Title: Executive Compensation in Large Industrial Corporations

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Volume Publisher: NBER

Volume ISBN: 0-870-14481-2

Volume URL: <http://www.nber.org/books/lewe68-1>

Publication Date: 1968

Chapter Title: Sensitivity Analysis

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Chapter URL: <http://www.nber.org/chapters/c9353>

Chapter pages in book: (p. 258 - 277)

## *SENSITIVITY ANALYSIS*

The question of the extent to which the results described in the preceding chapters depend upon the particular values chosen for such key parameters as executives' discount rates, outside income, and nontaxable deductions and exemptions has been raised in a number of connections. Each time, the argument has been that the techniques employed to measure the worth of the various deferred and contingent compensation devices under consideration are such that the outcome of an empirical application of those techniques should be affected very little by rather substantial changes in the parameters involved. It is the task of this chapter to document that assertion.

### *Procedure*

The approach will be to cast up, from the body of data compiled for the study, a profile of the career of a "typical" executive, and then to test the impact on an analysis of his compensation of a series of changes in assumptions as to the conditions under which that compensation was received. The alternative would be to redo the calculations for the entire sample some fifteen or twenty times, changing one or two parameters for each trial—a strategy which is rejected as not only impractical but unnecessary. The results of the investigation have been presented throughout in terms of the collective experience of executives in fifty corporations, and a sensitivity analysis which concentrates on the rewards of an "average" individual as derived from the careers of those executives should provide as useful an appraisal of the influence of the several parameters chosen as would a full reconstruction of the various calculations.

Since the procedures employed in valuing the components of the pay

package made it possible to separate the computations related to executives' stock options from those for their other rewards,<sup>1</sup> the same separation will be effected here. The typical experience under an option plan will be examined independently and will be concerned only with those individuals who were granted options rather than with the entire sample studied. This will serve to highlight the features of the valuation techniques constructed for an instrument which we have seen to be almost as important a source of remuneration as salary and bonus for top corporate executives during the late 1950's and early 1960's. Those techniques and the nature of the contingencies involved are sufficiently distinctive that some extra concentration on them seems appropriate.

### *The Typical Executive: A Profile*

Because most of the conclusions presented above have been based on the *mean* values of the compensation provided by the fifty corporations studied, a similar viewpoint will be adopted in reconstructing the experience of a typical executive. The magnitude of his rewards and the timing of their receipt will be specified simply by summing the relevant dimensions of the careers of the some 550 individuals for whom data were compiled and dividing by the total number of observations applicable to each. For example, the mean length of time an executive appears in the sample is almost exactly fourteen years: There are 7,802 man-years of data and a total of 558 executives. Of those fourteen years, the last ten—or 5,300 of the total 7,802—were spent among the five highest-paid positions in the man's firm and are our most direct concern.<sup>2</sup> Information on the compensation he enjoyed during the four earlier years is, however, necessary to a proper valuation of his subsequent rewards and must therefore be taken into account. Finally, since all or part of the data for some 20 per cent (1,561 man-years) of the history analyzed could not be gathered from proxy statements and had to be estimated, the figures for the first three years of an executive's career will normally be of this type.<sup>3</sup>

<sup>1</sup> See the numerical example presented in Chapter 6.

<sup>2</sup> See Chapter 7.

<sup>3</sup> With few exceptions, it *was* during the early years of the executive's career wherein such extrapolation was necessary.

Given the indicated framework, the size and the pattern over time of the pertinent rewards are easily obtained. We find that the mean age of the 558 executives when they initially appeared in the sample was just over 49 years.<sup>3</sup> During that first year they averaged \$61,750 in before-tax salary and bonus, were promised \$4,040 in annual noncontributory pension benefits, and were required to contribute an average \$510 toward financing of a prospective annual contributory pension benefit amounting to \$3,600. A minority were, in addition, the beneficiaries of deferred compensation and profit-sharing plans, the anticipated annual post-retirement payments under which come to \$130 when averaged over the entire sample. Nine years was the mean term of such plans; i.e., payments were to begin at age 65 and continue through age 73.<sup>4</sup> Similar calculations were made using the data observed for the second and subsequent years of each executive's experience, the compensation totals being divided by the number of individuals contributing to them in every instance.

On that basis, the "typical" compensation history shown in the tabulation on p. 261 emerges.<sup>5</sup> In order to analyze this history, it is necessary to specify the calendar-year period covered, since the tax rates relevant to the various computations have fluctuated over time. The mean year in which the individuals under consideration first appeared in the sample turns out to be 1942, and that year is therefore adopted as a reference point, i.e., the career of our typical executive will be said to have begun in 1942 and ended in 1955. The tax schedules employed in the subsequent analysis reflect this convention.

### *Parameter Changes*

The assumptions about the nature of the compensation environment which were built into the empirical results described above took the form

<sup>3</sup> All such averages will be rounded to the nearest full year for purposes of the following computations.

<sup>4</sup> As a matter of convenience, the few profit-sharing plans confronted—all of which provided for a single large payment at age 65—were included in this category by assuming that the lump sum expected was instead to be paid out in nine equal annual installments as if it were a deferred compensation arrangement. This assumption permits a single computation to suffice here for both rewards even though the two devices were evaluated separately in the main body of the study.

<sup>5</sup> Excluding for the moment any stock option grants.

Age	Before-Tax Salary and Bonus	Expected Annual Non- Contribu- tory Pension Benefit	Expected Annual Contribu- tory Pension Benefit	Execu- tive's Annual Contribu- tions	Expected Annual Deferred Compen- sation Benefit <sup>a</sup>
49	\$ 61,750	\$ 4,040	\$ 3,600	\$ 510	\$ 130
50	65,290	4,940	4,340	610	170
51	68,210	5,490	4,990	700	210
52	72,790	5,930	5,270	760	310
53	74,660	6,790	5,730	860	500
54	76,710	6,980	6,200	910	690
55	83,130	7,430	6,740	980	730
56	84,880	7,830	7,260	1,100	1,140
57	91,000	8,740	8,220	1,270	1,710
58	97,950	9,520	9,250	1,460	2,290
59	107,620	11,070	10,350	1,610	2,670
60	114,630	11,830	11,370	1,770	3,360
61	121,560	11,810	12,330	1,910	4,600
62 <sup>b</sup>	132,180	12,960	12,870	1,940	5,890

<sup>a</sup> The average duration of the benefit promise is nine years throughout.

<sup>b</sup> The fact that the mean age of the executives when they disappear from the sample is below 65—the normal retirement age—should not seem surprising. For one thing, even if they all did retire "on time," they would be only 64 years old during the last year of their careers, and that would be the figure we would observe. Some, of course, died prior to retiring, others retired early, and a few resigned along the way to take a job with a company not in the sample. In addition, one firm studied set retirement at age 60 for its executives, thereby contributing to a lower average. The most important factor, however, is a purely technical one: Because the compensation data examined end in 1963, there are a number of executives whose histories necessarily are terminated in midstream and who were rather younger than 65 when they were last seen.

of choices as to the values of three parameters: the discount rate used in measuring the present value to the executive of any deferred payments, the fraction of his annual earnings which were claimed as deductions and exemptions, and the amount of income he received from sources other than his corporate employer. An annual rate of 2½ per cent after taxes was taken to be the relevant discount rate for pension and deferred compensation benefits; executives' deductions and personal exemptions were put at 10 per cent of gross income through 1950 and 15 per cent

thereafter; and outside income was assumed to come to 15 per cent of before-tax salary and bonus receipts. As a test of the impact of these choices, our typical executive's career will be evaluated using first the indicated parameters and then a series of alternative assumptions. In particular, the discount rate will be doubled to 5 per cent, deductions and exemptions figures of zero and 20 per cent will be tried, and the executive's outside income set equal to zero, 25, and 50 per cent of his annual salary and bonus. Since some portion of the data listed for the first three years of his career is likely to have been estimated, additional calculations in which those estimates are varied by as much as 50 per cent will be undertaken. The results of these trials should encompass as wide a range of possibilities as need occupy us here.

### *Outcome of the Tests*

A total of thirteen sets of computations were made. The first incorporated the environmental assumptions adopted in the main body of the study. The next nine assumed different values, one at a time, for each of the three parameters at issue and for the executive's early compensation data. The last three tested several combinations of such changes designed to identify the extent to which they offset or reinforce each other. A list of the sequence of the various assumptions is presented in Table 35 and a sampling of the outcome of the calculations in Table 36.<sup>7</sup>

Changes in the absolute magnitude of the numbers generated are, of course, not our real concern since the conclusions arrived at in previous chapters have dealt with the relationships *between* the components of

<sup>7</sup> The figures used for the first three years' compensation data in trial No. 8 require some explanation. The objective was to consider the impact on the analysis of overestimates of those figures. There is, however, a limit to the amount of overstatement that can occur if we observe a steadily rising trend in the man's earnings. Once we know the actual figures for his salary, prospective pension benefits, etc., for any given year, we can be fairly confident that those which were associated with previous years were lower. Therefore, if we wish to test the effect of larger numbers than the ones listed for ages 49, 50, and 51 for our typical executive, they should not exceed their counterparts at age 52 if the test is to be meaningful. In keeping with that constraint, the decision here was simply to split the difference and adopt the resulting figures as a "50 per cent overestimate" of the data. The salary and bonus figure for age 49, for example, was set at \$67,270—halfway between the original (estimated) \$61,750 and the \$72,790 recorded for age 52. A similar procedure was adopted for the other items of compensation observed in the first three years.

TABLE 35

## Sequence of Assumptions Used in the Sensitivity Analysis Computations

Trial Number	Discount Rate (per cent)	Deductions and Exemptions (per cent of income)	Outside Income (per cent of salary and bonus)
1	2½	10% through 1950; 15% thereafter	15
2	5	Same as Trial 1	15
3	2½	Same as Trial 1	None
4	2½	Same as Trial 1	25
5	2½	Same as Trial 1	50
6	2½	None	15
7	2½	20%	15
8	All parameters as in Trial 1, but first three years' compensation data raised by one-half the difference between the recorded figures and those listed for year four (see footnote 7).		
9	All parameters as in Trial 1, but first three years' compensation data reduced by 20 per cent.		
10	All parameters as in Trial 1, but first three years' compensation data reduced by 50 per cent.		
11	5	Same as Trial 1	50
12	2½	None	None
13	2½	None	50

the pay package and with their *rates of growth*. For that reason, the results of the thirteen trials indicated may be summarized for interpretation simply by recording for each year (1) the percentages of our typical executive's total after-tax compensation which are attributable to his salary and bonus, on the one hand, and his pension and deferred compensation benefits on the other, and (2) the pattern of increases in the value of all three over time. These figures provide as much information about the influence of changes in parameters and errors in estimation as we require. The relevant comparisons are presented in Tables 37 and 38. The numbering of the trials corresponds to that of Table 35.

TABLE 36

Sample Results: Sensitivity Analysis Computations  
(dollars)

Age	Before-Tax Salary and Bonus	After-Tax Salary and Bonus	Pension After-Tax Current Equivalent	Deferred Compensation After-Tax Current Equivalent	Total After-Tax Compensation
<i>Trial Number 1</i>					
49	61,750	30,870	2,910	30	33,810
50	65,290	28,550	3,480	40	32,070
51	68,210	29,320	3,910	50	33,280
52	72,790	30,440	4,170	80	34,690
53	74,660	34,990	4,770	140	39,900
54	76,720	35,620	5,120	210	40,950
55	83,130	49,770	5,890	220	55,880
56	84,880	50,560	6,630	430	57,620
57	91,000	53,190	8,470	770	62,430
58	97,950	53,970	10,360	1,150	65,480
59	107,620	53,850	13,470	1,410	68,730
60	114,630	56,270	15,850	2,020	74,140
61	121,560	62,640	17,330	3,500	83,470
62	132,180	66,250	21,100	6,820	94,170
<i>Trial Number 2</i>					
49	61,750	30,870	2,640	20	33,530
50	65,290	28,550	3,170	30	31,750
51	68,210	29,320	3,560	30	32,910
52	72,790	30,440	3,790	50	34,280
53	74,660	34,990	4,360	100	39,450
54	76,720	35,620	4,680	150	40,450
55	83,130	49,770	5,400	160	55,330
56	84,880	50,560	6,110	310	56,980
57	91,000	53,190	7,870	560	61,620
58	97,950	53,970	9,690	850	64,510
59	107,620	53,850	12,730	1,060	67,640
60	114,630	56,270	15,050	1,540	72,860
61	121,560	62,640	16,470	2,760	81,870
62	132,180	66,250	20,150	5,530	91,930

(continued)



TABLE 36 (concluded)

Age	Before-Tax Salary and Bonus	After-Tax Salary and Bonus	Pension After-Tax Current Equivalent	Deferred Compensation After-Tax Current Equivalent	Total After-Tax Compensation
<i>Trial Number 5</i>					
49	61,750	28,150	2,480	30	30,660
50	65,290	25,490	2,960	40	28,490
51	68,210	26,080	3,320	40	29,440
52	72,790	26,950	3,510	70	30,530
53	74,660	31,570	4,040	120	35,730
54	76,720	32,060	4,330	190	36,580
55	83,130	46,310	4,920	200	51,430
56	84,880	47,020	5,580	390	52,990
57	91,000	49,450	7,150	690	57,290
58	97,950	49,650	8,670	1,030	59,350
59	107,620	49,620	11,240	1,260	62,120
60	114,630	51,740	13,250	1,790	66,780
61	121,560	57,310	14,410	3,100	74,820
62	132,180	60,440	17,440	6,010	83,890
<i>Trial Number 7</i>					
49	61,750	35,370	3,000	30	38,400
50	65,290	33,830	3,620	40	37,490
51	68,210	34,860	4,090	50	39,000
52	72,790	36,470	4,370	80	40,920
53	74,660	40,710	5,030	150	45,890
54	76,720	41,530	5,420	220	47,170
55	83,130	54,810	6,210	230	61,250
56	84,880	55,710	7,010	450	63,170
57	91,000	58,860	8,940	790	68,590
58	97,950	57,500	10,920	1,180	69,600
59	107,620	57,980	14,230	1,450	73,660
60	114,630	60,690	16,790	2,080	79,560
61	121,560	67,200	18,360	3,620	89,180
62	132,180	71,400	22,490	7,060	100,950

TABLE 37

After-Tax Salary and Bonus as a Per Cent of Total After-Tax Compensation: Sensitivity Analysis for a Typical Executive

Trial Number	Executive Age													
	49	50	51	52	53	54	55	56	57	58	59	60	61	62
1	91	89	88	88	88	87	89	88	85	82	78	76	75	70
2	92	90	89	89	89	88	90	89	86	84	80	77	76	72
3	91	89	88	87	87	86	88	87	84	82	77	74	73	68
4	92	89	88	88	88	87	90	88	86	83	79	77	76	71
5	92	89	89	88	88	88	90	89	86	84	80	78	77	72
6	90	87	86	86	86	86	89	87	85	80	76	73	73	68
7	92	90	89	89	89	88	90	88	86	83	79	76	75	71
8	90	89	88	88	88	87	89	88	85	83	78	76	75	70
9	92	90	89	87	87	87	89	88	85	82	78	76	75	70
10	92	90	90	87	87	86	88	87	85	82	78	76	75	70
11	93	91	90	89	89	89	91	90	88	85	81	79	78	74
12	90	87	86	85	86	85	88	86	84	79	74	71	70	65
13	91	88	87	86	87	86	90	88	86	81	77	74	74	69

Looking first at Table 37, we see that there is remarkably little change in our assessment of the significance of deferred and contingent rewards in the pay package regardless of the values chosen for the several parameters. The percentages observed fall within a very narrow range in all cases where only one parameter is changed from its original value (trials 2 through 7), and the figures recorded for trial 1, which incorporates the assumptions actually used in the study, consistently fall midway between the extremes of that range. A similar conclusion emerges from the calculations (trials 8 through 10) which involve revisions in the compensation data listed for the first three years of the man's career: the percentage composition of the pay package is virtually unaffected.

The circumstances which produce the most noticeable change in the percentages are exemplified by trials 11 and 12. For the former, the assumptions built into trials 2 and 5 were combined and for the latter, those from trials 3 and 6—the objective in each instance being to put

TABLE 38  
Growth in After-Tax Rewards: Sensitivity Analysis for a Typical Executive

Trial Number	Salary and Bonus			Pension and Deferred Compensation			Total Compensation		
	Value at Age 53	Value at Age 62	Ratio	Value at Age 53	Value at Age 62	Ratio	Value at Age 53	Value at Age 62	Ratio
1	\$34,990	\$66,250	1.89	\$4,910	\$27,920	5.68	\$39,900	\$ 94,170	2.36
2	34,990	66,250	1.89	4,460	25,680	5.76	39,450	91,940	2.33
3	36,720	69,280	1.89	5,470	32,230	5.89	42,190	101,510	2.41
4	33,940	64,500	1.90	4,630	25,970	5.61	38,570	90,470	2.35
5	31,570	60,440	1.91	4,160	23,440	5.63	35,730	83,880	2.35
6	29,100	50,470	1.73	4,620	23,940	5.18	33,720	74,410	2.20
7	40,710	71,400	1.75	5,170	29,540	5.71	45,880	100,940	2.20
8	34,990	66,250	1.89	4,850	27,860	5.75	39,840	94,110	2.36
9	34,990	66,250	1.89	5,070	28,070	5.53	40,060	94,320	2.35
10	34,990	66,250	1.89	5,350	28,330	5.29	40,340	94,580	2.34
11	31,570	60,440	1.91	3,730	21,480	5.75	35,300	81,920	2.32
12	31,050	54,040	1.74	5,280	28,970	5.49	36,330	83,010	2.28
13	25,260	43,420	1.72	3,800	19,200	5.05	29,060	62,620	2.15

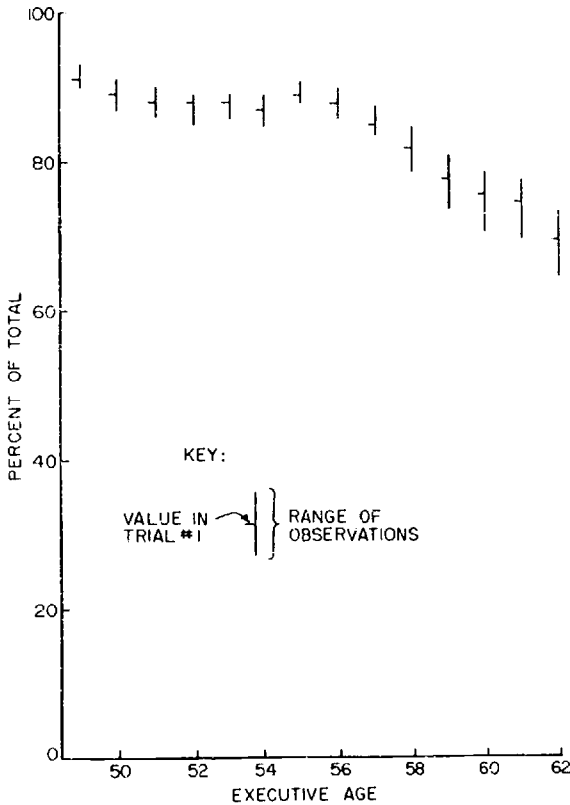
together a set of conditions whose effects on the analysis seemed likely to be in the same direction. Even at that, the numbers generated are not significantly different from those of trial 1, and the assumptions involved describe a pair of compensation environments which must certainly be near the fringes of reasonableness. In the one case, the executive is assumed to have outside income equal to fully half his pretax salary and bonus and to be able to realize 5 per cent per annum *after taxes* on investments which are in the same category of risk as government bonds; in the other, there is no outside income of any kind and the man claims no deductions or exemptions from taxable income in computing his personal tax liability. Finally, trial 13 was made as a test of the degree to which changes in parameters which have opposite effects on the analysis when taken singly will operate to offset each other when combined. The assumptions adopted for trials 5 and 6 (no deductions and exemptions but outside income amounting to 50 per cent of salary and bonus) were superimposed. As would be expected, the results are much like those obtained in trial 1.

In comparing the various sets of figures to trial 1, it is worth noting that in those instances where a change in assumptions does give rise to a slight difference in our appraisal of the percentage composition of the pay package, the difference is almost invariably maintained *throughout* the fourteen-year period examined. Therefore, even if there are some minor discrepancies in the data due to errors in estimation or in choosing the values of the relevant parameters, those errors will have little impact on perhaps the most important conclusion suggested by the present study: the extent to which there has been a shift in emphasis within the executive compensation package over time toward a greater reliance on deferred and contingent rewards. That shift is clearly identified in all thirteen trials and has essentially the same dimensions in each. Chart 28 summarizes the comparisons.

Further support for these assertions is offered in Table 38, which indicates the rate of growth in the value of the typical executive's after-tax remuneration under the assumptions listed above. The calculations use as a base the compensation figures for the year when the executive is age 53 in order to make it possible to compare the results of the thirteen trials, since several of them specify changes in the magnitude of the man's rewards during the early years of his career. Obviously, if the

CHART 28

*Sensitivity Analysis Results: Salary and Bonus as a Percentage of Total After-Tax Compensation*



original data for ages 49, 50, and 51 are revised, any time series based thereon will be affected. Our interest, however, is in the impact of such revisions on an evaluation of the man's compensation over the *last ten* years depicted because, as we saw, it was during that period that he occupied one of the five highest-paid executive positions in his firm. The interval from age 53 through age 62 is therefore the pertinent one.

It is clear from the tabulations that the pattern of growth in the value of the several rewards changes very little in response to the indicated changes in assumptions. Variations in the discount rate (trial 2), in the amount of outside income (trials 3 through 5), and in the early com-

compensation data (trials 8 through 10) have a negligible impact. They apparently alter the value of all three elements of the pay package to just about the same extent in every year and thereby leave the historical profile intact. Changes in the deductions and exemptions percentage (trials 6 and 7) produce slightly more pronounced effects, but the latter are noteworthy only by comparison. For example, the fact that the ratio of our typical executive's aggregate after-tax remuneration at age 62 to that at age 53 falls from 2.36 in trial 1 to 2.20 in trials 6 and 7 implies a decline in the compound annual rate of growth between the two years of just  $\bar{r}_{10}$  of 1 per cent—from 9.5 to 8.8 per cent.<sup>8</sup> At that, the deductions and exemptions figures adopted for the tests represent extreme situations, and, even if relevant for certain individuals, their influence may well be offset by errors in the opposite direction in other parameters. Some evidence of this is offered by the results of trials 11 and 12, for which, as before, the values of two parameters were changed simultaneously. Interestingly enough, the particular changes involved were chosen originally because their effects on an analysis of the percentage composition of the pay package seemed likely to—and in fact did—reinforce each other. It turns out, however, that the same combinations of changes have offsetting effects insofar as rates of growth are concerned. Trial 13 illustrates the reverse phenomenon.

Despite some minor variations of this sort, the results of the thirteen trials are quite similar. If there is any one characteristic of the data which stands out, it is the tendency for most changes in the parameters to produce time series which define a lower rate of growth in the value of the pay package than that outlined by trial 1. It would appear, then, that if there have been errors made in specifying the magnitude of those parameters, they have been predominantly in the direction of *overstating* the secular increase in the compensation of the executives who comprise

<sup>8</sup> The difference between these rates and the approximately 3 per cent per annum recorded in Chapter 8 for the entire sample is, of course, due to the concentration here on a single individual's career. During the ten years when he is one of his firm's top five officers, he is likely to be moving to a succession of higher positions, and his remuneration can be expected to grow more rapidly than that associated with any one of the offices he holds. Since the data in Chapter 8 were cast in terms of the developments within the same position over time, it is not surprising to find that the rates of growth observed there were lower.

the sample. Such errors would only strengthen the majority of the conclusions which were drawn above from the experience of that sample.<sup>9</sup>

### *Stock Options*

The same arguments can be made in connection with executive stock options. Of the 558 individuals whose compensation histories were examined, 221 (40 per cent) were granted at least one option. Since there were a total of 518 different grants observed, the average was slightly in excess of two per person. All but a very small percentage occurred after 1950. The aggregate after-tax remuneration produced amounted to some \$80.5 million, or approximately \$364,000 for each recipient.

It will be recalled that one feature of the valuation techniques employed in generating these figures was a stipulation that negative current equivalents were ruled out. Even if the pattern of annual changes in the value of a particular individual's option(s) was such as to dictate that in a given year an assessment should be made against his salary and bonus in order to "recoup" some portion of the current equivalents previously credited to him, that assessment was not recorded. Instead, the combined current equivalent of his options for the year was set equal to zero, the argument being that in practice this would almost certainly be the lower limit of any such arrangement.<sup>10</sup> Since it requires a fairly severe decline in common stock prices to create situations of this sort, the contention was that the results of an empirical analysis of executives' experiences with options would not be affected very greatly if the procedure described were adopted. A tabulation of the number of cases in which a negative current equivalent for an executive was indicated, but ignored, supports this claim: The total of \$80,505,000 in stock option current equivalents would have been reduced by only \$650,000—by  $\frac{8}{10}$  of 1 per cent—had negative values actually been taken into account.<sup>11</sup>

<sup>9</sup> See especially, Chapters 8 and 9.

<sup>10</sup> See Chapter 4.

<sup>11</sup> It should be stressed, however, that this result depends heavily on the particular time period under consideration. Had the general trend of stock prices since 1950 not been so favorable, negative stock option current income equivalents would have been much more of a problem here.

## A "TYPICAL" STOCK OPTION HISTORY

As was true of pensions and deferred compensation arrangements, the most efficient method for determining the impact of changes in tax rates and opportunity costs on stock option rewards is to concentrate on an appraisal of the experience of a "typical" executive. In addition, stock options have been such an important—and controversial—source of managerial remuneration in recent years that a description of the circumstances surrounding the average recipient among the senior officers of large manufacturing firms is of more than passing interest in its own right. That profile will once again be drawn in terms of the *mean* values for the sample.

The typical optionee was granted an option on two different occasions. The first such occasion was in 1954 and the age of the executive just under 54 years. The mean option price was exactly \$52, a figure which represented approximately 97 per cent of the then-market price of the optioned stock. The arrangement conferred the right to purchase a total of 7,337 common shares of the employer corporation, and the average term of the option was seven years.<sup>12</sup> A second grant typically followed three years later. It covered 4,444 shares at a mean option price \$35.18 higher than that of its predecessor, but was also seven years in duration.

In over 90 per cent of the cases studied, the executive exercised each of his options in full within four years of the date of granting. This pattern did not vary significantly among successive grants to the same individual. The usual situation consisted of the exercise of approximately 62 per cent of the option during the third year of the contract and the remainder during the subsequent year. By combining these observations with the history of stock price movements under the various arrangements, we may describe the experience of a typical option recipient as follows:

<sup>12</sup> The last figure is somewhat lower than might be anticipated on the basis of the nominal option term of ten years which was chosen by most firms in the sample. The difference is explained primarily by the fact that a great many options were granted to individuals who at the time had fewer than ten years of employment remaining until retirement. For them, the effective term of the option was shorter than the nominal period specified, since their rights expired at age 65.



## OPTION NUMBER 1

Granted	1954
Executive age	54 years
Number of shares	7,337
Option price	\$52 per share
Term	7 years

*Stock Price and Exercise Data:*

Year	End-of-Year Stock Price	Number of Shares Exercised	Market Price at Exercise
1954	\$ 56.80	—	—
1955	65.10	—	—
1956	72.15	—	—
1957	91.98	4,549	\$ 81.79
1958	100.61	2,788	100.55

## OPTION NUMBER 2

Granted	1957
Executive age	57 years
Number of shares	4,444
Option price	\$87.18 per share
Term	7 years

*Stock Price and Exercise Data:*

Year	End-of-Year Stock Price	Number of Shares Exercised	Market Price at Exercise
1957	\$ 91.98	—	—
1958	100.61	—	—
1959	107.33	—	—
1960	127.16	2,755	\$116.97
1961	135.79	1,689	135.73

If some of the later stock prices listed seem high as compared with the range in which most corporations' shares are traded, it is because the data incorporate an adjustment for stock splits and stock dividends. All prices are expressed in terms of the equivalent of one share of stock outstanding as of the date of the *first* option grant.

## SENSITIVITY ANALYSIS

The issue, then, is whether the results of an analysis of the compensation provided by these options are affected very greatly by changes in assumptions about executives' personal tax circumstances and market opportunities. As we saw, such assumptions take the form of specifying just two parameters: the tax rate applicable to the profits realized, and the discount rate used in calculating the present value of the appropriate stream of "current income equivalent" payments.<sup>13</sup> A figure of 15 per cent was chosen for the former. This was an estimate of the extent to which the statutory 25 per cent capital gains rate would be softened in practice by the deferral of the tax, by the tax savings attributable to the additional deductions and exemptions which option profits seemed likely to give rise to, and by the possibility that some executives would avoid the tax entirely by passing on the shares acquired in their estates. Similarly, historical evidence as to the average rates of return obtained from investments in common stocks suggested 5 per cent per annum after taxes as a reasonable discount rate.

With only these two parameters to contend with, a sensitivity analysis of the option experience depicted is easily accomplished. The task is made easier by the fact that the impact of changing one of the parameters can be predicted exactly: because the tax rate chosen enters into all computations of the actual and prospective rewards associated with options as a scale factor, the numbers generated by the valuation procedures adopted are simply a linear function of that choice. Thus, if the 15 per cent rate actually employed were changed to 20 per cent, the current income equivalents of the stock options received by every executive in the sample would be reduced to 80/85 of their original values.<sup>14</sup> The implication for a sensitivity analysis therefore is clear. The higher the tax rate assumed, the lower the remuneration credited to options.

It is also true, however, that the range of meaningful assumptions is sufficiently narrow that the possible effects of changes therein on the empirical results cannot be very great. For example, it was reported in Chapter 8 that stock options accounted for some 27 per cent of the aggregate after-tax remuneration enjoyed during the years 1955 through

<sup>13</sup> See Chapter 4.

<sup>14</sup> See below, Table 39, for confirmation.

1963 by the five highest-paid executives in each of the fifty corporations studied. Had the tax rate on option profits been set at 20 instead of 15 per cent, their share of the total pay package would have fallen to 26 per cent over the same period<sup>15</sup>—a decline which does not seem large enough to cast much of a shadow on any conclusions reached above. Similarly, the resulting change in tax assessments would have lowered the compound annual rate of growth in total after-tax compensation between 1940 and 1963 only from 3.34 to 3.27 per cent. A decrease in the tax rate to 10 per cent would, of course, produce equal but opposite effects. Since the “true” rate must lie somewhere between zero and 25, the numbers generated by the 15 per cent figure chosen for the study cannot be far wrong.

The consequences of changing the discount rate used in the calculations are less predictable, but turn out to be no more pronounced. Table 39 records the current income equivalents derived from our typical executive's stock option experience under the assumption first of a 5 per cent per annum after-tax opportunity cost and then a figure of 10 per cent. The differences between the two “total” columns each year indicate that doubling the discount rate increases the calculated value of the remuneration provided by the option some 6 per cent. Since this is about the extent of the change that would ensue were the tax rate raised to 20 per cent, the level of our concern with the sensitivity of the empirical results should be similar. Indeed, if both parameters are revised simultaneously, their effects pretty well cancel, as the third set of figures in Table 39 illustrates.<sup>16</sup> In any event, it would require a greater change in the relevant discount rate than that considered here to significantly alter the outcome of the computations. Figures in excess of 10 per cent per annum after taxes do not, however, appear very meaningful.

### *Summary*

Insofar as assumptions about corporate executives' personal circumstances have been required by the valuation techniques developed in

<sup>15</sup> That is, to the fraction  $(80/85)/[0.73 + (80/85)(0.27)]$  of the original figure of 27 per cent.

<sup>16</sup> Consistent with the arguments made above, each of these numbers is precisely 80/85 the size of its counterpart in the second trial.

## EXECUTIVE COMPENSATION

TABLE 39

## Sensitivity Analysis of Stock Option Rewards

Executive Age	After-Tax Current Income Equivalents (dollars)		
	Option No. 1	Option No. 2	Total
<i>Trial number 1: Discount rate = 5 per cent. Tax rate = 15 per cent</i>			
55	5,095	—	5,095
56	15,100	—	15,100
57	25,020	—	25,020
58	47,238	3,114	50,352
59	52,461	9,466	61,927
60	52,461	15,232	67,693
61	52,461	28,690	81,151
62	—	31,755	31,755
63	—	31,755	31,755
64	—	31,755	31,755
Totals	249,836	151,767	401,603
<i>Trial number 2: Discount rate = 10 per cent. Tax rate = 15 per cent</i>			
55	5,767	—	5,767
56	16,877	—	16,877
57	27,678	—	27,678
58	50,693	3,522	54,215
59	54,385	10,572	64,957
60	54,385	16,848	71,233
61	54,385	30,766	85,151
62	—	32,875	32,875
63	—	32,875	32,875
64	—	32,875	32,875
Totals	264,170	160,333	424,503
<i>Trial number 3: Discount rate = 10 per cent. Tax rate = 20 per cent</i>			
55	5,428	—	5,428
56	15,884	—	15,884
57	26,050	—	26,050
58	47,711	3,315	51,026
59	51,186	9,950	61,136
60	51,186	15,857	67,043
61	51,186	28,956	80,142
62	—	30,941	30,941
63	—	30,941	30,941
64	—	30,941	30,941
Totals	248,631	150,901	399,532

preceding chapters, the contention has been that the results of applying those techniques should not depend heavily on the particular assumptions made. An appraisal of a representative compensation history supports this claim. Wide variations in the values of the parameters which characterize the compensation environment do not produce important changes in the conclusions reached. The impact of those variations is cushioned by the design of the current income equivalents offered and by the emphasis throughout on the relationships between rewards rather than on their absolute magnitudes.