

SUMMARY

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THE REORGANIZATION OF INVENTION IN THE EARLY TWENTIETH CENTURY UNITED STATES

Professor Naomi R. Lamoreaux

Brief Description: According to the conventional wisdom, as technology became more complex in the early twentieth century—as cutting-edge invention required greater investments of human and physical capital and more team effort—the locus of technological change shifted from small firms and independent inventors to large firms with in-house R&D facilities. Evidence is accumulating, however, that this view is overdrawn. Although it is certainly the case that large firms increasingly built industrial research laboratories during this period, small firms and independent inventors continued to be a critical source of new technological ideas in the high-tech industries of the period. Intriguingly, these two alternative modes of technological discovery were centered in different regions of the country with different economic ecologies. On the one hand, large firms were disproportionately located in the Middle Atlantic, near the nation’s main capital markets. Although their securities traded publicly, they increasingly turned to internal sources of funds for their investments in R&D. On the other hand, small innovative enterprises were concentrated in the East North Central states, where they were highly dependent on local networks of venture capitalists and local capital markets to support their inventive activity. Although there was eventually a shift toward large-firm R&D, our research suggests that it occurred later—during the middle third of the century—and that it owed more to the differential impact of the Great Depression than, as previously thought, to the inherent superiority of the industrial research lab. During the depression years, large firms used their internal resources to expand dramatically their research laboratories and stockpile new technology. By contrast, small firms found it difficult to continue to finance R&D as their external sources of funds collapsed. The purpose of the project is to continue to explore empirically the effect of the Great Depression on these two alternative modes of technological discovery.

Main Research Findings: This past summer, I served as a research assistant to economics Professor Naomi Lamoreaux. Professor Lamoreaux is in the midst of her latest book on the connection between patent law, property rights and markets for innovation, and my summer research spanned a variety of tasks needed to support a section of this book. As a student considering continuing my studies in graduate school, I found the RA job to be an excellent opportunity to experience true academic research.

My research centered on the creation of “markets for innovation” in the late nineteenth and early twentieth centuries. Essentially, much of our research was based on the theory that as transaction costs to buy and sell patents (property rights over inventions) fell, markets for these property rights would grow in concert. The first task was to record a cross section of patent exchange contracts from 1850-1851; these contracts governed patent assignments between individuals (or companies). This was tedious work — the contracts were handwritten, and the

images of them were often faded and unclear. After assembling the dataset, I was able to run basic descriptive statistics on the numbers. When compared to the statistics from later periods (which Professor Lamoreaux had calculated in previous research), the patent assignments based on geographic regions fell following 1850. This result confirmed our expectations; as a national transportation network developed, there became little reason to sell a patent right over a geographic region when the patent holder could manage that region himself.

The second and larger task was to determine how intermediaries — in this case, registered patent attorneys — facilitated the growth of these new markets. Using a 50-year sample of patents by inventors whose last names began with the letter B (previously constructed by Professor Lamoreaux's colleagues), I looked up each patent using internet databases to determine whether or not an attorney was involved with the filing of the patent application. Our hypothesis was that by making use of these intermediaries — who lower transaction costs — inventors whose patents were affiliated with an attorney would be more prolific over the course of their careers. Although constructing this dataset was also tedious, it enabled an in-depth analysis of how attorneys affected inventors' patenting habits. In summary, my analysis suggested that consistently associating with one preferred attorney did indeed increase patenting activity.

Overall, my experiences this past summer were not only enjoyable in and of themselves, but also proved to be helpful as I consider plans for my future. I learned that seemingly tedious and dry tasks are essential to academic research, but they enable the more stimulating jobs like data analysis, which I loved. Additionally, as a student interested in both economics and history, I found that I enjoyed the economics and data analysis portions of my summer — running statistics on my constructed dataset — more than I enjoyed the more typical “historical” research — tasks like reading the patent assignment contracts. I now plan to further my studies in econometrics as a result of this insight.

I am very grateful to the Economics Department for giving me this opportunity this past summer. For students considering academic or social science research as a career, there seem few better opportunities at Yale to work alongside the University's best professors. I am also very thankful to Professor Lamoreaux for creating a work experience that allowed me the freedom and creativity to design my own methods of analysis for the questions she posed.