CHAPTER TWO

The Broad-Based Rise in the Return to Top Talent

Joshua D. Rauh

My talk here today is called, "It's the Market: The Broad-Based Rise in the Return to Top Talent." This is work that I've done with Steve Kaplan. We've been working on this for quite a while now. I think that we first started on it maybe seven or eight years ago. It's an honor to be here and to be presenting this work in memory of Gary Becker, whose ideas clearly pervade everything about which we're talking here today.

What do we know about the top 1 percent? There are some very clear facts. It is well known that the top 1 percent of taxable income represents a much greater share than it did thirty years ago. This is largely a story of market income—that is, of pre-tax and of pre-transfer income. If you look at what tax policy and transfers have done to the after-tax, after-transfer income of the top 1 percent, the changes over the last several decades are a lot more muted. Capital gains and options play a role, but the main drivers appear to be labor income and business income.

To illustrate this point again as an introduction to my remarks, let me show you some graphs. Figure 2.1 shows the share of US income going to the top 1 percent from 1979 to 2011. If you look before taxes and transfers, in 1979, it was 10 percent. In 2011, it was over 20 percent. If you look at numbers from the CBO (Congressional Budget Office), which considers income after accounting for taxes and transfers, there has still been a change over the last thirty years. But the change has been more muted, and there's volatility

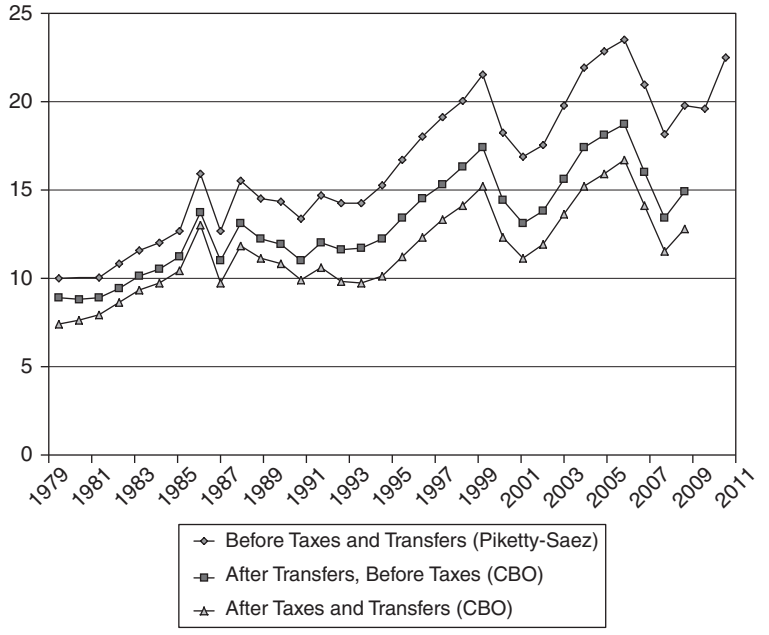

FIGURE 2.1. Share of US income to top 1 percent, 1979–2011

Source: Steven N. Kaplan and Joshua Rauh, "It's the Market: The Broad-Based Rise in the Return to Top Talent," *Journal of Economic Perspectives* 27(3): Summer 2013, 35–56

in the series. If you look at income accounting for tax policy and transfer policy, it'd be hard to say that there's been an explosion in the after-tax/after-transfer income share going to the top 1 percent. It's gone up and down, probably with the market and with the economy, but it's been relatively flat. So, that's one motivating fact.

Another motivating fact is that capital gains play a role. I'm going to talk to you today about some market-related phenomena. As such, some income of the top 1 percent is related to the stock market. But that is not the whole story. Figure 2.2 shows the share going to the top 1 percent, including and excluding capital gains. This is also a graph that we saw earlier today in some form. Capital gains are of course playing a role, but their contribution to top

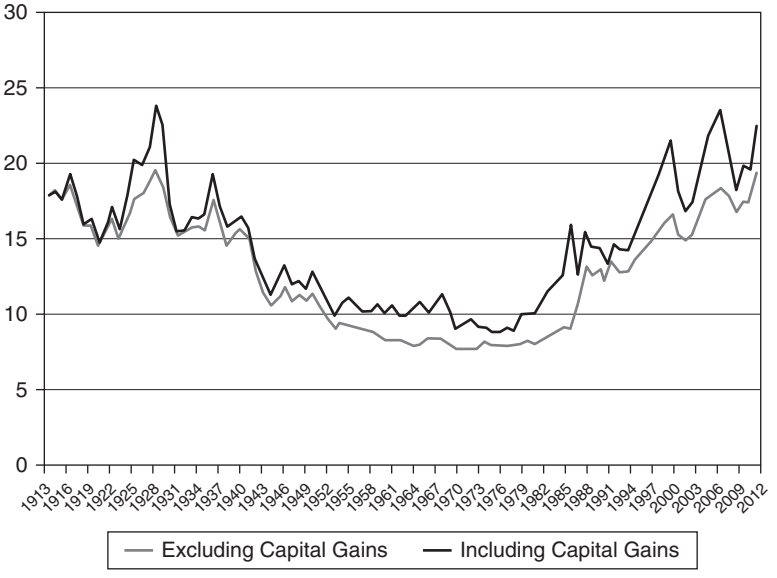

FIGURE 2.2. Capital gains play a role but are not the big story

Source: Emmanuel Saez, "Income Inequality in the United States, 1913–1998," with Thomas Piketty, *Quarterly Journal of Economics,* 118(1), 2003, 1–39, updated to 2012, September 2013

1 percent income inequality has not expanded very much in the past several decades.

Professor Kaplan and I have been trying to better understand the drivers of top 1 percent income inequality by examining what occupations have occupied the top 1 percent both several decades ago and today. We have done this in a series of papers. We've studied the increase in pay in the highest income levels across occupations, as well as changes in the occupations and backgrounds of the wealthiest Americans, to try to get a better sense of what it is that's driving top 1 percent income inequality.

In looking at the literature and at the ideas that are out there about top 1 percent income inequality, one finds two main categories of ideas. The first set of ideas are what I would call the

"It's-the-Market" ideas. There are a number of different variants of this concept. One of the hallmarks of "It's-the-Market" ideas is that there is some kind of interaction between scale and superstar producers, along the lines of the paper by Sherwin Rosen published in the *American Economic Review* in 1981. That paper argues that communications extended the scale on which talent can operate. Rosen was quite prescient writing this paper in 1981, because thanks to technology, the scale on which talent can operate is today much greater than it was in 1981. In the past several decades, we have felt the full impact of the personal computer, personal cell phones, the Internet, and other information technology innovations. The scale-superstar hypothesis is therefore one of the prime examples of the "It's-the-Market" hypothesis. Since the 1980s, that theory has been expanded upon and built upon in a number of different ways.

One of the other key aspects of the "It's-the-Market" hypothesis is the notion that there's been skill-biased technological change. Technology has changed in such a way that it makes the capabilities of the most educated or skilled workers in the economy more valuable. That's a theory that has been very impactful. Other related "It's-the-Market" theories are that you can have small dispersions in talent multiplied by growing organizations, which can lead to growing pay dispersion. This theory was put forth in a paper by Xavier Gabaix and Augustin Landier, published in the *Quarterly Journal of Economics* in 2008. It very much builds upon the scale-superstar theory of Rosen. The idea is that if you have very small differences in talent, scale increases are likely to cause growing pay dispersion. What we then have is an explanation for rising income inequality. The talented are able to multiply their talents across much larger pools of capital or people who they can reach. This talent-multiplication theory is another "It's-the-Market" theory, because increases in income inequality are driven by increasing size of enterprises and scope of talent to generate output. This is an

important idea as we honor Gary Becker: the notion that there are increasing returns to the work of individuals with certain types of skills and in particular with a certain type of education, which is an idea related to skill-biased technological change.

The opposing view of rising income inequality is what I would call the "It's the Rents of the Powerful and Wealthy." That is the idea that executives, who are top earners in the economy, are essentially setting their own pay. The argument is that CEOs of publicly traded companies can set their own pay because they control boards of directors. In so doing they can expropriate shareholders and other stakeholders. Related to that, there may have been a breakdown of social norms against high pay levels. Jim Piereson outlined the argument that there has been an interaction between taxes and the returns to rent-seeking. If marginal tax rates are low, then the returns to rent-seeking would be higher. Lower tax rates would then provide higher-powered incentives to engage in rent-seeking, which would then tend to increase the earnings of the top 1 percent. Some of these "Rents-of-the-Powerful-and-Wealthy" ideas have recently received a lot of attention in the book of Thomas Piketty, *Capital in the Twenty-First Century.*

In our research, Professor Steven Kaplan and I look at patterns in occupations of the top 1 percent of earners in the economy, and also at individuals who are at the top of the distribution of wealth in the economy. We ask the question: what do the data on the identity of the top earners in the economy imply about theories of income inequality? Do they favor the "It's-the-Market" theories, or do they favor the "Rents-of-the-Powerful-and-Wealthy" theories?

The first category at which we look is CEOs of publicly traded companies. There are two ways to look at CEO pay. One is that you can look at it based on the grant date or ex-ante pay. Ex-ante pay is the compensation that boards are giving CEOs in a financial value

sense when granted, equal to salary + bonus + restricted stock + the value of options when they are granted. Some think of the value of options when they are granted as a sort of expected value of their ultimate worth, although I should emphasize that is not the expected value exactly, but rather the market value of options using a Black-Scholes pricing formula. The ex-ante measure is the most relevant measure for evaluating what boards actually believe they are paying.

Another way to look at CEO pay is through looking at realized pay—in other words, what CEOs actually get. That would be salary + bonus + restricted stock + the value of options exercised or realized. That may be more relevant for evaluating pay for performance because, in this calculation, the options are viewed as being received, and they are valued at the point when they're actually exercised. It's an ex-post measure.

So what has happened to average CEO pay in the United States for publicly traded companies since 2000? Has it gone up? Is it flat? Or has it decreased?

One of the things that inspired us to do this research in the first place was that there seemed to be a generally pervasive notion in the US that average CEO pay has been spinning out of control. This was related to the narrative of CEOs expropriating shareholders or other stakeholders. And indeed, I think that many of you might have heard the popular narrative and believed that CEO pay has gone up. We decided to look at the data.

Figure 2.3 shows what happened. If you look at CEO pay, there was a big increase in the late 1990s, a lot of it related to the value of stock options granted to technology companies. Since 2000, there has not been much change. The graph shows the ex-ante CEO pay, in inflation-adjusted millions of 2012 dollars. These are S&P 500 CEOs. You can see what the average and median pay is for S&P 500 over this time period. The median pay for CEOs is today about the same as it was in 2000. The average, which of course is

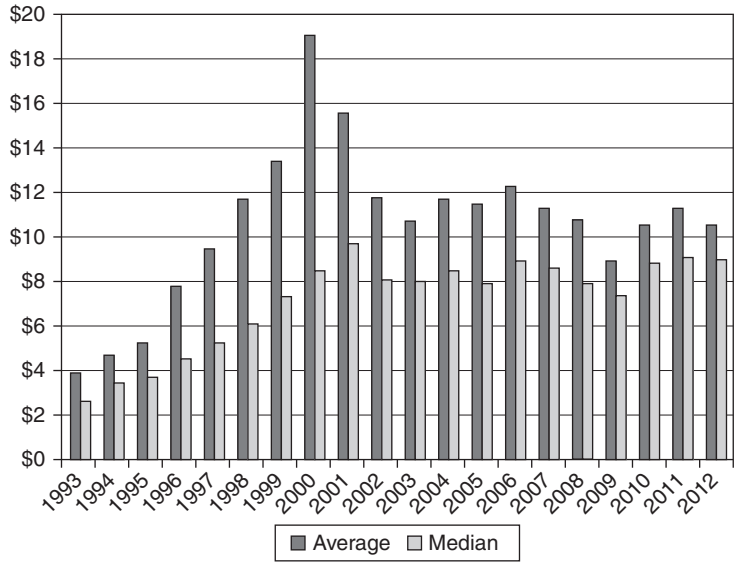

FIGURE 2.3. Ex-ante CEO pay, S&P 500 CEOs in millions of 2012 dollars

Source: ExecuComp and Compustat Index Constituent File, calculations by Steven N. Kaplan and Joshua Rauh

going to be skewed by outliers on the far-right tail, has gone down since that time period. Right now, pay for CEOs looks about the same as it was in the late 1990s.

CEOs in publicly traded companies get a lot of attention. One of the reasons is that the data on what CEOs are paid is easily available from 10-K forms and from disclosures from publicly traded companies. Observers can open the 10-K online and see that the CEO made a hundred times what the average worker in his firm did. But if you look at how CEO pay has changed over time, it has been really quite flat.

In figure 2.4, we look at realized pay. Realized pay is going to be more volatile, and it's going to vary more with the stock market. Of course, CEOs are going to exercise more options when the market

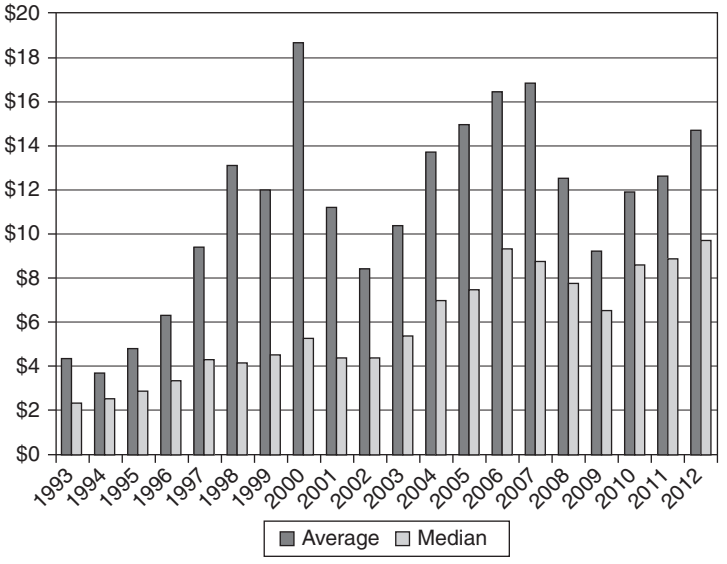

FIGURE 2.4. Realized CEO pay, S&P 500 CEOs in millions of 2012 dollars
Source: ExecuComp and Compustat Index Constituent File, calculations by Steven N. Kaplan and Joshua Rauh

is high. Here things have been more volatile but, again, you don't see an explosion in CEO pay, although median realized CEO pay has increased with the stock market.

Another interesting way to look at CEO pay is relative to the net income of the firm. This has been an area of focus. In figure 2.5, we plot what percentage of the total net income of the S&P 500 is being paid out to the CEO of the firm. CEO pay in 2012 as a fraction of net income looks pretty low relative to the 1990s. The level of CEO pay in 2012 as a share of net income is between 0.5 percent and 1.0 percent, depending on whether we are using ex-ante pay or realized pay including the value of options exercised. This compares to levels of 1.0–1.5 percent in 1997–1999 and 1.5–2.0 percent in 2000–2002.

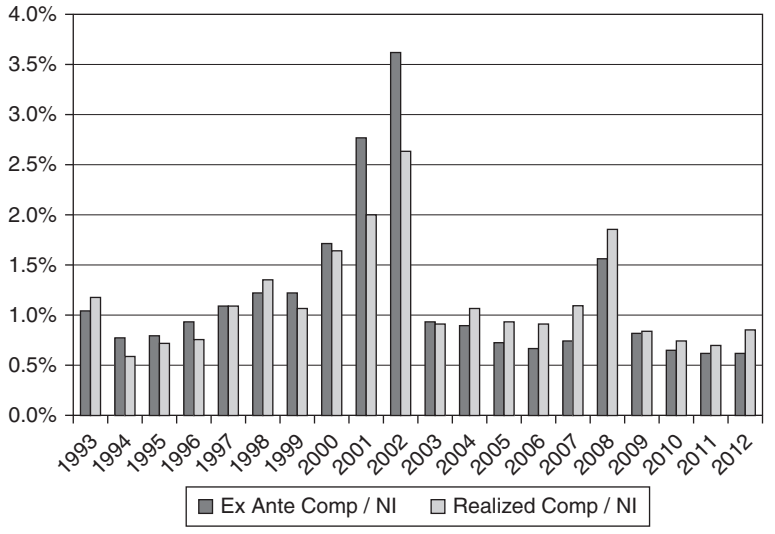

FIGURE 2.5. S&P 500 CEO pay/net income, 1993–2012

Source: ExecuComp, Compustat, calculations by Steven N. Kaplan and Joshua Rauh

How have CEOs done relative to others? There is no question that CEOs are paid a lot relative to the typical household or worker. The question that we wanted to ask is, has their pay increased in an outsized way relative to other high earners in the economy?

When examining the hypothesis that CEOs are expropriating shareholders or other stakeholders, one would want to examine whether the agents in the economy that we believe are most capable of setting their own pay had actually done better relative to others in the economy. Has their pay increased in an outsized way relative to other high earners with less ability to set their own pay? We can study this question by measuring CEO pay as a fraction of the very top IRS income brackets.

What I'm going to show you here is S&P 500 CEO estimated pay versus the adjusted gross income (AGI) of the average taxpayer in the top 0.1 percent, which now is about 140,000 taxpayers.

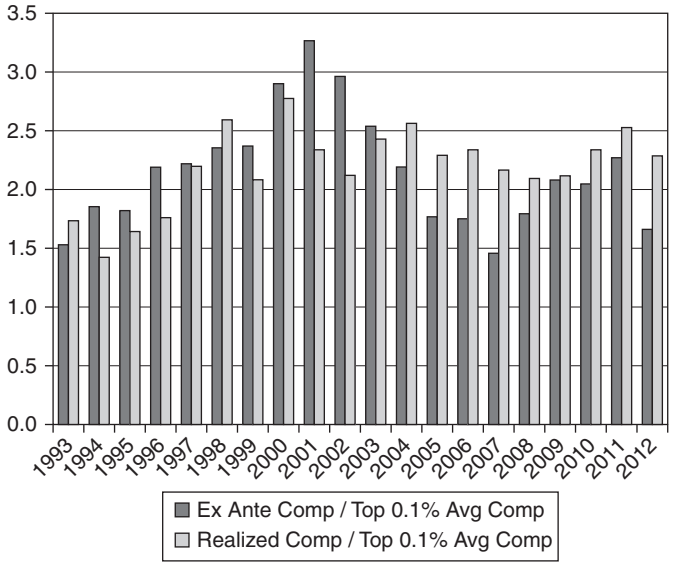

FIGURE 2.6. Ex-Ante S&P 500 CEO relative to average AGI of top 0.1 percent, 1993–2012

Source: ExecuComp, Piketty and Saez data, calculations by Steven N. Kaplan and Joshua Rauh

Figure 2.6 shows that the S&P 500 CEOs are not representing more of this top 0.1 percent of income than they have in the past. There is some up and down that is related probably to the stock market, the timing of when options are granted, and how they are valued. But this is not a graph that is consistent with the notion that CEOs are occupying a lot more of these top income echelons than in the past. If anything, it looks fairly flat.

Under the usual rents story, we would hypothesize that public CEOs would particularly profit because of agency problems related to dispersed ownership. The rents hypothesis is predicated on the ability of CEOs to control their own pay to some extent, rather than be subject to market forces. What do we see? CEO pay has increased along with the rest of the top of the income distribution, but CEOs are no more represented in the top of the income

distribution than they were a couple of decades ago. CEOs in 2010 through 2012 are taking home a smaller share of corporate net income than in most previous years. The broad conclusion here is that the rise in top 1 percent incomes is not a phenomenon that is particular to CEOs of public companies whose shareholders are not disciplining them.

What about private company executives? There is a 2012 working paper by a trio of authors (Jon Bakija, Adam Cole, and Bradley T. Heim) who accessed IRS tax returns and were able to access a coded version at the bottom of the tax return where the occupation is listed of the primary earner. They looked at income of executives and managers of businesses who are more likely to be at publicly traded companies versus private. Now, the data do not provide an actual designation of whether the manager who is filing the personal tax returns works at a public or private firm. They do provide indications of whether the managers are salaried or derive their income from the profits of closely held firms. Bakija et al. are therefore imputing whether the firm is public or private on the basis of whether the filer of the tax returns is indicating that the income comes from salaries or from the business income of closely held firms.

As figure 2.7 shows, sourced from the Bakija et al. paper, the percent of total income from executives, managers, and supervisors in the top 0.1 percent has increased a lot. That percentage has gone from 0.5 percent up to around 2.5 percent. For salaried executives, who are more likely at the publicly traded companies, there is little or no trend.

So the Bakija et al. data show that private-company executives are representing a larger share of the very top income brackets than before. Again, the salaried ones, those would be the ones who would tend to be in publicly traded companies, have been flat.

What can we conclude from this? There have clearly been larger pay increases for executives of private, closely held companies

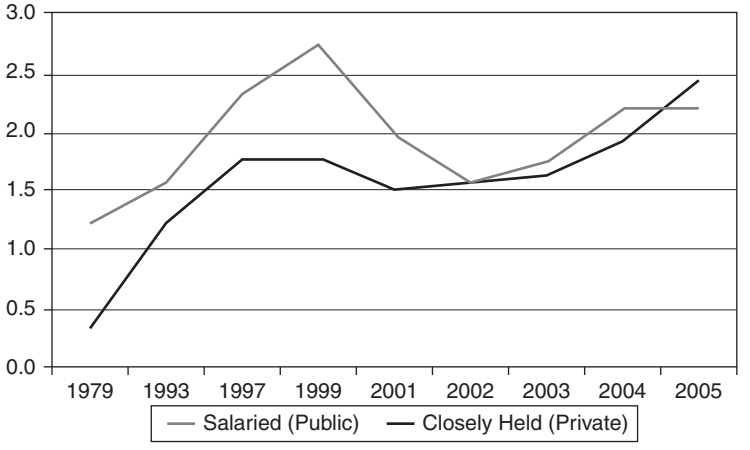

FIGURE 2.7. Percentage of total income from executives, managers, and supervisors in top 0.1 percent

Source: Jon Bakija, Adam Cole, and Bradley T. Heim, "Jobs and Income Growth of Top Earners and the Causes of Changing Income Inequality: Evidence from US Tax Return Data," April 2012, Tables 6 and 7

than for public CEOs. That is not broadly consistent with the rents hypothesis. Theory would say that there are fewer agency problems and fewer managerial power issues at the privately held companies than at the closely held businesses, because the closely held businesses are the ones where the owners are the managers. We don't have a problem of the separation between ownership and control that economic theory tells us drives these agency problems.

Of course, there could also be agency problems in privately held companies. Those would typically be between majority shareholders and minority shareholders. At the end of the day, you have to figure that there is a market that these firms face. They're producing some kind of product. The market is telling them what kinds of profits that they can earn. Unless there's been some kind of drastic increase in market power, it's hard to see how this can be consistent with a rent-seeking hypothesis. In addition, private executives

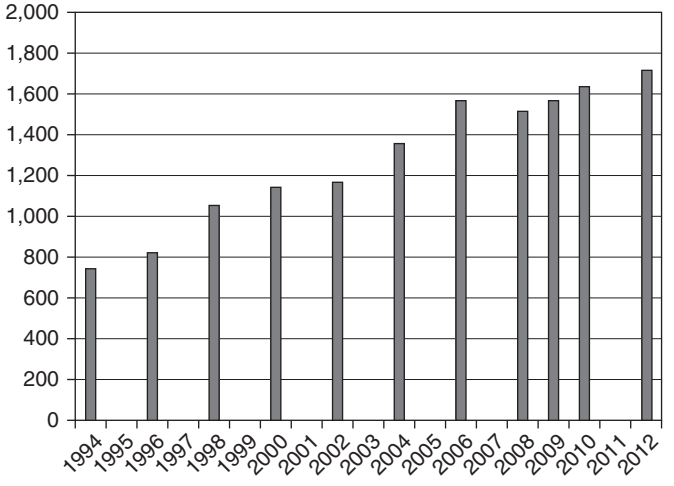

FIGURE 2.8. Average profit per partner at top 50 US law firms, 1994–2012 (in thousands of 2012 dollars)

Source: The American Lawyer magazine, calculations by Kaplan and Rauh

don't have to disclose their pay, but public executives do. So this evidence doesn't really fit the changing social norms story that well, either.

Next, we look at other occupations. If it's not the CEOs, then who is it that's occupying these top income brackets?

The next set of figures I am going to show you considers lawyers at top law firms, another useful comparison group. Since 1994, what has happened to top law partner pay? Figure 2.8 shows average profit per partner at the top fifty law firms. It was around $750,000 in 1994, and around $1.7 million in 2012. This is all in inflation-adjusted dollars. So lawyers have done particularly well. This is a strong and steady increase, in contrast to CEO pay, which has been up and down.

What about lawyers relative to the top 0.1 percent? Figure 2.9 shows that lawyer incomes are countercyclical. If you look at where the local highs in this are, it's during times where the rest of the

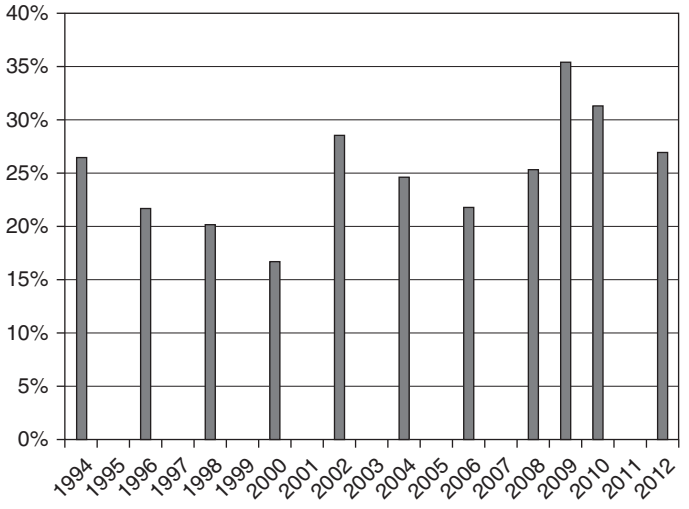

FIGURE 2.9. Average profit/partner at top 50 law firms relative to average AGI of top 0.1%, 1994–2012

Source: The American Lawyer magazine, calculations by Kaplan and Rauh

economy is not doing so well. So, lawyers tend to look really good during a time period when the economy and the stock market are not generating the kinds of returns that they may have been generating in other times. Overall, lawyers' pay has not shown any clear trend relative to the top 0.1 percent, representing around 25 percent in normal times.

So far, we've seen CEO pay as flat relative to the top 1 percent. Lawyers are also basically flat relative to the top 0.1 percent. We have seen that the managers in private companies have increased their representation in the top 0.1 percent. Let's keep going.

What about hedge-fund managers? Figure 2.10 shows the hedge-fund managers, and here we have to use a whole different scale. Here we're doing multiples of pay of the top twenty-five hedge-fund managers in the economy (tabulated by the *Alpha* magazine "rich list"), relative to the sum total ex-ante pay of all 500 S&P 500 CEOs. We're looking at a different magnitude. If you

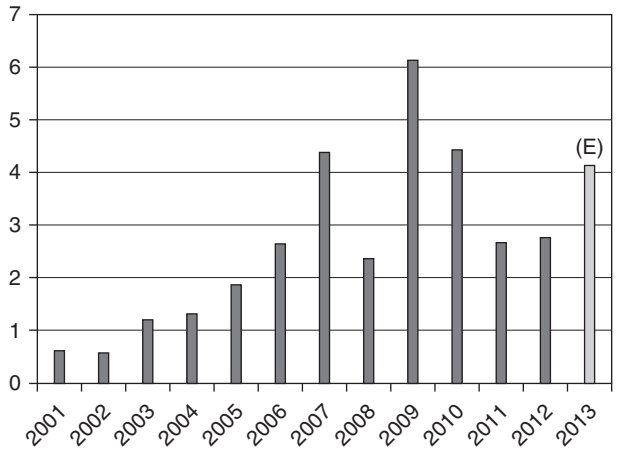

FIGURE 2.10. Multiples of pay of top twenty-five hedge-fund managers to total ex-ante pay of all 500 S&P 500 CEOs

Source: ExecuComp, *Alpha* magazine "rich lists," calculations by Kaplan and Rauh

looked at these data going back to around 2001 or 2002, you have multiples of pay of around a half. So, what that means is that, if you compare the total pay of the top twenty-five hedge-fund managers in 2001 with the total pay of all 500 S&P 500 CEOs in 2001, you would find that the top twenty-five hedge-fund managers were earning about 50 percent of what the top 500 CEOs of publicly traded companies were earning.

Hedge-fund pay went up quite dramatically in the early 2000s. It did so in a partially cyclical way, but it is perhaps more so a volatility phenomenon. By 2007, the top twenty-five hedge-fund managers were earning more than four times total S&P 500 CEO pay. They peak in 2009 at around six times. Hedge-fund managers like volatility. They didn't like 2011 or 2012 as much, where they were earning two or three times what all of the S&P 500 CEOs were earning, still a very high level of pay but smaller compared to surrounding years. In 2013, we don't have the denominator yet, but the estimate is about four times.

The top hedge-fund managers are the individuals who are likely to be at the very top of the pay scale. In fact, every year, there are a few hedge-fund managers who are earning more than $1 billion per year.

What do the hedge-fund manager results say about the theories? That depends on the interpretation of the hedge-fund manager's activities. On the one hand, one might ask whether this finance is a form of rent-seeking. It might be. I'm a finance professor, but I still admit that not all financial market activities are about making markets more efficient. On the other hand, a lot of hedge-fund activity is voluntary purchase of financial services by wealthy individuals who are the clients of hedge-fund managers. A lot of clients are university endowments. A lot of clients are rich individuals. They invest with hedge funds and pay fees because they like the distribution of outcomes that they believe hedge-fund managers are offering them. Many hedge funds offer zero-beta (market-neutral) or negative-beta portfolios. The clients of these hedge funds are willing to pay "two-and-twenty" for these investment opportunities. The investments are voluntary investments by extremely wealthy economic agents, and hedge-fund managers are receiving their fees from the resources of those extremely wealthy agents for providing services that those agents appear to value.

The only place where I would think of the hedge-fund manager as expropriating the general public is possibly in some of the poorer hedge-fund investments that have been made by public-sector pension funds. But that's something that the government is deciding, and over which the government has control.

So one possibility is that the government is making the public better off by investing public resources in hedge funds, which provide a desirable distribution of investment outcomes. The other possibility is that they're making the public worse off and are at fault for investing money with managers who are not creating value.

The bottom line is that it's hard to see how there's a direct chain of expropriation by hedge-fund managers in which hedge-fund managers expropriate the general public. The only way that could happen is via some kind of action that the government takes by having public-sector pension funds invest in poorly performing hedge funds.

Professor Kaplan and I also looked at professional athletes. I haven't updated this as recently. The data in figure 2.11 go through 2011. Top professional athletes have also seen their pay go up by a great deal. Depending on which team you're a fan of, you might perhaps view LeBron James as expropriating the general public through his basketball-playing. But the fact that his salary is so high is the result of a market for his talent, not a financial expropriation. Why is it that professional baseball, basketball, and football players earn so much more money now than they did twenty years ago? That is most likely related to what the market is willing to pay for their talent.

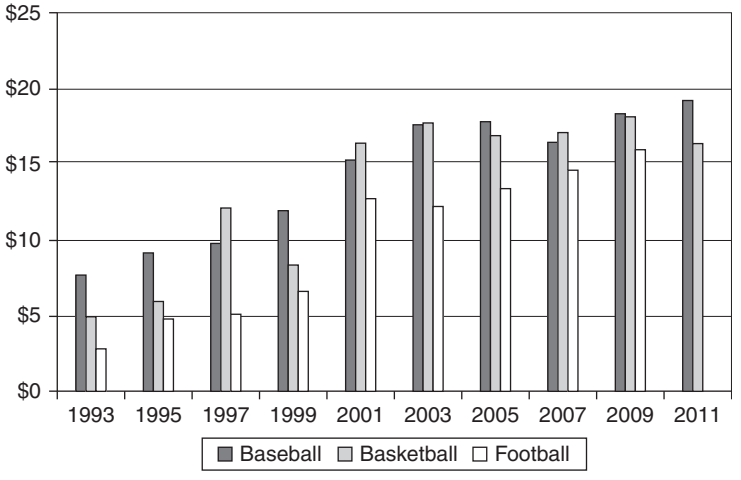

FIGURE 2.11. Average top twenty-five salaries in professional baseball, basketball, and football (in millions of 2010 dollars)

Source: Steven N. Kaplan and Joshua Rauh

So in sports, as in other occupations, there isn't really a sense in which managerial power is influencing top pay here. The overall point is that the pay increases have been really pervasive at the top. We think the evidence is consistent with scale and superstars effects. We think that's evidence that it's consistent with skill-biased technological change where you have executives, investors, lawyers, athletes, and other talented people in the economy who can apply their talent over larger companies, larger asset pools, and larger audiences than ever before. There's clearly an element of globalization that contributes as well, as that contributes to making the markets that talented individuals can reach much larger. Overall, we find the evidence on the occupations consistent with "It's-the-Market" and not with the "Rents-of-the-Powerful" hypothesis.

The other set of analyses on which we've been working to shed light on the various income inequality theories looks at wealth-generating activities of the Forbes lists. So, we examine the top 400 wealthiest individuals in the US. We have done this over four samples: 1982, 1992, 2001, and 2011. These were the years for which we have the data. We're working on filling in the intermittent years. We also have Forbes lists of global billionaires from 1987, 1992, 2001, and 2012.

There are four main questions that we address. First, of the top 400 wealthiest individuals in the United States, did they own first-generation businesses or inherited businesses? Second, did the individuals grow up wealthy or not? Third, were they well-educated? And fourth, what industries were they in?

What we're trying to get is the question of how much wealth of the super-wealthy is inherited or generated by the capital of their parents, and how much is generated by their own work, ingenuity, or innovation. Figure 2.12 examines the generation of wealth-creating businesses in the Forbes 400. On the bottom axis are the generation numbers. So, for example, Facebook, a first-

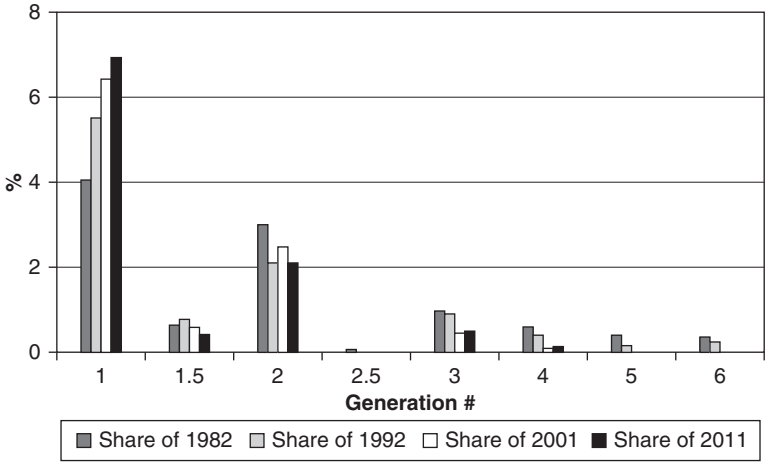

FIGURE 2.12. Generation of wealth-creating business in Forbes 400: more self-made, less inheritance

Source: Steven N. Kaplan and Joshua Rauh

generation business, would be given a one. A two is a business that was founded by the member of the Forbes 400's mother or father. A three would be a business that was founded by a member of the Forbes 400's grandmother or grandfather. What is one and a half? A half is where you could argue that the parent founded the business, but the member of the Forbes 400 grew the business dramatically.

The different shaded bars show, over the different samples of the different time periods, what the generation was. So, in the Forbes 400 in 1982, first-generation businesses made up 40 percent of the list. By the 2011 Forbes 400, it was around 65 percent to 70 percent. That means that more businesses in the Forbes 400 were self-made, first-generation businesses. What are the categories where it decreased? Second generation, third generation, and fourth generation all decreased. There are no fifth and sixth generations in the later Forbes 400 years, whereas in the 1982 lists, some of the super-wealthy were still deriving their wealth from businesses that had

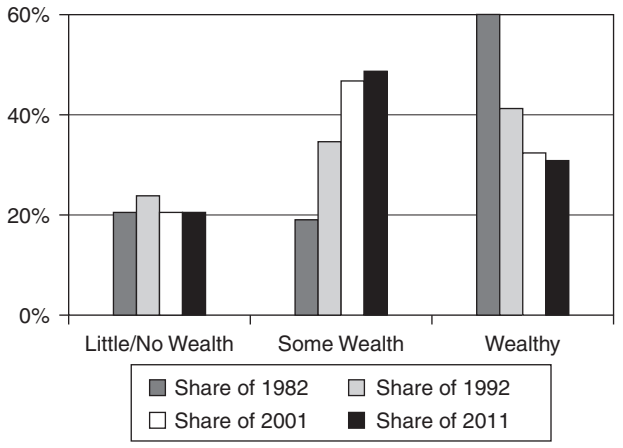

FIGURE 2.13. Did US Forbes 400 grow up wealthy?
Source: Steven N. Kaplan and Joshua Rauh

been started by Rockefellers and Vanderbilts. Those Rockefellers and Vanderbilts were still in the Forbes 400 in 1982, but they're not there today. We interpret that as meaning that inheritance is becoming less important in determining top wealth levels.

What about whether they grew up wealthy? Figure 2.13 shows the US Forbes 400 and whether they grew up wealthy. The categories we collected were: little or no wealth, some wealth, or wealthy. So Bill Gates grew up with some wealth. His father was a lawyer, not a rich businessman. That gives you the idea of what we're trying to do here. Obviously, the Rockefellers, they grew up wealthy. So, we collected information about their family history and assessed whether they grew up wealthy.

What we find is that the Forbes 400 is basically flat in terms of the percentage over time who grew up with little or no wealth. Some wealth is the category that went up from 20 percent to around 45 percent to 50 percent. Growing up wealthy became much less important. So, it is true that the Forbes 400 grew up in what I would describe as upper-middle-class backgrounds. The children

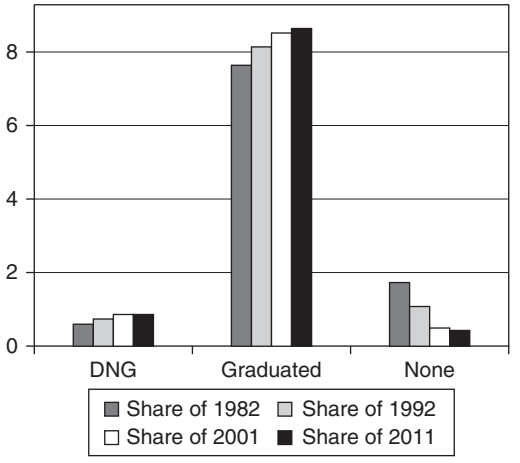

FIGURE 2.14. Higher education of Forbes 400
Source: Steven N. Kaplan and Joshua Rauh

of upper-middle-class people make up a much greater portion of the Forbes 400 in the later years than they did in the early '80s.

And then, what about education? Well, that's kind of a no-brainer. Education is more important. Figure 2.14 shows three categories: went to college but did not graduate, graduated from college, or had no education. No education, which was always a small portion, has gone down. Graduated from college was always a large portion, but it's gone up. Education has become even more important. So, that's not going to be surprising to many in this room.

We also looked at the industries. From what industries are the Forbes 400 making their money? Not surprisingly, technology—and especially computer technology—was a very big category. Another category that has seen strong growth and represents a full 15 percent of the 2011 Forbes 400 is retail and restaurants. We also view this as being consistent with scaling. Consider the founders of companies like Wal-Mart. A lot of what they're able to do is the result of being able to scale up operations in a massive way.

TABLE 2.1. Industries of US Forbes 400

	1982	1992	2001	2011	A(11-82)
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/LBO	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: Steven N. Kaplan and Joshua Rauh

What industries have declined in their representation among the Forbes 400? Energy has actually gone down. So, companies that are endowed with natural resources and selling energy do not represent nearly as much of the Forbes 400 as they did before. In 1982, energy was 21 percent; 2011 is around 10 percent. Some of that drop is the result of the grandchildren of the energy titans dropping out of the Forbes 400 sample in more recent years.

Finance is also very important. Hedge-fund managers were basically zero in 1982. In 2011, they're now 7.5 percent of the Forbes 400. That came at the expense of real estate, which has gone down.

The conclusion is that extensive family wealth and inheritance have become less important, while access to education has become more important. There are very few people in the top 400 now without any college education. What about industry evidence? The premium for technological skill is continuing to rise at the very top. Retail, technology, and finance are increasing. Real estate and energy are decreasing. We interpret that as being consistent with the idea that skilled individuals are applying talent to larger blocks

of capital. That's also related to finance. Finance is up from 4.5 percent in 1982 to 20 percent in 2011 of the Forbes 400. Also, in terms of the timing—except for finance—a lot of these changes occurred by 2001.

Finally, we also looked outside of the United States and examined the Forbes global billionaire lists. We found that the share of global billionaires who are first-generation also rose by a similar amount abroad as in the US. The technology component became more important globally, but its rise was not as strong as in the US. In stark contrast to the US, the category that gained the most globally in producing the billionaires is mining, metals, and energy. We believe that what's going on there is something about the initial allocation of property rights in developing countries. So that is one divergence between the global story and the US story, although the technology component is very important globally. (As an aside, I would note that many of the people in the Forbes 400 US list actually weren't born in the US.)

Figure 2.15 shows that the non-US billionaires were much more likely to grow up with little or no wealth than the US billionaires.

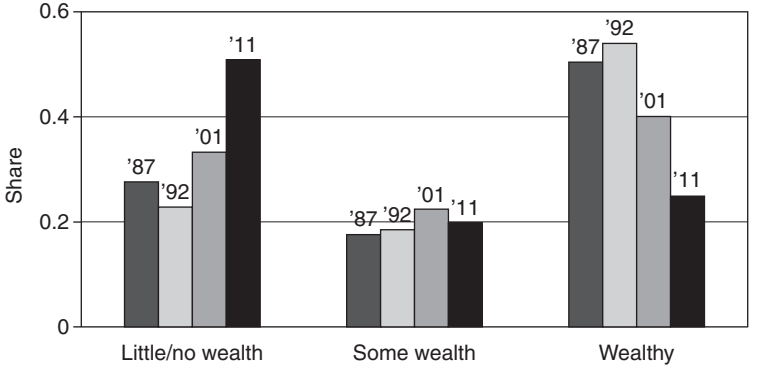

FIGURE 2.15. Outside the US: Sharpest difference between wealthiest individuals in United States and around the world?

Source: Who's Who and Internet searches

Remember that for the US super-wealthy, the category that grew was "some wealth." Both in the US and across the world, the rich are less likely than before to have grown up wealthy. In terms of the global billionaires, they are actually more likely to have grown up with little or no wealth, both in comparison to the US and in comparison to the way global wealth was generated thirty years ago.

So to conclude, those are the facts that I wanted to present. We're interpreting the facts and asking with which model are they the most consistent. Our interpretation is that the main drivers of increased income inequality in the US are technological change, increased scale, and their interaction. In sum: "It's the Market." That also has a very important educational component. Globalization may have contributed as well. Most changes occurred before 2000, and there hasn't been a recent acceleration of trends in a lot of these categories. Also, in the developing world, clearly there's something going on with the reallocation of property rights. Although again, there are a lot more people in the world at large who are billionaires now who grew up with little or no wealth.

Question and Answer

QUESTION: *It seems like your research showed that the returns to skill have exploded since the 1980s. I know that you haven't looked at the time period previous to that, but what's your explanation for why that changed in the 1980s—if indeed it did change—where the returns have gone up so drastically compared to the previous decades?*

RAUH: I think that it's a mix of things. We're not able to disentangle all of them. Two major factors come to mind. First of all, skill-biased technological change and the fact that the demand for skilled labor relative to the supply of skilled labor has taken off since the 1980s. Second is the massive scale of the

impact that computers and information technology have had since the 1980s, which allows talent to multiply across a much larger scale.

QUESTION: *It looks like the only smoking gun in your evidence is the hedge-fund guys. If you sort of look through the data, everything else is clean. Everybody else is the market, but the two-and-twenty always struck me as hard to understand as an equilibrium configuration, especially given the data that you and your other finance colleagues present to us on how ineffective money managers are at actually raising rates of return. So, I'm wondering whether you see this as either sort of a temporary phenomenon, a temporary anomaly, or whether there's something having to do with selection in the way that you're just looking at the top guys, and that just tends to be a more skewed distribution, and maybe we should be looking at something else.*

RAUH: Well, that is a very interesting question. To answer it, we have to look at who are the main investors in hedge funds. It's public-sector pension funds, university endowments, and wealthy individuals. Essentially, hedge funds are earning two-and-twenty off of these investors who have been willing to invest their money with hedge funds despite these apparently generous compensation contracts.

Now, I am sure that you've seen the news that the California Public Employees' Retirement System (CalPERS) is pulling out of hedge funds entirely, with plans to divest $4 billion of hedge-fund positions. And one of the reasons that hedge funds have come under fire lately, at CalPERS and elsewhere, is that if you had followed the John Bogle approach over the past five years and just invested in the stock market, you'd have made phenomenal returns since the financial crisis.

Recent history is leading to a backlash. Some hedge funds are investing in strategies that are not correlated with the market

and that will do very well in tail events, but not when the market is climbing. Some of them did very well in 2009. Other hedge funds are probably just investing in assets that basically have betas equal to one or more, and are collecting two-and-twenty for making those investments.

I think that there's probably going to be some refinement of the industry. CalPERS has apparently decided that it's not worth it for them. Perhaps they have come under political pressure, and people say, "Look how well the public markets have done. Why didn't you do this well in hedge funds?" Some observers have not been doing any kind of beta correction or asking in what kinds of market environments hedge funds are supposed to be doing well.

So, yes, the willingness of wealthy individuals and of wealthy institutions to pay two-and-twenty is something of a puzzle, and is a big piece of the top if you look at the top 0.1 percent. Hedge-fund people are highly represented there.

QUESTION: *On one of your early slides, you put a comparison. As I recall, it had calendar years on the horizontal axis of your ex-ante estimate of pay, basically including the Black-Scholes value of options, or the current value of restricted stock, even though it's restricted and realized. As I recall, it showed that the ex-ante estimates were usually quite a bit higher than the ex-post estimates. Now, as I understand it, they're not really referring to the same granting of grants. Have you ever tried to look at going back a few years [at] what actually happened and at how you would compare the ex-ante with the ex-post? What goes on in the market and [with] the individual stock, the implied volatility and the formula? I think that that would be interesting as well.*

RAUH: You're exactly right. In terms of the timing, the ex-ante is measured using Black-Scholes. It's the market value as the date the options were granted. The ex-post is the realized value

when they were exercised. And so that does affect the time patterns. We could try to decompose these differences into how much of the difference is due to timing and how much is due to valuation.

QUESTION: *In terms of technological change, I guess that you usually tend to think of technology like the production function, but I was wondering if you could comment on the extent to which you think that some of the key technological changes about which you're thinking are like the market technology, whether it's improvements in the capital market or improvement in the market for control or franchising. All of these things seem to be really tightly related, not just to traditional production-function type of technologies, but to market technologies. In some sense, improvement of the market may play a role in some of the things that you're seeing and looking at here.*

RAUH: As a finance guy, I think a lot about financial market technologies, which in some ways have gotten more efficient and allow managers to manage much larger pools of capital than they could have in the past. Of course, there have been more controversial innovations in market technology like high-frequency trading. That has earned a lot of money for some people, though it's not clear what the value of that actually is. I think that it's a very useful distinction, and even though we've been working on this for a while, I still feel like we're at that very beginning of understanding why it is that we see these changes as being so broad-based and what kinds of changes in technology are actually driving it.

QUESTION: *Have you looked at the relationship between top pay in a corporation and the pay of people who are close, but not at the top? That is, the top pay is public. It does create some restriction, I think. But sometimes, and I've observed in some cases, you have to get the top guy to get his pay up in order to allow people below*

him to get their pay up. So, there's a push. Have you explored that or run into that?

RAUH: We worked on this a little bit. We tried to do some exercises where we know the total compensation for firms. We know what the top managers earn. We tried to do some modeling of what we think. What are various possibilities for the distribution of pay of the managers below the top five in a publicly traded company? We parameterized it in different ways. Ultimately we couldn't really find a big impact of managers below the top five in the company on these types of very top quintile statistics, even looking at a range of possible intra-firm distributions of pay. The study that I mentioned that uses IRS data also makes progress on that as well because they measure whether an executive is salaried or whether they're part of a closely held corporation. There you see the salaried share of the top 0.1 percent going down. That includes all salaried, and not just salaried whose pay is observable in ExecuComp among the top five executives. And so, that also suggests that, when it comes to the corporate managers, they're not really the driving force behind the story.

QUESTION: *On hedge funds, the first comment to make is that two-and-twenty is the rack rate in a hedge fund. There's a limited amount of publication and especially of hedge-fund contracts with public pensions like the state of New Jersey. You'll find that they get a rather better deal, so you have to be a little bit careful about that. But the research on returns to hedge funds, to my knowledge, doesn't reject the possibility that these guys are actually earning what they're taking from it in the sense that, if you look at what hedge funds deliver to their limited partners, the returns are within striking distance at least of the risk-adjusted benchmark. Now, on this question of the disclosure of publicly traded executives, AIG had this very clever idea. They created a privately*

held, independent corporation that hired all of the executives, and then they wrote a service contract with AIG. So far as I know, no other publicly traded company has copied that. The fact that they haven't copied it, and that AIG got away with it, suggests that maybe there isn't rent-seeking. It supports your theory, I think, that it's the market.

RAUH: I guess that I would just add to your comment about hedge funds that if indeed what hedge funds are providing are very good returns during very bad and very volatile states of the world, then they are providing a valuable service that investors want. Investors are willing to invest in them because it expands the investable space for them. In reality, of course, there's a wide range of strategies that the hedge funds are pursuing. So, some of them are doing that, and some of them may be doing other things.

QUESTION: *One of the nice things about being able to test these two different theories is in principle it helps you to figure out what kind of policy is appropriate. But within the "It's the Market," there's a bunch of different things going on: globalization, skill-biased technological change, etc. It seems to me that we need to know a little bit more about which of those are driving this in order to think about the policy implications, but maybe not. Maybe there are some already about which you can speculate.*

RAUH: Well, I agree. There are going to be some areas where information technology is very clearly playing a role in skill-biased technological change, and others where globalization and access to large pools of capital are more important. I think that we could probably do some decomposition of that based on what we've done before, but more research is going to be needed for that.

QUESTION: *I just wanted to go back to hedge funds for a second. One important point is that it's never the same hedge-fund*

manager in the top year after year. The "twenty part" means the guy who got lucky. We all know that the persistence there is very small. Whereas with the CEO, you get to be in that top for four or five years in a row. I think that that may be pushing a lot of it. On the fees, I asked a hedge-fund manager who is a friend of mine to defend his crazy fees. His answer was that we give you something like momentum, which you don't know how to trade, and the two-and-twenty of highly leveraged portfolio is like 2 percent off of the top of a long-only portfolio. That was his defense of the fees. I'm not sure if it's a good defense, but as you point out, it's all of our endowments investing in them.

RAUH: There is actually a good deal of persistence within the list of the highest-earning hedge-fund managers. It's not as much as in the CEOs, that's true, but there is a good deal of persistence, due to the growth in the amount of capital the most successful hedge-fund managers have under management. You certainly have the John Paulsons of the world who made one great bet in 2009, and then a worse one in 2010, and so if it were just about one-year performance he'd be off the list in 2010. But it is not just about one-year performance, because of the management fee.

QUESTION: *I don't know how closely you looked at the international data, but the interesting thing to me was how few people were in the wealthy category to start. Between 1982 and the present, there's been gigantic change in China. I don't know if you've looked very closely at the geographic thing. Also, one could argue, and this may be anecdotal, that gigantic change has occurred in Russia, too, with oligarchs. Have you had a chance to look at countries and at what's going on there?*

RAUH: Yes, we can do some decomposition. However, for these global billionaires the data set is not that big. This cutoff at a

billion is a bit of a challenge for us. Many of the factors you mention could be operating simultaneously. Note that some of the oligarchs did not exactly grow up wealthy either. They may have grown up powerful or as parts of powerful families, but they had opportunities to grab property rights when they were available. In China, in contrast, there are some who are very much self-made capitalists. Those are very distinct stories.