

“I Don’t Work for Money” The Motives of Scientists and Engineers

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| Formal IP and Individuals' Incentives

- In addition to providing firms with investment incentives to conduct R&D, IP is also supposed to provide financial incentives for individuals to undertake inventive activity.
- Underlying assumption: Individuals care (a lot) about pecuniary gain from their inventive efforts
- But how much are individuals engaged in invention driven by money vs. other factors?
- How do individuals' various motives affect innovative effort and performance?
- Do individuals' motives and performance differ between startups and established firms?

| The Soul of a New Machine (Kidder 1981)

... most seemed to view the prospect of stock as a mere sweetener, and most agreed with Ken Holberger, sublieutenant of Hardy Boys, who declared “I don’t work for money.”

| Data on Scientists and Engineers

SESTAT 2003 restricted-access data (National Science Foundation)

- Population: Individuals who are either trained in science and engineering fields or work in S&E
- Mailed surveys
- Full sample (N=29,190):
 - Employed in startups, established firms, and academia
 - R&D among two most important activities
- Firm sample (N=9,609):
 - Employed in startups, established firms
 - R&D is most important activity

| Key Measures

- Motives: “In thinking about a job, how important is each of the following to you” (4 pt. scale)
 - Salary
 - Fringe benefits
 - Job security
 - Intellectual challenge
 - Independence
 - Opportunities for advancement
 - Responsibility
 - Contribution to society
- Effort: Hours worked in a typical work week
- U.S. patent applications in last five years
- Firm size and firm age used to define startups (<100 employees, <6 years) and large established firms (>500 employees, >5 years)

| Controls in Regression Analysis

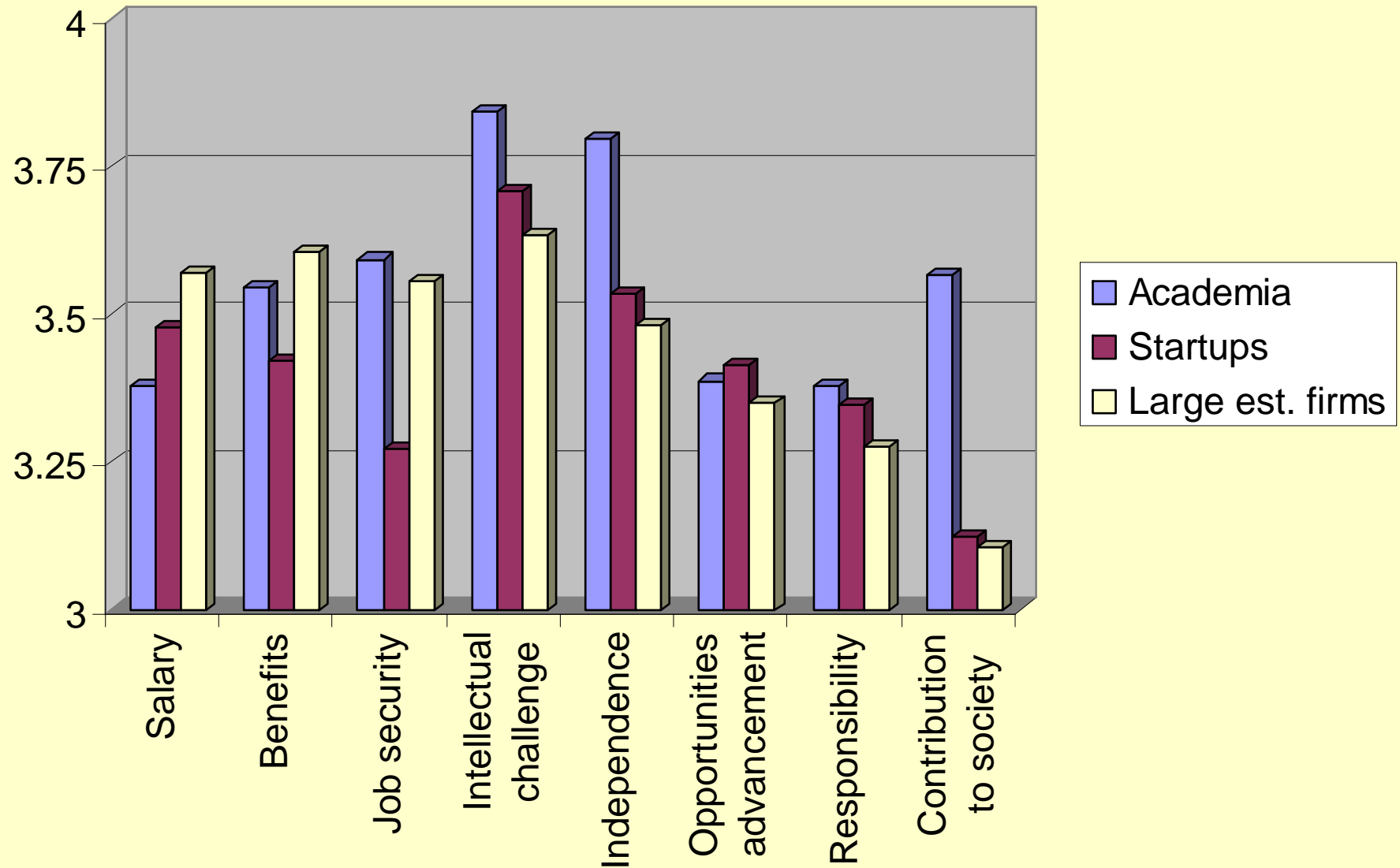
■ Productivity determinants

- Industry level: industry dummies
- Firm level: firm fixed effects (for subsample)
- Individual level: experience, degree, field, work type, non-R&D activities, recent job change, etc.

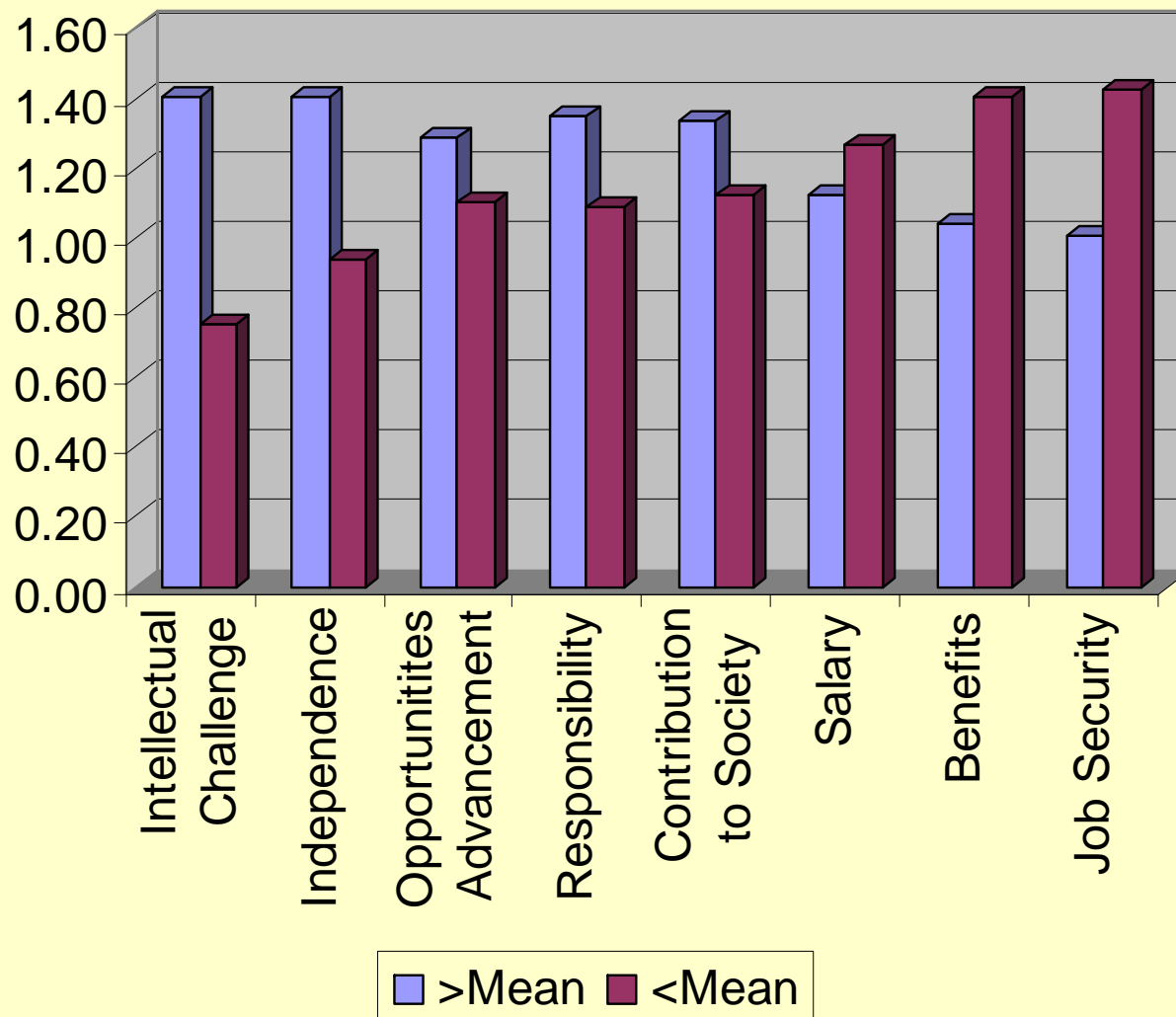
■ Other controls

- Base pay (but not contingent pay)
- Managerial status, age, gender, race, children, etc.

Motives in Academia, Startups, and Large Firms



Firm Sample: Motives and Performance



- Average # of patent applications (firm sample)
- But: Need to consider potential confounds and indirect effects

Firm Sample: Motives, Effort, and Performance

- Individuals' motives have significant impacts on innovative effort, but effects differ
 - Strongest positive effect: importance of intellectual challenge
- Pecuniary and non-pecuniary motives affect innovative performance, even controlling for effort (“productivity effects”)
 - Strong positive effect: intellectual challenge, smaller effects of independence, salary
 - Negative effect of importance of job security
- Results robust to inclusion of ability measures and firm fixed effects

Firm Sample: Startups vs. Established Firms

- Stronger salary, benefits, and job security motives in large established firms, surprisingly similar non-pecuniary motives
- Individuals in startups expend more effort than individuals in large established firms (ca. 3 hours)
 - Partially explained by demographic differences
 - Not explained by differences in motives
- Individuals in startups have more patent applications (ca. 30%)
 - Individuals in startups have lower desire for job security, which is negatively associated with innovative productivity
 - Individuals in startups expend more effort
 - Much of the “performance advantage” is due to recent hires. Selection effects at firm and individual levels?
- Results robust to inclusion of ability measures

| Implications

- While formal IP appeals to individuals' pecuniary motives, nonpecuniary motives for work may be more salient to individuals, especially in the innovation context
 - Nonpecuniary motives may also be associated with higher levels of innovation than pecuniary motives
 - Some authors suggest that pecuniary rewards may negatively impact intrinsic motives (e.g., Deci & Ryan 1999), though relevant empirical evidence is very limited
- Need to consider individuals' pecuniary as well as non-pecuniary motives and incentives and their interplay

Thank you.

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