Incentives to R&D Directors Improve Corporate R&D Performance

Many American corporations downsized their centralized corporate research facilities in the late 1980s. They also changed their compensation schemes to rely more heavily on plans tied to corporate performance. But substantial segments of the scientific establishment were unhappy with these shifts—in 1992, the National Science Board went so far as to state that such changes to centralized research facilities put “the needs of today’s customers’ ahead of longer-run objectives.” In Innovation and Incentives: Evidence From Corporate R&D (NBER Working Paper No. 11944), co-authors Josh Lerner and Julie Wulf find that the opposite is more likely true: in firms that give their head of corporate R&D firm-wide authority over R&D decisions, “more long-term incentives are associated with more highly cited patents,” patents of greater originality, and “more frequent awards.”

These results emerge from a confidential compensation survey of 300 publicly traded U.S. firms for the years 1987 to 1998. The firms in the sample were large, with average annual sales of 11 billion U.S. dollars, and were active in a number of industries. Treating the structure of each firm in each year as a single observation, the authors find that the companies had centralized R&D heads in 63 percent of the firm-years surveyed. In 48 percent of the firm-years, the head of R&D reported directly to the CEO.

In inflation-adjusted 1996 dollars, the average salary-plus-bonus for corporate heads of R&D rose from an average of $353,661 in 1988 to $480,092 in 1998. The ratio of long-term incentive pay—pay in the form of instruments like restricted stock and options grants—to salary rose from 0.39 to 0.87 over the same time period. The short-term incentive ratio—that is, the ratio of bonus to salary—rose from 0.28 to 0.34. For corporate CEOs, in contrast, long-term incentives as a fraction of salary rose from 0.64 to 1.68. Chief Financial Officers saw long-term incentives rise from 0.49 of salary to 1.29 of salary; human resources heads saw their long-term compensation rise from 0.355 to 0.80 of salary.

After allowing for differences in firm sales, the ratio of R&D spending to sales, and the year of observation, it turns out that high-powered incentives apparently increase both research quality and research output. Long-term incentives are associated with more heavily cited patents. They are also associated with more frequent awards and more original patents. Overall, pay also matters. Increasing “total compensation from the 25th percentile ($344,400) to the 75th percentile ($764,309) was also associated with an increase of 0.8 in mean citations for the firm.” These results hold only for firms with centralized research. Higher compensation for the head of R&D also increased patent awards in firms

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with decentralized research structures, but there was no obvious relationship between long-term incentives and innovation.

Although this paper fails to find any deleterious effects of the change in compensation for heads of corporate R&D, the authors note that, “it is by no means clear that our measures can capture shifts in truly groundbreaking research.” If profound changes in corporate research patterns have occurred, their effects may not be observable for several decades.

The authors measure innovation with patent data drawn from the NBER Patent Citations Database, publication data drawn from Thomson-ISI’s Web of Science, and compensation data from Hewitt Associates. The data on financial performance come from Compustat and CRSP.

— Linda Gorman