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INSIDE THIS ISSUE

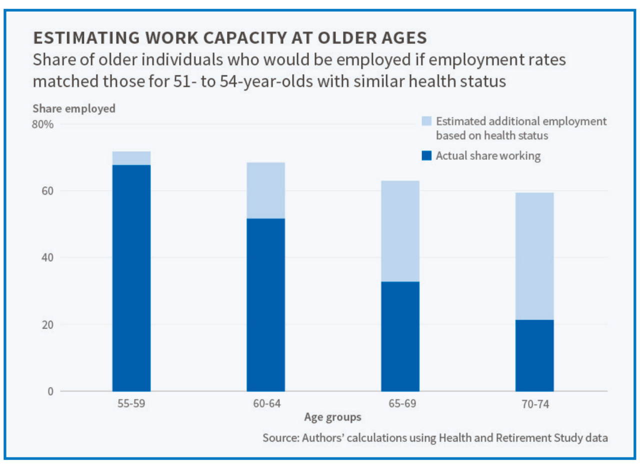
Health Capacity to Work at Older Ages: Evidence from the U.S.

Raising the eligibility ages for benefits is sometimes advanced as a possible response to the rising cost of Social Security and Medicare that will be associated with the aging of the U.S. population in coming decades. By raising the age at which pension and health benefits could be claimed, these changes would make it more costly for older individuals to leave the labor force. A central issue in evaluating such proposals is whether older Americans have the health capacity to work longer than they currently do.

In **Health Capacity to Work at Older Ages: Evidence from the U.S.** (NBER Working Paper No. 21940), Courtney Coile, Kevin S. Milligan, and David A. Wise find that many of today's workers are healthy enough to extend their working lives. The study employs several yardsticks to measure health capacity in the retirement-age population.

The researchers first compare the employment of older men today to that of men in the past with the same level of health, measured using mortality risk. In 1977, a 49-year-old man had a 0.8 percent chance of dying within a year and 89 percent of 49-year-old men were participating in the workforce. By 2010, the age at which the male mortality rate was 0.8 percent had risen to 55, but 55-year-olds' labor force participation rate was just 72 percent. If men in 2010 had exhibited the same labor force participation rates as their 1977 predecessors who faced the same mortality rates, i.e., if 55-year-old men in 2010 had participated as much as 49-year-old men in 1977 and so on for men of other ages, then on average men would have worked an additional 4.2 years between the ages of 55 and 69. The researchers note that their findings are somewhat sensitive to their choice of base year. If instead of comparing 2010 to 1977 they compared it with 1995, a low point in postwar labor force participation, they estimate that a 2010 worker would spend just 1.8 additional years in the workforce.

Health status at older ages has improved, not worsened; labor force participation has not kept pace.



The researchers also compare older individuals to slightly younger workers with similar health, measured using self-reported health conditions, disabilities, and medical care usage. They estimate that if older men had the same labor force participation rates as younger men who exhibited the same health status, then the labor force participation rate among 60 to 64 year olds would be 17 percentage points greater

The Capacity to Work at Older Ages is the seventh phase of an ongoing NBER project on Social Security Programs and Retirement around the World. The studies that comprise this project use differences in the structure of public pension programs in a dozen developed countries to explore the effect of Social Security on retirement and related questions.

Findings from Western Europe, the U.S., Canada, and Japan than it was, and that the analogous rate for those 65 to 69 would be 31 percentage points higher. They estimate that the average number of years worked between the ages of 55 and 69, which was 7.9 in 2010, would have been 2.6 years greater.

The researchers found that improvements in self-assessed health were disproportionately greater among the highly educated, suggesting that they could be in a better position to extend their work lives than their contemporaries with less education.

The researchers note that their study does not consider other factors that may affect workforce participation, such as age discrimination and business cycle fluctuations. They also note that while the older population in general is healthier than in the past, there are still some who may find it difficult to work and whose primary source of support is likely to be government transfer programs. They emphasize that their "estimates should not be taken as a reflection of how much older workers 'should' work." Increasing people's years at work "may not be a socially desirable outcome," they point out, "since leisure time has value as well."

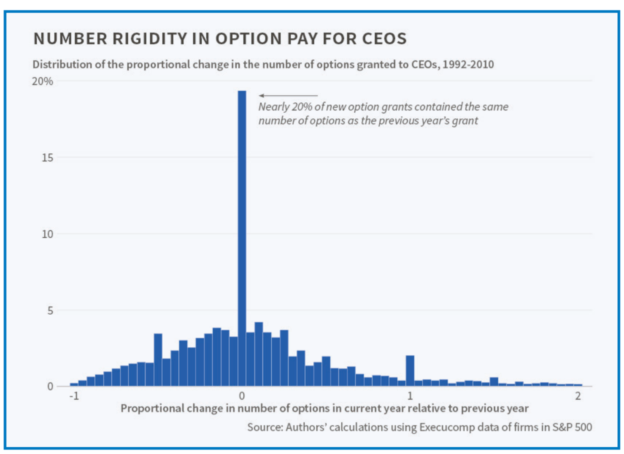
— Steve Maas

Stable Options Grants: An Explanation for the Rise in CEO Pay

During the period of rising stock prices in the 1990s and early 2000s, the total compensation of chief executive officers rose rapidly. The pay of the median CEO at an S&P 500 firm was $2.9 million in 1992, measured in 2011 dollars. By 2001 this figure had more than tripled, to $9.3 million. In contrast, the periods before and after the tech boom saw significantly less growth in CEO compensation. Further, growth in CEO pay during the tech boom period far outpaced growth in other high-income occupations.

In **Growth through Rigidity: An Explanation for the Rise in CEO Pay** (NBER Working Paper No. 21975), Kelly Shue and Richard Townsend suggest that rigidity in the number of stock options granted to CEOs contributed to the sharp rise in CEO pay. They observe that most executives receive grants of at-the-money call options, i.e., options to purchase company stock in the future at a price equal to the stock price on the day the option is granted. The value of such an option rises with the value of the stock price on the day the option is granted. For example, if a firm's stock price increased by 30 percent over the past year, granting the same number of options as in the previous year amounts to a 30 percent increase in this form of compensation. Thus, by keeping options grants constant in terms of number during a period of rapidly growing stock prices, boards actually drastically increased CEO pay in terms of real value.

> When a company's stock price is rising, granting the same number of at-the-money stock options every year amounts to increasing compensation.



Following regulatory changes in the early 1990s that encouraged tying CEO pay to corporate performance, stock options became an important component of executive pay. But while the value of these options fluctuates from year to year, the number of options issued to CEOs tended to stay relatively constant during the period of greatest increase in total compensation. Using data on large, publicly-traded firms, the researchers find that during the tech boom roughly 20 percent of CEOs who were granted options received the same number of options in consecutive years. In fact, many firms offered CEOs multi-year contracts that specified that the same number of options would be granted each year. During a period of increasing stock prices, this mechanically increased CEO pay. In theory, compensation committees could have offset the rising option pay by decreasing alternative forms of compensation, but the research finds no evidence of this. If anything, other forms of compensation mildly reinforced the rapid rise in option pay.

By the researchers' calculations, rigidity in options grants can account for more than half of the tech boom's deviation from long-run trends in CEO pay. This is partially due to spillover effects. Even CEOs at firms that adjusted their option grants annually may have benefited from the rising compensation of their fellow CEOs, since boards often set compensation by referring to peers. Option-grant rigidity is also consistent with the sharp rise in the correlation between CEO pay and stock returns during the 1990s, and with the increase in CEO pay dispersion during the tech boom.

The authors find that the number rigidity in options grants declined substantially following a regulatory change in 2006 that required firms to subtract the value of stock options from earnings on their income statements. Previously, firms were not required to recognize this expense, and regulations concerning disclosure of stock options tended to focus on their number rather than their value. The researchers suggest that during the tech boom, board members may not have fully understood the value of the options that they were granting to CEOs. They also find that boards with a greater percentage of independent directors, directors who joined the firm before the current CEO, or directors with M.B.A. degrees are significantly less likely to grant number-rigid options, suggesting board-member sophistication can limit unintended growth in option compensation.

— Andrew Whitten

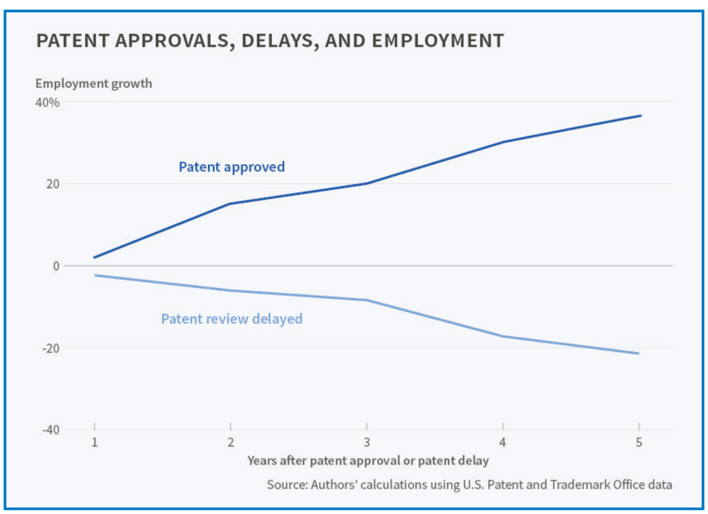
Prompt Patent Approval Spurs Startup Growth

Prompt patent approvals are associated with greater job and sales growth and higher investor returns at startup firms, Joan Farre-Mensa, Deepak Hegde, and Alexander Ljungqvist find in **The Bright Side of Patents** (NBER Working Paper No. 21959). Delays in approval substantially hurt a startup's growth prospects, and reduce not just jobs and sales growth but also follow-on innovation and the probability of going public or being bought.

The researchers analyze newly released data on patent applications approved or rejected by the U.S. Patent and Trademark Office. Studying 45,817 first-time patent applications filed by U.S. startups since 2001, they find that approval of a first patent is associated with a 36 percentage-point increase in a firm's employment growth and a 51 percentage-point increase in sales over the following five years. The firm's ability to innovate also improves. Startups whose applications are approved receive 49 percent more subsequent patents and 26 percent more citations per patent. Patent approval more than doubles the probability that a startup subsequently goes public. These estimates are derived from a comparison of firms whose patent applications are either randomly rejected or randomly accepted, in the sense that the applications are randomly assigned to a patent examiner who may be either intrinsically harsh or intrinsically lenient.

> Approval of a startup's first patent application is associated with higher growth in sales and employment, more innovation, and a greater likelihood of going public.

Delays in approving applications can have a similarly adverse effect on startups as outright rejection. The study finds that every year of delay in reviewing an eventually successful application, caused by administrative factors not related to the quality or complexity of the application, reduces a firm's employment and sales growth over the five years following approval by 21 to 28 percentage points. Such a delay is also associated with a 13 percent reduction in the number of subsequent patents, a seven percent decline in the number of citations per patent, and as much as a 50 percent drop in the probability that the patenting firm goes public. On average, a two-year delay in approval has the same negative impact on a startup's growth and success as outright rejection of the patent application.



"Patent review delays can significantly hamper the success of innovative startups by adversely affecting their ability to raise the capital necessary for their growth," the researchers conclude. "These novel findings highlight the importance of a quick patent review process, particularly in fast-moving industries, to resolve uncertainty surrounding applicants' property rights and their ability to produce patentable innovations."

One reason a patent is good for business is that winning one boosts a startup's probability of attracting venture capital by 53 percent. The startups most likely to benefit from patent approval are those that had raised little or no previous funding, were founded by inexperienced entrepreneurs, were based in areas less likely to attract investors' attention, and were in an information technology business.

— Laurent Belsie

Moral Hazard and Adverse Selection in Health Insurance

A central challenge in designing health insurance plans is providing coverage that will provide for participants' unexpected health care needs without encouraging unnecessary spending.

When insured individuals bear a smaller share of their medical care costs, they are likely to consume more care. This is known as "moral hazard." In addition, when individuals who have a choice among insurance plans select their plan, those who are more likely to require care tend to choose more generous plans. This is known as "adverse selection."

The challenge for economists is to estimate whether someone who spends more in generous plans does so because the plan covers more or because such a plan attracts individuals with greater underlying health needs.

In **Disentangling Moral Hazard and Adverse Selection in Private Health Insurance** (NBER Working Paper No. 21858), David Powell and Dana Goldman examine the effect of price changes on medical spending and the selection of workers across health insurance plans when a large manufacturing firm switches from offering just one employee insurance plan to a choice of three.

In 2005, the last year the single plan was in effect, enrollees paid no deductible, had a 20 percent co-insurance rate, and there was no cap on out-of-pocket medical expenditures. Subsequently, the company offered three plans that were similar in all respects other than their deductibles, co-insurance rates, and out-of-pocket maximums. As of 2007, the most generous plan featured a $250 deductible, a 10 percent co-pay, and a $1,250 out-of-pocket cap; the least generous had an $800 deductible, a 20 percent co-pay, and a $4,000 cap.

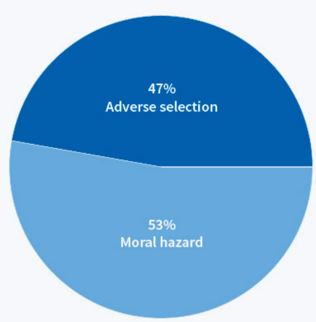
The researchers developed statistical procedures that minimized the influence of plan participants with extreme health outcomes — very little care, or a great deal — to assess the impact of plan choice.

Enrollee health status explains 47 percent of the difference in health spending of those who selected the most generous and least generous insurance plans at a large firm.

Predictably, those who enrolled in the most generous plan spent the most on health care. The researchers sought to isolate the relative significance of adverse selection and moral hazard in accounting for differences in their expenditures.

SELECTION IN HEALTH INSURANCE

Explanation of difference in average per person spending between firm's most generous and least generous health plan



Source: Authors' calculations using data from a large firm offering three health plan options

In analyzing how enrollees responded to the choice of plans, the researchers controlled for demographic factors that affect health spending, such as age, gender, and the relationship of dependents to employees. They also took account of enrollee spending in 2005, when everyone was under the same plan.

They found favorable selection in the least generous plan, which attracted an unusually healthy population, and adverse selection in the more generous plans.

Exemplifying favorable selection, 28 percent of the enrollees in the least generous plan spent under $182 on medical care during the year. Had selection bias not been a factor in enrollment, the researchers estimate only 20 percent of the enrollees would have been so frugal. The study estimates that had the entire sample enrolled in the least generous plan, annual premiums for this plan would have had to rise by $1,000 in order to cover the greater health spending of those who had chosen other, more generous plans.

The researchers calculate that adverse selection added $773 in per-person costs to the most generous plan. Enrollees had to pay an additional $60 a month in premiums in order for this plan to break even.

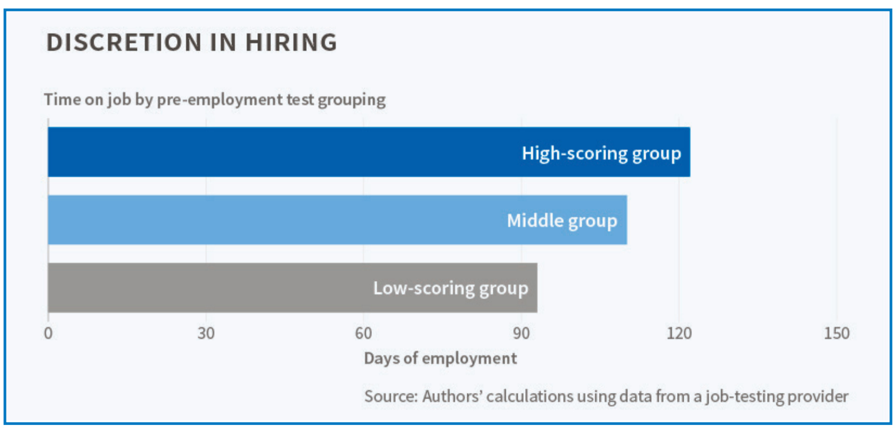
Overall, the study concludes that moral hazard accounted for $2,117, or 53 percent, of the $3,969 difference in spending between the most and least generous plans. It attributes the remaining 47 percent to adverse selection.

— Steve Maas

Testing versus Manager Discretion in Hiring

It has long been recognized that resumes, interviews, and other screening tools have only a limited capacity to determine whether a potential employee has the right skills and is a good fit for a particular job. Even if there are valid indicators in this screening information, the managers who make hiring decisions may have poor judgement, or may have preferences that do not align well with a firm's interests.

In **Discretion in Hiring** (NBER Working Paper No. 21709), Mitchell Hoffman, Lisa B. Kahn, and Danielle Li measure the value of managerial discretion versus reliance on job tests for hiring workers in low-skill service sector jobs. In the industry they study, training takes several weeks and median job tenure is only 99 days. They regard the length of time employees stay on the job as a key indicator of whether these employees were well selected.



DISCRETION IN HIRING

Source: Authors' calculations using data from a job-testing provider

The researchers find that higher scores on a pre-employment test on average predict that hired workers will have longer tenure. On average, individuals hired from the highest-scoring group stayed on the job 12 days longer than those in the next-highest group. Those in the second-highest group in turn had an average tenure that was 17 days longer than those in the group with the lowest scores.

Data for the study were provided by a firm offering online job testing services to its business clients. The sample consisted of 15 client firms that adopted the job test. As the firms gradually instituted testing at various locations, human resources managers in those locations were informed of whether a given applicant was in the highest-scoring, the middle, or the lowest group. The managers, whose primary duty was filling available slots, were encouraged to factor test results into their decisions, but still retained discretionary authority. The primary outcome measure was the average length of job tenure for workers hired at a specific location at a specific time. The researchers find that reliance on testing increased average tenure of hires by about 15 percent.

To measure the value of discretion, the researchers explore differences in worker tenure when managers decide to make exceptions to test-score-based hiring decisions. An "exception" is defined as hiring a member of the middle-scoring group when a member of the highest-scoring group goes unhired, or when someone in the lowest-scoring group is hired over someone in one of the higher-scoring groups. Managers frequently chose job candidates who were not the most highly rated on the test. Some managers and hiring locations made more exceptions than others.

Study finds that relying on pre-employment test scores does a better job of identifying workers who will have longer tenure than allowing managers to use discretion.

After controlling for differences in the composition of different applicant pools, hiring times, and locations, the researchers conclude that a one standard deviation increase in the exception rate for a given group of workers is associated with a five percent reduction in job tenure. Furthermore, workers from the top-scoring group who were passed over in one month but hired at a later date were more productive than the workers for whom they were originally passed over; they stayed in their jobs about eight percent longer than people from the middle-scoring group who were hired before them from the same applicant pool. Members of the highest- and middle-scoring groups who were passed over and eventually hired stayed about 24 percent and 17 percent longer, respectively, than members of the lowest-scoring group for whom they had been passed over. Moreover, there was no evidence that the number of exceptions made by a particular manager was positively correlated with the productivity of the workers this manager hired.

—Linda Gorman

The Impact of Early Female Jurors on Criminal Cases

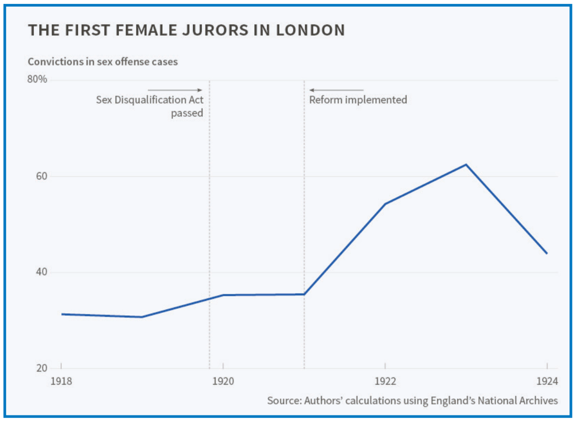
The role of women in civic, political, and economic life has expanded slowly but steadily over the past century, as women have secured voting rights and assumed increasingly diverse and powerful positions in the public and private sectors. Yet measuring the impact of this inclusion has been challenging, in part because it has been difficult to find examples of women taking on new roles in which they do not reflect the views of those who elected or appointed them.

In **A Jury of Her Peers: The Impact of the First Female Jurors on Criminal Convictions** (NBER Working Paper No. 21960), Shamena Anwar, Patrick Bayer, and Randi Hjalmarsson analyze verdicts in England before and after women began sitting on juries in criminal cases.

England's Sex Disqualification (Removal) Act of 1919 provided a unique opportunity for the researchers to study the effect of female jurors on real-world decisions well before women being on juries in equal numbers to men became the norm and made it more difficult to measure how gender influences results. They find the inclusion of women was followed by large, significant changes in some conviction rates, specifically for sex offenses and violent crimes against women.

The researchers reviewed hand written records of more than 3,000 cases in the Central Criminal Court of London and surrounding communities from 1918 to 1926. The Sex Disqualification (Removal) Act was implemented in 1921 and court records immediately before and after implementation provide a wealth of information about the types of cases, verdicts, gender of defendants, victims, jurors, and other valuable data.

> Inclusion of women on juries was followed by large changes in conviction rates for sex offenses and violent crimes against women.



The study shows that the inclusion of women on juries had little effect on overall conviction rates within all the criminal cases examined. However, there were distinct shifts in conviction rates within subcategories of criminal cases. Significantly, when women were on juries — even when they were outnumbered by men, as was the case in the early years after implementation of the act — conviction rates for sex offense cases increased by 16 percent.

Meanwhile, there was a decrease of 10 percent in the conviction rate for property crimes and 13 percent for violent crimes overall. There also was an important shift in conviction rates within the violent-crime subcategory. Prior to implementation of the act, the conviction rate differential between crimes involving male and female victims was essentially zero. After the reforms, that conviction rate differential changed dramatically, with cases in which the victim was a woman now 20 percent more likely to lead to convictions compared to cases in which men were the victims. The inclusion of women also increased the likelihood of juries being discharged without reaching a verdict on all charges and increased the average time taken to reach a verdict.

"Taken as a whole, the results of our analysis imply that female representation on juries substantially affects the likelihood of conviction for a subset of cases — sexual and violent crimes — in which female jurors might have viewed the alleged behavior or its impact on the victim from a different perspective than their male counterparts," the researchers conclude.

— Jay Fitzgerald