The NBER Digest

NATIONAL BUREAU OF ECONOMIC RESEARCH

www.nber.org

February 1998

IN THIS ISSUE

CEO Pay is Linked to Firm Performance Via Stock Options

The exploding use of stock options to compensate executives has increased CEO pay significantly. But the justification that CEOs and corporate boards most often give for generous stock options—that they effectively link pay to performance—is often scoffed at. And in years of academic research, study after study has shown little relationship between CEO compensation and corporate performance.

In **Are CEOs Really Paid Like Bureaucrats?** (NBER Working Paper No. 6213), however, NBER Faculty Research Fellows **Brian Hall** and **Jeffrey Liebman** point out that times have changed. Using data from large U.S. corporations from 1980 to 1994, they show that CEO pay has become much more sensitive to corporate performance than it once was. And they credit stock options for this change.

Hall and Liebman show that, when one accounts for revaluations of stock and stock options, CEO pay often changes by millions of dollars for only modest changes in firm performance. Moreover, they estimate that the responsiveness of CEO compensation to firm value — that is, the percentage change in compensation from the prior year divided by the percentage change in firm value—more than tripled from 1980 to 1994, rising from 1.2 to 3.9. The elasticity of salary-plus-bonus (with stock and options excluded) to firm value was much lower, although it had increased from 0.13 in the early 1980s to 0.24 in the late 1980s and early 1990s. Hall and Liebman argue that the "pay-to-performance sensitivities from changes in salary and bonus are swamped by sensitivity generated by changes in the value of stock and stock options."

From 1982 to 1994, CEO pay rose sharply—a median real increase of 120 percent—outpacing that of average workers (who had a real increase of about 7 percent) and even of other groups of highly paid Americans. Only professional athletes did better. But the large increase in median CEO pay masks the risk of large, year-to-year variations in pay. For example, in 1994, a mediocre year for the stock market, almost a quarter of the CEOs in the survey actually lost money as the value of their company stock holdings declined.

> "The responsiveness of CEO compensation to firm value—that is, the percentage change in compensation from the prior year divided by the percentage change in firm value—more than tripled from 1980 to 1994, rising from 1.2 to 3.9."

Hall and Liebman do not claim that current pay-to-performance sensitivity is sufficiently high. Also, they point out that stock options often reward (or punish) a CEO for market-wide or industry-wide gains

NBER Working Papers On-Line

A complete list of all NBER Working Papers with searchable abstracts, and the full texts of Working Papers (issued since September 1994) are available at **http://www.nber.org/wwp.html** to anyone located at a university or other organization that subscribes to the (hard copy) Working Paper series.

If you believe that your organization subscribes, but you cannot access the on-line Working Paper service, please e-mail the NBER at **wwp@nber.org** for more information and assistance.

(or losses), rather than for the performance of the CEO's corporation relative to other corporations. But, they argue, "Our findings do contradict the claim that CEO contracts are wildly inefficient because there is no correlation between performance and pay..." —Justin Fox

Juvenile Crime Rates are Related to Punishment

A walk around the streets of New York, Houston, Los Angeles, and just about any other major city confirms what the headlines tell us: crime is down. Yet the overall good news on crime is marred by a soaring juvenile crime rate. For instance, the rate at which juveniles were arrested for murder rose 177 percent between 1978 and 1993 even as the murder arrest rate for adults dropped by 7 percent. Over the same time span, the violent crime arrest figure for juveniles jumped by 79 percent while the comparable adult figure rose by only 31 percent. Juvenile violence, much of it senseless and brutal, has led to such fearsome explanations as the "super-predator" theory—that an amoral and ruthless generation of adolescents is behind the crime spree.

But NBER Faculty Research Fellow **Steven Levitt** carefully challenges such notions in **Juvenile Crime and Punishment** (NBER Working Paper No. 6191). He asks whether the striking divergence between the adult and juvenile crime rates is a rational response by teenagers to the likelihood and severity of punishment. For instance, by at least one crude measure (the ratio of adult state and federal prisoners per violent crime committed in that year compared to the corresponding ratio for juveniles), criminal sanctions against youngsters were comparable to those for adults in 1978. But they were only half as severe by 1993. Levitt finds that changes in relative punishments could account for 60 percent of the differential growth rate in juvenile and adult violent crime between 1978 and 1993.

> "...changes in relative punishments could account for 60 percent of the differential growth rate in juvenile and adult violent crime between 1978 and 1993."

A number of important results emerge in his wide-ranging paper. For instance, state level data strongly suggest that lower rates of juvenile crime are associated with stiffer punishments. Here's one indication: violent crime in groups reaching the age of majority fell by nearly 4 percent in those states where the juvenile courts were most lenient compared to the adult courts. In sharp contrast, states that were relatively harsh with juvenile offenders vis-a-vis adults saw a 23 percent surge in violent crime with the passage into adulthood.

Does the severity of juvenile punishment have any implications for the likelihood of committing crime as an adult? Levitt does not unearth a convincing connection between the punitiveness of juvenile justice and later criminal involvement. It may be that the message that crime does not pay is roughly offset by the stigmatizing effects of confinement, he speculates.

It's hard not to conclude after reading Levitt's paper that stiff sanctions will do the job when it comes to combating youth crime. But Levitt is careful to emphasize that his analysis does not suggest a clear public policy response—more needs to be known about what works and what doesn't among the different kinds of juvenile treatment programs. —Chris Farrell

Women's Place in Home and Labor Market Has Improved

American women have made "substantial progress" toward gender equality over the past 25 years, according to NBER Research Associate **Francine Blau,** although wage inequality among women has been rising, just as it has among men. After examining dozens of indicators of the well-being of women in the labor market and in the family, Blau finds smaller differences now between the percentage of women and men who are working for pay; that women now remain in the labor market more consistently during their work lives; and that differences between men and women in occupations, types of education, and rates of self-employment have diminished.

The wage gap between women and men also has narrowed substantially: the average female worker earned 56 percent of the average male worker's wage in 1969 and 72 percent in 1994. Within the family, wages of wives rose relative to those of their husbands during the past 25 years. Perhaps as a consequence, husbands did a small but notably greater amount of housework. Women's wage gains relative to men appear to have been distributed widely across education levels. Women's average real wages increased 31 percent from 1969 to 1994, while men's stagnated. Similarly, women upgraded their major occupations between 1979 and 1988: that is, women moved into higher paying occupational categories. On net, men's occupational shifts left their real wages unchanged, rising only 3 percent in 25 years.

In **Trends in the Well-Being of American Women, 1970–1995** (NBER Working Paper No. 6206), Blau further notes that all this progress does not mean that discrimination and gender-related disabilities affecting women have disappeared. "...the challenges of combining work and family appear to continue to pose serious obstacles and dilemmas for women but, at this point, do not seem to affect men in the same way or at least to the same extent," she writes. Moreover, the increase in families headed by single women has hurt the economic well-being of women and their dependent children. This has been concentrated especially among women with less than 12 years of education and among black women.

"Women's average real wages increased 31 percent from 1969 to 1994, while men's stagnated."

More generally, parallel to the recent decline in the labor market position of lower skilled men, there has been a deterioration in the economic status of less educated women. Female high school dropouts experienced real wage declines in the 1980s and early 1990s. While women at all skill levels upgraded their occupations, women with low or moderate skills lost union jobs, although at a slower pace than men. Their representation in higher paying industries also fell at about the same rate as that of men.

In addition, less educated women are more likely to be single mothers than more educated women. The availability of welfare does not seem to account for the large number of single mothers in the United States, Blau finds. This country has lower levels of support for single mothers than other industrialized countries, yet it has one of the highest rates of single motherhood and the highest rate of teen pregnancy. Nor do other economic factors offer a complete explanation for the growth in the number of female-headed families, although there is some evidence that the deteriorating labor market position of less skilled men and women plays a part. Blau concludes that a principal role in this trend must be assigned to "changes in behavioral responses and shifts in social attitudes." There is now less social condemnation of unwed mothers, and divorce is easier.

—David R. Francis

Benefits of R and D Spill Over to Trading Partners

One industry's investment in research and development (R and D) enhances more than just its own productivity. It can also generate a measurable economic rippling effect that stimulates productivity gains both at home and, most noticeably, abroad. In **Trade and the Transmission of Technology** (NBER Working Paper No. 6113), **Wolfgang Kelle**r shows how one industry's investment in R and D has the potential to spark near-identical efficiency gains in the industrial counterparts of its foreign trading partners. Meanwhile, domestically, the positive effects of that initial R and D can also spread to other industrial sectors, causing noticeable boosts in productivity.

Keller examines R and D spending, trade flows, and productivity gains between 1970 and 1991 for a range of manufacturing industries in eight of the world's leading industrialized countries. (The group includes all of the G-7 nations, plus Sweden.) He first confirms that

"R and D expenditures are positively related to productivity levels." He then goes on to conclude that the R and D spending by an industry in one country can benefit the same industry in another country, almost as much as if it had made the investment itself.

"We find that the benefit derived from foreign R and D in the same industry is in the order of 50–95 percent of the productivity effect of its own R and D," Keller states. "These results are consistent with international trade being an important transmittent of foreign technology in the same industry."

> "We find that the benefit derived from foreign R and D in the same industry is in the order of 50–95 percent of the productivity effect of its own R and D."

Keller also determines that, domestically, the R and D benefits from one industry can spillover into other sectors (mainly, as they provide other industries with technologically superior "intermediate goods"). He estimates that, overall, R and D conducted outside a given industry is "one-fifth to one-half as effective in raising productivity" as the R and D investments within the industry. This means that "industries benefit generally more from foreign technology creation in the same industry than from domestic technology creation in other industries."

—Matthew Davis

NBER

The National Bureau of Economic Research is a private nonprofit research organization founded in 1920 and devoted to objective quantitative analysis of the American economy. Its officers are:

Martin Feldstein—President and Chief Executive Officer
Sam Parker—Director of Finance and Corporate Secretary
John H. Biggs—Chairman
Carl F. Christ—Vice Chairman
Gerald A. Polansky—Treasurer

Contributions to the National Bureau are tax deductible. Inquiries concerning the contributions may be addressed to Martin Feldstein, President, NBER, 1050 Massachusetts Avenue, Cambridge, MA 02138-5398.

The **NBER Digest** *summarizes selected Working Papers recently produced as part of the Bureau's program of research. Working Papers are intended to make preliminary research results available to economists in the hope of encouraging discussion and suggestions for revision. The* **Digest** *is issued for similar informational purposes and to stimulate discussion of Working Papers before their final publication. Neither the Working Papers nor the* **Digest** *has been reviewed by the Board of Directors of the NBER.*

Preparation of the **Digest** *is under the supervision of Donna Zerwitz, Director of Public Information.*

Abstracts of all current NBER Working Papers appear in the **NBER Reporter.** *Individual copies of the NBER Working Papers summarized here (and others) are available free of charge to Corporate Associates.* ***For all others, there is a charge of $5.00 per paper requested. Outside of the United States, add $10.00 per order for postage and handling. Advance payment is required on all orders. MasterCard and Visa are accepted. Please do not send cash.*** *To order, call the Publications Department at (617) 868-3900. Please have the Working Paper Number(s) ready.*

Subscriptions *to the full NBER Working Paper series include all 300 or more papers published each year. Subscriptions are free to Corporate Associates. For others within the United States, the standard rate for a full subscription is $1480; for academic libraries and faculty members, $750. Higher rates apply for foreign orders.*

Partial Working Paper subscriptions, *delineated by program, are also available. For further information, see our Web site, or please write: National Bureau of Economic Research, 1050 Massachusetts Avenue, Cambridge, MA 02138-5398.*

Requests for **Digest** *subscriptions, changes of address, and cancellations should be sent to* **Digest,** *NBER, 1050 Massachusetts Avenue, Cambridge, MA 02138-5398. Please include the current mailing label.*