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Small Serial Innovators: The Small Firm Contribution to Technical Change

by CHI Research, Inc.

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Purpose

Prior research discovered that small firms find the patent system to be problematic. The objective of this study is to understand the role of small firm patenting in the United States compared to large firm patenting and to measure their share of patenting and contribution toward technical change in the economy. This report examines technical change through patenting. It is important to note that patenting reflects invention or creation rather than innovation, although they are closely related.

Overall Findings

Patents for small firms (businesses with fewer than 500 employees) are more technically important on

average than those for large firms, since a small firm patent is more likely than a large firm patent to be among the top 1 percent of most frequently cited patents. In addition, small serial innovators are younger than large patenting firms, but they are not startups. The resilience of these firms makes them serial innovators, hence they concentrate in newer, science-based technologies such as biotechnology, semiconductors, and pharmaceuticals.

Highlights

- Small firm patenting is very strong in health technologies and gaming, and there are a large number of small firm innovators in parts of information technology.

Small Firm Share of Patenting by Top Technology Area

| Technology Area | Percent of Patents from Small Firms | Number of Patents | Percent of Small Firms | Number of Firms |
|---------------------|-------------------------------------|-------------------|------------------------|-----------------|
| Biotechnology | 25 | 3,886 | 71 | 45 |
| Pharmaceuticals | 19 | 6,453 | 68 | 59 |
| Medical Equipment | 11 | 8,437 | 45 | 88 |
| Unclassified | 11 | 2,511 | 31 | 26 |
| Medical Electronics | 11 | 2,974 | 64 | 14 |
| Chemicals | 9 | 15,760 | 29 | 91 |
| Agriculture | 8 | 2,561 | 28 | 18 |
| All Technologies | 6 | 193,976 | 33 | 1,071 |

Source: *Small Serial Innovators: The Small Firm Contribution to Technical Change* by CHI Research Inc., under contract to the U.S. Small Business Administration, Office of Advocacy, 2003.

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- Small firms represent one-third of the most prolific patenting companies that have 15 or more U.S. patents.
- Small firm innovation is twice as closely linked to scientific research as large firm innovation on average, and so substantially more high-tech or leading edge.
- Small firms are more effective in producing high-value innovations—the citation index for small firm patents averaged 1.53 compared to 1.19 for large firms.
- Seventy percent of patenting firms are manufacturing firms even though they represent only 6 percent of U.S. firms.
- Small patenting firms are roughly 13 times more innovative per employee than large patenting firms.
- Small firms account for 6 percent of patents issued to the 1,071 most innovative firms. When ranked by citation index small firms account for 8 percent of the top 10 percent; 9 percent of the top 5 percent; and 14 percent of the top 1 percent.
- A small firm patent is at least twice as likely to be found among the top 1 percent of highest-impact patents as a patent from a large firm.

Scope and Methodology

A total of 1,071 firms with 15 or more patents issued between 1996 and 2000 were examined. A total of 193,976 patents were analyzed. CHI created a database of these firms and their patents. This list excluded foreign-owned firms, universities, government laboratories, and nonprofit institutions. Assignees that were part of a firm with more than 45

patents in the five years ending in 2000 were eliminated. This required using CHI's existing thesaurus linking patent assignees and institutions, for institutions with 45 patents or more in the past five years. CHI used FISonline, Who Owns Whom, CorpTech, Dun & Bradstreet, the Internet and Edgar to determine whether the status of the assignees were independent firms or part of a larger firm. Information on primary SIC of the firm, number of employees, and revenues were collected.

Ordering Information

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