

# **CEO pay has skyrocketed 1,460% since 1978**

CEOs were paid 399 times as much as a typical worker in 2021

**Report** • By [Josh Bivens](#) and [Jori Kandra](#) • October 4, 2022

**What this report finds:** Corporate boards running America’s largest public firms are giving top executives outside compensation packages that have grown much faster than the stock market and the pay of typical workers, college graduates, and even the top 0.1%. In 2021, we project that a CEO at one of the top 350 firms in the U.S. was paid \$27.8 million on average (using a “realized” measure of CEO pay that counts stock awards when vested and stock options when cashed in and ownership is taken). This 11.1% increase from 2020 occurred because of rapid growth in vested stock awards. Using a different “granted” measure of CEO pay (which counts the value of stock awards and options when announced (or “granted” rather than realized), average top CEO compensation was \$15.6 million in 2021, up 9.8% since 2020. In 2021, the ratio of CEO-to-typical-worker compensation was 399-to-1 under the realized measure of CEO pay; that is up from 366-to-1 in 2020 and a big increase from 20-to-1 in 1965 and 59-to-1 in 1989. CEOs are even making a lot more than other very high earners (wage earners in the top 0.1%)—almost seven times as much. From 1978 to 2021, CEO pay based on realized compensation grew by 1,460%, far outstripping S&P stock market growth (1,063%) and top 0.1% earnings growth (which was 385% between 1978 and 2020, according to the latest data available). In contrast, compensation of the typical worker grew by just 18.1% from 1978 to 2021.

**Why it matters:** Exorbitant CEO pay is a contributor to rising inequality that we could restrain without doing any damage to the wider economy. CEOs are getting ever-higher pay over time because of their power to set pay and because so much of their pay (more than 80%) is stock-related. They are not getting higher pay because they are becoming more productive or more skilled than other workers, or because of a shortage of excellent CEO candidates. This escalation of CEO compensation and of executive compensation more generally has fueled the growth of top 1% and top 0.1% incomes, leaving fewer of the gains of economic growth for ordinary workers and widening the gap between very high earners and the bottom 90%. The economy would suffer no harm if CEOs were paid less (or were taxed more).

**How we can solve the problem:** We need to enact policy solutions that would both reduce incentives for CEOs to

## SECTIONS

1. Introduction • 2
2. Measuring CEO compensation • 3
3. Analysis • 6
4. Dramatically high CEO pay does not simply reflect the market for skills • 12
5. The connection between CEO pay and overall inequality • 16
6. Policy recommendations: Reversing the trend • 17

---

Acknowledgments • 18

About the authors • 18

Notes • 19

References • 20

extract economic concessions and limit their ability to do so. Such policies could include reinstating higher marginal income tax rates at the very top; setting corporate tax rates higher for firms that have higher ratios of CEO-to-worker compensation; using antitrust enforcement and regulation to restrain the excessive market power of firms—and by extension of CEOs; and allowing greater use of “say on pay,” which allows a firm’s shareholders to vote on top executives’ compensation.

---

## Introduction

Chief executive officers (CEOs) of the largest firms in the U.S. earn far more today than they did in the mid-1990s and many times what they earned in the 1960s or 1970s. They also earn far more than the typical worker,<sup>1</sup> and their pay—which relies heavily on stock-related compensation—has grown much more rapidly than a typical worker’s pay. Importantly, rising CEO pay does not reflect a rising value of skills but rather CEOs’ use of their power to set their own pay. In economic terms, this means that CEO compensation reflects substantial “rents” (income in excess of actual productivity). This is problematic since the growing earning power of CEOs has been driving income growth at the very top—a key dynamic in the overall growth of inequality. But it also means that CEO pay can be curtailed without damaging economywide growth.

### Key findings

- **Growth of CEO compensation (1978–2021).** Using the realized compensation measure, compensation of the top CEOs increased 1,460.2% from 1978 to 2021 (adjusting for inflation). Top CEO compensation grew roughly 37% faster than stock market growth during this period and far eclipsed the slow 18.1% growth in a typical worker’s annual compensation. CEO granted compensation rose 1,050.2% from 1978 to 2021.
- **Growth of CEO compensation during the pandemic (2019–2021).** The dramatic increase in CEO compensation during the pandemic is remarkable. While millions lost jobs in the first year of the pandemic and suffered real wage declines due to inflation in the second year, CEOs’ realized compensation jumped 30.3% between 2019 and 2021. Typical worker compensation among those who remained employed rose 3.9% over the same time span.
- **Changes in the CEO-to-worker compensation ratio (1965–2021).** Using the realized compensation measure, the CEO-to-worker compensation ratio reached 399-to-1 in 2021, a new high. Before the pandemic, its previous peak was the 372-to-1 ratio in 2000. Both of these numbers stand in stark contrast to the 20-to-1 ratio in 1965. Most importantly, over the last two decades the ratio has been far higher than at any point in the 1960s, 1970s, 1980s, or early 1990s. Using the CEO granted compensation measure, the CEO-to-worker compensation ratio rose to 236-to-1 in 2021, significantly lower than its peak of 393-to-1 in 2000 but still many times higher than the 44-to-1 ratio of 1989 or the 15-to-1 ratio of 1965.

- **Changes in the composition of CEO compensation.** The composition of CEO compensation is shifting away from the use of stock options and toward the use of stock awards. Vested stock awards and exercised stock options averaged \$21.9 million in 2021 and accounted for 80.1% of the average realized CEO compensation.
- **Changes in the CEO-to-top-0.1% compensation ratio.** Over the last three decades, compensation grew far faster for CEOs than it did for other very highly paid workers (the top 0.1%, or those earning more than 99.9% of wage earners). CEO compensation in 2020 (the latest year for which data on top wage earners are available) was 6.88 times as high as wages of the top 0.1% of wage earners, a ratio 3.7 points greater than the 3.18-to-1 average CEO-to-top-0.1% ratio over the 1947–1979 period.
- **Implications of the growth of CEO-to-top-0.1% compensation ratio.** The fact that CEO compensation has grown far faster than the pay of the top 0.1% of wage earners indicates that CEO compensation growth does not simply reflect a competitive race for skills (the “market for talent”) that also increases the value of highly paid professionals more generally. Rather, the growing pay differential between CEOs and top 0.1% earners suggests the growth of substantial economic rents (income not related to a corresponding growth of productivity) in CEO compensation. CEO compensation, it appears, does not reflect the greater productivity of executives but the specific power of CEOs to extract concessions—a power that stems from dysfunctional systems of corporate governance in the United States. Because so much of CEOs’ income constitutes economic rent, there would be no adverse impact on the economy’s output or on employment if CEOs earned less or were taxed more.
- **Growth of top 0.1% compensation (1978–2020).** Even though CEO compensation grew much faster than the earnings of the top 0.1% of wage earners, that doesn’t mean the top 0.1% did not fare well. Quite the contrary. The inflation-adjusted annual earnings of the top 0.1% grew 385% from 1978 to 2020. CEO compensation, however, grew nearly four times as fast!
- **CEO pay growth compared with growth in the college wage premium.** Over the last three decades, CEO compensation increased more relative to the pay of other very-high-wage earners than did the wages of college graduates relative to the wages of high school graduates. This finding indicates that the escalation of CEO pay does not simply reflect a more general rise in the returns to education.

## Measuring CEO compensation

We focus on the average compensation of CEOs at the 350 largest publicly owned U.S. firms (i.e., firms that sell stock on the open market) by revenue. Our source of data is the S&P Compustat ExecuComp database for the years 1992 to 2021 and survey data published by *The Wall Street Journal* for selected years back to 1965. We maintain the sample size of 350 firms each year when using the Compustat ExecuComp data.<sup>2</sup>

## A note about the Compustat data

It is worth noting some complexity of the Compustat data at the outset. Compustat tracks data (including measures of CEO compensation) for all publicly traded firms in the United States across a range of years (we use it back to 1992 and find it reliable since that year). However, public companies sometimes move *out* of the data universe of publicly traded firms. They might go private, they might go out of business entirely, or they might be bought by another firm. When a firm stops being public, it does not simply drop out of the sample from that point on; it is also removed from previous years' samples. Optimally, we would like the Compustat data to give us information on the largest 350 firms *that were public in a given year*. Instead, it gives us information on the largest 350 firms that were public in a given year *and* that continue to be public according to the most recent data. This explains why some of our data—even for years relatively far in the past—changes with each new iteration of this report.

Further, even the data we use before 1992 (which we explain more about below) rely on a procedure that “backcasts” Compustat to pre-1992 data that originate from other sources. Therefore, even the pre-1992 data can change with each successive round of Compustat.

In practice, the degree of change to previous years' data caused by this reshuffling of firms in the Compustat universe is quite small, but it is not zero.

## Two ways of measuring CEO compensation

We use two measures of CEO compensation, one based on compensation as “realized” and the other based on compensation as “granted.” Both measures include the same measures of salary, bonuses, and long-term incentive payouts. The difference is how each measure treats stock awards and stock options, major components of CEO compensation that change value from when they are first provided, or granted, to when they are realized.

The realized measure of compensation includes the value of stock options as realized (i.e., exercised), capturing the change from when the options were granted to when the CEO invokes the options, usually after the stock price has risen and the options values have increased. The realized compensation measure also values stock awards at their value when vested (usually three years after being granted), capturing any change in the stock price as well as additional stock awards provided as part of a performance award.

The granted measure of compensation values stock options and restricted stock awards by their “fair value” when granted. (Compustat estimates of the fair value of options and stock awards as granted are determined using the Black-Scholes model.) For details on the construction of these measures and benchmarking to other studies, see Sabadish and Mishel 2013.

## An extreme outlier in 2021: The pay of Elon Musk

In 2021, Elon Musk (CEO of Tesla Motors) exercised \$23.5 billion worth of stock options that would have expired in 2022. Under our “realized” methodology, this would have made his pay almost 1,000 times that of the average large-company CEO. Including him in our sample would have resulted in an increase of CEO pay in 2021 relative to 2020 of over 300% (the “average” for the sample would have been just under \$100 million).

Because inclusion of this extreme outlier would have made this year’s numbers incomparable with previous years’ numbers, we opted to exclude Tesla and Musk from our sample entirely.<sup>3</sup>

It is worth reflecting on what Musk’s 2021 pay means for how we interpret CEO compensation. Often, the growing importance of stock-related compensation measures are thought to create a tighter link between CEO performance and CEO pay. The reasoning is that the CEO’s main job is to make money for the company’s shareholders, and if the company’s share price is rising, it is as good a signal as any other that the company is successful.

There are some grains of truth in this view. All else being equal, tying CEO compensation to growth in shareholders’ incomes should better align their sometimes-conflicting incentives (see Bebchuk and Fried 2004 for the myriad ways the interests of shareholders and CEOs can be in conflict). However, a number of questions remain about the most efficient way to structure CEO pay.

First, interests can be aligned with compensation measures at much lower scales than what commonly prevails. Yes, it may make some sense to provide stock options to a CEO to incentivize the CEO to take measures that will boost shareholder returns. But is it really necessary to give a CEO options on *16 million shares* of stock (which is how many shares Musk exercised options on in 2021) to achieve this goal?

Another issue involves differentiating share price growth that is company-specific versus that which is driven by overall market trends. Company-specific share price increases are at least plausibly related to CEO performance. Share prices that rise because the entire stock market has risen are much less so. Most stock-related compensation of CEOs does a very poor job (by design) of drawing such distinctions and preventing CEOs from being rewarded simply for luck.

Finally, the potential role of economic rents in Elon Musk’s compensation for 2021 is clear. Musk’s options in 2021 were worth as much as they were because Tesla stock rose by roughly 300% between the start of the pandemic and mid-2021. As DeLong (2022) notes, there are many reasons to believe that the

underlying fundamental value of Tesla simply does not justify its stock price. Hypothetically speaking, if Tesla managed to sell 100% of all cars sold in the United States by the end of the next decade, and it made a per-car profit roughly 10 times that of the current per-car profit of General Motors, Ford, and Fiat-Chrysler, then Tesla's profits would be large enough to justify the current valuation of its stock. If it does not achieve a 100% market share and an extraordinarily high level of profitability, its stock price will eventually fall significantly. This means that Musk will have been able to personally claim \$23.5 billion in purchasing power in 2021 that was never matched by actual economic activity—and certainly not activity that redounds to the benefit of Tesla shareholders whose wealth was diluted to make room for his stock options.

While we have chosen to remove Musk from this year's CEO sample to simplify data comparability, it is worth noting that Musk's 2021 compensation is really just different in degree, not in kind, from other CEOs' pay: It is fundamentally divorced from the long-term economic value he brings to the shareholders (not to mention the workers) of his company.

## Analysis

### Trends in CEO compensation growth

This section examines several decades of available data to identify historical trends in CEO compensation.

#### Composition of CEO compensation

Stock-related components of CEO compensation constitute a large and increasing share of total compensation: Realized stock awards and stock options made up 73.3% of total CEO compensation in 2016 (\$13.2 million out of \$18 million) and 82.0% of total compensation (\$22.8 million out of \$27.8 million) in 2021 (not shown in chart). The growth of these stock-related components from 2016 to 2021 explains over 93% of the total growth in CEO-realized compensation over this period.<sup>4</sup> Of the stock-related components of compensation, stock awards make up a growing share, while the share of stock options in CEO compensation packages has decreased over time.

There is a simple logic behind companies' decisions to shift from stock options to stock awards in CEO compensation packages, as Clifford (2017) explains. With stock options, CEOs can only make gains: They realize a gain if their company's stock price rises beyond the price of the initial options granted, and they lose nothing if the stock price falls. The fact that they have nothing to lose—but potentially a lot to gain—might lead options-holding CEOs to take excessive risks to bump up their company's stock price to an

unsustainable short-term high.

Stock awards, on the other hand, promote better alignment of a CEO's goals with those of shareholders. A stock award has a value when given or when vested, and it can increase or decrease in value as the firm's stock price changes. If stock awards have a lengthy vesting period of three to five years, then the CEO has an interest in lifting the firm's stock price over that period while being mindful to avoid any implosion in the stock price—to maintain the value of what they have.

## CEO compensation growth in 2021

Realized CEO compensation (reported in **Table 1**) rose by \$2.8 million, up 11.1%,<sup>5</sup> to \$27.8 million from 2020 to 2021. This growth was overwhelmingly due to the increased value of vested stock awards.

The granted measure of CEO compensation, which values stock options granted in 2021 (not those exercised), rose by \$1.4 million, or 9.8%, to \$15.6 million.

## Long-term trends in CEO compensation

Table 1 also presents the longer-term trends in CEO compensation for selected years from 1965 to 2021.<sup>6</sup> Our discussion of longer-term trends focuses mostly on the realized compensation measure of CEO compensation preferred in most economic analyses.

For comparison, the average annual compensation (wages and benefits of a full-time, full-year worker) of private-sector production/nonsupervisory workers (a group covering more than 80% of payroll employment; see Gould 2020) is shown in Table 1, allowing us to compare CEO compensation with that of a typical worker.

From 1995 onward, the table also identifies the average annual compensation of production/nonsupervisory workers in the key industry of the firms included in the sample. We take this compensation as a proxy for the pay of typical workers in these particular firms and use it to calculate the CEO-to-worker compensation ratio for each firm.

Finally, the table shows inflation-adjusted changes in the stock market, as measured by the Dow Jones Industrial Average and the S&P 500 Index.

CEO compensation (our realized measure) has, in general, risen and fallen along with the S&P 500 Index over the last five and a half decades. The period from 1965 to 1978 is an exception: Although the stock market fell by roughly half between 1965 and 1978, realized CEO compensation increased by 78.9%.

Typical worker compensation saw relatively strong growth over that period—that is, strong relative to subsequent periods, not relative to CEO pay or the pay of other earners at the top of the wage distribution: Annual worker compensation grew by 20.0% from 1965 to 1978, about a fourth as fast as CEO compensation growth.

Realized CEO compensation grew strongly throughout the 1980s but exploded in the



Table 1

## CEO compensation, CEO-to-worker compensation ratio, and stock prices (2021\$), selected years, 1965–2021

Year(s)	CEO annual compensation (thousands)		Private-sector production/nonsupervisory workers annual compensation		Stock market (indexed to 2021\$)		CEO-to-worker compensation ratio	
	Realized	Granted	All private-sector workers	Workers in the firms' industries*	S&P 500	Dow Jones	Realized	Granted
1965	\$995	\$758	\$45.2	NA	664	6,856	20.4	14.9
1973	\$1,300	\$990	\$53.1	NA	587	5,051	22.7	16.6
1978	\$1,781	\$1,356	\$54.3	NA	367	3,138	30.3	22.3
1989	\$3,317	\$2,526	\$51.7	NA	683	5,311	59.3	43.6
1995	\$6,435	\$7,149	\$51.7	\$57.1	959	7,968	118.8	131.6
2000	\$23,219	\$23,242	\$54.6	\$59.8	2,252	16,919	371.7	392.9
2007	\$20,696	\$15,459	\$56.8	\$63.2	1,935	17,262	334.6	246.0
2009	\$10,995	\$11,367	\$59.0	\$65.1	1,200	11,248	178.3	176.6
2020	\$25,008	\$14,195	\$63.8	\$70.4	3,368	28,146	365.6	208.6
Projected 2021	\$27,780	\$15,592	\$64.1	\$70.4	4,273	34,055	398.8	236.0
2020 FH	\$24,620	\$14,602	\$63.8	\$71.6	3,368	28,146	354.0	207.2
2021 FH	\$27,349	\$16,039	\$64.1	\$70.4	4,273	34,055	387.2	234.6
<b>Percent change</b>		<b>Change in ratio</b>						
1965–1978	78.9%	78.9%	20.0%	NA	-44.6%	-54.2%	10.0	7.3
1978–2000	1,204.0%	1,614.5%	0.6%	NA	513.0%	439.1%	341.3	370.6
2000–2007	-10.9%	-33.5%	4.1%	5.5%	-14.1%	2.0%	-37.0	-146.8
2007–2009	-46.9%	-26.5%	3.9%	3.1%	-38.0%	-34.8%	-156.4	-69.5
2009–2021	152.7%	37.2%	8.6%	8.1%	256.1%	202.8%	220.5	59.4
2007–2021	34.2%	0.9%	12.8%	11.5%	120.8%	97.3%	64.2	-10.0
1978–2021	1,460.2%	1,050.2%	18.1%	NA	1,063.4%	985.2%	368.5	213.7
2020–2021	11.1%	9.8%	0.4%	0.0%	26.9%	21.0%	33.2	27.4

\* Average annual compensation of the workers in the key industry of the firms in the sample.

**Notes:** Average annual compensation for CEOs at the top 350 U.S. firms ranked by sales is measured in two ways. Both include salary, bonus, and long-term incentive payouts, but the "granted" measure includes the value of stock options and stock awards when they were granted, whereas the "realized" measure captures the value of stock-related components that accrues after options or stock awards are granted by including "stock options exercised" and "vested stock awards." FH = First half. CEO-to-worker compensation ratios are based on averaging specific firm ratios in samples and not the ratio of averages of CEO and worker compensation. Ratios prior to 1992 are constructed as described in the CEO pay series [methodology](#) (Sabadish and Mishel 2013).

**Source:** Authors' analysis of data from Compustat's ExecuComp database, the Federal Reserve Economic Data (FRED) database from the Federal Reserve Bank of St. Louis, the Bureau of Labor Statistics' Current Employment Statistics data series, and the Bureau of Economic Analysis NIPA tables.

Economic Policy Institute

1990s. It peaked at the end of the stock market bubble, in 2000, at about \$23.2 million, a 261% increase over just five years earlier in 1995 and a 1,204% increase over 1978. This latter increase exceeded even the growth of the booming stock market (513% for the S&P 500 and 439% for the Dow) between 1978 and 2000. In stark contrast to both the stock market and CEO compensation, private-sector worker compensation increased just 0.6% from 1978 to 2000.

When the stock market bubble burst in the early 2000s, there was a substantial paring

back of CEO compensation. By 2007, however, when the stock market had mostly recovered, realized CEO compensation reached \$20.7 million, just \$2.5 million below its 2000 level. However, granted CEO compensation remained down, at \$15.5 million in 2007, a substantial \$7.8 million fall from the 2000 level.

The stock market decline during the 2008 financial crisis also sent CEO compensation tumbling, as it had in the early 2000s, as realized CEO compensation dropped 46.9% from 2007 to 2009. After 2009, realized CEO compensation resumed an upward trajectory, growing 152.7% from 2009 to 2021 so that CEO compensation exceeded its previous level from 2007 by 34.2%. In fact, the fast growth of CEO compensation (as well as a step-up in the pace of inflation) in 2021 brought realized CEO compensation more than \$4.5 million above its prior peak level in 2000 at the height of the stock market bubble.

To assess the role of CEO compensation in the overall increase in income and wage inequality of the last four decades it is best to gauge growth since 1978.<sup>7</sup> For the period from 1978 to 2021, realized CEO compensation increased 1,460.2%—more than 37% faster than stock market growth (depending on the market index used) and substantially faster than the slow 18.1% growth in the typical worker’s compensation over the same period. CEO granted compensation grew 1,050.2% over this period.

## Trends in the CEO-to-worker compensation ratio

Table 1 also presents trends in the ratio of CEO-to-worker compensation, using both measures of CEO compensation. We compute this ratio, which illustrates the increased divergence between CEO and worker pay over time, in two steps:

- The first step is to construct, for each of the 350 largest U.S. firms, the ratio of the CEO’s compensation to the annual average compensation of production and nonsupervisory workers in the key industry of the firm (data on the pay of workers at individual firms are not available).<sup>8</sup>
- The second step is to average that ratio across all 350 firms. Note that trends before 1995 are based on the changes in average top-company CEO and economywide (not industry-specific) private-sector production/nonsupervisory worker compensation.

The last two columns in Table 1 show the resulting ratio for both measures of CEO pay. The trends are depicted in **Figure A**.

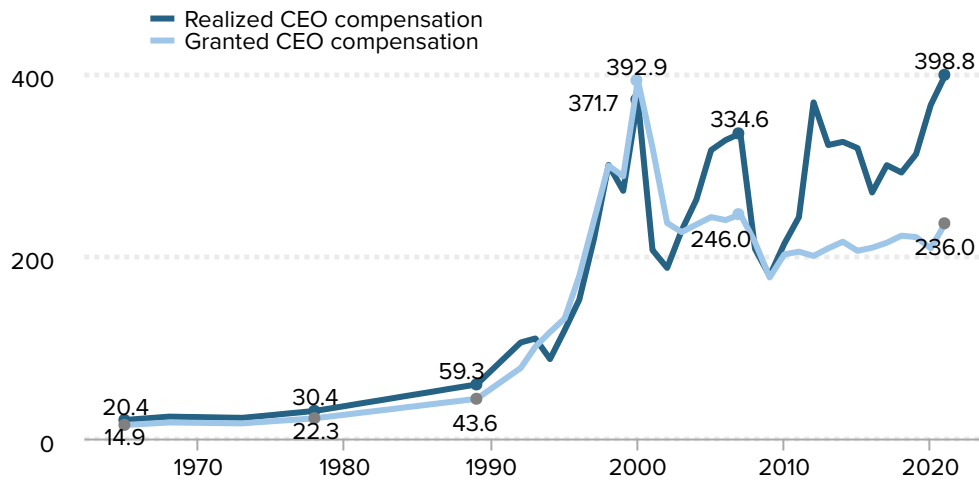
### How our metric differs from firm-reported metrics

The Securities and Exchange Commission (SEC) now requires publicly owned firms to provide a metric for the ratio of CEO compensation to that of the median worker in a firm, as mandated by the Dodd-Frank financial reform bill of 2010 (SEC 2015). Those ratios differ from those in this report in several ways:

Figure A

## CEOs make 399 times as much as typical workers

CEO-to-worker compensation ratio, 1965–2021



**Notes:** Average annual compensation for CEOs is for CEOs at the top 350 U.S. firms ranked by sales. Typical worker” compensation is the average annual compensation (wages and benefits of a full-time, full-year worker) of production/nonsupervisory workers in the industries that the top 350 firms operate in.

**Source:** Authors’ analysis of data from Compustat’s ExecuComp database, the Bureau of Labor Statistics’ Current Employment Statistics data series, and the Bureau of Economic Analysis NIPA tables.

### Economic Policy Institute

- First, because of limitations in data availability, the measure of worker compensation in our ratios reflects workers in a firm’s key industry, not workers actually working for the firm. The ratios reported to the SEC will reflect compensation of workers in the specific firm.
- Second, our measure reflects an exclusively domestic workforce; it excludes the compensation of workers in other countries who work for the firm. The ratios reported to the SEC may include workers in other countries.
- Third, our metric is based on hourly compensation annualized to reflect a full-time, full-year worker (i.e., multiplying the hourly compensation rate by 2,080 hours). In contrast, the measures firms provide to the SEC can be and are sometimes based on the actual annual (not annualized) wages of part-year (seasonal) or part-time workers. As a result, comparisons across firms may reflect not only hourly pay differences but also differences in annual or weekly hours worked.
- Fourth, our metric includes both wages and benefits, whereas the SEC metric focuses solely on wages.
- Finally, we use consistent data and methodology to construct our ratios; our

ratios are thus comparable across firms and from year to year. The SEC allows firms flexibility in how they construct the CEO-to-typical worker pay comparison; this means there is not comparability across firms—and ratios may not even be comparable from year to year for any given firm, if the firm changes the metrics it uses.

There is certainly value in the new metrics being provided to the SEC, but the measures we rely on allow us to make appropriate comparisons between firms and across time. More information on the SEC CEO-to-worker compensation ratio and our comparable measure can be found in Mishel and Kandra 2020.

As Table 1 and Figure A show, using the realized measure of CEO compensation, CEOs of major U.S. companies earned 20 times as much as the typical worker in 1965. This ratio grew to 30-to-1 in 1978 and 59-to-1 by 1989. It surged in the 1990s, hitting 372-to-1 in 2000, at the end of the 1990s recovery and at the height of the stock market bubble.<sup>9</sup>

The fall in the stock market after 2000 reduced CEO stock-related pay, such as realized stock options, and caused CEO compensation to tumble in 2002 before beginning to rise again in 2003. Realized CEO compensation recovered to a level of 335 times worker pay by 2007, still below its 2000 level. The financial crisis of 2008 and accompanying stock market decline reduced CEO compensation between 2007 and 2009, as discussed above, and the CEO-to-worker compensation ratio fell in tandem.

Over the 2009–2021 period, CEO pay resumed its upward trajectory and the 152.7% surge in realized CEO compensation brought the ratio to 399-to-1, above its 2007 level. Besides being higher than the value achieved in 2000 at the peak of a stock market bubble, it is, of course, *far* higher than it was in the 1960s, 1970s, 1980s, and the early 1990s.

The pattern using the granted measure of CEO compensation is similar. The CEO-to-worker pay ratio peaked in 2000, at 393-to-1, even higher than the ratio with the realized compensation measure. The fall from 2000 to 2007 was steeper than for the other measure, and it hit 246-to-1 in 2007. The stock market decline during the financial crisis drove the ratio down to 177-to-1 in 2009. The growth in granted CEO compensation over the 2009–2021 period, at just 37.2%, was far less than for realized compensation, so the CEO-to-worker pay ratio recovered to only 236-to-1. This level is far lower than its peak in 2000 but still far greater than the 1995 ratio of 132-to-1, the 1989 ratio of 44-to-1, or the 1965 ratio of 15-to-1.

The exponential growth in the CEO-to-worker compensation ratio reflects the strikingly different trajectory of CEO pay compared with typical worker pay. On the one hand, there has been very little growth in the compensation of a typical worker since the late 1970s: It has grown just 18.1% over the 43 years from 1978 to 2021, despite a corresponding growth of net economywide productivity of 61.8% (EPI 2021). The 1,460.2% growth in realized CEO compensation from 1978 (there are no data for 1979) to 2020 far exceeded the growth in productivity, profits, or stock market values in that period.

# Dramatically high CEO pay does not simply reflect the market for skills

This section reviews competing explanations for the extraordinary rise in CEO compensation over the past several decades. CEO compensation has grown a great deal since 1965, but so has the pay of other high-wage earners. To some analysts, this suggests that the dramatic rise in CEO compensation has been driven largely by the demand for the skills of CEOs and other highly paid professionals. In this interpretation, CEO compensation is being set by the market for “skills” or “talent,” not by managerial power or rent-seeking behavior.<sup>10</sup> This explanation lies in contrast to that offered by Bebchuk and Fried (2004) and Clifford (2017), who claim that the long-term increase in CEO pay is a result of managerial power.

The “market for talent” argument is based on the premise that “it is other professionals, too,” not just CEOs, who are seeing a generous rise in pay. The most prominent example of this argument comes from Kaplan (2012a, 2012b). In the prestigious 2012 Martin Feldstein Lecture at the National Bureau of Economic Research, he claims:

Over the last 20 years, then, public company CEO pay relative to the top 0.1% has remained relatively constant or declined. These patterns are consistent with a competitive market for talent. They are less consistent with managerial power. Other top income groups, not subject to managerial power forces, have seen similar growth in pay. (Kaplan 2012a, 4)

In a follow-up paper for the Cato Institute, published as a National Bureau of Economic Research working paper, Kaplan expands this point:

The point of these comparisons is to confirm that while public company CEOs earn a great deal, they are not unique. Other groups with similar backgrounds—private company executives, corporate lawyers, hedge fund investors, private equity investors and others—have seen significant pay increases where there is a competitive market for talent and managerial power problems are absent. Again, if one uses evidence of higher CEO pay as evidence of managerial power or capture, one must also explain why these professional groups have had a similar or even higher growth in pay. It seems more likely that a meaningful portion of the increase in CEO pay has been driven by market forces as well. (Kaplan 2012b, 21)

However, the argument that CEO compensation is being set by the market for “skills” does not square with the available data corresponding to Kaplan’s argument. Bivens and Mishel (2013) address the larger issue of the role of CEO compensation in generating income gains at the very top and conclude that substantial rents are embedded in executive pay. According to Bivens and Mishel, CEO pay gains are not the result of a competitive market for talent but rather reflect the power of CEOs to extract concessions.

Here we draw on and update Bivens and Mishel’s 2013 analysis to show that the evidence does not support Kaplan’s claim that “professional groups have had a similar or even

higher growth in pay” than CEOs (Kaplan 2012b). Not even close. CEO compensation grew far faster than that of very highly paid workers over the last few decades, which suggests that the market for skills was not responsible for the rapid growth of CEO compensation.

## Trends in the CEO-to-top-1% compensation ratio

To reach this finding, we use Kaplan’s series (Kaplan 2012b) on CEO compensation (through 2010 and updated forward using CEO realized compensation) and compare it with the wages of the very highest wage earners in the top 0.1% (reflecting W-2 annual earnings, which includes exercised stock options and vested stock awards). We use top wage earners rather than top 0.1% household incomes, as Kaplan did, in order to make the comparisons across earners.<sup>11</sup> The wage benchmark seems the most appropriate one because it avoids issues of changing household demographics (e.g., increases in the number of two-earner households over time) and limits the income to labor income (i.e., it excludes capital income, which is included in household income measures).

The data presented in **Table 2** show the result of our analysis: We find that, contrary to Kaplan’s findings, the compensation of CEOs has far outpaced that of the top 0.1% of earners. We present the ratio of the average compensation of CEOs of large firms (the series developed by Kaplan, incorporating stock options realized) to the average annual earnings of the top 0.1% of wage earners (based on a series developed by Kopczuk, Saez, and Song [2010] and updated by Mishel and Kandra [2021]) as a simple ratio and as a logged ratio (to convert it to a “premium,” defined as the relative pay differential between two groups) for selected years from 1979 to 2020.

Both the simple ratios and the log ratios understate the relative pay of CEOs because CEO pay is a nontrivial share of the denominator, a bias that has probably grown over time as CEO relative pay has grown. If we were able to remove top CEOs’ pay from the top 0.1% category, it would reduce the average for the broader group.<sup>12</sup>

But even with this inherent bias, these ratios tell a striking story of excessive growth in CEO pay in recent decades: CEO compensation was 6.88 times the pay of the top 0.1% of wage earners in 2020, substantially higher than the 4.36 ratio in 2007. CEO compensation grew far faster than that of the top 0.1% of earners over the recovery from 2009 to 2020, as the ratio spiked from 4.61 to 6.88. CEO compensation relative to the wages of the top 0.1% of wage earners in 2020 far exceeded the ratio of 2.63 in 1989, a rise (+4.25) equal to more than the pay of four very-high-wage earners.<sup>13</sup>

The log ratio of CEO relative pay grew 96 log points from 1989 to 2020 with respect to wage earners in the top 0.1%. CEO compensation grew more slowly than top 0.1% earnings over the 1979–1989 period, so longer-term comparisons back to 1979 show a lesser, but still substantial, rise in CEO compensation relative to other top earners.

**Figure B** compares the CEO compensation to top 0.1% earnings ratios back to 1947. In 2020 this ratio was 6.88, 3.7 points higher than the historical average of 3.18 over the 1947–1979 period (a relative gain in wages earned by the equivalent of three very-high-wage earners).

Table 2

## CEO-to-top-0.1% and college-to-high-school wage ratios, selected years, 1979–2020

Year	Ratio		Log ratio	
	CEO compensation to top 0.1% wage earners	College-to-high-school wages	CEO compensation to top 0.1% wage earners	College-to-high-school wages
1979	3.26	1.41	1.18	0.35
1989	2.63	1.59	0.97	0.46
1993	3.05	1.64	1.11	0.49
2000	7.77	1.75	2.05	0.56
2007	4.36	1.77	1.47	0.57
2009	4.61	1.74	1.53	0.55
2020	6.88	1.83	1.93	0.61
<b>Change</b>				
1979–2007	1.10	0.35	0.29	0.22
1979–2020	3.62	0.42	0.75	0.26
1989–2020	4.25	0.25	0.96	0.14

**Notes:** Wages of top 0.1% of wage earners reflect W-2 annual earnings, which includes the value of exercised stock options and vested stock awards. The college-to-high-school wage ratios compare hourly wages of workers who have a college degree with hourly wages of workers who have only a high school education.

**Source:** Authors' analysis of EPI State of Working America Data Library data on top 0.1% wages in Mishel and Kandra 2021; data on wages by educational attainment from the EPI State of Working America Data Library; and data on CEO compensation from an extrapolation of Kaplan's (2012b) CEO compensation series.

### Economic Policy Institute

That CEO compensation grew much faster than the earnings of the top 0.1% of wage earners is not because the top 0.1% did not fare well. The very highest earners—those in the top 0.1% of all earners—saw their annual earnings (including realized stock options and vested stock awards) grow fantastically, though far less than the compensation of the CEOs of large firms: Top 0.1% annual earnings grew a healthy 385% from 1978 to 2020, though that was only a third as much as the 1,304% growth of realized CEO compensation between those years (see data in Table 1).

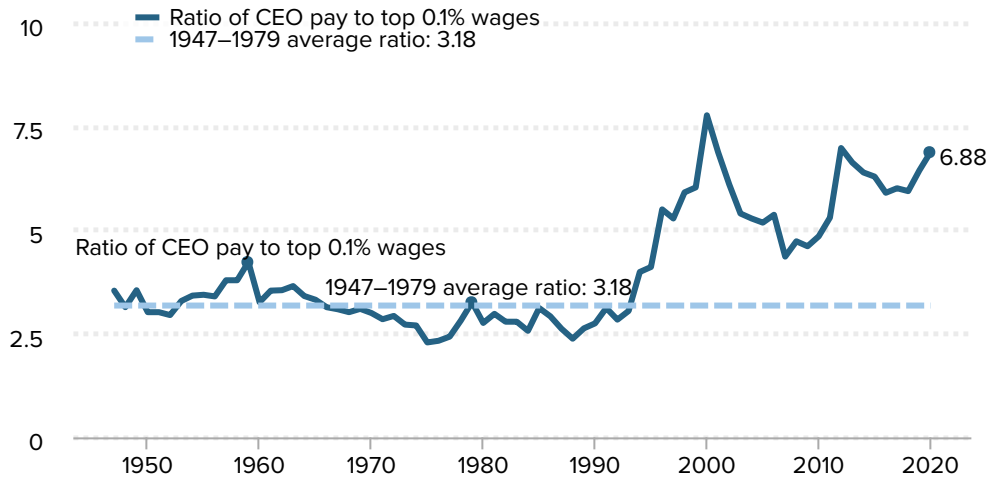
If CEO pay growing far faster than the pay of other high earners is evidence of the presence of rents, as Kaplan suggests, one would conclude that today's top executives are collecting substantial rents, *meaning that if they were paid less there would be no loss of productivity or output in the economy.*

The large discrepancy between the pay of CEOs and other very-high-wage earners also casts doubt on the claim that CEOs are being paid these extraordinary amounts because of their special skills and the market for those skills. It is unlikely that the skills of CEOs of very large firms are so outsized and disconnected from the skills of other high earners that they propel CEOs past most of their cohort in the top one-tenth of 1%. For everyone else, the distribution of skills, as reflected in the overall wage distribution, tends to be much more continuous, so this discontinuity is evidence that factors beyond skills drive the compensation levels of CEOs.

Figure B

## CEO compensation relative to top 0.1% earners is much higher than it was in the 1947–1979 period

Ratio of CEO compensation to top 0.1% wages, 1947–2020



**Note:** Wages of top 0.1% of wage earners reflect W-2 annual earnings, which includes the value of exercised stock options and vested stock awards.

**Source:** Authors' analysis of EPI State of Working America Data Library data on top 0.1% wages in Mishel and Kandra 2020 and data on CEO compensation from an extrapolation of Kaplan's (2012b) CEO compensation series.

Economic Policy Institute

## Trends in the growth of returns to education

For comparison purposes, Table 2 also shows the changes in the gross (not regression-adjusted) college-to-high-school wage premium. This premium is simply how much higher the hourly wages of workers with a (four-year) college degree are relative to the hourly wages of workers with only a high school diploma. This premium is a useful data point to examine because some commentators, such as Mankiw (2013), assert that the wage and income growth of the top 1% reflects the general rise in the return to skills, as reflected in higher college wage premiums.

Since 1979, and particularly since 1989, the increase in the logged CEO pay premium relative to other high-wage earners far exceeds the rise in the logged college-to-high-school wage premium, which is widely and appropriately considered to have had substantial growth: The logged college wage premium grew from 0.46 in 1989 to 0.61 in 2020, far smaller than the 0.97 to 1.93 rise in the logged ratio of CEO-to-top-0.1% earnings.

Mankiw's claim that top 1% pay or top executive pay simply corresponds to the rise in the college-to-high-school wage premium is unfounded (Mishel 2013a, 2013b). Moreover, the data we present here would show even faster growth of CEO relative pay if Kaplan's



historical CEO compensation series (which we use as the basis for the ratios in Table 2) had been built using the Frydman and Saks (2010) series for the 1980–1994 period rather than the Hall and Liebman (1997) data.<sup>14</sup>

## The stock market and CEO pay

There is normally a tight relationship between overall stock prices and CEO compensation. Some commentators draw on this regularity to claim that CEOs are being paid for their performance since, in their view, the goal of a CEO is to raise their company's stock price.

However, the stock–CEO compensation relationship does not necessarily imply that CEOs are enjoying high and rising pay because their individual productivity is increasing (e.g., because they head larger firms, have adopted new technology, or for other reasons). CEO compensation often grows strongly when the overall stock market rises and individual firms' stock values rise along with it. This is a marketwide phenomenon, not one based in the improved performance of individual firms.

Most CEO pay packages allow pay to rise whenever the firm's stock value rises; that is, they permit CEOs to cash out stock options regardless of whether the rise in the firm's stock value was exceptional relative to comparable firms in the same industry. Similarly, vested stock awards increase in value when the firm's stock price rises in simple correspondence to a marketwide escalation of stock prices. If corporate taxes are reduced and profits rise, leading to higher stock prices, is it accurate to say that CEOs have made their firms perform better?

## The connection between CEO pay and overall inequality

Some observers argue that exorbitant CEO compensation is merely a symbolic issue, with no consequences for the vast majority of workers. However, the escalation of CEO compensation, and of executive compensation more generally, has fueled the growth of top 1% and top 0.1% incomes, generating widespread inequality.

In their studies of tax returns from 1979 to 2005, Bakija, Cole, and Heim (2010, 2012) establish that the increases in income among the top 1% and top 0.1% of households were disproportionately driven by households headed by someone who was either a nonfinancial-sector “executive” (including managers and supervisors, hereafter referred to as “nonfinance executives”) or a financial-sector worker (executive or otherwise). Forty-four percent of the growth of the top 0.1%'s income share and 36% of the top 1%'s income share accrued to households headed by nonfinance executives; another 23% for each group accrued to households headed by financial-sector workers (some portion of which were executives).

Together, finance workers (including some who are executives) and nonfinance executives accounted for 58% of the expansion of income for the top 1% of households and 67% of

the income growth of the top 0.1%. The income growth of executives is the largest factor that led top 0.1% and top 1% incomes to greatly increase over the last four decades.

Our data applies to the CEOs of the very largest firms. We presume that these CEOs set the pay standards followed by other executives—of the largest publicly owned firms, of smaller publicly owned firms, of privately owned firms, and of major nonprofit firms (hospitals, universities, charities, etc.). If so, then CEO compensation is the largest driver of top incomes.

Relative to others in the top 1%, households headed by nonfinance executives had roughly average income growth; those headed by someone in the financial sector had above-average income growth; and the remaining top 1% households (nonexecutive, nonfinance) had slower-than-average income growth. These shares may actually understate the role of nonfinance executives and the financial sector because they do not account for increased spousal income from these sources in cases in which the head of household is *not* an executive or in finance.<sup>15</sup>

High CEO pay reflects economic rents—concessions CEOs can draw from the economy not by virtue of their contribution to economic output but by virtue of their position of power. Alluding to the fictional town in the radio program *A Prairie Home Companion*, Clifford (2017) describes the Lake Wobegon world of setting CEO compensation that fuels its growth: Every firm wants to believe its CEO is above average and therefore needs to be correspondingly remunerated. But, in fact, CEO compensation could be reduced across the board and the economy would not suffer any loss of output.

Another implication of rising pay for CEOs and other executives is that it reflects income that would otherwise have accrued to others: What these executives earned was not available for broader-based wage growth for other workers. (Bivens and Mishel [2013] explore this issue in depth.) It is useful, in this context, to note that wage growth for the bottom 90% would have been more than 72% faster over the 1979–2020 period had wage inequality not grown.<sup>16</sup> Most of the rise of inequality took the form of redistributing wages from the bottom 90%—whose share of wages fell from 69.8% to 60.2%—to the top 1%—whose wage share nearly doubled, rising from 7.3% to 13.8%, with most of the increase accruing to the top 0.1%, whose share of all wages grew from 1.6% to 5.4% (Mishel and Kandra 2021).

## Policy recommendations: Reversing the trend

Several policy options could reverse the trend of excessive executive pay and broaden wage growth. Some involve taxes:

- Implementing higher marginal income tax rates at the very top would limit rent-seeking behavior and reduce the incentives for executives to push for such high pay.
- Another option is to set corporate tax rates higher for firms that have higher ratios of

CEO-to-worker compensation. Clifford (2017) recommends setting a cap on compensation and taxing companies on any amount over the cap, similar to the way baseball team payrolls are taxed when salaries exceed a cap.

Other policies that could potentially limit executive pay growth are changes in corporate governance, such as greater use of “say on pay,” which allows a firm’s shareholders to vote on top executives’ compensation.

Baker, Bivens, and Schieder (2019) review policies to restrain CEO compensation and explain how tax policy and corporate governance reform can work in tandem: “Tax policy that penalizes corporations for excess CEO-to-worker pay ratios can boost incentives for shareholders to restrain excess pay,” but, “to boost the power of shareholders [to restrain pay], fundamental changes to corporate governance have to be made. One key example of such a fundamental change would be to provide worker representation on corporate boards.”

The CEOs examined in this report head large firms. These large firms, almost by definition, enjoy a degree of market power that some studies suggest has grown in recent decades. It seems that CEOs and other executives may have been prime beneficiaries of these firms’ greater market power. This suggests that it could be beneficial to use the tools of antitrust enforcement and regulation to restrain these firms’ market power. This would not only promote economic efficiency and competition but might help restrain executive pay as well.

## Acknowledgments

The authors thank the **Stephen M. Silberstein Foundation** for its generous support of this research. **Steven Balsam**, an accounting professor at Temple University and author of *Executive Compensation: An Introduction to Practice and Theory* (2007) and *Equity Compensation: Motivations and Implications* (2013), has provided useful advice on data construction and interpretation over the years. **Steven Clifford**, author of *The CEO Pay Machine: How It Trashes America and How to Stop It* (2017), has also provided technical advice. Clifford served as CEO for King Broadcasting Company from 1987 to 1992 and National Mobile Television from 1992 to 2000 and has been a director of 13 public and private companies.

## About the authors

**Josh Bivens** is the director of research at the Economic Policy Institute. His areas of research include macroeconomics, inequality, social insurance, public investment, and the economics of globalization. Bivens has provided expert insight to a range of institutions and media, including formally testifying numerous times before committees of the U.S. Congress. He has a Ph.D. in economics from the New School for Social Research.

**Jori Kandra** is a research assistant at the Economic Policy Institute. In addition to her work

on the CEO pay series, she has worked on the State of Working America 2020 wages report and the domestic workers chartbook, among other EPI publications. She has a bachelor's degree in economics from the University of Texas at Austin.

## Notes

1. For the pay of the typical worker, we use average compensation (wages and salaries plus benefits) of a full-time, full-year production or nonsupervisory worker (a group that makes up about 80% of the private-sector workforce).
2. In earlier reports, our sample for each year was sometimes fewer than 350 firms because some of these large firms did not have the same CEO for most of or all of the year or the compensation data were not yet available. In order to not let changes in sample size affect annual trends, we now examine the top 350 firms with the largest revenues each year for which there are data.
3. We do the same with Mark Zuckerberg's pay in 2013 because the initial public offering (IPO) for Facebook gave him a "realized" compensation of over \$3 billion that year (Davis and Mishel 2014).
4. Authors' analysis of the Compustat ExecuComp data.
5. Note that while we report executive compensation in millions in the text, and we round numbers to the nearest thousand in Table 1, dollar and percent changes are calculated using unrounded data.
6. We choose which years to present in the table based in part on data availability. Where possible, we choose cyclical peaks (years of low unemployment).
7. A better comparison would be to the low-unemployment year of 1979, but those data are not available.
8. There are a limited number of firms, which existed only for certain years between 1992 and 1996, for which a North American Industry Classification System (NAICS) value is unassigned. This makes it impossible to identify the pay of the workers in the firm's key industry. These firms are therefore not included in the calculation of the CEO-to-worker compensation ratio.
9. As noted earlier, it may seem counterintuitive that the two ratios for 2000 are different from each other when the average CEO compensation is the same. It is important to understand that (as we describe later in this report) we do not create the ratio from the averages; rather we construct a ratio for each firm and then average the ratios across firms.
10. The managerial power view asserts that CEOs have excessive, noncompetitive influence over the compensation packages they receive. Rent-seeking behavior is the practice of manipulating systems to obtain more than one's fair share of wealth—that is, finding ways to increase one's own gains without actually increasing the productive value one contributes to an organization or to the economy.
11. We thank Steve Kaplan for sharing his CEO compensation series with us (Kaplan 2012b). The series on the income of the top 0.1% of households that Kaplan used is no longer available. Moreover, as we discuss, the appropriate comparison is to other earners, not to households, which could have multiple earners and shifts in the number of earners over time.
12. Temple University professor Steve Balsam provided tabulations from the Capital IQ database of

annual wages of executives exceeding the wage thresholds (provided to him based on the Social Security Administration data used in Mishel and Kandra 2020) that place them in the top 0.1% of wage earners. There were 38,824 executives in publicly held firms in 2007; of those, 9,692 executives were in the top 0.1% of wage earners. These 9,692 executives had average annual earnings of \$4.4 million. Using Mishel et al.'s (2012) estimates of top 0.1% wages, we find that executive wages make up 13.3% of total top 0.1% wages. One can gauge the bias of including executive wages in the denominator by noting that the ratio of executive wages to all top 0.1% wages in 2007 was 2.14 but the ratio of executive wages to nonexecutive wages was 2.32. We do not have data that would permit an assessment of the bias in 1979 or 1989. We also lack information on the number and wages of executives in privately held firms: To the extent that their CEO compensation exceeds that of publicly held firms, their inclusion would indicate an even larger bias. The Internal Revenue Service Statistics of Income (SOI) Bulletin reports that there were nearly 15,000 corporate tax returns in 2007 of firms with assets exceeding \$250 million (IRS 2019). Given that the total number of publicly held firms in the United States was roughly 5,000 in 2007 (Bloomberg 2018), the majority of these 15,000 tax returns had to have come from privately held companies, meaning there is a much larger number of executives of large firms than we are able to capture through data on publicly held firms.

13. A one-point rise in the ratio is the equivalent of the average CEO earning an additional amount equal to that of the average earnings of someone in the top 0.1%.
14. Kaplan (2012b, 14) notes that the Frydman and Saks series grew 289% whereas the Hall and Liebman series grew 209%. He also notes that the Frydman and Saks series grew faster than the series reported by Murphy (2012).
15. The tax data analyzed categorizes a household's income according to the occupation and industry of the head of household. It is possible that a "secondary earner," or spouse, has income earned as an executive or as a financial-sector worker. If the household is in the top 1% or top 0.1% but the head of household is not an executive or in finance, then the spouse's contribution to income growth will not be identified as being connected to executive pay or financial-sector pay. The discussion in this paragraph draws on Bivens and Mishel 2013.
16. This follows from the fact that from 1979 to 2020, annual earnings for the bottom 90% rose by 28.2%, while the average growth across all earners was 48.6% (Mishel and Kandra 2021). That means that the bottom 90% would have seen their earnings grow 20.4 percentage points more over the 1979–2020 period if they had enjoyed average growth (i.e., no increase in inequality, 48.6 less 28.2).

## References

- Baker, Dean, Josh Bivens, and Jessica Schieder. 2019. *Reining in CEO Compensation and Curbing the Rise of Inequality*. Economic Policy Institute, June 2019.
- Bakija, Jon, Adam Cole, and Bradley Heim. 2010. "Job and Income Growth of Top Earners and the Causes of Changing Income Inequality: Evidence from U.S. Tax Return Data." Department of Economics Working Paper no. 2010-24, Williams College, November 2010.
- Bakija, Jon, Adam Cole, and Bradley Heim. 2012. "Job and Income Growth of Top Earners and the Causes of Changing Income Inequality: Evidence from U.S. Tax Return Data." Department of Economics Working Paper, Williams College, April 2012.

- Balsam, Steven. 2007. *Executive Compensation: An Introduction to Practice and Theory*. Washington, D.C.: WorldatWork Press.
- Balsam, Steven. 2013. *Equity Compensation: Motivations and Implications*. Washington, D.C.: WorldatWork Press.
- Bebchuk, Lucian, and Jesse Fried. 2004. *Pay Without Performance: The Unfulfilled Promise of Executive Remuneration*. Cambridge, Mass.: Harvard Univ. Press.
- Bivens, Josh, and Lawrence Mishel. 2013. “[The Pay of Corporate Executives and Financial Professionals as Evidence of Rents in Top 1 Percent Incomes.](#)” Economic Policy Institute Working Paper no. 296, June 2013.
- Bloomberg. 2018. “[Where Have All the Public Companies Gone?](#)” April 9, 2018.
- Bureau of Economic Analysis (BEA). Various years. [National Income and Product Accounts \(NIPA\) Tables](#) [online data tables]. Tables 6.2C, 6.2D, 6.3C, and 6.3D.
- Bureau of Labor Statistics (BLS). Various years. [Employment, Hours, and Earnings—National](#) [database]. In *Current Employment Statistics* [public data series].
- Clifford, Steven. 2017. *The CEO Pay Machine: How It Trashes America and How to Stop It*. New York: Penguin Random House.
- Compustat. Various years. *ExecuComp* [commercial database].
- Davis, Alyssa, and Lawrence Mishel. 2014. [CEO Pay Continues to Rise as Typical Workers Are Paid Less](#). Economic Policy Institute, June 2014.
- DeLong, Brad. 2022. “[Tesla’s Valuation\(s\)](#).” Braddelong.substack.com, May 24, 2022.
- Economic Policy Institute (EPI). 2021. “[The Productivity–Pay Gap](#).” Economic Policy Institute website, accessed August 29, 2022.
- Federal Reserve Bank of St. Louis. Various years. [Federal Reserve Economic Data \(FRED\)](#) [database].
- Frydman, Carola, and Raven E. Saks. 2010. “Executive Compensation: A New View from a Long-Term Perspective, 1936–2005.” *Review of Financial Studies* 23, no. 5: 2099–2138.
- Gould, Elise, 2020. “[The Labor Market Continues to Improve in 2019 as Women Surpass Men in Payroll Employment, but Wage Growth Slows](#).” *Working Economics Blog* (Economic Policy Institute), January 10, 2020.
- Hall, Brian J., and Jeffrey B. Liebman. 1997. “[Are CEOs Really Paid Like Bureaucrats?](#)” National Bureau of Economic Research Working Paper no. 6213, October 1997.
- Internal Revenue Service (IRS). 2019. “SOI Bulletin Historical Table 12: Number of Business Income Tax Returns, by Size of Business for Income Years, Tax Years 1990–2016, Expanded Version” (data table). Excel file downloadable at <https://www.irs.gov/statistics/soi-tax-stats-historical-table-12>.
- Kaplan, Steven N. 2012a. “[Executive Compensation and Corporate Governance in the U.S.: Perceptions, Facts, and Challenges](#).” Martin Feldstein Lecture, National Bureau of Economic Research, Washington, D.C., July 10, 2012.
- Kaplan, Steven N. 2012b. “[Executive Compensation and Corporate Governance in the U.S.: Perceptions, Facts, and Challenges](#).” National Bureau of Economic Research Working Paper no.

18395, September 2012.

Kopczuk, Wojciech, Emmanuel Saez, and Jae Song. 2010. "Earnings Inequality and Mobility in the United States: Evidence from Social Security Data Since 1937." *Quarterly Journal of Economics* 125, no. 1: 91–128.

Mankiw, N. Gregory. 2013. "Defending the One Percent." *Journal of Economic Perspectives* 27, no. 3: 21–24.

Mishel, Lawrence. 2013a. "Greg Mankiw Forgets to Offer Data for His Biggest Claim." *Working Economics Blog* (Economic Policy Institute), June 25, 2013.

Mishel, Lawrence. 2013b. "Working as Designed: High Profits and Stagnant Wages." *Working Economics Blog* (Economic Policy Institute), March 28, 2013.

Mishel, Lawrence, and Josh Bivens. 2021. "The Role of Policy Choices in Explaining Wage Suppression and Wage Inequality." *International Productivity Monitor*, Fall 2021 (forthcoming).

Mishel, Lawrence, Josh Bivens, Elise Gould, and Heidi Shierholz. 2012. *The State of Working America, 12th Edition*. An Economic Policy Institute book. Ithaca, N.Y.: Cornell Univ. Press.

Mishel, Lawrence, and Jori Kandra. 2020. "Wages for the Top 1% Skyrocketed 160% Since 1979 While the Share of Wages for the Bottom 90% Shrunk." *Working Economics Blog* (Economic Policy Institute), December 1, 2020.

Mishel, Lawrence, and Jori Kandra. 2021. "Preliminary Data Show CEO Pay Jumped Nearly 16% in 2020, While Average Worker Compensation Rose 1.8%." *Working Economics Blog* (Economic Policy Institute), May 27, 2021.

Murphy, Kevin. 2012. "The Politics of Pay: A Legislative History of Executive Compensation." University of Southern California Marshall School of Business Working Paper no. FBE 01.11.

Sabadish, Natalie, and Lawrence Mishel. 2013. "Methodology for Measuring CEO Compensation and the Ratio of CEO-to-Worker Compensation, 2012 Data Update." Economic Policy Institute Working Paper no. 298, June 2013.

Securities and Exchange Commission (SEC). 2015. "SEC Adopts Rule for Pay Ratio Disclosure: Rule Implements Dodd-Frank Mandate While Providing Companies with Flexibility to Calculate Pay Ratio." Press release no. 2015-160, August 5, 2015.