Historical Trends in Executive Compensation 1936-2003

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Abstract

Soaring executive compensation during the past two decades has sparked an interest in CEO and other top management pay. We add a long-term perspective to this trend by constructing the first panel dataset to follow the compensation of top executives in large firms from 1936 to the present. The average real value of total compensation experienced three distinct phases: a sharp decline during World War II, a modest and gradual increase from the mid-1940s to the 1970s, and a high and accelerating growth rate in the 1980s and 1990s. The structure of executive pay has undergone a steady transformation during the past fifty years, as stock options and long-term incentive payments have become a larger share of compensation over time. To explain the trends in the level and structure of pay, we assess the contributions of tax policy and the growth in the market value of firms. We find that executives facing larger cuts in marginal income tax rates had larger reductions in stock option grants during the 1960s, revealing that tax policy influenced the composition of managerial pay. High income taxes also limited the total value of compensation by changing the correlation of pay with the market value of firms. Our simulation results suggest that, had taxes been at their low 2000 level throughout the past 60 years, compensation would have been 35 percent higher during the 1950s and 1960s. Hence, progressive taxation in the past restrained managerial compensation from keeping pace with the growing size of firms.

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1. Introduction

The compensation of top executives increased by 6.8 percent per year from 1980 to 2003, stimulating a large interest in the determinants of managerial pay. Despite the substantial body of empirical research based on the past two decades, far less is known about the compensation arrangements of corporate officers prior to the 1980s. This paper sets forth the long-run trends in the level and composition of executive pay, providing a foundation for understanding the evolution of the market for corporate managers. A historical perspective adds insight into the determinants of compensation because it permits a new assessment of the effects of tax policy and the performance of firms on executive pay. Studies using recent data are constrained by a small degree of variation from which to identify these effects. Over a longer time span, however, the stock market has experienced periods of both strong and weak market performance, and tax policy has undergone much larger changes. By constructing a new panel dataset on the compensation of top corporate officers from 1936 to 2003, we examine the roles of these factors in explaining the evolution of executive pay.

Previous researchers studying managerial pay in earlier decades focused on short periods.[1] Because each study has used a different sample design and employed a different methodology to value the components of compensation, they cannot provide a consistent description of how executive compensation has changed over time. To examine the long run evolution of managerial pay, we have constructed the first comprehensive panel dataset on executive compensation that spans most of the twentieth century. This information is collected from proxy statements and 10-K reports of

[1] A few examples include Baker (1938), Roberts (1959), Lewellen (1968), and Wattel et al. (1978), Murphy (1985).

publicly-traded firms, which have been required to disclose the compensation of top officers ever since the Securities and Exchange Commission (SEC) was established in 1934.

We begin by presenting the central facts on the longer run trends in executive compensation from 1936 to 2003. After a sharp decline in the average real value of pay during World War II, compensation grew at a sluggish rate of 0.8 percent per year during the following 30 years. This stability is particularly surprising in view of the economic prosperity of the 1950s and 1960s, because more recent decades have witnessed a much stronger positive correlation between the level of pay and the market value of firms (Hall and Murphy 2003, Jensen and Murphy 2004, Bebchuk and Grinstein 2005). Another significant trend in managerial compensation has been the use of executive stock options, which have risen as a fraction of average compensation in every decade from the 1950s to the present.

To explain the evolution in the level and structure of pay, we examine the contributions of the stock market and tax policy. Earlier in the 20th century corporate executives faced exceedingly high marginal personal income tax rates, which created an incentive for firms to search for alternative ways to remunerate top executives. The widespread adoption of restricted stock options directly after the passage of the 1950 Revenue Act suggests that compensation arrangements were highly responsive to tax policy. Moreover, we find that the share of stock options in total compensation declined following the 1964 and 1969 tax cuts. In contrast to studies using recent data (Goolsbee 2000, Hall and Liebman 2000), these findings indicate that for sufficiently large differentials in tax rates, the structure of managerial contracts is sensitive to tax policy.

If firms cannot get around the effect of taxes by offering alternatives that are equally valued by executives, high income taxes will also limit the total value of remuneration. By constraining the level of pay, high marginal tax rates may alter the correlation between compensation and the market value of firms. We find that when tax rates are higher, a given increase in the market value of firms results in a smaller increase in the real value of executive compensation. Simulation results suggest that had taxes throughout the past 60 years been at their low 2000 level, compensation during the 1950s and 1960s would have been 35 percent higher. Progressive taxation, therefore, restrained managerial compensation from keeping pace with the growing size of firms.[2]

While high tax rates help to explain why executive compensation was relatively low in the past, changes in tax policy can account for only about 30 percent of the growth in compensation from 1946 to the present. Thus, a number of other factors also have influenced changes in the compensation arrangements of top officers over time. Among other explanations, corporate governance, social norms, the market for corporate control, and the labor market for executives, may have contributed to the evolution of executive compensation (Bebchuk, Fried and Walker 2002, Bebchuk and Fried 2004, Piketty and Saez 2003, Bertrand and Mullainathan 1999, Bertrand and Mullainathan 2001, Murphy and Zábojník 2004).

2. Executive compensation data

2.1 Sources of data on executive pay

[2] Piketty and Saez (2003) suggest that progressive taxation may have contributed to the lack of recovery of large fortunes from the 1940s to the 1970s. Our results for the labor income of top executives provide some empirical support for their claim.

In the early 20th century compensation practices were closely guarded secrets and consequently only scattered historical evidence exists on executive salaries.[3] Revelations regarding executive pay first occurred during World War I, when railroad corporations became managed by the federal government and the exorbitant salaries of railroad officers were exposed. Public scrutiny intensified during the 1920s, when the compensation of railroad and banking executives were published in the popular press.[4] By the early 1930s, the controversy surrounding the level of pay had extended to executives in all businesses. As the economy slipped into the Depression, the nation became increasingly troubled by the "lavish stipends and bonuses" accruing to the managers of large public corporations.[5] Prompted by these concerns, the Reconstruction Finance Corporation, the Federal Trade Commission, and several other institutions requested information on the compensation of officials in firms under their respective jurisdictions.[6] These dispersed efforts to monitor the compensation practices of major corporations were centralized with the establishment of the Securities and Exchange Commission (SEC) in 1934.

Created to enforce the Securities Exchange Act of 1934, the SEC was put in charge of the disclosure of data by firms participating in the securities market, thereby regulating corporate finance (Seligman 2003). Disclosure of information related to the

[3] Court records are a possible source of information for this period, because they occasionally reveal the remuneration of corporate officers (Baker, 1938). Alternatively, one could rely on payroll records from individual firms.

[4] See, for example, "Explains Big Salary of Railroad Head. Charles Frederick Carter Says Competent President Earns it Many Times," *New York Times*, December 24, 1922; "Comptroller Seeks Salary Data From National Banks," *Wall Street Journal*, February 25, 1921; "Commerce Commission Goes Into Executives' Salaries," *Wall Street Journal*, December 23, 1922; "They Earn Their Salaries," *Wall Street Journal*, February 27, 1923.

[5] "Inquiry Into High Salaries Pressed by the Government," *New York Times*, October 29, 1933.

[6] For example, the Federal Trade Commission was directed to collect information on the salaries of executives from the companies listed in the NYSE in 1933 (Senate Resolution No. 75, Seventy-third Congress).

remuneration of executive officers and directors was intended to deter managers from engaging in wrongful behavior and mismanaging corporate assets (Loss and Seligman 1995). Thus, the inception of the SEC has made executive compensation data available to the public from the 1930s to the present.

Because SEC disclosure requirements have not meaningfully changed over the years, corporate reports provide a valuable resource for tracking the components of compensation in a consistent manner.[7] Proxy statements report information on the remuneration paid to each of the top officers in the firm, including salaries, bonus payments, and stock options. Moreover, these reports also contain detailed descriptions of incentive compensation and stock option plans, providing a useful insight into the reasons for granting different types of compensation. We take advantage of this rich source of data by collecting information on the compensation of top officers in large corporations from 1936 to the present.[8]

The detailed information available in proxy statements allows us to value stock options granted at all points in time in a manner consistent with current research. Thus, we can compare the use of stock options in the 1950s and 1960s with options granted in recent decades. Because gains from stock options prior to the 1970s were not generally taxed as income and consequently not recorded on personal income tax returns, tax returns may provide a biased estimate of the incomes of top earners.[9] Further benefits of

[7] Proxy statements have been used by previous researchers, but not to construct a long-term series of executive compensation. Among others, see Roberts (1959), Lewellen (1968), Yermack (1995), and Hall and Liebman (1998).

[8] While corporations were required to disclose the compensation of top officers in 10-K reports since 1934, many firms were reluctant to do so in the beginning and sent the information separately to the SEC. By 1936 most of the firms included data on remuneration in these reports, and so we start our sample in that year.

[9] Tax returns have been a primary source of information on the incomes of top earners. For example, see Piketty and Saez (2003).

our dataset are that it allows us to examine pay differentials within the firm and to track pay changes for individual executives over time.

2.2 Sample selection and data collection

Our sample includes the compensation of individual officers in the largest 50 publicly-traded corporations ranked according to the value of sales in 1940, 1960 and 1990, which amounts to a total of 102 firms.[10] For each firm selected according to this criterion, we include annual data for as many years as our sources would allow from 1936 to 2003. When a firm in our sample merges with a firm outside of the sample, we continue to follow the executives in the merged firm if the new firm retains the same name or if the industrial classification of the new firm is the same (see the appendix for details). In this manner, we construct an unbalanced panel dataset as companies enter and leave the sample at different points in time.[11] By selecting firms that were large at different points in time, our sample reflects many of the structural changes that were experienced by the economy over the 70-year period. Although this sample is not representative of the economy as a whole, it comprises about 38 percent of the market value of the S&P 500 during the sample period. This share is as large as 50 percent in the 1940s and falls to about 20 percent by the 1990s.[12] Because the sample includes all of the available years for each firm instead of only the largest firms in each 20-year period, our sample is more broadly representative of publicly-traded firms as opposed to reflecting only the largest

[10] Because there is no available series on the value of sales for all public corporations, we ranked firms according to market value in 1940.

[11] Firms enter the sample when they go public or when corporate records become available in the collection at the Baker Library of Harvard Business School (our main source of corporate reports). Companies exit the sample as they go bankrupt, become private, or are acquired by a foreign company, among other reasons.

[12] All of the trends presented in this paper are robust to including only enough firms to form a constant fraction of the market in each year (see Appendix Table A3).

companies (see Table 1). On the other hand, the sample does not reflect the compensation practices of small or private firms.

The data from 1936 to 1991 are collected from proxy statements and 10-K reports. We supplement this information with data from Compustat's Executive Compensation database, which is available electronically from 1992 to 2003. Compustat is also based on firms' proxy statements, so these data are comparable to the information collected for the earlier years. The majority of the sample firms (75 percent) are in manufacturing, including a large fraction of automobile producers, airplane manufacturers and oil companies. Our sample also contains communications, public utilities, and retail companies. Appendix Table A1 shows the distribution of firms by 2-digit SIC code, and Appendix Table A4 gives a complete list of the firms in our sample.

Basic descriptive statistics of our dataset are shown in Table 1. Our sample contains more than 15,000 executive-year observations between the years 1936 to 2003, for a total of 2,694 individuals. Although we have collected data on the five highest paid officers in each firm whenever possible, in this paper we limit the sample to the top three officers because firms were only required to report information on the top three prior to 1978.[13] The data appendix provides a more detailed description of the sample selection and data collection methodology, and Appendix Table A3 presents summary statistics by decade for alternative samples.

As suggested by their job titles, the executives in the sample held the greatest decision-making power in the firm (see Table 2). More than 47 percent of the officers

[13] Corporations are required to disclose the compensation of only the highest paid officers. The reporting requirements regarding the number of employees whose pay had to be reported has varied over time, and so we limit the sample to the highest three to have a consistent number of top managers in each firm over time. The data appendix provides a more detailed description of changes in these requirements.

held the title "CEO," "president," or "chairman of the board." Other frequently observed job categories are "executive vice-president" and "vice-president."[14] Another indication of the importance of the individuals in our sample is that more than 8 out of 10 officers also served on the board of directors.

Proxy statements contain detailed data on several components of executive pay, including salaries, current and long-term bonuses, and stock options. Using this information, we provide consistent time series evidence on the absolute and relative level of executive compensation from the 1930s to the present.

Our current analysis does not include information on two components of pay: pensions and perquisites. Although proxy statements provide descriptions of pension plans, we are unable to estimate the value of these benefits because many plans were based on an age-tenure profile of the managers and we lack information on employment tenure and personal characteristics for most of the executives in the sample.[15] Perquisites are excluded because firms were not required to report information on this type of pay until the late 1970s. However, it is unlikely that the presence of these components of pay would change our main conclusions, as the value of pensions and perks would need to have been extraordinarily high in the 1950s and 1960s to alter the trends documented in this paper.

3. Total compensation

[14] Over time, there have been important changes in the job titles assigned to top officers. The title "chief executive officer" was not commonly used before the 1970s, and presidents and/or chairmen of the board fulfilled the functions of CEOs earlier in the century (Mace, 1971). Other titles that became more prevalent over time are CFO and COO.

[15] Moreover, Compustat does not provide information on contributions to retirement plans, and so we would not be able to construct a consistent series on pensions that extended into the 1990s.

3.1 Average real value of total compensation

The average and median real value of total compensation from 1936 to 2003 are given in Figure 1.[16] Total compensation is measured as the sum of salaries, bonuses, long-term incentive payments, and the Black-Scholes value of stock option grants. The long-run trend reveals three distinct phases over the course of the twentieth century. First, the average real value of total compensation experienced a sharp decline of more than 20 percent during World War II. Next, there was relative stability: executive pay remained constant until the 1950s, and then increased but only gradually during the next 30 years.[17] Finally, the compensation of top officers began to increase at a faster pace during the 1980s and 1990s. The growth of average (median) executive pay was about 0.8 (0.7) percent per year from 1946 to 1976, but it grew at 6.5 (5.3) percent per year from 1976 to 2003.

The profound contraction in the real value of pay that was experienced during the war period is hardly surprising, as nominal wage and salary controls established during the war combined with a rising price level during this time (Young 1956, Rockoff 1984).[18] Prior to 1942, only about 15 percent of the executives in our sample received the same nominal amount of compensation as in the previous year. In contrast, the nominal level of pay remained at the level of the previous year for more than 25 percent

[16] Real values are measured in year 2000 dollars using the Consumer Price Index. Detailed statistics by decade are presented in Appendix Table A3.

[17] The increase in executive pay during this period was only interrupted by a sharp but very short-lived decline in total compensation in the early 1970s, coinciding with a sharp increase in inflation, a downturn in the stock market, and salary controls introduced by Nixon to control inflation.

[18] As described in section 4.1, almost all of the compensation of top officers was accounted for salaries and current bonuses during this period. Thus, constraints on the level of salaries translated into rigidity of total compensation.

of the sample during the years 1943 to 1945. Nominal rigidities declined after the war, and the fraction of executives with constant compensation returned to its pre-1940 level.

If government wage and salary controls acted to limit the growth in executive compensation during the war, then it would be natural to expect a rebound of the level of pay when controls were lifted.[19] But that did not happen. Instead, the average real value of total compensation increased at a slow pace in the post-war period. It took more than 25 years (until 1972), for executive pay to recover its pre-war real level. Despite the slow growth of average compensation, individual executives did experience real gains in remuneration. The average annual change in compensation for individual officers was 4.1 percent (the median was 1.7 percent) from 1946 to 1975. Thus, compositional changes contributed to the slow pace of average compensation growth as the highest-paid executives were replaced with managers earning lower salaries (see Table 3).

After about 30 years of relative stability, the growth in average level of total compensation began to accelerate. From a pace of 3.1 percent per year during the 1970s, the real value of executive compensation rose by 5.6 percent in the 1980s and 18.5 percent in the 1990s. By the end of our sample in 2003 the real level of total compensation was more than 5.5 times higher than it had been in 1940. As with the earlier period, the gains accruing to individual officers during this time were greater than those implied by growth in the average level. While average compensation increased at an annual rate of 6.3 percent from 1975 to 2003, the average (median) annual change in compensation for individual officers was 9.3 (7.0) percent.

[19] Although wage and price controls may have been maintained for some time after the war, they were probably less effective than during wartime (Goldin and Margo 1992).

Trends in the average level of compensation might conceal differences across groups of executives and thus we investigate how the distribution of income among managers changes across the century. Compensation growth at the 10th, 25th, 50th, 75th and 90th percentiles of the executives in our sample shows broadly similar patterns (Table 4). One exception is the decline in real compensation that occurred during the 1940s, which was experienced only by executives at the higher end of the distribution. Thus, the period was marked by a sharp compression in the distribution of income among executives, suggesting that the "Great Compression" (Goldin and Margo 1992) occurred even among some of the highest-paid individuals in the nation. The most highly-paid executives also experienced faster compensation growth during the 1980s and 1990s. By 2003, the executive at the 90th percentile earned about 11 times more than the executive at the 10th percentile, more than twice the ratio prior to the war.

The distribution of compensation across executives reflects variation both between and within firms. About 2/3 of the total variation in compensation in our sample can be attributed to between-firm variance, as larger firms pay on average higher salaries.[20] To examine differences in pay within the firm, Table 5 compares the compensation of the highest-paid executive in each firm to the compensation of the 3rd and 5th highest-paid executives, and CEO pay relative to the average compensation of the two highest-paid officers other than the chief executive.[21] Following a sharp decline during the war period, within-firm inequality experienced a slow but steady compression

[20] The positive correlation between firm size and executive pay has been well-documented. See Lewellen and Huntsman (1970), Kostiuk (1989), and Rosen (1992), among others.

[21] We focus on comparisons of officers by income rank because job titles have not been consistently used over time. The highest-paid individual held the job title of president 47 percent of the time, chairman of the board 50 percent of the time, and CEO 39 percent of the time. 67 percent of the 3rd highest paid individuals were either an executive vice president or vice president, while 58 percent of the 5th highest paid officers held the title of executive vice president or vice president. When examining relative CEO pay, we identify the CEO as the president of the company in firms where the title "CEO" is not used.

until the 1970s. Disparities in compensation within the firm began to increase in the 1980s, and have widened significantly in the past 13 years. The remuneration of the highest-paid officer compared to the 3rd highest in the year 2000 was about 25 percent higher than in the pre-war period. Although top executives have gained more in recent years than the other officers in the firm, the increase in inequality within the firm was smaller than the overall widening in the distribution of compensation among the executives in our sample.

In summary, we find a U-shaped pattern in the average real value of executive compensation.[22] The most surprising aspect of this trend is the considerable stability in managerial compensation during the 1950s and 1960s, which contrasts sharply with the strong growth of firms and the performance of the economy during this period. To illustrate, we calculate the average compensation of the three highest-paid officers in each firm in our sample relative to the market value or total value of sales of that firm. The median of these ratios (indexed to 1 in 1936) in each year are shown in Figure 2. Executive compensation declined steadily relative to both market value and sales from the 1940s to the 1960s. The trends diverged during the 1970s, when the ratio of pay to market value increased while compensation relative to total sales continued to decline.[23] Although executive pay began to grow at a faster rate than the size of firms in the 1990s,

[22] One explanation for lower levels of pay in earlier decades is that executives may have received a larger fraction of compensation in other forms of remuneration such as pensions and perquisites. However, a simple back-of-the-envelope calculation suggests that the value of these benefits is too small to account for the increase in the level of pay from 1950 to the present. For example, assume that an executive in 1950 was entitled to an annual 20-year pension of $2 million (which would be worth about $.85 million per year if he retires in 15 years and the interest rate is 5 percent), was given a new house worth $2 million every 10 years, and receives memberships to clubs and other perquisites worth another $100,000 per year. These benefits are worth a total of $1.15 million, which would raise average compensation in 1950 to $2.1 million. Even under the extreme assumption that the value of pensions and perquisites had dwindled to 0 by the 1990s, average compensation would still have been twice a high in the 1990s as in 1950.

[23] This divergence is not surprising as the downturn in the stock market had a negative effect on the market value of firms, while accounting measures of firm performance were not significantly affected.

by the end of our sample both measures were still lower than their Depression-era values. Despite the rapid growth in compensation in recent decades, executives' paychecks are still not as large relative to the size of firms as they were prior to World War II.

The long-run pattern in managerial pay creates a challenge for explaining the trends in executive compensation. Managerial pay has not grown systematically with the size of firms, but rather has experienced both periods of slower and faster growth than the market value of firms. Therefore, any theory that seeks to explain the rise of executive pay with the growth of firms or the performance of the economy also must address why this relationship was weaker in earlier times.

3.2 Executive pay relative to the earnings of the average worker

Prior to World War II, average compensation of top executives was about 63 times higher than average earnings (see Figure 3).[24] This ratio fell significantly during the war years, so that by 1945 the remuneration of top executives was 41 times average earnings. The decline was likely caused by the explicitly progressive wage and salary controls mentioned above (Rockoff 1984, Goldin and Margo 1992).

Following this rapid contraction, relative compensation declined gradually until the early 1970s, by which time executive pay relative to average earnings was less than half of its pre-war level.[25] Inequality between executives and workers then began to rise, and grew at an increasing rate throughout the 1980s and 1990s. The level of inequality

[24] Average earnings are measured as total wage and salary accruals per full-time equivalent employee from table 6.6 of the National Income and Product Accounts. These earnings include commissions, tips, bonuses, contributions to 401K plans, and gains from exercising nonqualified stock options.

[25] Despite the impression given by the aggregate time series, declines in the relative level of executive pay do not mean that individual executives did not gain relative to the average employee. As discussed in Section 3.1, compositional changes contributed to the slow growth of executive compensation during the period, and so individual executives may have become better off relative to the average employee. However, assessing this hypothesis requires a panel dataset of other workers, which is not available.

surpassed its Depression-era levels around 1987 and reached a peak in the year 2000, at which time average executive compensation was 330 times average earnings in the economy. Although the ratio has fallen during the past few years, relative executive pay in 2003 was almost triple the level of the 1930s. Because the distribution of executive pay is skewed and the annual averages may be heavily influenced by outliers, Figure 3 also shows the ratio of median compensation of top officers to average earnings. This measure of inequality also grew during the past two decades, but at a slower pace. By the year 2000, median executive pay was about 120 times average earnings, or about twice its pre-war level.

Despite fluctuations over our sample period, the ratio of executive compensation to average income was substantial throughout. Comparing the level of executive pay with the distribution of wages and salaries computed by Piketty and Saez (2003) from income tax returns, more than 95 percent of the individuals in our sample fall above the 99.9^{th} percentile in the economy in every year. Thus, it is not surprising that the measures of relative executive compensation shown in Figure 3 mimic the U-shaped pattern found by Piketty and Saez's for the top 0.1 percent wage share over the past 70 years.[26]

These growing income differentials reflect gains made by both chief executive officers and other top executives in the corporation. Table 6 provides a consistent look at

[26] Although these two measures of inequality in earnings followed a similar pattern, the use of data from income tax records induces several biases due to changes in the use and tax treatment of options over time. First, income tax statements contain information on the gains from exercised options, instead of the value of stock option grants, which provides a more accurate reflection of the value of compensation at the time of the award. Moreover, the vast majority of employee stock options used in the 1950s and 1960s were not taxed as income, and so were not be reported at all on income tax returns.

the relative compensation of CEOs and other corporate officers over the past 70 years.[27] Column (1) replicates Figure 3 by presenting the ratio of average executive pay to average worker earnings for each decade, column (3) gives the total compensation of CEOs relative to average workers, and column (5) shows average relative pay for the two highest-paid officers in each firm other than the CEO. Series for both CEOs and other top managers show a similar U-shaped pattern. Although the growth in relative pay was faster for chief executives, both types of top executives have gained significantly relative to the average worker during the past 30 years. Thus, our results suggest that the growth in income inequality cannot be explained solely by increasing returns to being the CEO.

4. Changes in the structure of compensation

In order to explain changes in the level of compensation, it is helpful to understand how the use of different forms of remuneration has changed over time. The measure of total compensation that we have presented in this paper is composed of three major types of remuneration: salaries and current bonuses, long term bonus payments, and stock option grants. The relative shares of these forms of compensation have undergone important changes throughout the past 70 years, even during the period of stability in total pay.

Figure 4 decomposes the real value of total compensation into each of its three components. The short dashed line shows the value of salaries plus any bonus that was both awarded and paid out within the same year, which we refer to as *current* direct

[27] Because the title "CEO" was not use frequently prior to 1970, we identify the chief executive officer as the company president in years when the CEO is not specified (Mace, 1971). Using the chairman of the board or the highest-paid officer as the CEO does not alter the trends in any meaningful way.

compensation.[28] These bonuses were generally paid in cash, but some were also paid in the form of company stock. The long-dashed line adds the amount paid to each executive as part of a deferred bonus or long-term incentive payment (we define the sum of current direct compensation and deferred bonuses as *total* direct compensation). The solid line, which replicates the value of total compensation shown in Figure 1, includes the Black-Scholes value of stock option grants.

4.1 Direct compensation

From 1936 to 1950, current direct compensation accounted for almost all of total compensation. This measure declined during World War II and remained stagnant for many years afterward. It was not until the 1970s that current direct compensation began to increase, and it has grown at a steady rate of 4.1 percent per year from 1975 to 2003. Although current direct compensation failed to recover for many years from its war-time decline, the 1950s saw the emergence of long-term bonuses and stock options as a means to compensate top officers.[29] The value of long-term bonuses is calculated as the amount of incentive pay received by an executive in a given year for performance in previous

[28] Because bonuses payments are frequently related to firm performance, it would be useful to separate current cash compensation in its two components. However, we are unable to identify these two components separately from 1936-1991 because many firms reported only the sum of the two. While we cannot independently measure these two components, it is likely that the share of bonuses was stable during the 1950s and 1960s because the level of current direct compensation remained constant. If the share of bonuses rose during this period, the real value of salaries must have fallen by the same amount. Evidence from the firms in our sample that reported salaries and bonuses separately (about 25 percent of the sample) for that period supports the first conjecture, as the value of current bonus payments was relatively constant between 15-20 percent of current cash compensation during this period.

[29] The 1950s were not the first period when incentive compensation mechanisms were a part of managerial pay. Historical accounts suggest that both current and deferred forms of incentive compensation were almost negligible prior to WWI but became commonly used during the 1920s (Taussig and Barker 1925, Baker and Crum 1935, Baker 1938, Roberts 1959). However, hard evidence concerning the magnitude of these payments is difficult to find because firms were reluctant to divulge the details of managerial compensation. With the onset of the Depression and large declines in firm profits, many bonus plans were abandoned or suspended (Baker 1938).

years.[30] A common deferred bonus scheme was to award payments based on the firm's profits or net income, and then to distribute the bonus (in cash or stock) in equal installments over a certain number of years.[31]

As a fraction of total direct compensation, long-term bonus payments rose from less than 1 percent in the 1940s to more than 5 percent by the late 1960s. This fraction remained stable for the next two decades, before rising again to more than 25 percent by the end of our sample. Thus, the importance of this form of pay became substantially larger during the 1990s. Whereas the level of current direct compensation grew by 4.6 percent from 1990 to 2003, including these long-term bonus payments leads to an increase in compensation of more than 7.5 percent per year.

4.2 Employee Stock Options

4.2.1 Trends in the real value of stock option grants

The rapid growth of employee stock options over the past two decades has been well-documented (Hall and Liebman 1998, Murphy 1999). Because most available datasets lack information on this instrument of pay, less is known about the use of stock options to remunerate top executives in earlier periods. Prior research based on the gains from exercising options concludes that stock options were not a significant part of executive compensation during the 1970s (Murphy 1999, Jensen and Murphy 2004). Using a different sample and other methods to value options, Lewellen (1968), documents

[30] These bonuses are awarded in the forms of cash and stock, and sometime both. We measure bonuses as the amount received rather than the amount awarded (to be paid in the future) for consistency, because Compustat does not report information on the amount of bonus awards. See the appendix for a more detailed description of the components of pay.

[31] This period was generally around 5 years, although individual plans varied from 2 to 10 years.

significant stock option use in the 1950s and 1960s.[32] By including information on the individual grants awarded to each officer in every year and by using the Black-Scholes formula to price options, our sample presents the first set of evidence to measure the use of employee stock options in a consistent manner over the past 70 years.

The difference between the solid and long-dashed lines in Figure 4 measures the average Black-Scholes value of stock option grants for the executives in our sample.[33] As a share of total compensation, stock option grants have grown in every decade since the 1950s. By the year 2000, about a half of managerial pay was received in the form of options.

In contrast to prior studies, we find that options accounted for a non-trivial proportion of total compensation during the 1970s.[34] Thus, large firms continued to grant stock options even as firms' stock prices declined during the downturn of the stock market.[35] The Black-Scholes formula, although consistent with currently used pricing methods, may not accurately reflect the value of option grants before it was derived and

[32] It is difficult to assess the extent of stock option use from Lewellen's work since his methodology to value options is inconsistent with current pricing methods. While most current research uses the Black-Scholes formula to measure the value of options at the time they are granted, Lewellen uses the difference between the exercise price and the market price of the stock at the end of each fiscal year, and then spreads the potential gains from stock appreciation over the duration of the option. Relative to the Black-Scholes value, this ex-post valuation method tends to overstate the value of an option, and he finds that stock option grants comprised a significantly larger fraction of compensation than we document below.

[33] For about 25 percent of the sample in the 1970s and 1980s, we imputed annual grants from information reported as 3- and 5-year cumulative summations. See the appendix for details.

[34] During the 1970s, corporations increased the use of other methods of pay to tie executive rewards to the long-term performance of the firm, as in the case of performance shares (Foote 1973, Carey 1978). Our measure of long-term incentive pay only includes awards contingent on performance when the amounts paid out are reported in proxy statements because otherwise we are unable to observe whether the performance targets were actually met. This omission implies that the value of long-term incentive payments is underestimated (and thus the value of stock options as a fraction of total compensation is overestimated) during periods when companies report the awards of contingent awards but not the payouts. Although it is possible that this could be a more severe problem in the 1970s than in other decades, it is not possible to assess the magnitude of the bias over time.

[35] Because of the downturn in the market, the repricing of options was a common practice in the 1970s. Whenever it is possible to identify them, we exclude repriced options from our estimates.

regularly used.[36] To assess this concern, Figure 5 compares the value of option grants with the gains from exercising options. The solid line presents the sum of total direct compensation and the gains from exercising options while the dashed line shows the sum of total direct compensation and the Black-Scholes value of option grants. As a share of total direct compensation, gains from exercises were more than twice as high as the value of grants during the 1950s and 1960s. Gains from exercises were slightly lower than the value of grants during the 1970s, and these two measures correlate fairly well from the 1980s onwards. Overall, however, the trend in the use of options given by information on exercises is similar to the pattern suggested by the Black-Scholes value of grants. Except for a very modest decline from the 1960s to the 1970s, stock options have been a significant and growing part of executive pay for the past 50 years.[37]

To understand the reasons for the growing importance of stock options, we separate the average value of grants into two components: the value of grants conditional on being granted a stock option, and the fraction of executives receiving them. Figure 6 shows that, among those executives receiving stock options, the value of this component of pay has been substantial throughout the past 50 years. This value averaged above 20 percent of total compensation from 1950 to 1990. It increased during the 1990s, reaching

[36] The Black-Scholes formula was derived in 1973. Before this time, there was no clearly established methodology to price stock options. Because a true market for these derivatives did not develop until the early 1970s, there was also no easily accessible price from market transactions. Despite the difficulty in calculating a precise value, numerous accounts acknowledge the relevance of stock options as a means of compensation. For example, in a special panel on stock option plans conducted in 1951, the Salary Stabilization Board concluded that it was "difficult to evaluate in terms of dollars and cents the economic significance of this development, although substantial evidence points to its magnitude."

[37] It should be kept in mind, however, that this conclusion is based on a sample that is only representative of large, publicly traded firms. It is possible that option use in smaller firms did not become common until later in the century, or that these firms discontinued the use of employee stock options during the 1970s.

a level of 48 percent of total compensation by the end of the bull market.[38] However, the growth in the contribution of stock options to average pay was significantly larger. The value of a grant among those officers being granted stock options rose by 5.6 percent during the 1990s, but the average value of stock option grants grew by 32 percent over the same period.

Most of the increase in the average value of stock options since the 1950s can therefore be attributed to an increase in the frequency of stock option grants. As depicted in Figure 7, almost no executive in our sample received employee stock options prior to 1950, but more than 18 percent of the officers were granted an option in 1951. This fraction rose throughout the next two decades and reached more than 50 percent by the end of the 1960s. Despite the downturn in the stock market, the number of executives receiving options continued to increase during the 1970s. It finally reached a plateau during the late 1990s, when more than 80 percent of the managers in our sample were granted options in any given year. Thus, while stock options have now become a regular part of the compensation package, corporations granted options less frequently and to only some of their top officers during the 1950s and 1960s.[39]

4.2.2 The rise of restricted stock options

Although stock options were granted to executives occasionally during the 1940s, they were not an attractive means of compensation because they were likely to be taxed as

[38] This change can be accounted for by an increase in the number of stock options awarded in each grant, as the average Black-Scholes value per option granted remained fairly constant over time.

[39] Because stock options were not granted every year and vested slowly over time, an even higher fraction of executives (67 percent in the 1960s) held options at a given point in time in the past. To give some perspective, Hall and Liebman (1998) report similar fractions of stock option holdings for CEOs in the early 1980s.

income at a time of high marginal tax rates (Washington and Rothschild 1951).[40] The 1950 Revenue Act changed this incentive by introducing the "restricted" stock option (later called "qualified" or "incentive" options), which was subject only to capital gains tax upon disposal of the stock that had been acquired by exercising a restricted option.[41] Because marginal income tax rates were around 80 to 90 percent for many of these executives and the capital gains tax rate was only 25 percent, restricted stock options were an attractive alternative to other means of compensating top executives.

The establishment of this new method of compensation did not pass unnoticed; the majority of stock option plans introduced after 1950 were designed to grant restricted options. Throughout the 1950s and 1960s, 97 percent of the options granted satisfied the restrictions to qualify as restricted stock options. The sharp increase in the number of executives receiving stock options in 1951, combined with the qualitative evidence reported by industry surveys and the companies themselves, strongly suggests that the Tax Reform Act of 1950 played an influential role in changing the composition of executive pay. To investigate further, we take advantage of the cross-sectional variation in tax rates faced by the executives in our sample. Individuals receiving higher levels of cash compensation, and thus facing higher tax rates, would have benefited more from forms of remuneration not taxable with income tax rates. Thus, all else equal, these executives should have received a larger amount of their pay as stock options. To

[40] Employee stock options appear to have been more common in the 1920s, but the extent to which they were granted is hard to assess due to the secrecy surrounding these plans (United States Salary and Stabilization Board 1951). Following the market crash in the 1930s, the use of stock options became essentially nonexistent (Baker 1938). They then underwent a modest reappearance in the 1940s.

[41] To qualify as restricted, an option had to satisfy conditions regarding the exercise price, the length of time before the option expired, and the length of time the stock had to be held before disposal, among others. Some of the qualifications were: an exercise price of at least 95 percent of the stock price on the day it was granted, a maximum duration of 10 years, and stock acquired by exercising an option could not be sold within two years after the day it was granted, or 6 months after exercise. These conditions evolved over time, in general reducing the attractiveness of restricted stock options.

determine the marginal income tax rate faced by each executive in our sample, we assume that each individual is married, files jointly and that he has no income other than the compensation earned at his firm. Thus, the tax brackets and schedule of marginal income tax rates provide us with an estimate of the marginal tax rate on labor income for each executive.[42]

Regressing the total value of stock option grants (in millions of $2000) awarded to each executive from 1951-1955 as a function of his average tax rate during this period and his 1950 job title, we obtain a coefficient of 1.35 (s.e. 0.66).[43] Thus, an executive facing a 10 percentage-point higher tax rate received $135,000 more in stock options during the years following the 1950 Revenue Act.

Although this estimate suggests that stock option grants were the result of high tax rates, executives facing higher tax rates were either the highest-paid executives in the firm or those working at a larger firm. If stock options were disproportionately granted to these managers for reasons other than the level of taxes, the estimate based on a simple cross-section of executives will be biased. A partial solution would be to examine the share of stock options relative to total compensation, but there still are reasons to expect

[42] Executives with other sources of income will, of course, be in higher tax brackets. This unobservable income will have a differential effect on the executives in our sample, as additional income for individuals in the highest tax brackets will not change their marginal rate. Thus, the cross-sectional variation in tax rates we find in our sample may be an artifact of not observing the total taxable income of each individual. To illustrate, we estimate the marginal tax rates in 1950 to be 59 percent at the 25th percentile of our sample, 68 percent at the median, and 84 percent at the top. In order for all of these individuals to be taxed at the top marginal rate, the income of the executive at the 25th percentile would have to have been more than five times higher (a move from $75,000 to $400,000 in nominal dollars), while the median executive's income would have to have been 3.9 times higher. Even assuming that the compensation we observe is only half of an individual's total labor income, we would still find a difference in tax rates between the 25th percentile and the top of more than 10 percentage points.

[43] We exclude firms that did not have a stock option plan in effect during this period. The controls for job title are indicators for president, chairman of the board, executive vice-president and vice-president. Because the tax rate observed may be influenced by the composition of cash and stock options chosen by the executive, we instrument for the observed average tax rate with an average of the predicted tax rate had total direct compensation remained at its nominal 1950 level (Gruber and Saez, 2002).

corporate officers with more decision-making responsibilities to have a larger share of incentive pay. As an alternative strategy, we examine the effect of subsequent tax reforms on *changes* in the composition of an individual's compensation package. By considering the change in compensation from pre- to post-tax reform years, we can control for any potential correlation of stock option grants with an executive's position in the hierarchy of the firm.[44]

Two major tax reforms between 1950 and 1976 allow us to identify the effect of changes in tax rates on the structure of compensation: the Kennedy reform, which cut marginal tax rates by an average of 13 percentage points in 1964 and 1965, and the 1969 Revenue Act, which reduced the maximum tax rate on labor income from 70 percent in 1970 to 50 percent by 1972. [45] Executives facing a larger tax cut because of the reform should experience a larger reduction in the share of stock option grants (or alternatively, to increase their share of stock options by less). Table 7 estimates the change in the share of direct compensation and stock option grants as a function of the change in tax rates for each individual.[46] Changes in taxes and compensation shares are measured as the difference from the year prior to each reform to the year after the reform was completed. Thus, the estimated effect of the 1964 reform (col. 1 and 2) is based on the 3-year change (in taxes and compensation) from 1963 to 1966 and the effect of the 1969 reform is based

[44] We cannot use this procedure to analyze the 1950 reform because almost none of the executives were granted options in the pre-reform period.

[45] We do not consider reforms after 1976 because after this time all of the executives in our sample were taxed at the same rate, so there is no cross-sectional variation in taxes to identify an effect.

[46] Each type of compensation is expressed relative to total compensation, which is the sum of direct compensation (salary+bonus), deferred bonus awards, and option grants. Payments received from deferred bonuses should not be affected by changes in tax rates because these payments were determined before the reform took place. Therefore, we measure deferred bonuses as the present discounted value of bonuses in the year they were awarded.

on the 4-year change from 1968-1972.[47] To increase the size of the sample, we include all of the officers in each firm for whom compensation was reported, which was typically about five during this period.

Since a positive shock to income could cause an executive to move into a higher tax bracket, contemporaneous changes in income and tax rates will be mechanically correlated with one another. To control for this problem, we instrument for the observed change in taxes with the change in taxes that an individual would have faced had his direct compensation remained at the same level as the year prior to the reform. Thus, the effect of taxes is identified solely from changes in the structure of income taxes.

Table 7 shows that executives experiencing a larger tax cut decreased their share of compensation taken in the form of options, while increasing the share of direct compensation and deferred pay. The average tax cut during these two tax reforms was about 15 percentage points, which corresponds to about a 4.8 percentage-point increase in the share of direct compensation and a 5.2 percentage-point decline in the share of options granted. Thus, the share of compensation taken as stock options might have been even larger during the 1960s and 1970s if tax rates on labor income had not been reduced during this period. [48]

[47] A drawback of using the compensation changes experienced by individual executives is that the sample can only include individuals who are observed in both the pre and post tax reform years. Thus, we are limited to examining relatively short-run effects of the changes in tax policy. Because stock options were generally granted only once every few years to each executive, this strategy may underestimate the effect of the tax reforms. Lengthening the number of years around the reform would require observing each individual for a long period of time and thus reduce the sample size substantially.

[48] Given the sizable tax advantage of restricted options, it may be surprising that their adoption in the 1950s ad 1960s was not even more widespread. A few factors may explain why stock options were not granted more often during that period. First, most stock option plans limited the total number of shares to be granted, perhaps to reduce shareholders' concerns about potential dilution by use of stock options. Also, non-risky components of pay should optimally decline by less than the increase in risky components if executives are risk averse. Because high income tax rates made it difficult for firms to increase traditional methods of compensation, executives may have been unwilling to accept a large number of stock options.

These regressions provide suggestive evidence that high tax rates led executives to substitute into other forms of compensation during the 1950s and 1960s. As successive tax reforms reduced the differential between labor income and capital gains tax rates and made the requirements for qualified options stricter, the firms in our sample began to substitute non-qualified for qualified stock options.[49] By the mid-1980s, the vast majority of options granted were taxed as labor income.[50] Thus, the growth in stock option grants during the 1980s and 1990s cannot be explained by tax policy (Hall and Liebman, 2000).

5. Tax Policy, Stock Market Performance and the Level of Executive Pay

Despite the growing use of executive stock options during the 1950s and 1960s, the real value of total compensation remained stagnant throughout this period. Slow growth in compensation contrasts sharply with the experience in later decades, which has led many people to expect a positive correlation with market performance and the level of pay (Hall and Murphy 2003, Jensen and Murphy 2004, Bebchuk and Grinstein 2005). Table 8 shows the correlation between the total compensation of each individual in our sample and the market value of the firm he managed. A 1 percent increase in firm market value

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Moreover, the Depression –and the ensuing crash in the value of compensation tied to the stock market- was probably still fresh in people's minds.

[49] According to the 1964 Revenue Act, newly granted qualified options were not exercisable until previously granted options were exercised or expired. This feature made qualified options very unattractive during the declining stock market of the 1970s. Moreover, qualified stock options were banned in 1976. In 1981, the Economic Recovery and Tax Act reestablished qualified options as "Incentive Stock Options" (ISO). Their use was severely curtailed by this Act, since the value of ISOs that could vest each year was capped at a fair market value of $100,000.

[50] Starting in the 1970s, proxy statements do not always identify the type of stock options being granted. About 41 percent of the options granted in the 1970s for which we observe their characteristics (58 percent of total grants) were actually qualified. Moreover, most corporations amended their stock option plans during this decade to allow both types of options to be granted, suggesting that non-qualified options had become more important during this time.

is associated with 0.34 percent higher compensation in the 1990s, but a similar increase corresponded to only 0.22 percent higher compensation in the 1950s. This difference is even larger when firm fixed effects are included in the regression. Moreover, the same pattern is evident for total direct compensation, suggesting that growth in the use of stock options alone cannot account for this rising correlation over time.

In order to explain why the level of compensation has behaved differently in recent decades now than in the past, a natural place to start is the structure of personal income tax rates. Figure 8 shows the marginal tax rate on labor income faced by the executives at the 25th, 50th and 75th percentiles in our sample, along with the top marginal rate in the economy.[51] From the 1940s until the mid-1960s, the marginal tax rate faced by the median executive in our sample was around 70 to 80 percent. Subsequent tax reforms reduced these rates substantially, and by the 1990s almost all of the executives in our sample faced rates around 35 to 40 percent, nearly half as high as in earlier decades. The extremely progressive tax structure was a prominent issue during the 1940s and 1950s, and high rates were frequently mentioned in proxy statements as a factor limiting the compensation of corporate executives. If substitution between different forms of compensation were costless, then altering relative tax rates should not affect the level of pay, but rather would lead to a shift in the structure of compensation towards forms of remuneration that are not taxed or taxed at lower rates. Thus, a plausible explanation for the low level of pay during this period is that we do not observe certain components of pay that are not taxed as personal income, such as perquisites and pensions. However, it is unlikely that the value of these benefits could have been high enough to make

[51] As described in Section 4.2.2, the tax rate for each individual is calculated assuming that his total annual income is equal to his total direct compensation and using the tax schedule for married couples filing jointly.

compensation in the 1950s and 1960s comparable to the levels observed later in the century (see footnote 22).[52]

The conjecture that taxes held down the level of pay may be surprising since simple theory suggests that an increase in the tax rate on labor income will cause the supply of executives to shift inward, and thus lead to a *higher* level of pay. However, there are several reasons to expect the opposite correlation to hold in the case of corporate executives. Because the marginal income tax rates faced by executives in the 1950s and 1960s were exceedingly high, a small increase in after-tax income would require a large increase in pre-tax compensation. Granting pay increases of such large magnitudes might be infeasible if firms face credit constraints, or suboptimal given alternative investment opportunities. Alternatively, if the level of compensation reflects executives' ability to capture firms' rents, then an increase in personal relative to corporate income taxes should cause managers to reinvest a higher fraction of firms' profits and extract less in the form of compensation. Another reason to expect a negative correlation between tax rates and the level of pay is that higher tax rates may simply reflect society's preferences for less income inequality. In this case, social norms may also have constrained firms' ability to increase compensation at the top. By changing the marginal value of a dollar to an executive relative to the firm, high tax rates would change not only the level of compensation, but the relationship between the level of pay and the performance of the firm.

[52] Firms' ability to use and executives' desire to accept remuneration in forms other than salaries and bonuses may be limited for several reasons. For example, there are limits to the number of options that an undiversified, risk-averse executive will be willing to hold without an increase in the non-risky components of pay. The use of options also may have been constrained by firms' restrictions on the number of shares that could be granted at any point in time. Other forms of compensation like pensions, health insurance and perquisites also may have limited value to the executive since they are not perfectly tradeable.

Table 9 explores the correlation between taxes, the market value of firms, and the level of executive compensation. Pooling all of the data from 1947 to 2003, col. (1) shows the coefficient estimates of regressing the logarithm of the real value of total compensation on a cubic time trend.[53] The regression also controls for the job titles of CEO, president, chairman of the board, executive vice-president, and vice-president. The estimated coefficients on the time trend are displayed graphically as the solid line in Figure 9, and show that compensation grew at an increasing rate throughout the sample period. Col. (2) adds the logarithm of the market value of the firm in the prior year. On average, a 1 percent increase in market value is associated with 0.24 percent higher compensation. Col. (3) includes the marginal tax rate faced by each executive, determined as before using the value of his total direct compensation. As with the regressions in the previous section, we instrument this tax rate with the rate an executive would have faced given his direct compensation in the prior year and the current year's income tax rate schedule. The level of taxes is positively correlated with executive pay, which can be attributed to fact that tax policy has always been progressive. Col. (4) shows that the interaction of the tax rate with the firm's market value is negative, suggesting that executives facing higher taxes benefited less from improvements in the market value of firms. The average tax rate in the sample during the 1990s was 0.37 percent, and so the returns to a 1 percent increase in market value were 0.25 percent. However, executive pay increased only by 0.11 percent for a similar change in market value during the 1950s, when the average tax rate was 0.76 percent. These results are robust to adding firm and individual fixed effects to the regression.

[53] We focus on the post-war period because wartime wage and salary controls are likely to have changed the way compensation was determined. The coefficient on a quartic term was not significant.

Because this relationship is identified largely from a comparison of tax rates at different points in time, it is difficult to distinguish the effect of taxes from any other factors that might have led to a secular decline in tax rates and increases in the level of pay. Therefore, in col. (7) we include an interaction of the tax rate with the cubic time trend. The interaction of taxes and market value in this specification is identified from large deviations in tax rates from the time trend, which arise from tax reforms that generate large discrete changes in tax rates. Again, executives are remunerated less for an increase in market value when facing higher tax rates. Overall, the results presented in Table 9 suggest that high tax rates reduced the level of executive compensation earlier in the century. Furthermore, accounting for the influences of the firm's market value and tax rates alters the shape of the time trend, shown as the dashed line in Figure 9. The trend increases at a constant rate from 1960 to 2003, whereas the initial specification suggested that the unexplained portion of compensation was flat until the 1970s and grew at an increasing rate in subsequent decades. Thus, the correlation of compensation with income tax rates and the market value of firms can help explain changes in the behavior of compensation over time.

Other research that examines the effect of taxes on income is generally identified by comparing individuals at different points in the income distribution. A well-known problem with this strategy is that income inequality rose steadily throughout the 1980s and 1990s while high-income earners received larger tax cuts. Thus, estimates of the effect of taxes on the level of compensation may be biased because it is difficult to control for underlying changes in the income distribution. Similarly, estimates will be biased in the opposite direction during time periods of declining income inequality.

Although a variety of methods have been used to address this concern (Goolsbee 1999, Gruber and Saez 2002), most studies examine the effect of a single tax reform or are limited to a short time horizon, which means that the potential for bias remains. While we adopt a similar estimation strategy to these papers, our sample has the additional benefit that it spans a long period of time. Thus the effect of taxes will be identified from a comparison of individuals facing different income tax rates, not because they are in different points of the income distribution, but because they are subject to different tax regimes at different points in time. The bias from underlying changes in the distribution of income will be mitigated by including tax reforms that occurred during periods of both rising and declining income inequality.

Although the analysis presented in Table 9 goes some distance in this direction, the identification still comes from a substantial amount of cross-sectional variation in tax rates that is correlated with the distribution of income. We present two methods of addressing this problem in Table 10. In the left-hand panel, we add controls for the executive's direct compensation in the previous year. The first column imposes a (log) linear effect of lagged income, while the second column allows for a more flexible functional form.[54] Because the current year's tax rate is instrumented with the tax rate based on the lagged value of direct compensation, the effect of taxes in these specifications is identified by comparing individuals facing different tax rates due to either non-linearities in the structure of marginal income tax rates or to changes in tax rates over time. In the right-hand panel we instrument for the current tax rate with the top marginal rate (Saez, 2004), which ensures that the results are identified solely from time-

[54] In particular, we include a set of 20 dummy variables for each 5-percentile division of the income distribution. This specification is similar in spirit to Gruber and Saez (2002).

series variation in tax rates. In both specifications and whether the tax rate is interacted with the time trend or not, these results confirm that exceedingly progressive tax policy limited the level of executive compensation at times of growing firm value.

To interpret the magnitude of these results, we perform a simple simulation by calculating the average real level of compensation in each year holding taxes at their year 2000 level for the entire sample period.[55] We perform this simulation using the specification reported in col. (2) of Table 10, and present the results in Figure 10. The solid line shows the average value of actual compensation in the sample, while the long-dashed line shows fitted values using the actual tax rates observed in each year. The fitted values are a bit higher than the actual values in the early years of the sample and lower in the later years, but the regression does a good job at fitting the level of compensation overall. The short-dashed line shows simulated values using tax rates from 2000. The simulated values are substantially higher than both the fitted and actual values from the 1950s to the mid-1970s. These results suggest that, had tax rates been at their year 2000 level for the entire sample period, the level of executive compensation would have been 35 percent higher in the 1950s and 1960s.

Although high tax rates created constraints on increases in compensation, these results indicate that tax policy is not the only explanation for the growth in executive pay. Holding taxes fixed at their 1946 level, the real value of executive pay would have risen from $1.0 million in 1947 to $3.3 million in 2003, or an annual growth rate of 2.2 percent. In contrast, the fitted values that allow tax rates to change grew by 3.3 percent

[55] To be specific, we calculate the fitted values of the regression and replace observed tax rates with the tax rates that an individual would have faced in 2000 given the real values of his income and his firm's market value in the previous year, and his job title. Because the predicted values based on a log-transformed variable do not provide consistent estimates of the conditional mean of the untransformed variable, we use a smearing estimator to calculate the fitted values (Duan, 1983).

per year over the same period. Thus, tax policy and its interaction with the growth of firms can account for compensation growth of about 1.1 percentage points per year. The real value of actual compensation grew by 3.7 percent per year during this period, and so changes in tax policy can explain about 1/3 of this secular rise in executive pay.

6. Conclusion

In this paper, we add new insight into the determinants of managerial pay by setting forth the central facts concerning the level and composition of executive compensation from the mid-1930s to the present. This time period can be divided into three distinct phases: pronounced decline during World War II, relative stagnation from the mid 1940s to the mid-1970s, and then growth at an increasing rate. Thus, historical experience poses a challenge to explaining recent changes in executive pay, as the real level of compensation remained relatively stable throughout both times of prosperity during the 1950s and 1960s, and the downturn of the stock market in the 1970s.

While the long run trends in managerial pay have been shaped by many factors, in this paper we focus on the role of the stock market and tax policy in explaining the level and structure of pay. Tax policy alone cannot explain the recent growth in incentive pay (Goolsbee 2000, Hall and Liebman 2000), but a longer run perspective suggests that the structure of compensation is responsive to changes in taxation when the differential in tax rates is sufficiently high. Moreover, high marginal income tax rates have limited the value of total compensation by altering the correlation between the market value of firms and executive compensation. Using time-series variation in tax rates, we find that a given

increase in the market value of firms results in smaller gains in compensation when tax rates are higher. Our estimates suggest that, had taxes been at their low 2000 level, compensation would have been 35 percent higher in the 1950s and 1960s. Thus, extremely progressive taxation restrained total compensation from keeping pace with the growing size of firms earlier in the century. It has only been in the past 20 years, a time of significantly lower income tax rates, that executive pay has exhibited a strong correlation with stock market movements.

Although the interaction between tax policy and stock market performance has had an important effect on the evolution of executive compensation in the 20th century, a significant portion of the long-run changes cannot be explained by these factors. A more exhaustive explanation of the trends described in this paper should assess the contributions of other determinants of managerial pay such as corporate governance, social norms, the market for corporate control, and the labor market for executives.

Data Appendix

Sample Selection

Our sample includes data on executives working in the largest 50 firms in 1940, 1960 and 1990. We measure firm size by the total value of sales and obtain company rankings from the Compustat database. Compustat assembles a large amount of balance sheet and financial information from corporate reports on publicly traded companies on the NYSE-AMEX and NASDAQ exchanges. The coverage of the database was expanded in 1978 from 2700 to 6000 firms, so firms that were listed prior to 1978 are less likely to be included in the sample.[56] Therefore, we crosscheck our 1960 ranking with the rankings published by *Fortune* magazine.[57] A rank ordering of firms by the value of total sales in 1940 was not available from either Compustat or any published surveys such as *Forbes* or *Fortune*. Therefore, we rank firms by total market value using the CRSP database. For years in which both total market value and total sales are available, the overlap between these two different rankings firm size is about 50 percent. The industrial composition of the firms in the sample is shown in Appendix Table A1.

Our data on executive compensation were obtained from corporate reports that were filed with the Securities and Exchange Commission (SEC). In 1934, the SEC began to require firms to disclose information on executive compensation in 10-K reports. In particular, these documents list the name, job title, and aggregate remuneration paid to each of the 3 highest-paid officers in the firm. Recognizing that the information reported in the 10-Ks was not very detailed, the SEC introduced executive compensation as an item in proxy statements when it revised proxy rules in 1942. At that time, it was the Commission's perception that "more extensive information [had to] be given on the compensation and dealings of corporate managers."[58] Ever since 1942, proxy statements have contained detailed quantitative and descriptive information on the different components of compensation for the highest paid officers in the firm. Therefore, we collect data from proxy statements between 1943 and 1992 (thus for compensation pertaining to 1942 to 1991), and extend our sample to back to 1936 using 10-K reports.[59] Our main source of proxy statements and 10-K reports is the collection of corporate reports at the Baker Library of Harvard Business School, which is one of the largest collections of corporate reports in the world. Although some firms did not disclose executive compensation in their 10-K reports and the collection of 10-Ks at Baker Library is not as extensive as their collection of proxy statements, we were able to find information pertaining to this time period for 63 out of the 85 firms in our sample that existed during the 1936-42 period. Starting in 1992, we supplement our sample with information on executive compensation, which is electronically available through

[56] See Kothari, Shanken and Sloan (1995) for a more detailed description of survivorship bias in Compustat.

[57] Among the 50 largest firms in 1960, we find 3 companies that are missing from Compustat and add them to our sample. We base our ranking on Compustat instead of the Fortune rankings because Fortune only includes manufacturing firms.

[58] Securities Act of 1933, Release No. 2887, December 18th, 1942.

[59] The collection of 10-Ks at Baker Library includes fewer companies in the early years. We begin our sample with 10-Ks pertaining to 1936 because this is the first year that provides us with a large enough sample size.

Compustat's Executive Compensation database. These data are also originally from proxy statements, and so are comparable to the data we collected.

Because we are interested in examining the long-run trends in compensation, we limit our sample to firms for which the Baker Library has proxy statements for a large number of years. In particular, we examine firms for which we can find proxy statements for at least 20 years between then years 1936-66 for the firms that were selected from the 1940 ranking, for at least 20 years between the years 1943-73 for the firms that were selected from the 1960 ranking, and for at least 20 years between the years 1970-2000 for the 1990 sample. Moreover, we also require that proxy statements or 10-Ks be available for at least 3 blocks of 5 consecutive years. If a firm does not have enough information to be included in the sample, we replace it with the next largest firm on the list. In this manner, we move down the ranking for a given year until we have selected a total of 50 firms. Because the ranking of firms is fairly consistent over time, our final sample includes a total of 102 firms. For each firm that meets our selection criteria, we collect annual data for all of the years for which proxy statements or 10-Ks are available. Thus, in any year the sample includes not only executives of firms that were large in that year, but also executives of smaller firms that were large at other points in time. Appendix Table A2 shows the distribution of the executives in our sample ranked according to firm size.

One final issue related to the selection of the firms in our sample is whether to continue to follow a firm when it merges with another firm. Our intent is to keep a post-merger company in the sample if the new firm is similar to the original company. Thus, we continue to follow a company for as long as the firm maintains the same permanent company identification number (PERMNO) in the CRSP database. We also include a post-merger firm with a different permanent number if either (1) all or part of the name of the old company is retained in the new company's name, or (2) the 2-digit SIC code of the new and the old company are the same. Out of the 102 firms in our sample, we include 7 cases of mergers where the new firm retains the name of the old firm that was originally in our sample, and 25 cases where the name changed but the new firm was in the same industry as the original firm. There are 11 cases where we stop following a firm after a merger because the new firm takes on an entirely new name and operates in a different industry. There are also another 14 cases where we cease to follow a firm because the new firm is foreign-owned (and therefore not subject to SEC reporting requirements) or because the firm has gone out of business. A list detailing these cases for particular companies is available from the authors.

Our selection of the executives to include from each firm in the sample is limited by the number of people that are listed in each proxy statement. Initially, the SEC required firms to report aggregate remuneration for each of their 3 highest paid officers. From 1943 to 1978, this requirement was extended to include the 3 highest paid officers, plus any officers who earned above a nominal amount that was increased over time.[60] From 1978 to the present, the disclosure requirements extended to the 5 most highly compensated officers whose remuneration exceeded a certain amount.[61] Because we observe more than 3 individuals in a given year for most companies, we collect information on the 5-highest paid officers whenever possible. Overall, 72 percent of the

[60] This level was initially $20,000. It was raised to $25,000 in 1948, $30,000 in 1954, and $40,000 in 1974.
[61] This amount increased from $50,000 in 1978, to $60,000 in 1983, and $100,000 in 1993.

firm-year observations in our sample have information on 5 officers or more. To avoid any potential biases that would arise from having more executives from firms that report information on a larger number of people, we focus on a sample that is limited to the three highest paid officers in each company.[62] We do not include observations for executives that entered the sample or retired mid-year.

Information on Firm Characteristics

The market value for each firm is calculated as the share price times the number of shares outstanding, both of which are taken from CRSP. Information on total sales is from Compustat, which is available for 1950 to the present. For years prior to 1950, we collected data on total sales from various editions of *Moody's Industrial Manual*, *Moody's Transportation Manual,* and *Moody's Public Utility Manual*.

Information on Executive Compensation

The information on executive compensation contained in the proxy statements comes from several parts of the document. As required by the SEC, each proxy statement contains a table listing the remuneration of the directors and highest paid officers in the firm. These tables provide us with data on cash remuneration, long-term bonuses and frequently job titles. Information on the number of stock options granted and exercised generally follows this table. Many proxy statements also include a description of any incentive compensation or stock option plans that were in effect at the time. Not only do these descriptions provide us with more information on stock options and bonuses (for example, the vesting structure of options and deferred bonuses, the tax status of stock options, and the method used to calculate incentive compensation), but they also provide us with an insight into why these forms of compensation were used (or at least, the reasons that were being given to the company shareholders). Another useful section of the proxy statement is a table that lists all of the nominees for director and their holdings of company stock. This table allows us to record the stock holdings of all officers who are also directors, which comprises more than 80 percent of the executives in our sample.

Definition of Variables

Direct Compensation: Salary plus any bonus both awarded and paid out in the same year. These bonuses are generally in the form of cash, although some were given in stock. Stock bonuses are valued using the stock price on the day the stock was given to the executive. When the stock price on the award day is missing, we use the stock price at the end of the fiscal year. Ideally we would like to be able to separate straight salaries from bonuses, but in many cases only total cash remuneration is reported. In about 5 percent of the sample, these amounts include payments from long-term incentive awards as well as current-year bonuses.

Long-term incentive payments: Payments made to the executive as compensation for bonuses awarded in prior years. Many long-term incentive plans were structured to pay

[62] In particular, the entire sample will be more heavily weighted by higher-paying firms and later time periods. We select the highest-paid officers according to total direct remuneration, which is same measure used to determine which individuals are listed in the proxy statements.

bonuses in equal installments during the 4 to 5 years after they are awarded. Although we would prefer to attribute all bonus awards to the year in which they are granted, the majority of firms only report the cash amounts paid to the executive in each year. In cases where the firm reports the amount awarded instead of the amount paid out, we convert the award into future payments using the structure of the bonus plan to estimate the amount paid out each year. The majority of these bonuses are paid in cash, but a few are awarded in stock. Stock bonuses are valued using the stock price at the end of the year that the individual receives the stock. Since the realization of performance measures for contingent awards are usually not observable, contingent bonuses only included when the amounts paid out are reported.

Options granted: We value options on the day they are granted using the following Black-Scholes formula:

$$\text{Award value} = N[Pe^{dT}\Phi(Z) - Ee^{rT}\Phi(Z - \sigma\sqrt{T})]$$

$$Z = \frac{\ln\left(\frac{P}{E}\right) + T(r - d - \frac{1}{2}\sigma^2)}{\sigma\sqrt{T}}$$

N = number of shares awarded

P = stock price on the date of the award. We assume this price is equal to the exercise price of the stock (see below for details).

E = exercise price of the stock option.

D = monthly dividend rate = 1/12*ln(1+D/S) where D is the total amount of dividends paid in the previous year and S is the average stock price in the previous year.

T = time to expiration of the option, measured in months.

R = monthly yield on US treasury securities. We use the 3-year constant maturity interest rate from Global Insight's DRI-WEFA Basic Economic Database.

Σ = standard deviation of monthly stock returns. Monthly stock returns are obtained from the CRSP database and are corrected for stock splits and dividend payments. The standard deviation in each year is calculated from the previous 3 years of monthly stock returns.

$\Phi(Z)$ = cumulative probability function for the normal distribution

Except for the dividend rate, interest rate and standard deviation of stock returns, the proxy statements generally contain all of the information necessary to implement the Black-Scholes formula. Before 1964, the typical stock option plan granted options that expired after 10 years and had an exercise price ranging from 95 to 100% of the market price of the stock on the day it was granted. These characteristics are fairly standard because, under the 1950 Revenue Act, capital gains tax rates applied to an option with these characteristic instead of income tax rates. When the 1964 Revenue Act replaced "restricted" with "qualified" stock options, these requirements were changed to an exercise price of 100% and duration of 5 years. The majority of the firms in our sample changed their stock option plans in order to conform to these new rules. As the tax incentive to grant stock options diminished during the 1970s, firms began granting a larger number of non-qualified options that lengthened the duration back to 10 years. Therefore, when information on the duration of an option is missing, we assume that it is 10 years if the option was granted prior to 1964 or after 1974, and 5 years if it was granted between 1964 and 1973. This imputation is made for 16% of the sample prior to

1992, and the missing information is more common during the 1970s and 1980s. Compustat does not report the duration of option grants, so we assume a horizon of 7 years for all options granted after 1992.[63] Because the vast majority of the options granted after 1950 had an exercise price equal to the stock price on the day of the grant, we assume that the stock price on the day of the award is equal to the exercise price for all options grants after this year. For years prior to 1950, a much larger number of options were granted in-the-money. Therefore, we assume that the stock price on the date of the award is equal to the end-of-year price in these early years.

One final complication to valuing stock option grants and exercises is that from the late 1960s to the late 1980s, many firms began reporting the amounts of stock options awarded and gains from exercising options as a total for each executive during the previous 3 or 5 years. Wherever possible, we combine this information with information on annual grants and exercises from previous proxy statement to estimate the amounts granted and exercised in an individual year. However, this imputation cannot be made for executives who do not appear in all of the previous 3 or 5 proxy statements, or if the proxy statement for an intervening year is missing. Because roughly 27 percent of the firms in the 1970s and 20 percent of the firms in the 1980s reported options in this manner, excluding this information would severely bias downward our estimates of stock option grants and exercises. Instead, we assume that 1/5 of the 5-year totals were granted in each of the past 5 years, or 1/3 of the 3-year totals in each of the past 3 years. We assume that the exercise price of these options was equal to the stock price at the end of the fiscal year, and that the duration was 5 years for options granted prior to 1974 and 10 years after 1974. Similarly, we assume that 1/5 of the gains from exercising options were realized in each of the past 5 years, or 1/3 over the past 3 years when 3-year totals are reported.

Appendix figures A1 and A2 show the total value of compensation for the top 3 officers in the firm including and excluding imputed option grants and exercises. Imputing options granted has the largest impact during the 1970s, when the imputation causes the average value of options granted to double. Without the imputation, option grants appear to be no higher in the 1970s than they had been during the 1960s. However, including the imputation suggests that options comprised a larger share of compensation during the 1970s than in previous decades. Moreover, including these imputed option grants causes the total value of compensation to follow an upward trend during the 1970s instead of remaining constant. This imputation is less important when considering the gains from exercising stock options. In this case, the biggest difference appears from the late 1960s to early 1970s. The inclusion of imputed option exercises causes the gains from exercising to double during this period, but this adjustment does not create a significant change in the trend in total compensation. It is also worth noting that this imputation generates a far more pronounced increase in the fraction of executives been granted options during the 1970s and 1980s (see Appendix Figure A3). Because the imputations during the 1970s are derived from 5-year summaries, it is difficult to ascertain how the timing of option grants and exercises correlates with changes in the stock market during this period. It is possible that many of the grants attributed to the mid-1970s were granted in the late 1960s or early 1970s, thus producing

[63] We assume 7 years instead of 10 year both to be consistent with prior research and to be consistent with the assumptions made by Compustat.

a stronger correlation with firm performance. Nevertheless, it is clear that there was an upward trend in the granting of stock options from the 1950s to the 1990s, including a substantial number of grants during the 1970s.

Options exercised: Proxy statements issued during the 1950s, 1960s and 1970s generally report the number of options exercised, the exercise price (adjusted for stock splits) and the market value of the stock on the date of purchase. Using this information, we value options exercised as the difference between the exercise price and the average stock price on the day the option was exercised. The exercise price is missing for about 1.6% of the observations on stock option exercises, and so these exercises are not included in the analysis. Proxy statements issued during the 1980s and 1990s generally report the total gains from exercising options directly.

Equity holdings: Equity holdings are valued with the stock price at the end of the fiscal year. We include shares that are held by family members and associates, and are thus likely to have an impact on the executive's incentives. Equity holdings are only known for officers who are also directors and sometimes they are only reported for directors who are up for re-election, so we are able to estimate stock holdings for 84% of the executives in our sample.

Job title: Executives are divided into broad job categories based on titles reported in the proxy statement. When multiple job titles are reported, we record all of them.

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Table 1
Sample Summary Statistics

	1936-2003
Total # of person-year observations	15493
Total # of executives	2694
Average # of firms in each year	76
Average # of years each executive is observed	5.5
Median # of years each executive is observed	4
Fraction of obs. in firms with market value	
Ranked 1-50	39.1
Ranked 50-100	19.5
Ranked 100-200	19.4
Ranked 200-500	16.1
Ranked 500+	5.2

Note: Based on the three highest-paid officers in the largest 50 firms in 1940, 1960 and 1990. Rankings by market value are determined based on all firms appearing in the CRSP database, which includes all publicly-traded firms in the NYSE, AMEX and NASDAQ stock markets.

Table 2
Distribution of Job Titles

Title	Fraction of observations		
	All sample	1936-1969	1970-2003
Chairman of the board	21.0	15.8	25.7
Vice-chairman	6.3	2.0	10.3
President	28.6	31.5	25.9
Chief executive officer	14.9	2.3	26.6
Chief financial officer	1.6	.01	3.1
Chief operating officer	4.9	.2	9.2
Executive or senior vice-president	21.3	15.3	26.9
Vice-president	15.4	27.9	4.0
Treasurer	1.2	2.4	.1
Comptroller	.6	1.2	.1
Other job title	5.8	6.8	4.8
Director	85.7	91.7	80.2

Note: Based on the three highest-paid officers in the largest 50 firms in 1940, 1960 and 1990. The sum of each column is greater than 100 percent because some officers hold multiple titles. Other categories not listed include "secretary," "chairman of the executive committee," and officers of subsidiaries.

Table 3
Compositional Changes and Executive Pay:
Change in Annual Average Total Compensation versus Average Annual Change in Total Compensation for Individual Officers by Decade

Decade	Average Total Compensation		Average Individual % Change in Total Compensation
	Level (Mil. of $2000)	% change from previous decade (annual rate)	
1936 - 1939	.97	--	7.09
1940 - 1949	.91	-0.64	1.98
1950 - 1959	.94	.32	5.07
1960 - 1969	1.00	.62	4.37
1970 - 1979	1.17	1.58	4.08
1980 - 1989	1.77	4.23	7.59
1990 - 1999	4.36	9.43	14.6
2000 - 2003	8.53	6.94	4.03

Note: Total compensation is the sum of salaries, bonuses, long-term bonus payments, and the Black-Scholes value of stock option grants. Based on the three highest-paid officers in the largest 50 firms in 1940, 1960 and 1990.

Table 4
Average Real Value of Total Compensation by Percentile
(Millions of $2000)

	10^{th} percentile	25^{th} percentile	50^{th} percentile	75^{th} percentile	90^{th} percentile
1936 - 1939	.36	.52	.84	1.23	1.74
1940 – 1945	.41	.58	.81	1.13	1.61
1946 - 1949	.36	.52	.73	1.01	1.53
1950 - 1959	.39	.56	.76	1.09	1.60
1960 - 1969	.46	.61	.84	1.20	1.69
1970 - 1979	.48	.66	.95	1.39	1.98
1980 - 1989	.60	.90	1.42	2.12	3.12
1990 - 1999	.99	1.48	2.60	4.73	8.64
2000 - 2003	1.23	2.07	4.25	9.84	20.4

Note: Total compensation is the sum of salaries, bonuses, long-term bonus payments, and the Black-Scholes value of stock option grants. Based on the three highest-paid officers in the largest 50 firms in 1940, 1960 and 1990.

Table 5
Distribution of Total Compensation Within the Firm

	Fraction of Total Variation Within the Firm	Ratio of Top to Third Highest-Paid Officer	Ratio of Top to Fifth Highest-Paid Officer	Ratio of CEO to Two Other Highest-Paid Officers
1936 - 1939	.39	2.2	--	1.6
1940 – 1945	.39	2.0	2.7	1.6
1946 - 1949	.28	1.9	2.5	1.4
1950 - 1959	.23	1.9	2.6	1.5
1960 - 1969	.28	1.8	2.4	1.4
1970 - 1979	.28	1.8	2.6	1.4
1980 - 1989	.33	2.0	3.0	1.6
1990 - 1999	.47	2.8	4.4	2.1
2000 - 2003	.40	3.6	5.6	2.5

Note: Total compensation is the sum of salaries, bonuses, long-term bonus payments, and the Black-Scholes value of stock option grants. Columns (1), (2) and (4) are based on the three highest-paid officers in the largest 50 firms in 1940, 1960 and 1990, and column (3) is based on the five highest-paid officers. Information on the fourth and fifth highest paid officers was not available for the 1936-42 period.

Table 6
Total Compensation Relative to Average Wages
for CEOs and Other Top Officers

	Ratio of Average Top 3 Compensation to Average Workers		Ratio of CEO Compensation to Average Workers		Ratio of Other Officer Compensation to Average Workers	
	Level	Growth rate	Level	Growth rate	Level	Growth rate
1936 - 1939	63	--	82	--	56	--
1940 – 1945	51	-3.8	66	-3.9	44	-4.3
1946 - 1949	41	-4.7	49	-6.4	37	-3.9
1950 - 1959	38	-0.8	47	-0.4	34	-0.8
1960 - 1969	32	-1.7	39	-1.9	30	-1.2
1970 - 1979	33	0.3	40	0.3	31	0.3
1980 - 1989	52	4.7	69	5.6	45	3.8
1990 - 1999	122	8.9	187	10.4	95	7.8
2000 - 2003	219	6.0	367	7.0	164	5.6

Note: Total compensation is the sum of salaries, bonuses, long-term bonus payments, and the Black-Scholes value of stock option grants. Based on the three highest-paid officers in the largest 50 firms in 1940, 1960 and 1990. Average earnings are measured as total wage and salary accruals per full-time equivalent employee from table 6.6 of the National Income and Product Accounts. Growth rates are defined as the percent change from the average in the preceding period at an annual rate.

Table 7
Effect of Tax Reforms on the Structure of Compensation

	1964 Reform		1969 Reform		Both Reforms	
	Δ Share Salary+Bonus (1963-1966)	Δ Share Option Grants (1963-1966)	Δ Share Salary+Bonus (1968-1972)	Δ Share Option Grants (1968-1972)	Δ Share Salary+ Bonus	Δ Share Option Grants
Δ tax rate	-.181 (.176)	.233 (.167)	-.459* (.233)	.438** (.184)	-.316** (.143)	.333** (.127)
1969 Reform dummy					-.018 (.019)	.020 (.017)
# Observations	295	295	162	162	457	457

Note: Shares are calculated relative to the sum of salaries and bonuses, the value of deferred bonus awards, and stock option grants. Changes in tax rates and compensation shares are calculated from the year prior to the reform to the year after the reform has taken place (dates shown in parentheses). The change in the tax rate is instrumented with the change in the tax rate holding nominal direct compensation at its pre-reform level. Sample is based on the compensation for all reported officers in the largest firms in 1940, 1960 and 1990. Standard errors are reported in parentheses. * indicates significance at the 10% level and ** indicates significance at the 5% level.

Table 8
Correlation of Ln(Total Compensation) with Ln(Firm Market Value)

	Total Compensation		Direct Compensation	
		With Firm Fixed Effects		With Firm Fixed Effects
	.251	.081	.251	.081
1936 - 1939	(.042)	(.039)	(.042)	(.039)
	.116	-.084	.118	-.085
1940 – 1945	(.042)	(.036)	(.042)	(.035)
	.176	.201	.175	.201
1946 - 1949	(.039)	(.083)	(.039)	(.080)
	.216	.144	.211	.098
1950 - 1959	(.038)	(.030)	(.038)	(.025)
	.222	.240	.214	.164
1960 - 1969	(.032)	(.035)	(.029)	(.031)
	.193	.098	.153	.060
1970 - 1979	(.028)	(.038)	(.019)	(.028)
	.241	.444	.203	.359
1980 - 1989	(.024)	(.045)	(.021)	(.037)
	.342	.583	.274	.431
1990 - 1999	(.029)	(.056)	(.026)	(.054)
	.350	.503	.295	.433
2000 - 2003	(.029)	(.172)	(.039)	(.152)

Note. Each cell shows the result of regressing the logarithm of an individual's total or direct compensation on the logarithm of the firm's market value. All variables are measured in constant $2000. Total compensation is the sum of salaries, bonuses, long-term bonus payments, and the Black-Scholes value of stock option grants. Direct compensation is the sum of salaries, bonuses, and long-term bonus payments. Regressions also control for dummy variables for president, chairman of the board, executive vice president and vice president. Standard errors are clustered by firm and shown in parentheses. Based on the three highest-paid officers in the largest 50 firms in 1940, 1960 and 1990.

Table 9
Determinants of Ln(Total Compensation), 1947-2003

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Time Trend	.014 (.008)	-.027** (.009)	-.054** (.018)	-.047* (.020)	-.037** (.011)	-.007 (.017)	-.013 (.038)
Time Trend^2	-.0008* (.0004)	.0006 (.0004)	.0025* (.0011)	.0024* (.0012)	.0015** (.0006)	.0002 (.0009)	.001 (.002)
Time Trend^3	.00002** (5.12×10^{-6})	3.90×10^{-6} (4.28×10^{-6})	-.000018 (.000013)	-.000018 (.000014)	-7.33×10^{-6} (6.81×10^{-6})	9.64×10^{-6} (.000011)	-7.88×10^{-6} (.00003)
Ln(Market Value$_{t-1}$)		.24** (.023)	.22** (.031)	.22** (.013)	.25** (.016)	.19** (.028)	.212** (.016)
Tax Rate			1.64* (.80)	1.81* (.79)	.964* (.406)	.36 (.36)	1.39** (.54)
Tax Rate* Ln(Market Value$_{t-1}$)				-.37** (.07)	-.280** (.069)	-.315** (.085)	-.324** (.072)
Tax Rate* Time Trend							-.121 (.129)
Tax Rate* Time Trend^2							.002 (.005)
Tax Rate* Time Trend^3							-.00001 (.00007)
Firm Fixed Effects	No	No	No	No	Yes	No	No
Individual Fixed Effects	No	No	No	No	No	Yes	No
Job title dummy variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Joint-significance of time trend coefficients	926 (.000)	473 (.000)	89.4 (.000)	159 (.000)	373 (.000)	45.7 (.000)	16.5 (.003)
# Obs	10569	10569	10569	10569	10569	10569	10569

Note. Standard errors are clustered by decade and shown in parentheses. The tax rate is instrumented with the tax rate as predicted from the previous year's direct compensation and the current year's tax schedule. Total compensation and the firm's market value are measured in year 2000 dollars. Total compensation is the sum of salaries, bonuses, long-term bonus payments, and the Black-Scholes value of stock option grants. Based on the three highest-paid officers in the 50 largest firms in 1950, 1960, and 1990. * indicates significance at the 10% level and ** indicates significance at the 5% level. Test of the significance of the time trend reports the F-statistic of the test that the coefficients on the three time-trend terms are jointly equal to 0, with p-values in paranehteses.

Table 10
Determinants of Ln(Total Compensation), 1947-2003

	Instrument with Tax Rate Determined by Direct Compensation$_{t-1}$				Instrument with Top Marginal Tax Rate	
Time Trend	-.0037 (.0084)	.0046 (.0080)	.021 (.016)	.026 (.013)	-.022** (.008)	.0007 (.011)
Time Trend^2	.0003 (.0004)	-.00008 (.00038)	-.001 (.001)	-.0013* (.0007)	.0006 (.0004)	-.0011 (.0006)
Time Trend^3	-3.41 x10^{-7} (4.43 x10^{-6})	4.92 x10^{-6} (4.29 x10^{-6})	.00002 (.00001)	.00002 (9.17 x10^{-6})	4.13 x10^{-6} (4.81 x10^{-6})	.00003** (8.68 x10^{-6})
Ln(Market Value$_{t-1}$)	.082** (.017)	.084** (.018)	.084** (.018)	.086** (.019)	.236** (.016)	.243** (.020)
Tax Rate	.204 (.252)	.102 (.211)	.362 (.257)	.311 (.237)	.081 (.231)	.164 (.254)
Tax Rate* Ln(Market Value$_{t-1}$)	-.128** (.039)	-.186** (.047)	-.106** (.037)	-.168** (.043)	-.206* (.103)	-.153 (.082)
Direct Compensation$_{t-1}$	.738** (.071)	--	.741** (.070)	--		
Tax Rate* Time Trend			.013 (.030)	.011 (.031)		.089* (.046)
Tax Rate* Time Trend^2			-.0033* (.0014)	-.0028 (.0017)		-.0064** (.0023)
Tax Rate* Time Trend^3			.00007** (.00003)	.00006** (.00003)		.00011** (.00004)
Direct Compensation$_{t-1}$ dummy variables	No	Yes	No	Yes	No	No
Job title dummy variables	Yes	Yes	Yes	Yes	Yes	Yes
# Obs	10097	10097	10097	10097	10569	10569

Note. Standard errors are clustered by decade and shown in parentheses. In the left-hand panel, the tax rate is instrumented with the tax rate as predicted from the previous year's direct compensation and the current year's tax schedule. In the right-hand panel, the tax rate is instrumented with the top marginal tax rate. Total compensation and the firm's market value are measured in year 2000 dollars. Total compensation is the sum of salaries, bonuses, long-term bonus payments, and the Black-Scholes value of stock option grants. Based on the three highest-paid officers in the 50 largest firms in 1940, 1960, and 1990. * indicates significance at the 10% level and ** indicates significance at the 5% level.

Table A1
Distribution of Firms by Industry

Industry	Percent of Firms
Mining	.9
Manufacturing	
Food and kindred products	10.7
Tobacco	4.2
Lumber/wood products	.8
Paper and allied products	2.2
Chemicals and allied products	7.0
Petroleum and coal products	11.1
Rubber and misc. plastics products	3.2
Stone, clay, glass, concrete products	.8
Primary metal industries	8.7
Fabricated metal products	2.0
Industrial machinery and equipment	4.2
Electronic equipment	4.8
Transportation equipment	
Motor vehicles and equipment	5.0
Aircraft and parts	5.5
Ship and boat building	.9
Instruments and related products	1.7
Transportation	2.6
Communications	2.2
Utilities	6.0
Wholesale trade	.6
Retail trade	
General merchandise stores	5.5
Food stores	2.5
Other retail	1.0
Finance, Insurance and Real Estate	6.0

Note. Based on the largest 50 firms in 1940, 1960 and 1990. Each firm is weighted by its share in the sample of the three highest-paid officers. Industry definitions are based on 2-digit SIC codes from CRSP.

Table A2
Distribution of Firms by Size

	1936-1939	1940-1949	1950-1959	1960-1969	1970-1979	1980-1989	1990-1999	2000-2003
Fraction of Firms Ranked by Market Value								
Rank<=50	.50	.53	.42	.40	.33	.34	.32	.27
50<Rank<=100	.21	.21	.26	.19	.17	.20	.14	.16
100<Rank<=200	.16	.12	.18	.23	.20	.20	.25	.16
200<Rank<=500	.10	.11	.11	.17	.21	.17	.19	.22
500<Rank	.01	.00	.01	.01	.09	.09	.10	.20
Fraction of Firms Ranked by Total Sales								
Rank<=50	--	--	.58	.52	.39	.40	.31	.28
50<Rank<=100	--	--	.21	.26	.26	.26	.25	.14
100<Rank<=200	--	--	.12	.14	.21	.19	.17	.25
200<Rank<=500	--	--	.04	.08	.11	.13	.22	.19
500<Rank	--	--	0	.00	.03	.02	.05	.14
Average Market Share of Entire Sample in S&P 500								
	.39	.51	.49	.42	.37	.30	.24	.24

Rankings by market value are determined based on all firms appearing in the CRSP database, which includes all publicly-traded firms in the NYSE, AMEX and NASDAQ stock markets. Rankings by sales are determined based on all firms appearing in Compustat (largest firms on the American and New York stock exchanges including all companies in the S&P, plus former utility subsidiaries and companies listed on major exchanges), which does not have data prior to 1950.

Table A3
Summary Statistics by Decade

		1936-1939	1940-1949	1950-1959	1960-1969	1970-1979	1980-1989	1990-1999	2000-2003
Panel A: Sample of 3 highest-paid executives (main sample)									
Total # person- year obs.		695	2154	2316	2245	2598	2482	2256	747
Total # executives		253	332	356	358	446	435	350	216
Mean # firms in each year		60	73	78	75	87	82	75	62
Mean # executives in each firm		2.9	2.9	3.0	3.0	3.0	3.0	3.0	3.0
Mean yrs each exec. is observed		8.5	9.4	10.8	9.8	7.9	7.7	7.3	6.4
Current direct comp.	Mean	.96	.89	.81	.80	.84	1.10	1.63	2.49
	Median	.84	.76	.73	.74	.75	.92	1.22	1.53
Total direct comp.	Mean	.97	.90	.88	.89	.91	1.28	2.44	4.41
	Median	.84	.77	.74	.77	.80	1.03	1.58	2.32
Total compensation	Mean	.97	.91	.94	1.00	1.17	1.77	4.36	8.54
	Median	.85	.77	.77	.84	.95	1.35	2.37	4.11
Panel B: Sample of all executives reported on proxy statements									
Total # person- year obs.		780	3912	4191	3905	4229	4098	4758	1635
Total # executives		289	729	816	807	1004	1088	1182	560
Mean # firms in each year		60	73	78	75	87	82	75	62
Mean # executives in each firm		3.3	5.5	5.4	5.2	4.9	4.9	6.3	6.6
Mean yrs each exec. Is observed		9.9	10.8	12.0	10.8	8.4	7.1	6.4	6.1
Current direct comp.	Mean	.93	.71	.68	.67	.72	.94	1.18	1.65
	Median	.80	.59	.59	.61	.64	.78	.85	.99
Total direct comp.	Mean	.93	.72	.74	.76	.79	1.08	1.79	2.94
	Median	.81	.60	.60	.63	.68	.85	1.11	1.49
Total compensation	Mean	.93	.73	.78	.85	1.02	1.49	2.98	5.46
	Median	.81	.60	.62	.69	.80	1.11	1.55	2.43
Panel C: Balanced panel of 30 firms									
Total # person- year obs.		337	862	847	795	827	862	885	360
Total # executives		119	132	126	124	130	138	126	99
Mean # firms in each year		28	29	28	27	28	29	30	30
Mean # executives in each firm		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Mean yrs each exec. Is observed		8.2	9.5	11.6	10.3	9.0	8.0	7.5	5.8
Current direct comp.	Mean	.90	.92	.83	.83	.97	1.09	1.72	2.88
	Median	.69	.79	.80	.77	.84	.99	1.27	1.71
Total direct comp.	Mean	.92	.96	.96	.95	1.08	1.24	2.41	4.88
	Median	.69	.79	.80	.82	.95	1.11	1.56	2.42
Total compensation	Mean	.92	.96	1.01	1.05	1.45	1.77	5.19	9.56
	Median	.69	.80	.83	.88	1.14	1.45	2.55	4.30
Panel D: Largest firms representing 20% of S&P market value									
Total # person- year obs.		110	163	129	159	279	618	1011	249
Total # executives		57	35	20	19	27	77	105	73
Mean # firms in each year		9	6	4	5	9	21	34	21
Mean # executives in each firm		3.0	3.0	3.0	2.9	3.0	3.0	3.0	3.0
Mean yrs each exec. is observed		7.4	7.8	9.0	8.2	6.6	8.3	7.4	6.7
Current direct comp.	Mean	1.21	1.27	1.04	1.04	1.26	1.35	2.09	4.15
	Median	1.19	1.14	1.00	1.00	1.01	2.24	1.54	2.64
Total direct comp.	Mean	1.26	1.39	1.80	1.49	1.42	1.59	3.27	7.48
	Median	1.21	1.25	1.28	1.29	1.20	1.45	2.03	4.70
Total compensation	Mean	1.26	1.39	1.88	1.66	2.07	2.28	6.33	15.52
	Median	1.21	1.25	1.44	1.45	1.52	1.84	3.47	9.77

Note: Based on the largest 50 firms in 1940, 1960 and 1990. All measures of compensation are in millions of 2000 dollars. Current direct compensation is the sum of salaries and current bonuses. Total direct compensation is the sum of salaries, bonuses, and long-term bonus payments. Total compensation is the sum of salaries, bonuses, long-term bonus payments, and the Black-Scholes value of stock option grants. Panel A presents the main sample, composed of the three highest paid officers in each firm. Panel B includes all the officers for which information on compensation was collected (a maximum of five executives in each firm). Panel C restricts the sample to the top three officers at the 30 firms that had available information in every year from 1936 to 2003. In order to present a constant market share over time, Panel D limits the information to the three highest paid executives in the largest firms in each year that accounted for 20 percent of the market value of the S&P 500 –the highest fraction achieved by the firms in our sample in any year.

Table A4
Firms Included in the Sample

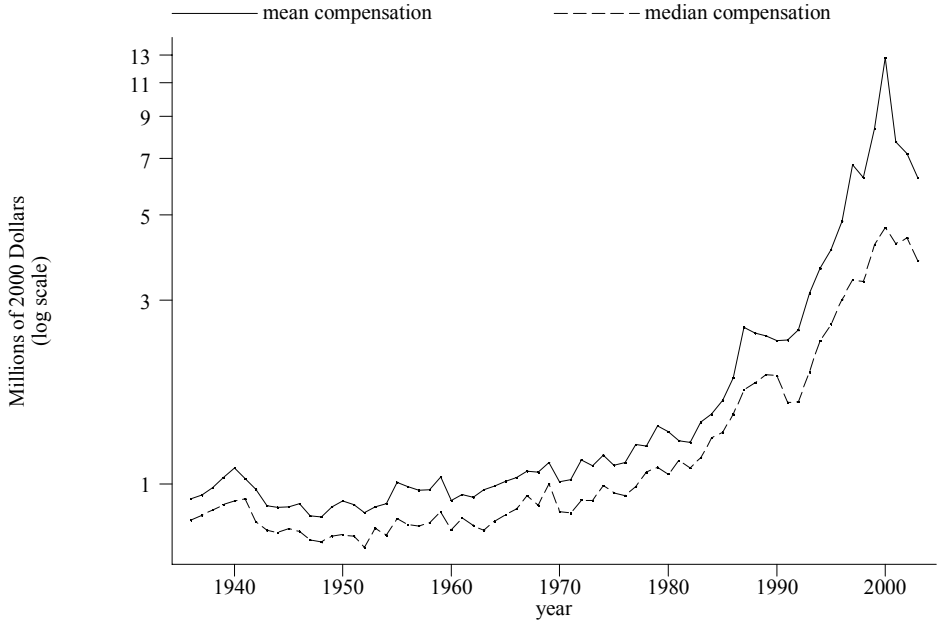
Company Name	First Year in Sample	Last Year in Sample	Rank in 1940	Rank in 1960	Rank in 1990	Industry
AETNA LIFE & CASUALTY CO	1964	2003	--	--	145	Insurance carriers
ALLIED CHEMICAL CORP	1936	2003	16	66	170	Chemical mfg
AMERICAN CAN CO	1936	2003	35	43	249	Fabricated metal products
AMERICAN EXPRESS CO	1977	2003	--	--	51	Depository institutions
AMERICAN INTERNATIONAL GROUP INC	1970	2003	--	--	30	Holding and other investment offices
AMERICAN MOTORS CORP	1937	1986	299	44	--	Motor vehicles
AMERICAN STORES CO	1936	1998	262	58	309	Food stores
AMERICAN TELEPHONE & TELEG CO	1942	2003	--	3	7	Communications
AMERICAN TOB CO	1936	2003	36	73	60	Tobacco mfg
ANACONDA COPPER MNG CO	1936	1975	31	86	--	Primary metals
ARMCO INC	1937	2003	212	55	548	Primary metals
ARMOUR & CO	1936	1969	227	23	--	Food mfg
ATLANTIC RICHFIELD CO	1936	1999	103	93	53	Petroleum mfg
BELLSOUTH CORP	1984	2003	--	--	11	Holding and other investment offices
BETHLEHEM STEEL CORP	1936	2000	25	16	251	Primary metals
BOEING CO	1936	2003	233	27	32	Motor vehicles
BORDEN CO	1936	1993	84	53	140	Food mfg
C I G N A CORP	1982	2003	--	--	202	Holding and other investment offices
C I T FINANCIAL CORP	1938	1976	62	208	--	Nondepository credit institutions
C P C INTERNATIONAL INC	1936	1999	63	77	93	Food mfg
CHASE MANHATTAN CORP	1972	2002	--	--	407	Depository institutions
CHESAPEAKE & OHIO RAILWAY CO	1938	2003	19	--	190	Transportation
CHRYSLER CORP	1936	1997	21	11	211	Motor vehicles
CITICORP	1971	1997	--	--	151	Depository institutions
CITIES SERVICE CO	1939	1981	--	50	--	Petroleum mfg
COCA COLA CO	1936	2003	10	108	8	Food mfg
COMMONWEALTH EDISON CO	1938	1999	14	114	70	Electric, Gas, Sanitary
CONAGRA INC	1972	2003	--	--	164	Food mfg
CONSOLIDATED EDISON CO NY INC	1938	2003	28	83	114	Electric, Gas, Sanitary
CONTINENTAL CAN INC	1936	1983	69	41	--	Fabricated metal products
DAYTON HUDSON CORP	1970	2003	--	--	149	General merchandise stores
DETROIT EDISON CO	1938	2003	52	190	153	Electric, Gas, Sanitary
DIGITAL EQUIPMENT CORP	1971	1997	--	--	47	Industrial machinery
DOW CHEMICAL CO	1936	2003	45	64	40	Chemical mfg
DU PONT E I DE NEMOURS & CO	1937	2003	3	17	13	Chemical mfg
EASTMAN KODAK CO	1936	2003	18	54	38	Instruments
ENRON CORP	1970	2000	--	--	220	Electric, Gas, Sanitary
FIRESTONE TIRE & RUBBER CO	1936	1987	165	36	--	Rubber
FORD MOTOR CO DEL	1955	2003	--	4	41	Motor vehicles
GENERAL DYNAMICS CORP	1951	2003	--	19	503	Motor vehicles
GENERAL ELECTRIC CO	1942	2003	--	6	3	Electronic equipment

GENERAL FOODS CORP	1937	1984	39	42	--	Food mfg
GENERAL MOTORS CORP	1936	2003	2	1	18	Motor vehicles
GENERAL TEL & ELECTRS CORP	1941	2003	--	38	21	Communications
GEORGIA PACIFIC CORP	1951	2003	--	232	185	Lumber/wood mfg
GOODYEAR TIRE & RUBR CO	1936	2003	185	28	99	Rubber
GULF OIL CORP	1946	1982	--	13	--	Petroleum mfg
HEWLETT PACKARD CO	1970	2003	--	--	92	Instruments
INLAND STEEL CO	1936	2003	49	71	630	Primary metals
INTERNATIONAL BUSINESS MACHS COR	1936	2003	50	32	1	Industrial machinery
INTERNATIONAL HARVESTER CO	1936	2003	32	24	808	Industrial machinery
INTERNATIONAL PAPER CO	1936	2003	190	48	102	Paper
INTERNATIONAL TEL & TELEG CORP	1936	2003	325	61	105	Electronic equipment
KENNECOTT COPPER CORP	1936	1979	12	110	--	Primary metals
KRESGE S S CO	1936	1992	56	131	88	General merchandise stores
KROGER COMPANY	1970	2003	--	--	45	Food stores
LIGGETT & MYERS TOB CO	1937	1989	37	168	--	Tobacco mfg
LOCKHEED AIRCRAFT CORP	1936	2003	187	34	290	Motor vehicles
MCDONNELL DOUGLAS CORP	1936	1996	167	39	387	Motor vehicles
MINNESOTA MINING & MFG CO	1950	2003	--	97	24	Paper
MONTGOMERY WARD & CO	1936	1975	40	--	--	General merchandise stores
NATIONAL DAIRY PRODS CORP	1936	1987	86	25	--	Food mfg
NORFOLK & WESTERN RAILWAY CO	1938	2003	23	--	89	Transportation
OCCIDENTAL PETROLEUM CORP	1970	2003	--	--	112	Oil and gas extraction
OWENS ILLINOIS GLASS CO	1936	1985	60	91	--	Stone, clay, glass, concrete
PACIFIC GAS & ELEC CO	1938	2003	44	84	44	Electric, gas, sanitary
PACIFIC TELEPHONE & TELEG CO	1938	1980	34	--	--	Communications
PENNEY J C CO INC	1936	2003	30	31	63	Apparel and accessory stores
PENNSYLVANIA RAILROAD CO	1939	2003	22	--	512	Transportation
PEPSICO INC	1936	2003	197	288	54	Food stores
PHELPS DODGE CORP	1937	2003	42	186	312	Primary metals
PHILIP MORRIS INC	1936	2003	96	160	4	Tobacco mfg
PHILLIPS PETROLEUM CO	1936	2003	41	37	83	Petroleum mfg
PROCTER & GAMBLE CO	1936	2003	15	33	9	Chemical mfg
RADIO CORP AMER	1936	1984	102	30	--	Electronic equipment
REPUBLIC STEEL CORP	1936	1986	59	45	--	Primary metals
REYNOLDS R J TOBACCO CO	1936	1999	24	62	62*	Tobacco mfg
ROCKWELL INTERNATIONAL CORP	1940	2003	153	52	100	Motor vehicles
SAFEWAY STORES INC	1937	2003	195	14	61*	Food stores
SALOMON INC	1970	1996	--	--	225	Primary metals
SEARS ROEBUCK & CO	1970	2003	--	--	55	General merchandise stores
SHELL OIL CO	1936	1984	47	22	--	Petroleum mfg
SINCLAIR OIL CORP	1936	1967	89	35	--	Petroleum mfg
SOCONY VACUUM OIL INC (Mobil Corp)	1936	1998	27	10	16	Petroleum mfg
SPERRY RAND CORP	1941	2003	--	40	941	Industrial machinery
STANDARD OIL CO CALIFORNIA	1936	2003	29	26	12	Petroleum mfg
STANDARD OIL CO IND	1937	1997	13	18	10	Petroleum mfg

STANDARD OIL CO N J	1936	2003	5	2	2	Petroleum mfg
SWIFT & CO	1937	1984	58	15	--	Food mfg
TENNECO INC	1955	2003	--	94	101	Electric, gas, sanitary
TEXACO INC	1970	2000	--	--	31	Petroleum mfg
UNION CARBIDE CORP	1938	1992	6	29	301	Chemical mfg
UNITED AIRCRAFT CORP	1936	2003	79	49	103	Motor vehicles
UNITED FRUIT CO	1938	2003	38	173	398	Food mfg
UNITED STATES RUBBER CO	1936	1985	147	51	--	Rubber
UNITED STATES STEEL CORP	1941	2003	--	8	47	Primary metals
WAL MART STORES INC	1973	2003	--	--	14	General merchandise stores
WARNER LAMBERT CO	1936	2003	48	250	53	Chemical mfg
WESTINGHOUSE ELECTRIC CORP	1936	2003	26	20	58	Electronic equipment
WOOLWORTH F W CO	1938	2003	20	46	168	General merchandise stores
WRIGLEY WILLIAM JR CO	1936	2003	46	378	306	Food mfg

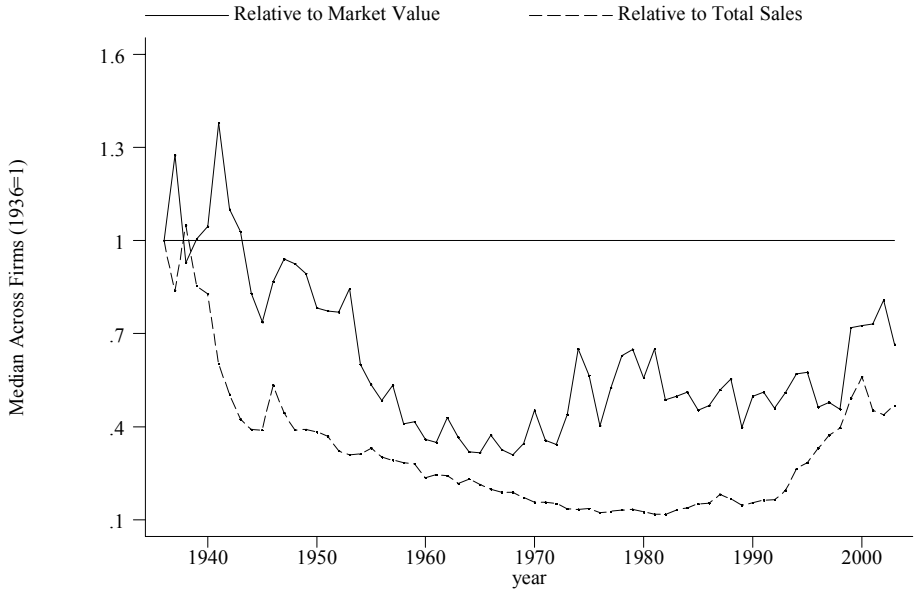
Note. Rank in 1940 is defined according to market value and rank in 1960 and 1990 is defined according to total sales. Company names refer to the name most frequently used throughout the entire time period, with names in parentheses referring to other names frequently used. * indicates rank in 1991 instead of 1990 because the company was not public in 1990. Industry definitions are the modal 2-digit SIC code reported in CRSP.

Figure 1
Average and Median Real Value of Total Compensation, 1936-2003



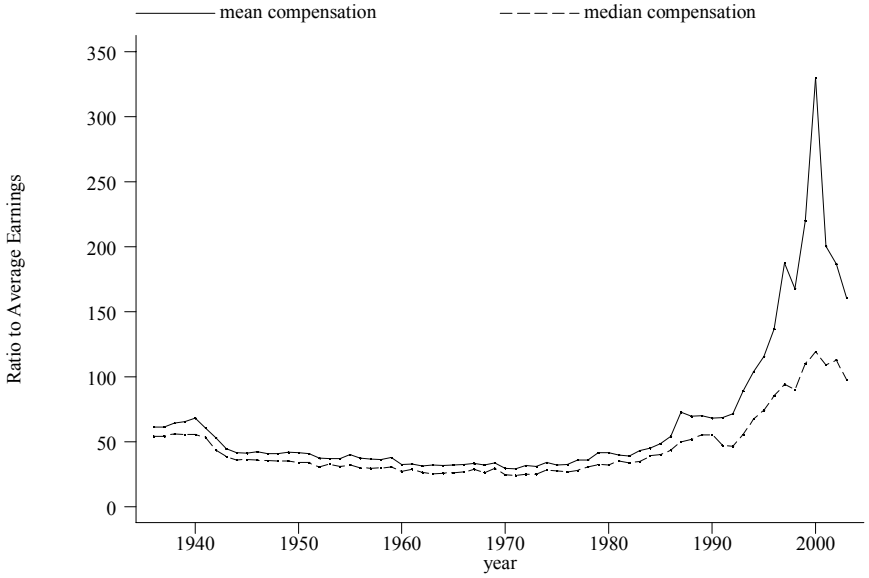
Note: Total compensation is composed of salary, bonuses, long-term bonus payments, and stock option grants. Based on the three highest-paid officers in the largest 50 firms in 1940, 1960 and 1990.

Figure 2
Total Compensation in the Firm Relative to its Market Value and Sales



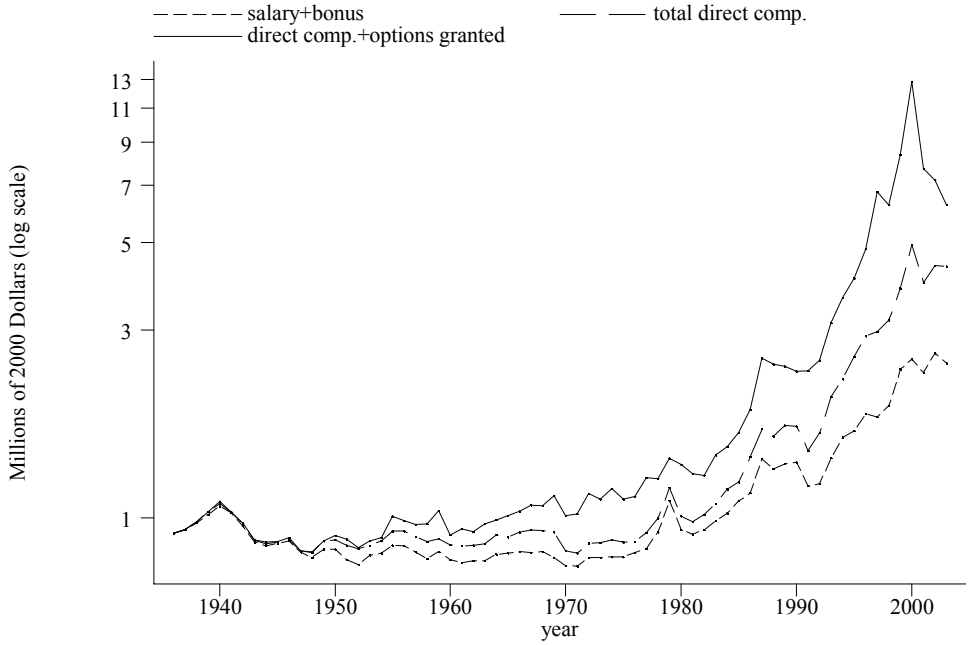
Note: Based on the three highest-paid officers in the largest 50 firms in 1940, 1960 and 1990. Each line shows the median across firms of average executive compensation in each firm relative to market value or the total value of sales in that firm. Annual medians are converted to an index that equals 1 in 1936.

Figure 3
Average and Median Executive Compensation Relative to Average Wages



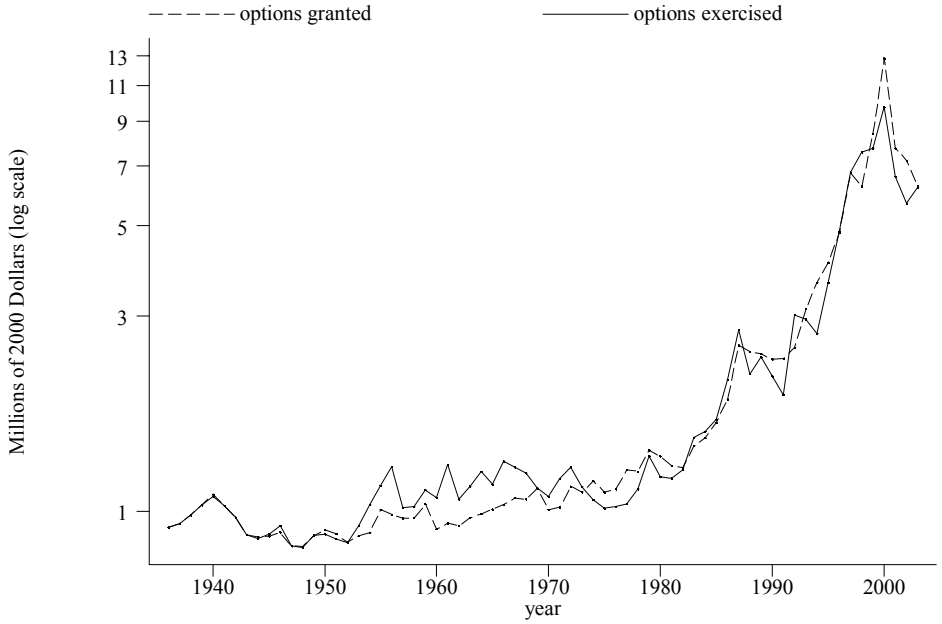
Note: Total compensation is composed of salary, bonuses, long-term bonus payments, and stock option grants. Average compensation in each year is expressed relative to total wage and salary accruals per full-time equivalent employee from table 6.6 of the National Income and Product Accounts. Based on the three highest-paid officers in the largest 50 firms in 1940, 1960 and 1990.

Figure 4
Structure of Total Compensation, 1936-2003



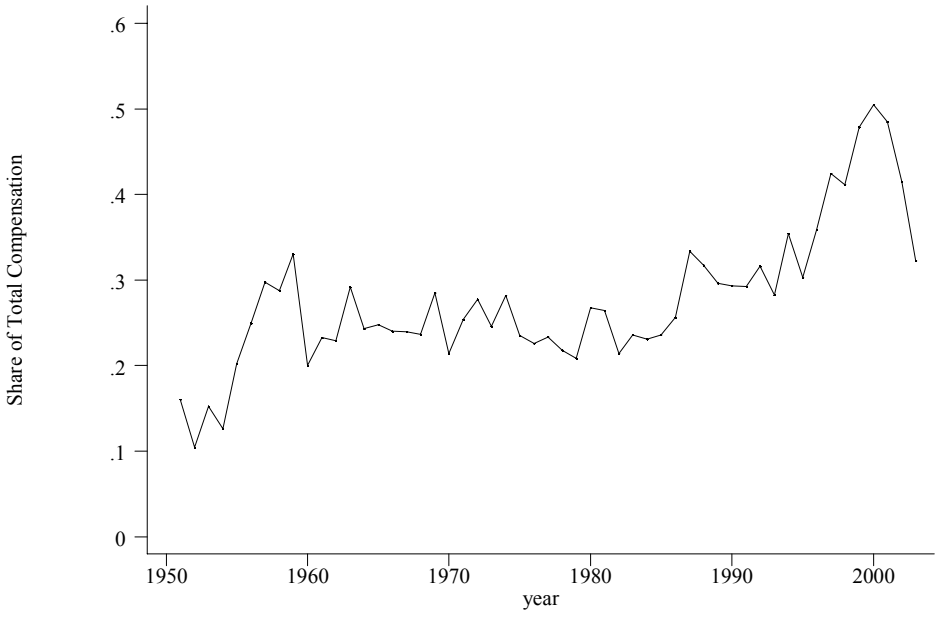
Note: Total direct compensation is the sum of salaries, bonuses and long term incentive payments. The solid line is total direct compensation plus the Black-Scholes value of options granted. Based on the three highest-paid officers in the largest 50 firms in 1940, 1960 and 1990.

Figure 5
Total Compensation Measured Using Stock Option Grants and Exercises
1950-2003



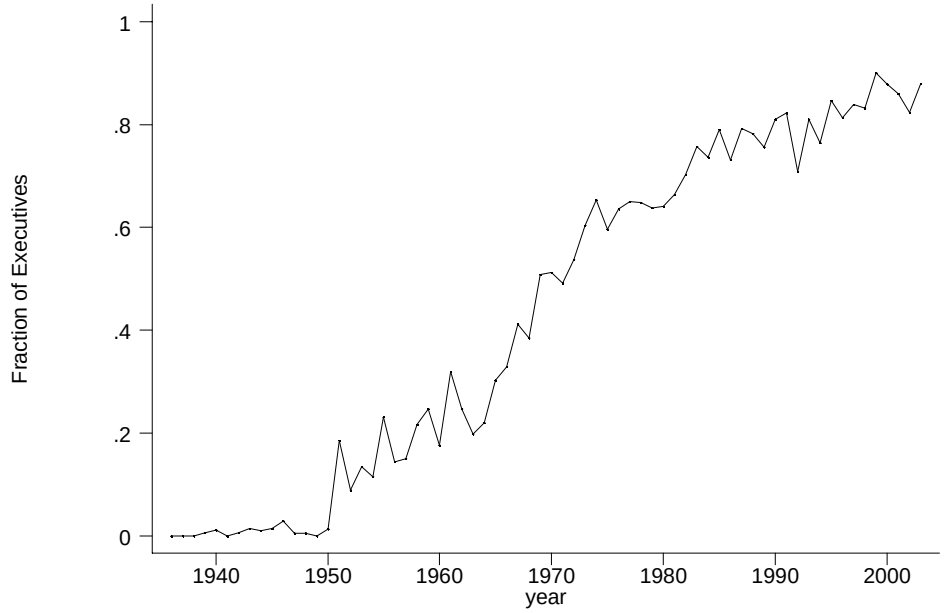
Note: Each line shows the average value of total direct compensation plus either the value of stock options granted or exercised. Based on the three highest-paid officers in the largest 50 firms in 1940, 1960 and 1990.

Figure 6
Value of Stock Option Grants Relative to Total Compensation, 1950-2003
(Average Across Individuals Receiving Option Grants)



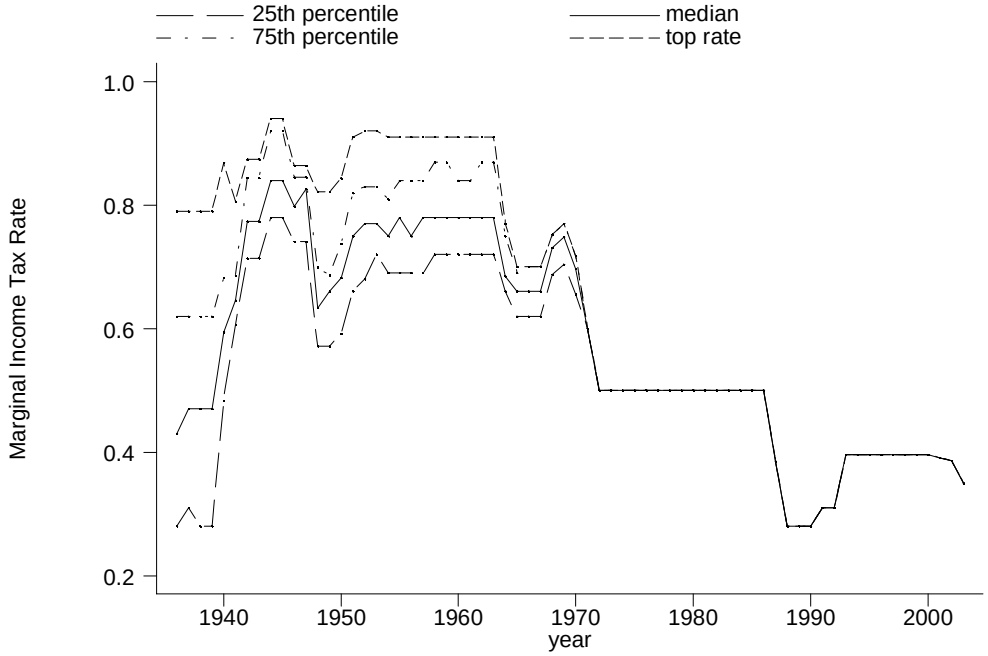
Note: Figure shows the average share of stock option grants relative to total compensation among those executives receiving stock options in each year. Based on the three highest-paid officers in the largest 50 firms in 1940, 1960 and 1990.

Figure 7
Fraction of Top Officers Granted Stock Options, 1936-2003



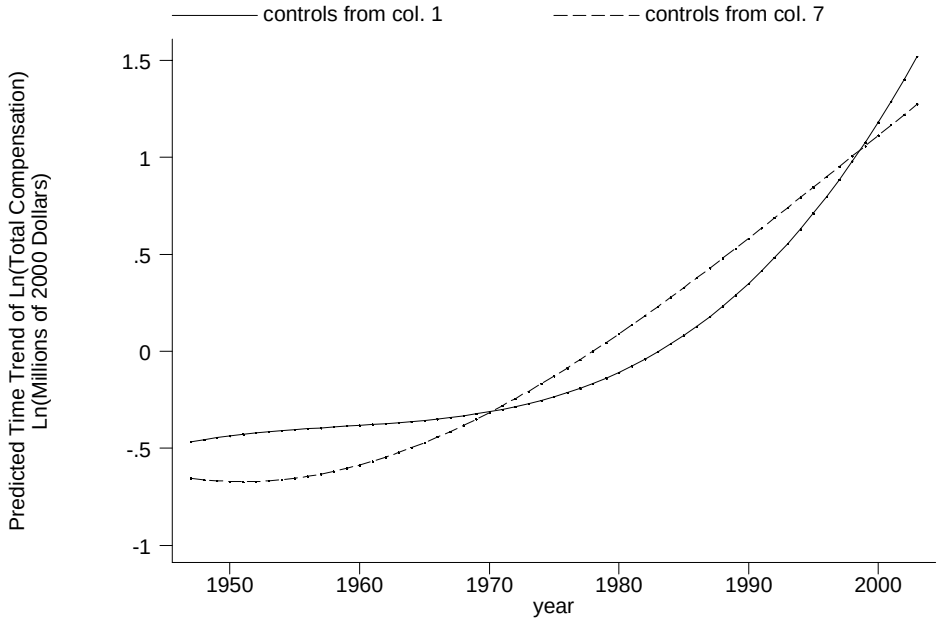
Note: Based on the three highest-paid officers in the largest 50 firms in 1940, 1960 and 1990.

Figure 8
Marginal Tax Rates on Labor Income, 1936-2003



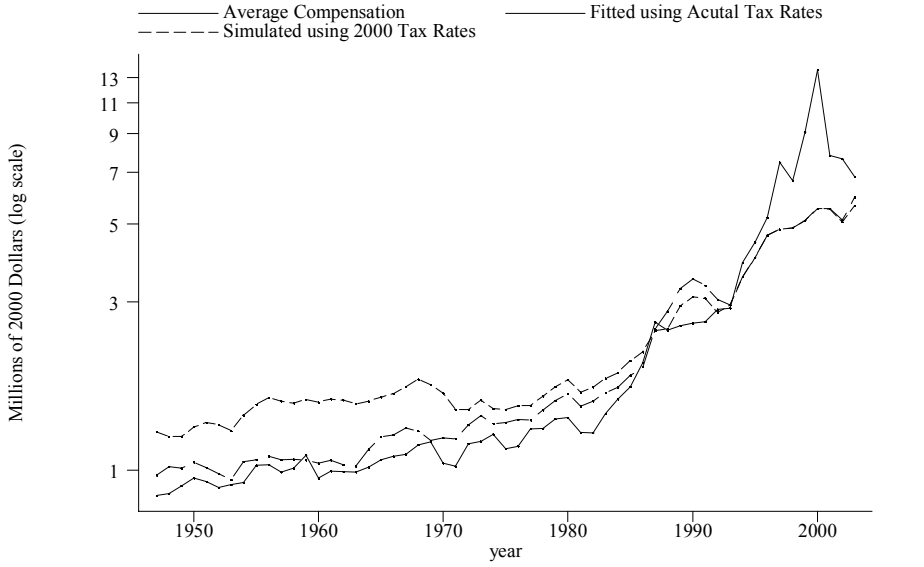
Note: Based on the three highest-paid officers in the largest 50 firms in 1940, 1960 and 1990. Top rate is top marginal rate on personal income in each year. Rates for each percentile are calculated for the executives in the sample.

Figure 9
Predicted Time Trend in Total Compensation



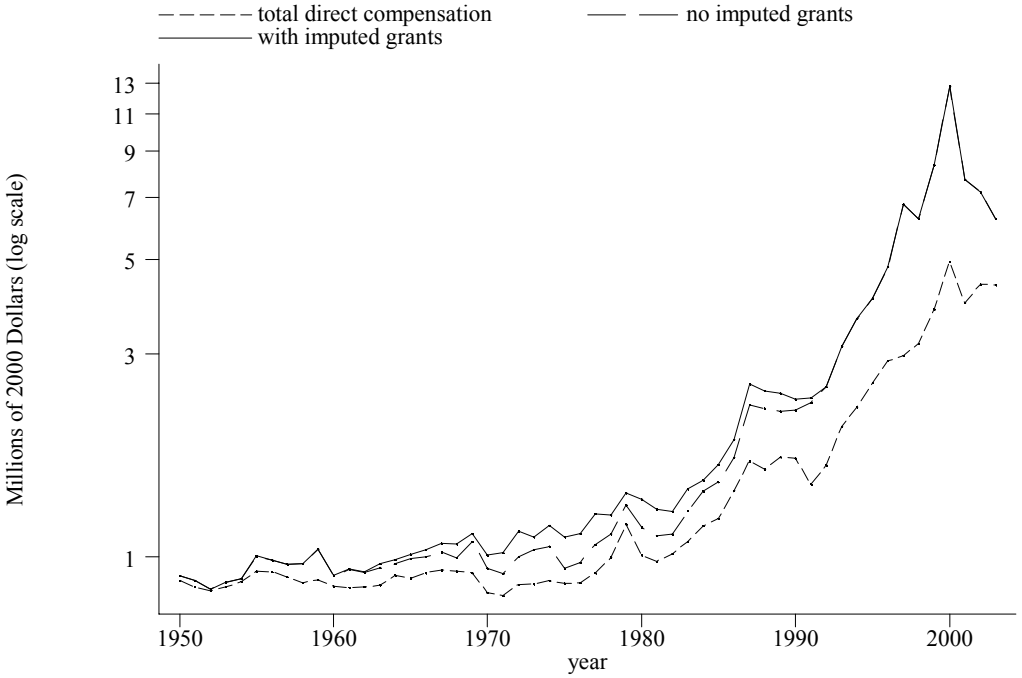
Note: Based on the largest 50 firms in 1940, 1960 and 1990. The predicted time trends are based on a regression of ln(total compensation) from 1947 to 2003 on a quadratic trend. The solid line is based on the specification shown in col. 1 of Table 9, which controls for job title dummy variables. The dashed line controls for job title dummy variables, ln(firm market value), the marginal income tax rate faced by each executive, an interaction of market value with tax rates, and an interaction of tax rates with a quadratic time trend.

Figure 10
Simulated Level of Total Compensation Holding Tax Rates Constant



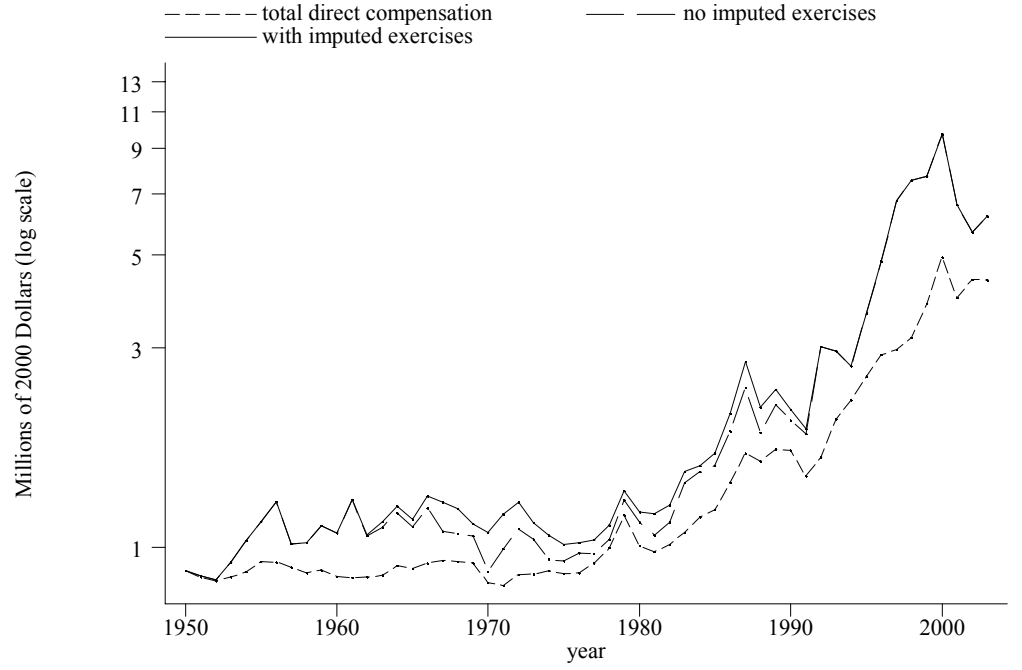
Note: Based on the largest 50 firms in 1940, 1960 and 1990. The fitted and simulated values are based on the regression shown in column 2 of Table 10. Simulated values are the average fitted value in each year assuming that marginal income tax rates are held fixed according to the year 2000 schedule.

Appendix Figure A1
Total Real Compensation With and Without Imputed Stock Option Grants



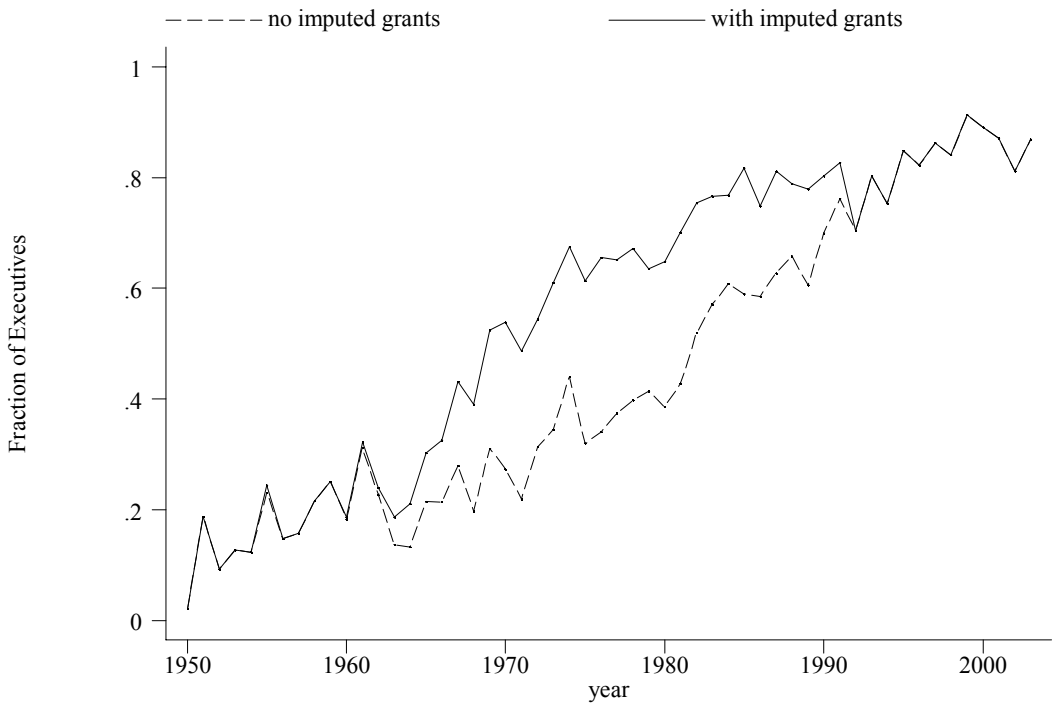
Note: Option grants are imputed from information on 3- and 5-year totals reported for individual executives during the 1970s and 1980s. Based on the largest 50 firms in 1940, 1960 and 1990.

Appendix Figure A2
Total Real Compensation With and Without Imputed Stock Option Exercises



Note: The gains from option exercises are imputed from information on 3- and 5-year totals reported for individual executives during the 1970s and 1980s. Based on the largest 50 firms in 1940, 1960 and 1990.

Appendix Figure A3
Fraction of Executives Receiving Options
With and Without Imputed Stock Option Grants



Note: Option grants are imputed from information on 3- and 5-year totals reported for individual executives during the 1970s and 1980s. Based on the largest 50 firms in 1940, 1960 and 1990.