It's the Market: The Broad-Based Rise in the Return to Top Talent[†]

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Back in 1981, when the rise in inequality over recent decades was barely underway, Sherwin Rosen (1981) wrote a prescient article on "The Economics of Superstars." Rosen argued that technological change, particularly in information and communications, can increase the relative productivity of highly talented individuals, or "superstars." Essentially, such superstars become able to manage or to perform on a larger scale, applying their talent to greater pools of resources and reaching larger numbers of people. Those who are able to do so receive higher compensation.

Of course, other explanations of the rise in inequality have been offered, including arguments that managerial power has increased in a way that allows those at the top to receive higher pay (Bebchuk and Fried 2004), that social norms against higher pay levels have broken down (Piketty and Saez 2006), and that tax policy affects the distribution of surpluses between employers and employees (Piketty, Saez, and Stantcheva forthcoming). This paper offers some evidence bearing on these disputes. We first look at differences in occupations in the United States across those with the highest income levels. The increase in pay at the highest income levels is broad-based; for example, it is not primarily or solely a phenomenon of

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publicly traded companies. We also discuss some evidence on the income share of the top 1 percent over time.

We then turn to evidence on inequality of wealth at the top. In looking at the wealthiest Americans, those in the Forbes 400 are less likely to have inherited their wealth or to have grown up wealthy. The Forbes 400 of today also are those who were able to access education while young and apply their skills to the most scalable industries: technology, finance, and mass retail.

We conclude by analyzing which of the different theories are more consistent with the patterns in the data. We believe that the US evidence on income and wealth shares for the top 1 percent is most consistent with a "superstar"-style explanation rooted in the importance of scale and skill-biased technological change. In particular, we interpret the fact that the top 1 percent is spread broadly across a variety of occupations as most consistent with an important role for skill-biased technological change and increased scale. These facts are less consistent with an argument that the gains to the top 1 percent are rooted in greater managerial power or changes in social norms about what managers should earn.
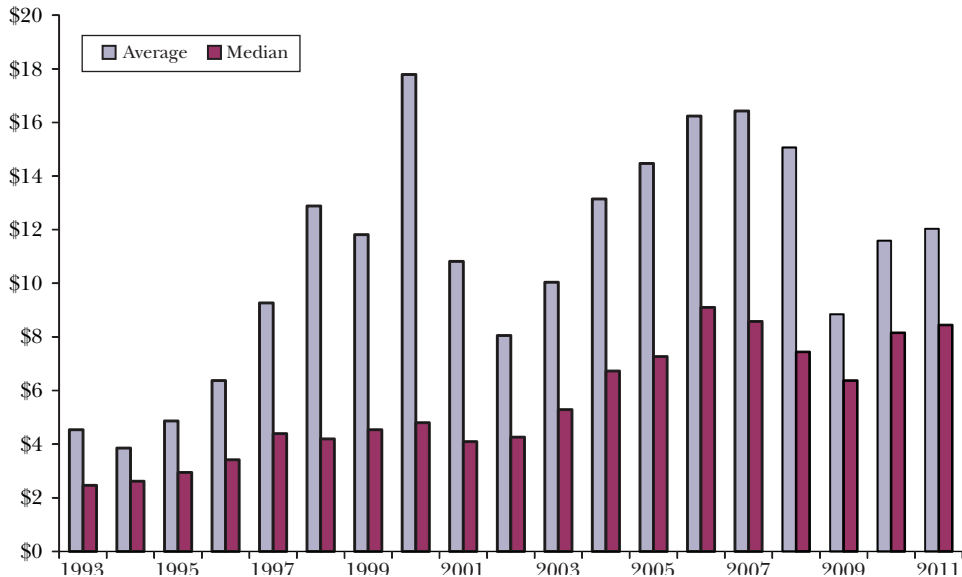
Income Inequality at the Very Top

The increase in pay in the US economy at the very top is broad-based. It is not solely a phenomenon of one sector, but has occurred for public company executives, private company executives, financial executives, corporate lawyers, and professional athletes. In this section, we attempt to understand what professions and forces have driven those increases, using and building on earlier results from Kaplan and Rauh (2010), Bakija, Cole, and Heim (2012), and Kaplan (2012).

Evidence on Top Incomes across Professions

In this section, we report evidence on the increase in pay over time of public company executives, private company executives, hedge fund and private equity investors, Wall Street employees, lawyers, and professional athletes. All of these groups have experienced marked increases in pay over the last 20 to 30 years.

We update Kaplan (2012) by reporting time series information on the pay of US chief executive officers from 1993 to 2011. This analysis tracks the pay of CEOs of Standard and Poor's 500 companies from Standard and Poor's ExecuComp database. These are the largest publicly traded US companies. These data also include pay for CEOs of the other companies covered by ExecuComp—companies that at one time have been in Standard & Poor's 1500 index—but are not in the S&P 500.

Figure 1 shows "realized" pay—that is, in each year it includes the value of the stock options the executive exercised that year, all in millions of 2010 dollars to remove the effects of inflation. Average realized pay for chief executive officers rose sharply in the 1990s, peaked in 2000, dipped by more than 50 percent by 2002, rebounded close to 2000 levels by 2007, dipped markedly again in 2009 and rebounded somewhat in 2010–2011. Average pay in 2011, at $12 million, is

Figure 1

Average and Median Total Pay (Realized) of S&P 500 Chief Executive Officers from 1993 to 2011

(millions of 2010 dollars)

Source: We update Kaplan (2012) by reporting time series information from Standard and Poor's ExecuComp database.
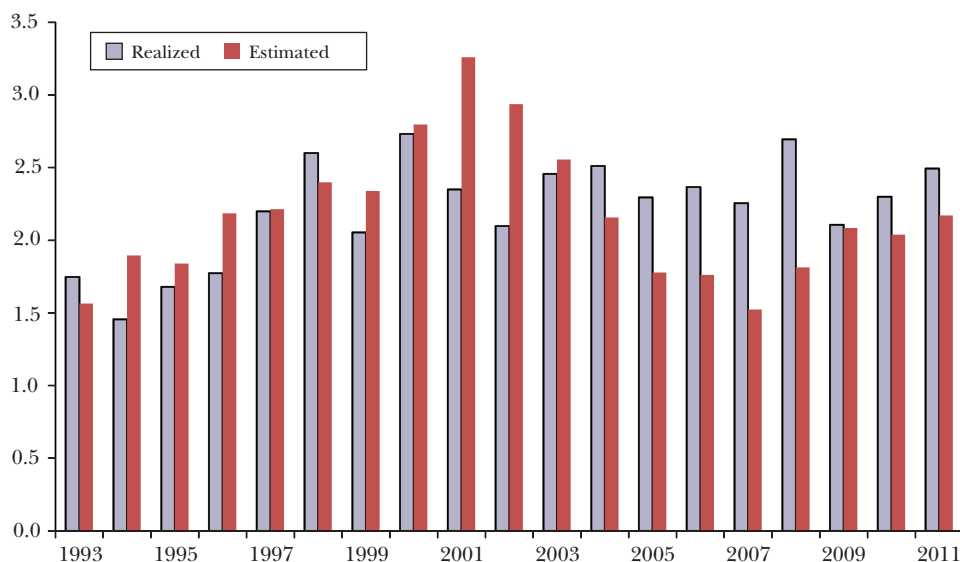*Note:* Figure 1 shows "realized" pay—that is, including the value of the stock options the executive exercised each year, in millions of 2010 dollars.

32 percent below its peak in 2000. Median pay fluctuates less, and has a generally upward trend over this period. It peaked in 2006 at a value of just over $9 million (again, expressed in 2010 dollars). The increase in the median is the result of an increased use of restricted stock, rather than stock options, as a compensation tool. The patterns for CEOs of firms outside the Standard and Poor's 500 are qualitatively similar.

In Kaplan and Rauh (2010), we compared how well-off chief executive officers and other top executives were relative to other top earners. Figure 2 updates this analysis by comparing the average pay of CEOs of the Standard and Poor's 500 to the average income of US households in the top 0.1 percent from 1993 to 2011. Here we show two different measures: realized pay (as discussed above), and estimated pay, which is based on the financial value of stock options when they are granted as opposed to when they are realized. In 2011, the adjusted gross income cutoff for the top 0.1 percent was $1.7 million; the average adjusted gross for taxpayers in the top 0.1 percent was $5.0 million. Because there were roughly 140,000 such taxpayers in this group in 2011, the 500 CEOs have only a minimal effect on the average gross income of this group. As the figure shows, actual pay for the CEOs of

Average Pay (Estimated and Realized) of S&P 500 Chief Executive Officers Relative to Average Adjusted Gross Income of Top 0.1% of Taxpayers from 1993 to 2011

Source: We update Kaplan and Rauh (2010), using data from ExecuComp and Piketty and Saez (2013).
Note: Realized pay includes the financial value of stock options when they are realized; estimated pay includes the financial value of stock options when they are granted.

Standard and Poor's 500 companies has been stable since 1997 at 2 to 2.75 times the average pay of the top 0.1 percent, with the latest figure at 2.5 times and with the peaks in 1998, 2000, and 2008. From 1993 to 1996, realized pay was somewhat lower, at roughly 1.75 times that of top 0.1 percent taxpayers. In other words, CEOs of Standard & Poor's 500 firms have seen little change in their realized pay relative to top 0.1 percent taxpayers since the late 1990s. For CEOs of companies outside the Standard and Poor's 500, realized pay relative to average income for top 0.1 percent taxpayers has remained roughly constant since the early 1990s.

One of the arguments sometimes heard about the pay of top executives of public companies is that these executives have too much power to shape a compliant board of directors and thus to gain power over their own pay. In evaluating the importance of this argument, it is natural to look at other groups of highly paid executives who operate under different corporate governance structures and have their pay determined in different ways.

One useful set of comparisons comes from Bakija, Cole, and Heim (2012), who study IRS tax return data for a number of years between 1979 and 2005. The advantage of the IRS data is that it by definition incorporates the pay of executives from all companies, both publicly traded and privately held. If the governance structure of

public companies has played a major role in rising income inequality, then we should see pay rising more for chief executive officers of public companies than for those of private companies. Public companies are potentially vulnerable to agency and managerial power problems, while private or closely-held companies are, by definition, controlled by large shareholders or the executives themselves, and therefore should face much more limited agency problems. The pay of executives of most privately-held companies is generally not publicly disclosed unlike the pay of public company executives. So if the loosening of social norms against higher pay levels have played a strong role, then we should see pay rising more for public company CEOs. While loosening social norms might lead to an increase in the pay of public company executives, it should have no effect on private company executives because their pay has not been and still is not visible to the general public.

Although the IRS data cannot definitively identify whether the executives in the sample work for private or public companies, nor whether executives are chief executive officers, the data allow for some informative approximations. Bakija, Cole, and Heim (2012) compare executives who receive the majority of their income in salary and wages to those executives who receive the majority of their income from self-employment, partnership, and S-corporation related income. They argue that the former are more likely to include public company executives, while the latter are most likely to include executives of closely-held business. Their data show that the pay of closely-held business executives has risen substantially as a share of the top 0.1 percent. Pay of closely-held business executives comprised 22 percent of the top 0.1 percent in 2005, up from 18 percent in 1993 and 9 percent in 1979. In contrast, the pay of salaried executives, whom they argue are more likely to be with public companies, has actually fallen relative to the top 0.1 percent. Pay of salaried executives comprised 20 percent of the top 0.1 percent in 2005, down from 28 percent in 1993 and 38 percent in 1979.

This evidence is not supportive of the arguments that the top incomes have been driven by managerial power or poor corporate governance in public companies. Public company executives, who should be more subject to problems of managerial power problems, saw their pay and relative standing increase less over this period than executives of closely-held company businesses that are, by definition, controlled by large shareholders or the executives themselves and are subject to more limited agency problems. Furthermore, the Bakija, Cole, and Heim (2012) findings are not consistent with loosening social norms being an important factor in the increase in incomes at the top, as it is the pay of closely-held businesses—where executive pay is private and undisclosed—that increased the most.

Finance professionals are another potentially useful comparison group. In Kaplan and Rauh (2010), we find that when looking at those with top incomes, finance industry executives are at least as important as public company executives. In the Bakija, Cole, and Heim (2012) data, taxpayers in finance increased from 0.4 percent of the top 0.1 percent in 1979 to 2.0 percent in 2005, or a factor of five times. As discussed in a symposium in the Spring 2013 issue of this journal, the financial sector markedly increased its share of US GDP in the last years.

Table 1

Average Pay of Top Hedge Fund Managers and Law Partners

Year	Average pay of top 25 hedge fund managers (Millions of $2010 [and relative to average adjusted gross income of top 0.1%])	Average profit per partner at top 50 law firms (Millions of $2010 [and relative to average adjusted gross income of top 0.1%])
1994		$0.704 [0.268]
1996		$0.784 [0.219]
1998		$0.997 [0.200]
2000		$1.084 [0.167]
2002	$133.7 [34.6x]	$1.099 [0.285]
2004	$289.5 [55.7x]	$1.286 [0.247]
2006	$616.2 [90.3x]	$1.491 [0.218]
2008	$469.8 [82.1x]	$1.449 [0.253]
2010	$882.8 [177.6x]	$1.557 [0.313]
2012	$537.2 [115.7x]	

Source: Authors using data from *Absolute Return + Alpha* magazine, *American Lawyer*, and Piketty and Saez (2013).

We can also consider data for financial professionals working in the specific areas of hedge funds, private equity funds, and venture capital funds. Since 2001, *Absolute Return + Alpha* magazine has published an annual "Rich List" of the 25 highest paid hedge fund managers. These estimates include the annual income of these managers from fees and their capital invested in their funds. As a result, these data overstate the income of these managers attributable to their employment per se, as separate from their investment income. Nevertheless, the results are informative.

As shown in the first column of Table 1, the average pay of these top 25 hedge fund managers was $134 million in 2002, and it was $537 million in 2012 (all in 2010 dollars), standing at almost 116 times the pay of the average adjusted gross income of the top 0.1 percent. In fact, in each year since 2004, the 25 highest paid hedge fund managers have earned more than all of the chief executive officers of the Standard and Poor's 500 companies combined. In 2010, the 25 top hedge fund managers combined earned roughly four times as much as the CEOs of Standard and Poor's 500 firms.

In Kaplan and Rauh (2010), we also document a large increase in fees to private equity and venture capital investors through 2005. The payments to all but a few of the individuals within these firms are not in the public record. However, the fees received by these firms can be inferred by looking at their assets under management and their profits. We start with the assumption that private equity and venture capital investors earn fees on capital committed to their firms over the previous seven years. Capital raised or committed is obtained from Private Equity Analyst. We assume that the private equity firms earn an annual management fee of 1.5 percent on that capital, while venture capital firms earn a 2.0 percent management fee. In addition, we assume that private equity and venture capital firms receive 20 percent of the profits earned by funds in a given year. Profits are estimated using the average

return earned by private equity and venture capital funds in a given year reported by Cambridge Associates.

Using this approach, we estimate that the fees for private equity firms have increased substantially over time. Back in the late 1980s, the private equity industry was relatively small, with $1 to $2 billion in annual fees. By 1996–98, it was consistently in the range of $10 billion per year in fees. Private equity fees then spiked in 1999 and 2000 at about $20 billion per year, before falling back in 2001 and 2002. Private equity funding and fees picked up substantially after that. From 2005 to 2011, private equity fees averaged roughly $34 billion per year (in 2010 dollars). This represents an increase of almost three times the average over the previous ten years.[1]

Consistent with the large increase in fees, the founders of the large private equity firms earned very large amounts in 2012. The three founders of Carlyle received a total of over $300 million on distributions. The founder of Blackstone received over $200 million; and the two founders of KKR received more than $130 million each.
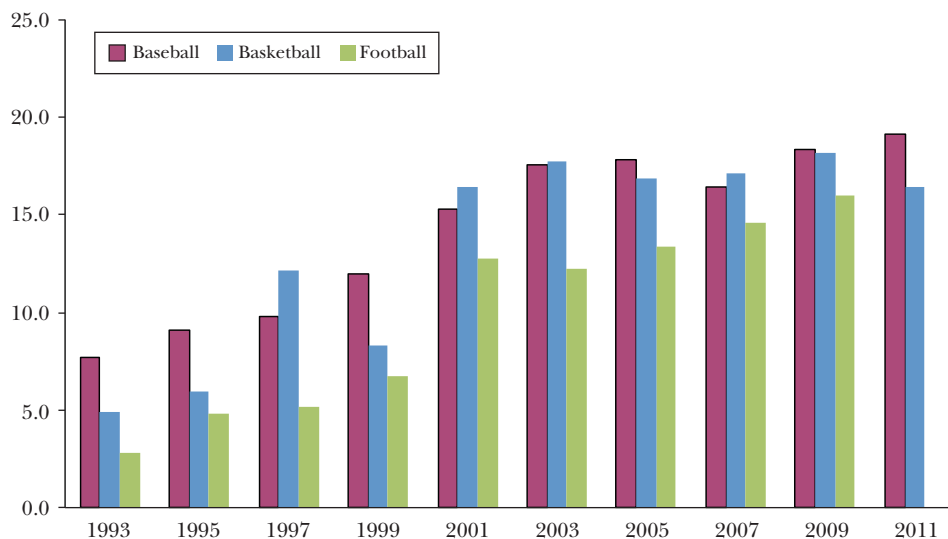
Venture capital firms have had a more volatile record. These firms typically earned fees of $1–$4 billion through the 1990s, until the Internet boom at the turn of the century, when their fees spiked to almost $30 billion in 1999 and more than $70 billion in 2000. Venture capital fees then dropped back to $4–$5 billion per year from 2001 to 2004. However, from 2004 to 2007 and, after the financial crisis years, again in 2011, venture capital fees exceeded $10 billion per year. Nevertheless, both analyses suggest that fees have increased markedly since the early 1990s.[2]

Lawyers at top law firms also have done very well. Because the law firms are partnerships and their fees are negotiated in an arms-length manner with clients, the pay of partners at those law firms is less subject to concerns that managerial power is leading to the increase in pay. The second column of Table 1 reports average profit per partner at the 50 top law firms from *American Lawyer* surveys from 1994 to 2010. This calculation measures the total partner profits at all of these firms divided by the total number of partners. The average profit per partner provides an estimate of the average partner's average gross income earned from employment at the law firm. The average profit per partner increased from $0.7 million in 1994 to almost $1.6 million in 2010 (in 2010 dollars). The numbers in brackets show that the average partner's income increased from 0.27 to 0.31 of the average income of the top 0.1 percent. These numbers may understate how well the very top partners

[1] In an alternative analysis, we assume that private equity firms earn overall fees of 4 percent while venture capital firms earn fees of 5 percent on capital raised over the previous seven years. This assumes that the profit share has a value of roughly 2.5 percent per year for private equity firms and 3 percent per year for venture capital firms. Those assumptions are consistent with the fee estimates in Metrick and Yasuda (2010). Under this methodology, private equity firm fees have averaged $26 billion per year since 2005.
[2] Investment banking firms offer another possible comparison group. In Kaplan and Rauh (2010), we use financial statements of publicly traded investment banking firms and assumptions of the pay distribution within these firms to estimate the pay of the most highly compensated people. We find that investment bankers constitute a meaningful fraction of the top 0.1 percent. Bell and Van Reenen (2010) use income data from the United Kingdom to study financial sector incomes there. They find that the pay of bankers' increased substantially since 1999 and contributed meaningfully to the increase in income inequality.

Figure 3
Average Top 25 Salaries in Professional Baseball, Basketball, and Football
(in millions of 2010 dollars)

Source: USA Today Sports Salary Database.

at these law firms have done. The number of partners increased over this period from 7,000 to 12,000. If it were possible to compare the pay of the top 7,000 partners in 2010 and 1994, the increase for top lawyers would be greater.

As a final comparison, we also consider pay for professional athletes in baseball, basketball, and football. We extend the analysis in Kaplan and Rauh (2010) by looking at the average pay of the top 25 most highly paid athletes in those sports (every other year) from 1993 to 2011. Figure 3 shows that the top 25 athletes in each sport average over $15 million per year in salary. Compared to Table 1, we see that these pay levels are higher than the average of top law partners (in the $1–2 million range) but lower than those of top hedge fund managers (in the hundreds of millions of dollars). This graph understates the total income of the athletes because it does not include nonsalary income such as endorsements. Pay at the top has increased markedly since 1993, with baseball, basketball, and football players earning, respectively 2.5, 3.3, and 5.8 times as much in 2009 as in 1993. The greater part of the increase, particularly for baseball and basketball, occurred by the early 2000s.

Again, the key reason for making these comparisons is that the mechanisms for determining compensation vary quite a bit across executives of public companies, executives of private companies, financial professionals, law firms, and professional athletes. If the reason for growth of incomes at the very top is, say, managerial power in publicly owned companies, then one would expect the increases in income at the

top levels to be much larger for that group. But the breadth of the occupations that have seen a rise in top income levels is much more consistent with the argument that the increase in "superstar" pay (or pay at the top) has been driven by the growth of information and communications technology, and the ways this technology allows individuals with particular skills that are in high demand to expand the scale of their performance.

Time Series Evidence on Income Inequality

One of the most widely cited measures of income inequality at the very top is the share of taxable income accruing to the top 1 percent of earners in the economy as tabulated by Piketty and Saez (2003, 2013). As of 2011, the top 1 percent of earners received 19.8 percent of all "market income" (labor income, business income, capital income, capital gains). This measure peaked at 23.9 percent in 1928, fell below 10 percent in the late 1960s and early 1970s, then increased markedly from 1980 to 2000. Since 2000, the share of the top 1 percent has fluctuated, peaking at 23.5 percent in 2007, dipping to 18.1 percent in 2009, and increasing to 19.8 percent in 2011, roughly the same as it was in 1998 and 1999. These measures of course do not include taxes or government transfers. The Congressional Budget Office (2012) has presented shares of the top 1 percent after transfers and before taxes, and after both transfers and taxes. In Figure 4, we present all three series since 1979, which is the first year in the Congressional Budget Office time series and also a time when the Piketty and Saez measure of the income of the top 1 percent is near its low point. Much can be said about this data, but here, we emphasize three points.

First, while the share of income going to the top 1 percent has clearly increased by any of these measures, the long-term extent of the increase is not best judged by looking at the peaks in 1999 or 2007.
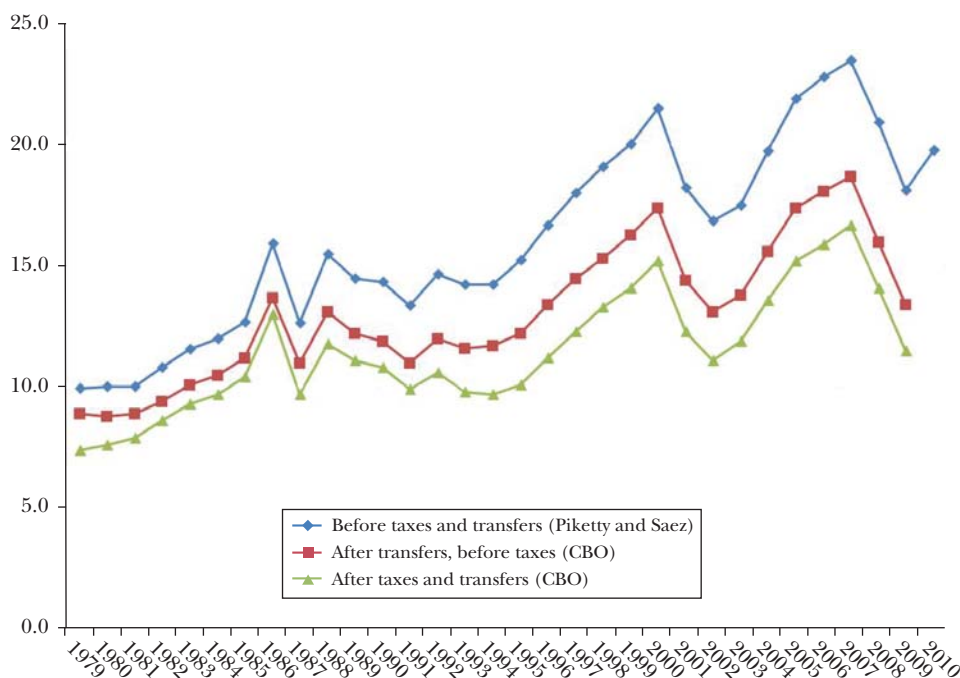
Second, the share of income going to the top 1 percent is quite volatile. In particular, it seems to rise during financial markets booms and then drop back.

Third, adding transfers and taxes to the picture and using the Congressional Budget Office data, transfer and tax policy appear to be having some effect in restraining the growth of inequality. In the most recent data from 2009, the after-tax, after-transfer income share of the top 1 percent was around the same level as in 1987–1988, 1996, and 2001.

Background of the Wealthiest Americans

In this section, we look at the Forbes 400 data to gather data on family background. The Forbes 400 is a list of the 400 wealthiest individuals in the United States by net worth. It has been published annually since 1982. We collected the lists in 1982, 1992, 2001, and 2011, approximately one year each decade, to get an overview. In constant 2011 dollars, the Forbes 400 wealth amounted to $214 billion in 1982, $483 billion in 1992, $1.197 trillion in 2001, and $1.525 trillion in 2011. As

Figure 4
Share of Income Accruing to the Top 1 Percent

Source: Picketty and Saez (2013) and Congressional Budget Office (2012).
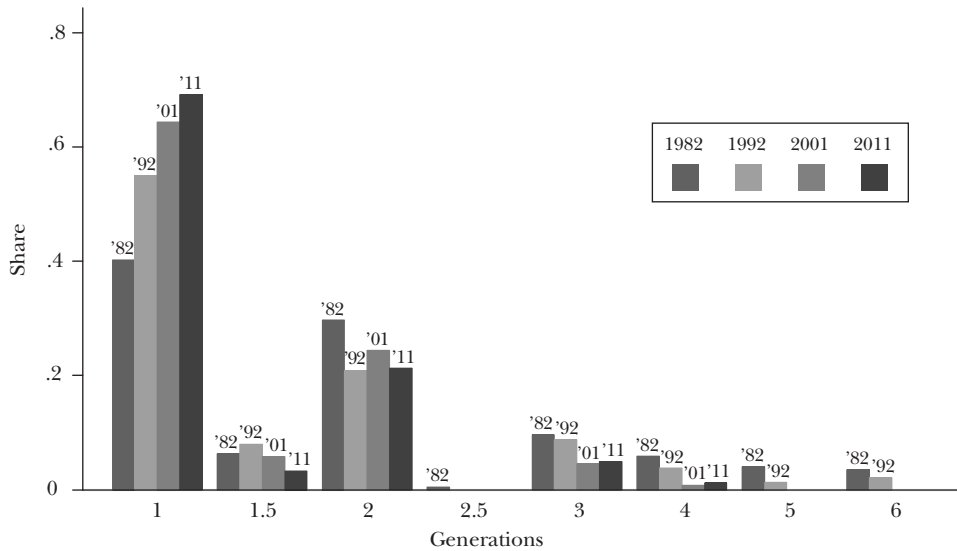
a fraction of total US stock market value, this wealth amounted to, respectively, 7.0, 7.0, 7.0, and 8.5 percent.

In Kaplan and Rauh (2013), we provide a more detailed description of the list. This section draws on that research and deepens the analysis, particularly in comparing the Forbes 400 in the US to the list of international billionaires, also from *Forbes* magazine.

For each individual in the domestic and international datasets, we collect and code biographical details, using *Who's Who* and Internet searches as our primary sources. We identify the founding date of the business that generated the individual's wealth and then determine in what generation the individual is within the family of the founder of that business. The normal coding for the generation is an integer. However, if the individual inherited a modest business and built it into a much larger one, we input the generation as 1.5. For example, Edward C. Johnson III, of Fidelity Investments, receives a 1.5 in our dataset. Fidelity Investments was founded by the father of Johnson III but was built primarily by Johnson III himself.

We separately code the extent to which the individual grew up wealthy, defining three categories: little or no wealth in the family, some wealth in the family, or wealthy. For example, the Koch brothers grew up wealthy. Bill Gates, whose father

Figure 5

Generation of the Wealth-Creating Businesses of Forbes 400 Individuals in 1982, 1992, 2001, and 2011
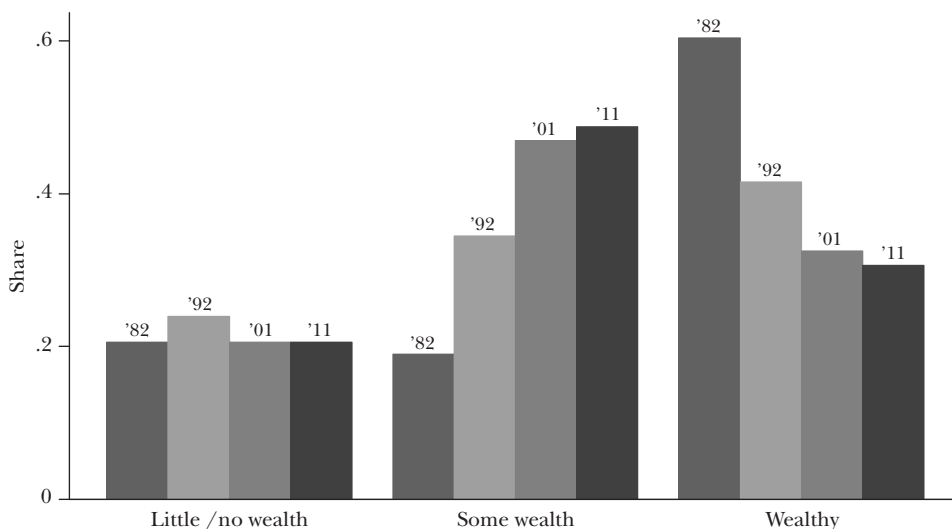
(share among Forbes 400 individuals)

Source: Authors, using *Who's Who* and Internet searches as primary sources.
Notes: The numbers along the *x*-axis give the generation of a Forbes 400 individual within the family of the founder of his or her business. The normal coding for the generation is an integer. However, if the individual inherited a modest business and built it into a much larger one, we input the generation as 1.5.

cofounded a successful law firm, grew up with some wealth, as did, for example, sons and daughters of US Congressmen (Warren Buffett of Berkshire Hathaway), factory owners (James Simons of the hedge fund Renaissance Technologies), newspaper publishers (Philip Knight of Nike), retail owners (Stephen Schwarzman of the Blackstone Group), and psychiatrists (Dustin Moskovitz, a cofounder of Facebook). We view the "some wealth" category as the equivalent of an upper middle class upbringing.

Figure 5 shows that in the United States, the share of Forbes 400 individuals who are the first generation in their family to run their businesses has risen dramatically from 40 percent in 1982 to 69 percent in 2011. The inheritance of a small family business and the building of it into a larger business were never very common, but it represents a trivial fraction of the sample by 2011. Much of the increase in the first generation businesses has come at the expense of the second-generation and third-generation inherited businesses or wealth. The share of those belonging to fourth-, fifth-, and sixth-generation inherited businesses or wealth has virtually evaporated. These findings are very similar when the results are weighted by wealth.

Figure 6
Did the Forbes 400 Grow Up Wealthy?
(share of Forbes 400 individuals for 1982, 1992, 2001, and 2011 with each upbringing)

Source: Authors using *Who's Who* and Internet searches as primary sources.
Notes: Figure 6 shows the share of Forbes 400 individuals for 1982, 1992, 2001, and 2011 who grew up with little or no wealth, who grew up with some wealth, and who grew up wealthy. In coding the data, we view the "some wealth" category as the equivalent of an upper middle class upbringing.

Figure 6 illustrates that the percent that grew up wealthy fell from 60 to 32 percent while the percent that grew up with some money in the family rose by a similar amount. The percent who grew up with little or no wealth remained about flat. Again, these findings are very similar when the results are weighted by wealth.

Overall, Figures 5 and 6 show a trend in the Forbes 400 list away from people who grew up wealthy and inherited businesses towards those who grew up with more modest wealth in the family and started their own businesses. These changes largely occurred between 1982 and 2001. From 2001 to 2011, the percentage of Forbes 400 that started their businesses increased only slightly, while the percentage that grew up wealthy declined only slightly. The results therefore point to an increase in wealth mobility at the very top, although the added mobility comes from those who would be considered upper middle class.

Access to education also appears to be of increasing importance. The share of the Forbes 400 who graduated from college rose from 77 to 87 percent between 1982 and 2011. The share of college dropouts (like Bill Gates and Mark Zuckerberg) also rose from 6 to 8 percent. At the same time, the share of those without any college dropped markedly from 17 to 5 percent. These results are very similar when the observations are weighted by wealth.

Table 2

Categories of the Wealth-Creating Businesses behind the Forbes 400

(share of Forbes 400 businesses)

	1982	1992	2001	2011	*Change from 1982 to 2011*
Industrial					
Retail/Restaurant	0.053	0.118	0.132	0.150	+0.097
Technology–Computer	0.033	0.053	0.130	0.123	+0.090
Technology–Medical	0.005	0.018	0.021	0.023	+0.017
Consumer	0.131	0.174	0.125	0.108	−0.023
Media	0.136	0.132	0.164	0.100	−0.036
Diversified/Other	0.207	0.205	0.156	0.123	−0.084
Energy	0.214	0.089	0.062	0.098	−0.117
Finance and investments					
Hedge funds	0.005	0.011	0.018	0.075	+0.070
Private equity/leveraged buyout	0.018	0.034	0.039	0.068	+0.050
Money management	0.018	0.055	0.062	0.045	+0.027
Venture capital	0.003	0.005	0.008	0.015	+0.012
Real estate	0.179	0.105	0.081	0.075	−0.104

Source: Authors' calculations from the Forbes 400.

We next code industries of the wealth-generating firms into both broad and more narrowly defined categories. The broad categories are industrial, finance/investments, and real estate. Within the industrial category, we further subdivide into seven subcategories: computer technology, medical technology, retail/restaurant, energy, consumer, media, and diversified/other. Within the finance category, we divide into four subcategories: hedge funds, private equity/leveraged buyouts, venture capital, and money management. This leaves us with 12 separate categories.

Table 2 documents the industries of the wealth-generating businesses of the Forbes 400 members in each year of our sample. The "finance and investments" category grew in representation by around 16 percentage points, technology (both computer and medical) by 11 percentage points, and retail/restaurant by 10 percentage points. Energy shrank by 12 percentage points, real estate shrank by 10 percentage points, and the remaining groups that lost share were the nontechnology industrial businesses. The rise in computer technology and the decline in energy is even more pronounced in value-weighted results.

We also create an indicator variable for whether the business had an important technology component. We begin by assuming that all the technology businesses have a technology component. We then code other businesses as having a technology component if they are pharmaceutical firms, energy firms that develop new extraction technologies (such as fracking), financial firms that exploit new technologies (such as online brokerage), and venture capitalists who invest heavily in technology firms. Even in the businesses started by the Forbes 400 that are not computer

technology businesses per se, technology has become more important. The share of businesses with some technology component increased from 7.3 percent in 1982 to 17.8 percent in 2011. On a value-weighted basis, the percentage increased from 7.1 percent in 1982 to 25.5 percent in 2011, over one-quarter of the total wealth in the 2011 Forbes 400.
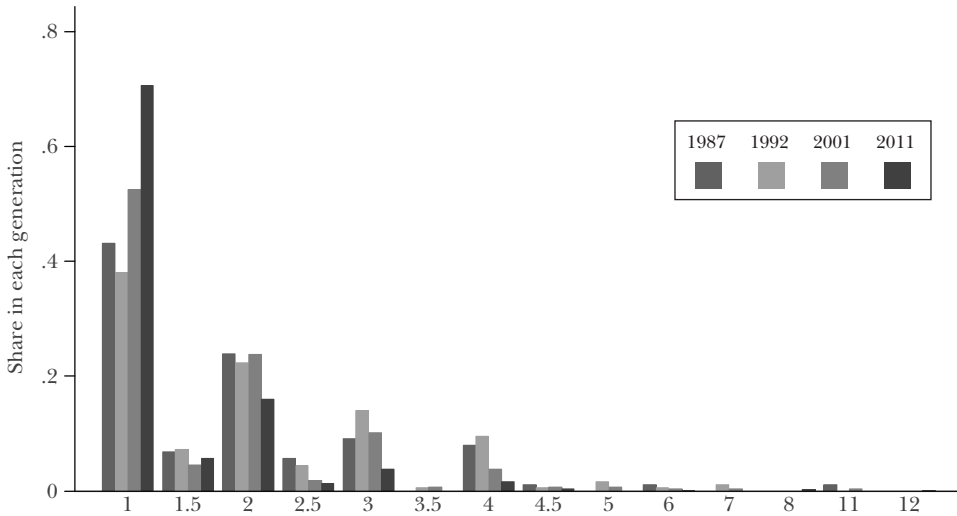
The growth in the technology share occurred largely in the 1990s. The share of computer and medical technologies in the Forbes 400 businesses peaked in 2001 at 15.1 percent, before declining slightly to 14.6 percent in 2011. The share of industries with a technology component rose from 9.1 to 17.5 percent between 1992 and 2001, but only very slightly thereafter. The growth in financial businesses—private equity, hedge funds, and venture capital—on the other hand, occurred primarily in the 2000s, while the share of media, consumer, and diversified businesses declined during that decade.

These findings appear to be consistent with theories of technological change that favor skill in scalable areas (Gabaix and Landier 2008; Kaplan and Rauh 2010). Entering the elite group of the wealthiest individuals is less likely to be linked to having already grown up rich, but having some wealth still confers advantages, particularly in access to education. The wealthiest individuals increasingly comprise individuals who accessed this education while young and then applied their skills to the industries that turned out to be highly scalable. In these industries, the combination of increasing technology and returns to skill allow for the greatest generation of wealth: finance, technology, and also retail. The findings are less consistent with the rise in inequality being the result of broken corporate governance or cultural changes.

Some of these patterns are reflected globally, but others are not. Figure 7 shows that the share of non-US billionaires who are first-generation in the business rose by a similar amount abroad as in the United States, and the composition of the declines in the other categories are very similar to the US experience. Strikingly, however, the share of non-US billionaires who grew up with little or no wealth has risen from under 30 percent in 1987 to over 50 percent in 2012, as shown in Figure 8. The share that grew up with some, but not large wealth has hovered around 20 percent, whereas the share that grew up wealthy plummeted. Recall that while the share of ultra wealthy that grew up wealthy also fell in the United States, the rise of those from the poorest group globally as opposed to the middle group in the US represents a major difference. We can only speculate about the sources of these differences, but one possibility is that in the United States there is better access to education when the family has some wealth, and such access is increasingly important to success in the US economy.

Table 3 shows the business in which the non-US billionaires earned their fortunes over time. Because of their greater prevalence outside the US, Table 3 adds two categories—construction and mining/metals—that were included in "diversified/other" in Table 2. The technology component has become more important globally, but not so important as in the United States. Computer technology and money management are increasingly represented among billionaires globally, but the category that gained

Figure 7
Generation of the Wealth-Creating Businesses in the Forbes Non-US Billionaires in 1987, 1992, 2001, and 2012

Source: Authors using *Who's Who* and Internet searches as primary sources.
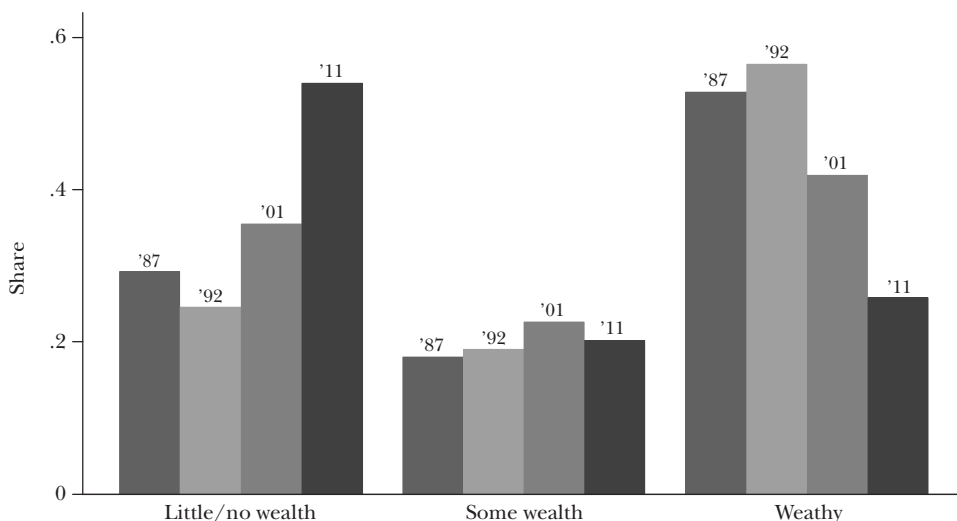*Notes:* The numbers along the *x*-axis give the generation of a Forbes non-US billionaire within the family of the founder of his or her business. The normal coding for the generation is an integer. However, if the individual inherited a modest business and built it into a much larger one, we input the generation as 1.5.

the most is mining/metals. There was a substantial increase in the business category of energy among the ultra rich globally, whereas this category of business fell among the ultra rich in the United States. Looking at energy together with metal/mining, it is clear that natural resources have played a much larger role outside the United States in creating wealth in the last 20 years.

With the large improvements in information technology and the substantial increase in value of the securities markets over the last 30 years, skilled individuals can now apply their talent to much larger pools of capital. The changes in the composition of the wealthiest individuals in the United States suggest that these trends are shaping wealth more than they used to, while being born to extensive wealth and inheriting family businesses have become less important. Having access to education also has become more important in wealth generation, but it remains an open question what proportion of those gains are due to gains in skill and what proportion are due to improved access to networks.

The rise in the overall college wage premium in the United States may have flattened somewhat in the past decade (James 2012), but our evidence from the identity of the super-rich suggest that the premium for technological skill has continued to rise in the right-tail of wealth outcomes. These findings are most consistent with

Figure 8
Did the Forbes Non-US Billionaires Grow Up Wealthy?
(share of Forbes non-US billionaires in 1987, 1992, 2001, and 2011 with each upbringing)

Source: Authors' using *Who's Who* and Internet searches as primary sources.
Notes: Figure 8 shows the share of Forbes non-US billionaires for 1987, 1992, 2001, and 2011 who grew up with little or no wealth, who grew up with some wealth, and who grew up wealthy. In coding the data, we view the "some wealth" category as the equivalent of an upper middle class upbringing.

the frameworks of Goldin and Katz (2008), in which technological progress widens inequality among skill groups. Over time, this effect might be countered by the continuing broad-based accumulation of human capital, particularly (as pointed out by Acemoglu and Autor 2012) when there are deep interactions between skills and technologies in accomplishing job tasks.

Wealth Inequality

Inequality in wealth appears to be more stable than inequality in income. Estimates of household wealth are available in the triennial Survey of Consumer Finances started in 1983, and from a couple of reasonably comparable earlier surveys, like the Survey of Financial Characteristics of Consumers from 1962. Wolff (2010, 2012) compiles and compares the evidence. He finds that the top 1 percent of US households held 33–35 percent of total net worth in surveys from 1962, 1969, and 1993. In the four surveys done from 1989 to 1998, the top 1 percent of US households held 37–39 percent of net worth. This share of wealth for the top 1 percent fell back below 35 percent in the surveys of 2001, 2004, and 2007, but reached 35.4 percent of total wealth in 2010. In short, the wealth share of the top 1 percent has been more stable than inequality in income, and the latest readings for wealth are below their historic highs.

Table 3

Categories of the Wealth-Creating Businesses behind the Forbes Non-US Billionaires

(shares of the businesses of Forbes non-US billionaires)

	1987	*1992*	*2001*	*2011*	*Change 1987–2011*
Industrial					
Retail/Restaurant	0.101	0.101	0.109	0.124	+0.023
Technology – Computer	0.011	0.039	0.091	0.068	+0.056
Technology – Medical	0.045	0.050	0.042	0.039	−0.006
Consumer	0.157	0.128	0.113	0.098	−0.060
Media	0.067	0.067	0.053	0.030	−0.037
Diversified/Other	0.247	0.346	0.362	0.304	+0.057
Energy	0.022	0.022	0.034	0.049	+0.026
Construction	0.090	0.061	0.042	0.034	−0.056
Mining and metals	0.011	0.011	0.026	0.070	+0.059
Finance and investments					
Hedge funds	0.000	0.000	0.004	0.008	+0.008
Private equity/leveraged buyout	0.022	0.000	0.011	0.010	−0.012
Money management	0.034	0.061	0.072	0.065	+0.031
Venture capital	0.000	0.000	0.004	0.010	+0.010
Real estate	0.101	0.101	0.109	0.124	+0.023

Source: Authors' calculations from the Forbes non-US billionaires.
Note: Table 3 shows the business in which Forbes non-US billionaires the earned their fortunes over time.

These calculations may not capture all of the issues. For example, if the top earners have been engaging in notably more tax avoidance or evasion by offshoring taxes (for some discussion, see Zucman 2013), then wealth inequality might be rising without it being apparent in US-based statistics.

If the proportion of total net worth held by those in the top 1 percent has indeed been fairly stable, then how can this pattern be reconciled with the rising share of income going to the top 1 percent? One possibility is that the top earners decreased their savings rates relative to the rest of the distribution. Definitive conclusions about consumption inequality at the very top are made difficult by data challenges. Looking across the income distribution as a whole, Krueger and Perri (2006) argue that consumption inequality has not tracked income inequality, whereas Aguiar and Bils (2011) argue that "income inequality has been mirrored by consumption inequality." However, no study has shown that the top incomes are actually consuming an even larger share of their income, which is what would be required for consumption patterns to be smoothing out wealth inequality.

Another possible reason that wealth inequality has been more stable than consumption inequality relates to the effects of taxation. As shown above, increases in after-tax, after-transfer inequality in the top 1 percent have been more modest than increases in the before-tax, before-transfer income inequality. If the consumed

share of pretax income were relatively constant, then the increase in the share of income going to taxes would tend to mute the effect of increases in income inequality on wealth inequality.

Conclusions

Inequality in pretax income as measured by the income share of the top 1 percent has increased substantially in the US since 1980. The rise in after-tax, after-transfer income of the top 1 percent has been more muted, and the current levels are closer to the late 1990s and not so high as in the mid-2000s. The sources of rising pre-tax inequality have been long debated. Of course, these theories are not mutually exclusive and will overlap in various ways, but it can be a useful shortcut to think about these theories in two broad categories.

In one category, rising inequality is being driven by top earners finding ways to extract additional income. This category includes explanations of greater inequality based on theories of managerial power (Bebchuk and Fried 2004), social norms (Piketty and Saez 2006; Levy and Temin 2007), and how changes in marginal tax rates alter incentives for managers to seek higher income for themselves (Piketty, Saez, and Stantcheva forthcoming). In many of these theories, top earners obtain rents in the sense that they distort the economic system to extract resources in excess of their marginal products.

In the other category, the increase in inequality has been driven by economic factors that have altered the marginal productivity of certain kinds of labor. This category would include explanations of greater inequality based in skill-biased technological change (Katz and Murphy 1992; Garicano and Rossi-Hansberg 2006; Autor, Katz, and Kearney 2006; Garicano and Hubbard 2007), greater scale (Tervio 2008; Gabaix and Landier 2008), superstars (Rosen 1981), and trade or globalization (Hecksher 1931; Ohlin 1933; Stolper and Samuelson 1941). In most of these theories, the idea is that top earners have scarce and unique talents that allow them to command a premium due to the increasing value of their talents in markets of increasing size.

Our results tend to support the second broad category of explanations more than the first. For example, one version of the managerial power or extraction hypothesis argues that corporate governance has deteriorated in a way that allows top executives to have increased their compensation substantially (Bebchuk and Fried 2004). But our evidence suggests that poor corporate governance cannot be more than a small part of the picture of increasing income inequality, even at the very upper end of the distribution. Other groups that do not report to a potentially compliant board of directors, particularly private company executives, have experienced equal or larger increases in their contribution to the top income brackets. Furthermore, the Forbes 400 lists include virtually no public company chief executives who are not founders or who became the chief executive officer after the company went public.

A related theory of extraction argues that high earners have a greater incentive to extract from lower earners when marginal tax rates are low, because they get to keep a larger share of the returns from this bargaining activity (Piketty, Saez, and Stantcheva forthcoming). Our evidence that the wealthiest individuals in the US are increasingly populated by technology entrepreneurs is not directly consistent with this, as the fortunes of the developers of new technologies are arguably quite insensitive to the strength of their bargaining against lower-wage workers. The fact that the top 1 percent share in the wealth distribution has in fact been much more stable than the income distribution, and that the rise in the share of after-tax, after-transfer income held by the top 1 percent has been much less, also suggests that the top earners may have actually not kept as much of these income gains.

Our evidence also is not obviously consistent with those who suggest that the increase in pay at the top is driven by a recent removal of social norms regarding pay inequality. While top executive pay has increased, so has the pay of other groups, who are and were less subject to disclosure and, arguably, less subject to social norms. This is particularly true of private company executives and hedge fund and private equity investors.

Overall, we believe that our evidence remains more favorable toward the theories that root inequality in economic factors, especially skill-biased technological change, greater scale, and their interaction. Skill-biased technological change predicts that inequality will increase if technological progress raises the productivity of skilled workers relative to unskilled workers and/or raises the price of goods made by skilled workers relative to those made by unskilled workers. For example, computers and advances in information technology may complement skilled labor and substitute for unskilled labor. This seems likely to provide part, or even much, of the explanation for the increase in pay of professional athletes (technology increases their marginal product by allowing them to reach more consumers), Wall Street investors (technology allows them to acquire information and trade large amounts more easily) and executives, as well as the surge in technology entrepreneurs in the Forbes 400. Globalization may have contributed to greater scale, but globalization cannot drive the increase in inequality at the top levels given the breadth of the phenomenon across the occupations we study.

Tervio (2008) and Gabaix and Landier (2008) analyze "assignment models" for chief executive officers in which more-able CEOs can add more value to larger firms. In a competitive equilibrium, their models predict that top executives will be paid more as their firms and other firms they can work for become larger, because larger size increases the returns to hiring the more productive people. Tervio (2008) concludes that his model can explain the high levels of CEO pay. Gabaix and Landier (2008) attribute the large increase in pay of chief executive officers in US public companies to the large growth of those companies over time—the typical large US firm increased in market value by four to seven times in real terms from 1980 to 2003. Public companies, financial services firms, venture capital funds, private equity funds, hedge funds, and law firms all have grown larger, in many instances by orders of magnitude. Although the two papers do not seek to explain

why firms (and funds) have been able to become so much larger over time, the same technological change that is biased towards skills may have helped firms and funds to become larger during our sample period.

These theories, interacted with the incentive effects of taxes, regulations, and institutions, also help explain why income inequality has not risen as much in other countries such as Sweden and France. While these countries have implemented productivity-enhancing technologies, there has been considerably less direct development of the most profitable new technologies there than in the United States. While the private equity, venture capital, and hedge fund industries have grown in these places, they have not been scaled up to the extent that they have in the United States. Disincentives related to tax and regulatory policy may have caused both financiers and innovators in such countries to locate elsewhere, in places like London and Silicon Valley.

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