

Online Appendix

Spinning Tales about Japanese Cotton Spinning: Saxonhouse (1974) and Lessons from New Data

APPENDIX 1. DETAILS AND ACKNOWLEDGMENTS ABOUT THE DATA

As mentioned in the main text, we use monthly input-output data starting from the first such data published in the Official Gazette (“Kampō”). To the best of our knowledge, we were the first to systematically extract and code these early data to which Braguinsky was directed by advice from Naosuke Takamura. More precisely, we coded all available data from Kampō from June 1883–June 1889, as well as all available Geppō data from July 1889–December 1893. We then combined these with the Geppō data from January 1894 onward, previously coded and generously shared with us by Tetsuji Okazaki (see Okazaki 2008). Together, these data gave us an opportunity to critically examine the Japanese cotton spinning industry’s evolution over a longer period than had previously been possible.

Plant-level data used to estimate the effects of acquisitions on establishment-level performance were collected from governmental statistics (Nōshōkōmu Tōkei Nempō) and statistical yearbooks from various Japanese prefectures and coded jointly with Atsushi Ohyama and Tetsuji Okazaki (these are the same data used in Braguinsky et al. forthcoming).

Company shareholders’ reports were photocopied by Braguinsky, with the permission from Osaka University Library where they are held in the rare books depository. Over several trips to Osaka, over 1,250 such reports—all available for years spanning the 1890s, 1900s, and 1910s—were photographed and digitized. The information from those reports was then coded jointly with Atsushi Ohyama and Tetsuji Okazaki. To the best of our knowledge, these reports have never been systematically mined and electronically coded before.

APPENDIX 2. YEAR-BY-YEAR ESTIMATIONS
OF ACQUISITION EFFECTS

Here we estimate the equation similar to (1) in the main text, but with the full set of pre- and post-acquisition time dummies, so it is also designed to look at both pre- and post-acquisition time trends:

$$y_{it} = \alpha_0 + \beta_1 k_{it} + \beta_2 l_{it} + \gamma_- D_{i-} + \sum_{t=T-3}^{t=T-1} \gamma_{it} D_{it} + \sum_{t=T+1}^{t=T+5} \gamma_{it} D_{it} + \gamma_+ D_{i+} + h_i + \mu_t + \varepsilon_{it}, \quad (A1)$$

where T is the year of acquisition, and D_{i-} and D_{i+} are the dummies equal to 1 for plant i in years up to four years prior to the acquisition year and zero otherwise, and equal to 1 for plant i in years 6 and beyond after the acquisition and zero otherwise, respectively. The estimates are carried out using observations on all productive establishments that changed ownership between 1898 and 1911. Figure A1 presents the estimation results. It clearly shows that there is no discernible pre-trend in acquired plant's productivity before acquisitions take place, but that this productivity goes up substantially after acquisition, with the progress more or less even across years.

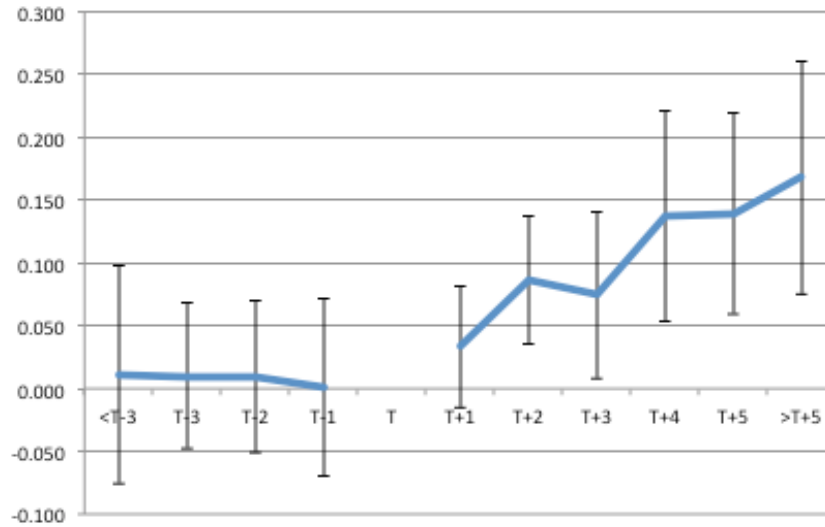


FIGURE A1

WITHIN-ACQUIRED ESTABLISHMENTS PRODUCTIVITY CHANGES

Note: The graph plots the coefficients on dummies set equal to 1 for corresponding pre- and post-acquisition years in the regression (1') in the main text. T is the acquisition year (omitted category). Vertical bars show the 95 percent confidence intervals.

Source: Our estimates.

TABLE A1
PRE-1900 ENTRANTS AND THEIR LONG-TERM OUTCOMES

| Firm Name | Year Founded | Year Started Operating | Exit Year | Acquired Year | Operating in 1897–1899 |
|----------------------------|--------------|------------------------|-----------|---------------|------------------------|
| Kagoshima | 1867 | 1867 | 1898 | N/A | Yes |
| Kashima | 1869 | 1872 | 1889 | N/A | No |
| Sakai | 1870 | 1870 | 1889 | N/A | No |
| Aichi | 1878 | 1881 | 1896 | N/A | No |
| Kuwanohara | 1878 | 1882 | 1900 | N/A | Yes |
| Himeji | 1879 | 1880 | 1899 | N/A | Yes |
| Ichikawa | 1880 | 1882 | 1916 | 1916 | Yes |
| Kawashima/Mie | 1880 | 1882 | Survivor | N/A | Yes |
| Miyagi | 1880 | 1883 | 1910 | N/A | Yes |
| Shibutani | 1880 | 1880 | 1896 | N/A | No |
| Shimotsuke | 1880 | 1885 | 1911 | 1911 | Yes |
| Hiroshima | 1881 | 1883 | Survivor | N/A | Yes |
| Nagoya | 1881 | 1885 | 1906 | 1906 | Yes |
| Okayama | 1881 | 1882 | 1907 | 1907 | Yes |
| Shimada | 1881 | 1884 | 1917 | 1917 | Yes |
| Shimomura | 1881 | 1882 | 1905 | 1905 | Yes |
| Tamashima | 1881 | 1882 | 1899 | 1899 | Yes |
| Toyoi | 1881 | 1884 | 1898 | N/A | Yes |
| Osaka | 1882 | 1883 | Survivor | N/A | Yes |
| Enshu | 1883 | 1885 | 1900 | N/A | Yes |
| Nagasaki | 1883 | 1884 | 1892 | N/A | No |
| Hirano | 1887 | 1889 | 1903 | 1903 | Yes |
| Kanegafuchi | 1887 | 1889 | Survivor | N/A | Yes |
| Kurashiki | 1887 | 1889 | Survivor | N/A | Yes |
| Naniwa | 1887 | 1888 | 1898 | 1899 | Yes |
| Onagigawa Menpu | 1887 | 1894 | 1903 | 1903 | Yes |
| Osaka Yoriito | 1887 | 1887 | 1903 | 1903 | Yes |
| Owari | 1887 | 1889 | 1906 | 1906 | Yes |
| Tenma | 1887 | 1888 | 1900 | 1900 | Yes |
| Tenma Orimono ¹ | 1887 | 1893 | Survivor | N/A | Yes |
| Tokyo | 1887 | 1889 | 1914 | 1914 | Yes |
| Uwa | 1887 | 1890 | 1903 | 1907 | Yes |
| Wakayama | 1887 | 1889 | 1911 | 1911 | Yes |
| Yawata | 1887 | 1889 | 1890 | N/A | No |
| Fujii | 1888 | 1888 | 1902 | N/A | Yes |
| Kanakin | 1888 | 1890 | 1906 | 1906 | Yes |
| Saitama | 1888 | — | 1888 | N/A | No |
| Amagasaki | 1889 | 1891 | Survivor | N/A | Yes |
| Kofu | 1889 | 1888 | 1907 | N/A | Yes |
| Kurume | 1889 | 1891 | 1899 | 1899 | Yes |
| Miike | 1889 | 1891 | 1903 | 1903 | Yes |
| Settsu | 1889 | 1891 | 1918 | 1918 | Yes |
| Shodoshima | 1889 | 1890 | 1899 | N/A | Yes |
| Senshu | 1890 | 1891 | 1903 | 1903 | Yes |
| Yamashiro | 1891 | 1891 | 1899 | N/A | Yes |
| Asahi | 1892 | 1894 | 1899 | 1899 | Yes |

| | | | | | |
|-------------------|------|------|----------|------|-----|
| Dempo (Fukushima) | 1892 | 1894 | Survivor | N/A | Yes |
| Fukuyama | 1892 | 1893 | 1903 | 1903 | Yes |
| Iyo | 1892 | 1893 | 1904 | 1904 | Yes |
| Kishiwada | 1892 | 1894 | Survivor | N/A | Yes |
| Sakai | 1892 | 1894 | 1917 | 1917 | Yes |
| Kashiwazaki | 1893 | 1895 | 1902 | 1902 | Yes |
| Koriyama | 1893 | 1894 | 1907 | 1907 | Yes |
| Kumamoto | 1893 | 1895 | 1899 | 1899 | Yes |
| Matsuyama | 1893 | 1894 | 1918 | 1918 | Yes |
| Meiji | 1893 | 1894 | 1902 | 1902 | Yes |
| Nihon | 1893 | 1896 | 1916 | 1916 | Yes |
| Noda | 1893 | 1895 | 1898 | 1898 | Yes |
| Takaoka | 1893 | 1894 | 1915 | 1915 | Yes |
| Wakayama Shokufu | 1893 | 1894 | Survivor | N/A | Yes |
| Heian | 1894 | 1896 | 1903 | N/A | Yes |
| Ise | 1894 | 1896 | 1899 | 1899 | Yes |
| Kasaoka | 1894 | 1896 | 1908 | 1908 | Yes |
| Kyoto | 1894 | 1896 | 1901 | 1901 | Yes |
| Tsushima | 1894 | 1895 | 1907 | 1907 | Yes |
| Awaji | 1895 | 1896 | 1899 | 1899 | Yes |
| Banyo Seimai | 1895 | 1895 | 1900 | 1906 | Yes |
| Fushimi | 1895 | 1896 | 1900 | 1900 | Yes |
| Ichinomiya | 1895 | 1897 | 1908 | 1908 | Yes |
| Nihon Boshoku | 1895 | 1897 | 1905 | 1905 | Yes |
| Sanshugumi | 1895 | 1896 | 1902 | N/A | Yes |
| Ajino | 1896 | 1896 | 1903 | 1903 | Yes |
| Awa | 1896 | 1898 | 1907 | 1907 | Yes |
| Bizen | 1896 | 1897 | 1907 | 1907 | Yes |
| Chita | 1896 | 1899 | 1907 | 1907 | Yes |
| Chugoku | 1896 | 1898 | 1903 | 1903 | Yes |
| Fuji | 1896 | 1898 | Survivor | N/A | Yes |
| Hakata Kinuwata | 1896 | 1897 | 1903 | 1903 | Yes |
| Harima | 1896 | 1896 | 1912 | 1912 | Yes |
| Isechuo | 1896 | 1897 | 1897 | 1897 | Yes |
| Kashu | 1896 | 1898 | 1899 | 1899 | Yes |
| Kuwana | 1896 | 1896 | 1907 | 1907 | Yes |
| Nakatsu | 1896 | 1898 | 1903 | 1903 | Yes |
| Nihon Hosoito | 1896 | 1898 | 1904 | 1904 | Yes |
| Osaka Menshi | 1896 | 1897 | 1899 | N/A | Yes |
| Saidaiji | 1896 | 1897 | 1898 | 1898 | Yes |
| Sanuki | 1896 | 1897 | 1918 | 1918 | Yes |
| Shanghai | 1896 | 1899 | 1899 | 1899 | Yes |
| Tokyo Gasu | 1896 | 1898 | 1907 | 1907 | Yes |
| Yamato | 1896 | 1898 | 1902 | 1902 | Yes |
| Yawatahama | 1896 | 1899 | 1903 | 1903 | Yes |
| Kunijima | 1898 | 1899 | 1899 | 1899 | Yes |

Note: For the purpose of this table Mie Spinning company is treated as the continuation of Mie/Kawashima mill (government-sponsored one). Onagigawa Menpu, Tenma Orimono, and Wakayama Shokufu started as weaving-only firms. "Year started operating" refers to the start of cotton yarn spinning in those firms. "Survivor" means that the firm survived (neither shut down nor was acquired) until at least 1920.

Source: Our data collected from the sources described in the main text and in the online appendix.

APPENDIX 3. BEHIND “A TALE”¹: GARY R. SAXONHOUSE’S
INTELLECTUAL INHERITANCE²

This essay provides a perspective on the intellectual context of the late Gary Saxonhouse’s first scholarly publication, which appeared in the *The Journal of Economic History* in 1974, a study of the Japanese cotton spinning industry in the Meiji Period. For the remainder of Saxonhouse’s illustrious career, “A Tale” served as scaffolding on which he built subsequent analyses and perspectives on Japan’s early industrialization. Understanding Saxonhouse’s intellectual inheritance enriches our understanding of this pioneering study and the making of an economic historian and, more broadly, a “Japan specialist” in the study of economic growth.

The year 2014 marked the 40th anniversary of the publication of the late Gary R. Saxonhouse’s article, “A Tale of Japanese Technological Diffusion in the Meiji Period,” in that year’s first issue of *The Journal of Economic History* (hereafter “A Tale” and *JEH*). “A Tale” was not only Saxonhouse’s first article in the *JEH* but was also his *first* journal article in what became an illustrious career cut all-to-short in 2006.³ Yet as Saxonhouse noted early in “A Tale,” he had two other publications in the works: a chapter, “Country Girls and the Japanese Cotton Spinning Industry,” forthcoming in his mentor Hugh Patrick’s edited volume, *Japanese Industrialization and Its Social Consequences*, and a third paper, in mimeo, “Productivity Change and Labor Absorption in Japanese Cotton Spinning, 1891–1935,” that would appear in *The Quarterly Journal of Economics* in 1975.⁴ Saxonhouse would not publish another article in the *JEH* until his and Gavin Wright’s “National Leadership and Competing Technological Paradigms: The Globalization of Cotton Spinning, 1878–1933,” appeared posthumously in 2010, bringing to a close his adult life’s fascination with and passion to understand deeply the early cotton spinning industry in Japan. With a history worthy of being called a tale, Japan’s Meiji-era cotton spinning industry led that Asian nation out of its feudal existence to become a highly industrialized

¹ Gary R. Saxonhouse, “A Tale of Japanese Technological Diffusion in the Meiji Period,” *The Journal of Economic History* 34 (1974): 149–65.

² We are most grateful to Arlene Saxonhouse and Hugh Patrick for providing us with biographical and other information on Gary Saxonhouse’s development as a Japan specialist.

³ Saxonhouse, “A Tale.” Saxonhouse’s second publication, “Economics of Postwar Fertility in Japan: Differentials and Trends: Comment,” *Journal of Political Economy* (*JPE*), would also appear in 1974 but in the second issue, whereas “Tale of Diffusion” appeared in *JEH*’s first issue of the year. The *JPE* piece was a four-page commentary on Masanori Hashimoto, “Economics of Postwar Fertility in Japan: Differentials and Trends.” 82, no. 2 (1974): S170–S194. Saxonhouse died of leukemia at the age of 63 30 November 2006. A short biographical sketch of Saxonhouse can be found at <http://um2017.org/faculty-history/faculty/gary-saxonhouse/memorial>.

⁴ Saxonhouse, “A Tale,” fn. 4, p.150. In fact, Patrick’s edited volume did not appear until 1976, and the title of Saxonhouse’s contribution had changed to “Country Girls and Communication among Competitors in the Japanese Cotton-Spinning Industry.” By this time his “mimeo” (a.k.a., a “working paper” that he circulated in mimeograph form) had already appeared in *The Quarterly Journal of Economics*—“Capital Accumulation, Labor Saving, and Labor Absorption Once More, Once More,” 89, no. 2 (1975): 322–30.

economy and a major player in twentieth-century war, politics, and global trade, an economic power that would threaten U.S. economic supremacy in the two decades following the appearance of “A Tale.” Throughout his academic career, Saxonhouse was an important interpreter of Japan’s economic development, whether his focus was cotton spinning or biotechnology.

In what follows, we focus on Gary Saxonhouse’s early work on Japanese cotton spinning and the training in economics, economic history, and the Japanese language that lay behind it. We introduce Saxonhouse’s mentors and the intellectual tradition he inherited from them and went on to advance throughout his career. We illuminate the database he assembled in his doctoral research that provided him with an impressive comparative advantage both early in and throughout his career as a specialist on the Japanese economy. Finally, we briefly analyze the immediate context in which Saxonhouse first orally delivered “A Tale” in 1973 and subsequently published it in early 1974. We offer this essay as a memorial to Saxonhouse’s early work in Japanese economic history and his perhaps under-appreciated influence on a wider community of scholars seeking to understand the fundamental processes of economic growth.

Born in 1943 in New York City and reared in the Rego Park neighborhood of Queens, Saxonhouse attended Yale University, where he majored in economics, earning his undergraduate degree in the spring of 1964. Yale’s Economics Department possessed particularly strong faculty capabilities in Japanese economic growth, including Gustav Ranis and Hugh Patrick. The university also provided an unrivaled institution to support research on the general phenomenon of economic growth, the Yale Economic Growth Center. Created through the “connivance” of Harvard’s Simon Kuznets and Yale’s Economics Department head Lloyd Reynolds and with an initial \$2 million dollar gift of the Ford Foundation, the Economic Growth Center was originally established as an inter-university center housed at Yale. By the time Gary Saxonhouse decided to stay at Yale to pursue his PhD in economics, however, the Economic Growth Center had largely become an all-Yale organization that left an enduring influence on his formation as a scholar of economic growth.⁵

Among others, Reynolds recruited Gustav Ranis to Yale in 1961 after meeting Ranis in Pakistan, where Ranis was serving as Director of the Pakistan Institute of Development Economics. After being on campus for four years, Ranis took a leave from Yale to become Assistant Administrator for Program and Policy, Agency for International Development (AID), at the U.S. Department of State between 1965 and

⁵ “Connivance” is the word used by Gustav Ranis in his history of the center given orally at the center’s 50th anniversary celebration. According to Ranis, Reynolds, a labor economist, had taken a leave from Yale in the late 1950s to work at the Ford Foundation, and Kuznets saw Reynold’s service at Ford as an opportunity to obtain major resources for an inter-college (more properly, an inter-Ivy) “Center for the Quantitative Study of Economic Structure and Growth” that would carry out interdisciplinary research and assemble a common database of economic indicators of 25 nations that could be used to understand the phenomenon of growth. Reynolds returned to Yale and became the Economic Growth Center’s founding director, which began operations in 1961. As Ranis notes in his brief account, the Ford Foundation continued to fund the Yale Economic Growth Center and eventually made a parting gift to the Center intended as permanent endowment, which Yale’s central administration matched on a two-to-one basis. For a transcript of Ranis’s 50th anniversary address, see <<http://www.econ.yale.edu/~egcenter/50th-2011/RanisEGC50th.pdf>>.

1967. Upon his return to Yale in 1967, he succeeded Reynolds as Director of the Economic Growth Center, serving until 1975. Ranis had demonstrated an early and passionate interest in Japan's early industrialization and economic development, so he would naturally been supportive of any bright economics graduate student who showed an interest in Japan and its economic growth.⁶

Ranis's first-hand knowledge of Japanese economic development paled in comparison to that of Saxonhouse's mentor, Hugh Patrick, Yale Economics Department's Japan specialist. Like Saxonhouse, Patrick had attended Yale as an undergraduate, where he majored in mathematics, economics, and philosophy, but the Korean War had removed him from New Haven and delivered him to Japan, where he served for two years on a civilian project for the U.S. Army (he had been classified as 4F in the Selective Service system). There, Patrick became enamored with Japanese culture, society, and economic development and was married to a Japanese woman who would bond him to Japan in a very personal way. Upon completion of his service obligation, Patrick earned a M.A. in Japanese Studies at the University of Michigan, which included a mix of history, literature, and economics. As Patrick noted, "Some really outstanding professors got me very excited about economics,"⁷ so he stayed at Michigan and earned his Ph.D. in economics in 1960 after completing a dissertation on the Japanese banking system, which had taken him to Tokyo and into the inner workings of the Bank of Japan in 1957–1958. When Yale University, among several universities, offered him a position in 1960, he chose to return to New Haven because the Economics Department would permit him "to teach and do research on the Japanese economy" rather than teaching the usual introductory course in economics.⁸ With Japanese language skills, a Japanese wife, some three years of work and research in Japan, including a year of work inside the Bank of Japan, Patrick was not only passionate about pursuing research studies on Japanese economic development,⁹ but he was also a brilliant institution builder and a strong, guiding mentor.

As a junior at Yale who was intensely interested in economic development issues, Gary Saxonhouse took Patrick's course on the Japanese economy.¹⁰ There he learned

⁶ cv_ranis.pdf, downloaded 9/15/2013. For an early expression of his interest in Japanese economic development, see Gustav Ranis, "The Community-Centered Entrepreneur in Japanese Development," *Explorations in Entrepreneurial History* 8 (1955): 80–98.

⁷ "Personal Recollections by Hugh Patrick: An Interview by Edward J. Lincoln," *Journal of Japanese Studies* 31 (2005): 121–40. Quotation appears on p. 122. Most of our biographical information on Patrick derives from this published interview and from Hugh Patrick, "The Development of Studies of the Japanese Economy in the United States: A Personal Odyssey," Center on Japanese Economy and Business, Columbia University, Working Paper 141, 1998. The latter also appears in Part III, Finale, Chapter 13, in Masahiko Aoki and Gary Saxonhouse, eds., *Finance, Governance, and Competitiveness in Japan* (Oxford: Oxford University Press, 2000).

⁸ Hugh Patrick, "A Personal Odyssey," p. 3.

⁹ In a published interview with another of his former Yale/Japan-specialist Ph.D.s, Edward Lincoln, Patrick emphasized that as a Yale faculty member, he was able to win summer grants from such foundations as Ford and Rockefeller and various government agencies that he always spent summers doing research in Japan, which surely worked well for his wife as well. See "Personal Recollections by Hugh Patrick," p. 126.

¹⁰ Hugh Patrick, unrecorded telephone interview with Serguey Braguinsky, 1 October 2013.

from a passionate specialist how extraordinary Japanese economic development was, as the majority of American consumers would in the following decades as “the Japanese miracle” stormed the U.S. market in textiles, consumer electronics, and automobiles, among other products. Seemingly, the die had been cast. By the time Gary Saxonhouse became a graduate student, Patrick had created with Harvard economic historian Henry Rosovsky and Columbia’s James Nakamura the Japan Economic Seminar, “an inter-university assemblage of faculty, advanced graduate students, and visiting scholars from Japan,” who gathered on eight Saturdays during the school year to formally discuss and critique two papers and then to top it off with dinner together, which built strong bonds among regulars and visitors as well.¹¹ Under Patrick’s guidance, Saxonhouse became a regular fixture at the Japan Economic Seminar.¹²

One additional member of Yale’s faculty would strongly influence Saxonhouse: economic historian William N. Parker.¹³ Though his own research focused on American economic history, Parker’s teaching interests ran more broadly, and he focused students’ minds on questions of processes of economic growth, industrialization, technological change, and innovation. Parker was also a champion of the New Economic History, what some would call “economic history for (and by) economists” or, more commonly, “Cliometrics” in reference to conscious testing of arguments and hypotheses with quantitative, especially econometric, methods.¹⁴ As

¹¹ The quotation is from Hugh Patrick, “A Personal Odyssey” p. 4. Patrick also discusses the work and importance of the Japan Economic Center in “Personal Recollections by Hugh Patrick,” pp. 133–34.

¹² Patrick, unrecorded interview by Serguey Braguinsky, 1 October 2013.

¹³ Parker’s influence on Saxonhouse is emphasized in *Ibid.*, and Arlene Saxonhouse to David A. Hounshell, email of 16 September 2013. That Gary Saxonhouse joined with Gavin Wright to produce a *Festschrift* for Parker is evidence enough, however. See Gary Saxonhouse and Gavin Wright, eds., *Technique, Spirit, and Form in the Making of the Modern Economies: Essays in Honor of William N. Parker*, Research in Economic History, Supplement 3, JAI Press, 1964. We note that in 1977 one scholar described Parker as “the dean of the cliometricians.” See Michael Greenberg, “The New Economic History and the Understanding of Slavery: A Methodological Critique,” *Dialectical Anthropology* 2 (1977): 131–41. On Parker’s role and fervor in championing the New Economic History, see also William C. Sundstrom, “An Interview with Nathan Rosenberg,” *Newsletter of the Cliometric Society* 9, no. 2 (October 1994): 3–6, 27–29 and Paul Rhode, “An Interview with William N. Parker,” *Newsletter of the Cliometric Society* 6, no. 2 (1991): 3–8, 19–25.

¹⁴ For discussions of Cliometrics’ early days most relevant in the context of this paper, see Douglass C. North’s EHA Presidential Address given at the same meeting at which Saxonhouse delivered “A Tale”: “Beyond the New Economic History,” *The Journal of Economic History* 34 (1974): 1–7. In his address, North claimed, “The research [of the cliometricians] has been more destructive than constructive. We have destroyed a number of older explanations but we have not replaced them with an explanation of the way economic change has occurred in any systematic fashion. If we have found slavery profitable, railroads less than essential, and the net burden of the Navigation Acts ‘light,’ we have not said what did make the system go—or what did change the distribution of income.” Quotation appears on p. 2. Stanley L. Engerman’s “Recent Developments in American Economic History,” *Social Science History* 2 (1977): 72–89 offers a more restrained assessment. See also the highly perceptive

Cliometricians ransacked one after another of the “old chestnuts” that non-quantitative historians had for years invoked to “explain” economic growth in history, the New Economic History raced through the ranks of the Economic History Association, largely driving out members of the old guard who were not comfortable with quantitative methods and, perhaps, the zealotry of some of its most prominent practitioners.

Exactly when during his undergraduate days at Yale Gary Saxonhouse determined to pursue graduate study in economics; to work with Patrick and become a Japan specialist, which by definition according to Patrick meant becoming fluent in Japanese and doing extensive research in Japan; to emphasize economic history; and to write a dissertation on the early Japanese cotton spinning industry are all unclear. Saxonhouse’s long-time spouse, Professor Arlene Saxonhouse, relates a family story about an incident that solidified in Gary Saxonhouse’s mind his decision to become a Japan specialist:

The story that I like the best and that Gary would generally tell was that he was reading the *NY Times* one day and there was a picture on the front page of an apartment complex [in Japan] with women sitting on benches rocking their baby carriages. The scene reminded him of where he grew up in Rego Park, New York. He was struck at how similar the two seemed and wondered how a culture that was so different from what he experienced as a child could come to look so much like [what] he knew.¹⁵

But as Arlene Saxonhouse also stressed, her husband had also developed a strong interest in econometrics, which is also not surprising given Yale’s firepower in econometrics. Perhaps best symbolized by the permanent move of the Cowles Commission, along with many of its most notable economists, from the University of Chicago to Yale’s Economics Department in 1955, econometrics had become an increasing focus of the department. During its two-decade residence at Chicago, the Cowles Commission had been one of the chief centers for the development of econometrics and economic theory, proudly espousing the motto, “Science is Measurement.” At Yale, James Tobin took immediate charge as director of the renamed “Cowles Foundation for Research in Economics,” but he also switched off twice with Tjalling Koopmans, who had come from Chicago and made fundamental contributions to mathematical economics, econometrics, and statistics, beginning with his own dissertation, “Linear Regression Analysis of Economic Time Series” (1936). During the 1960s, with the founding of the Economic Development Center at Yale in 1961, Koopmans became interested in the theory of economic growth (reportedly clashing repeatedly and hotly with Simon Kuznets around issues of theory versus

review of Robert Fogel and Stanley Engerman’s edited volume, *The Reinterpretation of American Economic History* (New York: Harper & Roe, 1977) in *The Journal of Economic History* 32 (1972): 566–69 for its description of the cliometricians’ missionary zeal, whose essays “are bloody with the corpses of myths and ‘traditional’ accounts—the Marxist belief in rising unemployment, the myth of the land speculator, the Axiom of Indispensability, the Phillips-Ramsdell tradition on slavery, and many more.” Quotation appears on p. 567.

¹⁵ Arlene Saxonhouse to David A. Hounshell, email of September 17, 2013. We have unsuccessfully searched the *New York Times* database in an attempt to find the photograph that inspired Gary Saxonhouse.

data). This new interest led Koopmans to work on optimal allocation of economic resources over time rather than devoting most of his time collaborating with colleagues to further formal mathematical economics and econometrics. As Herbert Scarf would write, “By 1960 the battle had been won; the troops no longer had to be massed for assaults on exposed positions. Mathematical reasoning had become an accepted mode of exposition for economic arguments, and the members of the Cowles Foundation felt freer to pursue their own individual substantive interests.”¹⁶ Reflecting the new freedom to pursue individual interests, Herbert Scarf, an operations research specialist and game theorist, succeeded Tjallings as director of the Cowles Foundation in 1967, serving in this position until 1971, the year that Saxonhouse submitted his dissertation.

Saxonhouse’s choice of a dissertation topic—the Japanese cotton spinning industry in the Meiji period—surprised his mentor Hugh Patrick, who thought he would select “a more contemporary topic.”¹⁷ Gustav Ranis may have introduced Saxonhouse to the topic in a general way, for Ranis had emphasized the role of the Japanese cotton textile industry in leading Japan’s economic development.¹⁸ But as both Hugh Patrick and Arlene Saxonhouse have emphasized, Gary Saxonhouse’s discovery that the Japanese cotton spinning industry and the Meiji government had gathered, tabulated, and published systematic industry- and firm-level data on cotton spinning so deeply impressed him and offered him such possibilities for rigorous econometric analyses that he knew he had found the right topic for a dissertation combining economic history, early industrialization and economic development study, and econometric analysis.¹⁹ A year of research in Japan, which included archival

¹⁶ Herber E. Scarf, “Tjalling Charles Koopmans, 1910–1985. A Biographical Memoir,” in *National Academy of Sciences Biographical Memoir*, Vol. 67, 1995, pp. 285–86, National Academies Press, Washington, D.C.

¹⁷ Patrick, unrecorded interview with Serguey Braguinsky, 1 October 2013.

¹⁸ At the same time, the high-profile, hotly debated study of the 1960s by W.W. Rostow, *The Stages of Economic Growth* (Oxford: Oxford University Press, 1960), had identified the cotton textile industry as one of Japan’s “leading sectors” that helped drive that nation into sustained economic growth. As did development economists and economic historians of every other country included in Rostow’s analysis, Japan specialists immediately contested both Rostow’s details of and conclusions about Japanese economic development. Thus, for a budding young scholar interested in the subjects of Japanese economic development and Japanese economic history, there was a wealth of fodder to chew on and sort out. See Yoichi Itagaki, “Criticism of Rostow’s Stage Approach: The Concepts of Stage, System and Type,” *The Developing Economies* 1, no. 1 (1963): 1–17, for a review of Japanese criticism contemporaneous to Saxonhouse’s studies at Yale. Of course, other critical works that economic development and economic history students at Yale would have read included Bert F. Hoselitz’s edited volume, *Theories of Economic Growth* (New York: The Free Press, 1960), and Alexander Gershenkron’s *Economic Backwardness in Historical Perspective: A Book of Essays* (Cambridge: Harvard University Press, 1962).

¹⁹ Arlene Saxonhouse to David A. Hounshell, email of 17 September 2013; Patrick, unrecorded interview by Serguey Braguinsky, 1 October 2013. Gary Saxonhouse’s initial decision to become a Japan specialist meant that he first had to acquire language proficiency. In the summer of 1967, he began studying Japanese at Harvard University immediately after passing his Preliminary Examinations. At roughly the same time, he

research at the All Japan Spinners Association, Kanegafuchi Spinning Company, and Tōyō Spinning Company, plus additional archival research in England at textile machine makers Platt Bros., Oldham, and Howard and Bulloughs, Accrington, provided Saxonhouse with a wealth of data that he would subsequently use in his doctoral dissertation, “Productivity Change in Japanese Cotton Spinning Industry, 1891–1935,” and throughout much of his career. He submitted his dissertation in 1971, noting in his acknowledgements that “my supervisors, Professors [Charles W.] Bischoff, [Hugh] Patrick and [Gustav] Ranis [had] patiently waited for the completion of this study.”²⁰ Bischoff’s role in Saxonhouse’s graduate education and as a member of his dissertation committee is not completely clear. At the time Saxonhouse submitted his dissertation, Bischoff was a junior member of the Economics Department faculty and a specialist in econometrics who had published four papers that appeared in the Cowles Foundation for Research’s Economics Reprint series.²¹

Saxonhouse’s dissertation summary provides an interesting perspective on where his graduate education and doctoral research had taken him and, perhaps, how conventional his advisors’—and the economic job market’s—expectations were of him. Because the summary is so short, we reproduce it in its entirety:

“This dissertation attempts to provide an econometrically based explanation of productivity change and labor absorption in the Japanese cotton spinning industry 1891–1935. Using firm data[,] the familiar conventional production model is estimated for each of forty-four years. The resulting time series of conventional production function parameters are regressed on specially constructed time series which reflect changes in spinning firm management’s experience and education, workers’ experience and education, age of the machinery being used, and working conditions. It is found that the role of worker experience and education and working conditions in the explanation of productivity change and labor absorption can be large and pervasive. Management’s education seems to play a more limited role. The other two factors listed above [i.e., management’s experience and age of machinery being used] have no role to play at all. The results here emphasize the importance of labor force characteristics at the expense of managerial expertise and new machinery. By tracing the influence of these characteristics through the conventional production function

applied for a fellowship from the Social Science Research Council for doctoral research in Japan, which he subsequently received. During the academic year 1967–1968, he continued his Japanese language studies at Yale right up to April 1968, when he and Arlene departed for Japan with SSRC support. Arlene Saxonhouse to David Hounshell, email of 17 September 2013

²⁰ Gary R. Saxonhouse, “Productivity Change in Japanese Cotton Spinning Industry, 1891–1935” (Ph.D. diss., Yale University, 1971). The archival sites that Saxonhouse visited are listed in his Acknowledgements.

²¹ We assume that Bischoff advised Saxonhouse on the dissertation’s econometrics. Hugh Patrick’s unrecorded telephone interview by Serguey Braguinsky, 1 October 2013, supports this view. For a list of Bischoff’s Cowles Foundation’s downloadable papers. see <<http://cowles.econ.yale.edu/P/au/b.htm>>. According to a Google search (1 October 2013), Bischoff earned his Ph.D. in economics from MIT in 1968 and is now Emeritus Professor of Economics at SUNY Binghamton <<http://www.binghamton.edu/economics/people/emerti/bischoff.html>>.

parameters it becomes possible to gain some understanding of the industry's alternating episodes of complementarity and conflict between the social objectives of economic growth and labor absorption."

As Saxonhouse makes clear in his introductory chapter, his study centered on the then-current debates surrounding economic growth accounting models exemplified perhaps most readily by that put forth by Robert Solow in his 1957 paper, "Technical Change and the Aggregate Production Function," and labor absorption theory exemplified most immediately by the work of one of his own mentors, Gustav Ranis. After taking into account both changes in labor and capital as sources for productivity growth in the American economy between 1909 and 1949, Solow found a surprisingly large "residual," which he suggested could be attributable to "technical change" and which seemed to account for the lion's share of growth.²² Throughout Saxonhouse's years at Yale, Ranis, and Ranis's colleague from his Pakistan Institute of Development Economics days, J.C.H. Fei, a theoretically-oriented development economist, had done joint work on Japan's labor absorption, inspired in part by Solow's paper.²³ Their findings paralleled those of Solow; Japan's labor absorption (i.e., growth of the work force) through 1915 was not fully accounted for by its capital inputs. Ranis and Fei, too, had found a residual and identified it as technological change.

Ranis and Fei's work was heavily disputed both in Japan and the United States. Economists in Japan contested their model's assumption that in the pre-World War I period, Japan's labor supply was unlimited and also disputed the manner in which they had built their data series both for labor and capital stock. Jeffrey G. Williamson found Ranis and Fei's model wanting, maintaining that, in Saxonhouse's words, "the appropriate framework should have the relative growth of inputs as a function of the relative change in factor prices."²⁴ These criticisms notwithstanding, Saxonhouse observed, in neither the literature on accounting for productivity growth (a la Solow) nor the work on labor absorption (a la Ranis and Fei) had any systematic attempt been made to determine the factors that accounted for the observed residuals. As Saxonhouse boldly concluded, "Only if we can determine, on the basis of tests of some power and generality, how non-conventional inputs enter into [the] production

²² Robert Solow, "Technical Change and the Aggregate Production Function," *Review of Economics and Statistics*, 39, no. 3 (1957): 312-20. Some of Solow's readers were much surer that the residual was technological change than Solow himself believed. In addition to Solow's work of 1957, a year earlier Moses Abramovitz had identified technical change as an outstanding factor in accounting for the growth of the U.S. economy. See Moses Abramovitz, "Resource and Output Trends in the United States Since 1870," *American Economic Review Papers and Proceedings* 46 (1956): 5-23.

²³ J.C.H. Fei and Gustav Ranis, "Innovation, Capital Accumulation and Economic Development," *American Economic Review* 53, No. 3 (1963): 283-313, and Gustav Ranis and J.C.H. Fei, "Theory of Economic Development," *American Economic Review* 51, No. 4 (1961): 533-565. Fei and Ranis, *Development of the Labor Surplus Economy: Theory and Policy* (Homewood, Ill.: Richard D. Irwin, Inc., 1964). John C. H. Fei and Gustav Ranis, "Economic Development in Historical Perspective," *American Economic Review* 59, 2 (1969): 386-400. On Fei, see Gustav Ranis, "Reflections," Yale Economic Growth Center Discussion Paper 786, December 1997.

²⁴ Saxonhouse, "Productivity Change in Japanese Cotton Spinning Industry, 1891-1935" (Ph.D. diss., Yale University, 1971), p. 22.

function can the demands of scientific [proof of] labor absorption analysis and economic growth accounting be met.”²⁵

In the second chapter of his dissertation, Saxonhouse proceeded to develop analytically an alternative to the attempts made to include non-conventional inputs in production functions. Prior work had simply included non-conventional factors as if they were completely symmetrical to capital and labor factors and had assumed that when a conventional input embodied a non-conventional input, it augmented the former. Instead, Saxonhouse developed a model that treated the traditional production function as being conditioned by non-conventional inputs. By doing so, he argued, he would be able to estimate empirically, even with relatively limited data, a new production function. He would do this by estimating conventional production function parameters for each period covered by his data; then, this series of parameters would be regressed using a data set of non-conventional inputs. The history of the Japanese cotton spinning industry would provide the necessary data on capital, labor, productivity change, and a variety of non-conventional factors²⁶ with which he would estimate a new production function that properly accounted for these non-conventional factors the industry’s total output. Saxonhouse’s framing of the residual problem thus drove the research he conducted in Japan and England that was necessary to carry out his estimations.

In executing his model with the data he had gathered in Japan and England and then analyzing his results, Saxonhouse found that several of the non-conventional factors he had enumerated in his design actually provided considerable explanatory power in dealing with the residuals that were unexplained using conventional production functions. Two unconventional factors—age of capital stock being used and management experience—provided no explanatory power, while management’s technical education had only a small amount of significance.

The results of Saxonhouse’s six-chapter dissertation must have pleased both Gustav Ranis, whose work with Rei had served to set up the big issue being addressed in the dissertation, and Hugh Patrick, the Japan specialist who had inspired Saxonhouse to also become a Japan specialist with a strong preference for economic history. But publication of the results of his dissertation would require Saxonhouse to reconfigure and carve up the work. One thing he would definitely have to do would be to comprehend much more clearly the “technology” dimension of his findings—and the technology dimension of the history of the Japanese cotton spinning industry. This would be one of his first tasks after settling into a tenure-track position in the Economics Department at the University of Michigan from which his mentor Hugh Patrick had come.

Saxonhouse used the occasion of the 33rd Annual Meeting of the Economic History Association in mid-September 1973 and its theme, “The Diffusion of New Technologies,” as the vehicle through which he would interpret the technological dynamics of the Japanese cotton spinning industry. For a session entitled “Agencies for Diffusion of Technology,” chaired by technology specialist Nathan Rosenberg, who was also the incoming Editor of the Association’s *The Journal of Economic History*, Saxonhouse proposed a paper with the daunting title, “Diffusion of Technology in Japanese Industry in the Meiji Period.”²⁷ By the time his paper

²⁵ Ibid, p. 24.

²⁶ Saxonhouse would focus on six such factors, which he enumerated in his above-quoted dissertation summary.

²⁷ The other two papers in the session were Yujiro Hayami, “Conditions for the Diffusion of Agricultural Technology: An Asian Perspective,” and Mira Wilkins, “The

appeared in the March 1974 *JEH*, traditionally called “The Tasks of Economic History” issue, Saxonhouse had retitled his contribution “A Tale of Japanese Technological Diffusion in the Meiji Period” and narrowed its focus to the Japanese cotton spinning industry.

At least in its published version, Saxonhouse’s paper bears the unmistakable imprint of Nathan Rosenberg and his Yale mentor in economic history, William N. Parker. In what is probably the strongest section of the paper (section three), which exploits qualitative data and offers an analytical narrative, Saxonhouse explicitly acknowledges Parker’s unpublished paper, “The Social Process of Diffusion,” as [a]n excellent example of the fruits of this now almost abandoned approach” to economic history. Moreover, he went further: “Much of this section of my paper draws on the spirit implicit in Parker’s analysis.”²⁸ A recently published article by Nathan Rosenberg, however, appears to have inspired Saxonhouse’s overall framing of his paper, just as it served to frame the overall theme of the EHA conference and particularly the session at which the paper was presented.

In “Factors Affecting the Diffusion of Technology,” Rosenberg declared, “The rate at which new techniques are adopted and incorporated into the productive process is, without doubt, one of the central questions of economic growth”²⁹ After providing an impressive historical review of the dynamics of technological diffusion and factors affecting it, Rosenberg devoted his last main section to “Diffusion and its institutional context.” Here he noted:

“Ever since Abramovitz and Solow opened up the problem of ‘The Residual,’ economists have been attempting to sort out the contributions of various factors to economic growth and, particularly, to measure the contribution of technological change as distinguished from all other possible factors. Whereas the entire residual was for some time uncritically attributed to technological change (although not by Abramovitz or Solow) a later, more discriminating approach has attempted to isolate other factors—changes in organization, improvements in the quality of the labor force, etc.—and to measure their separate contributions. In this difficult but essential process of ‘cutting technological change down to size,’ however, there is a danger of going too far, by assigning an independent and separate role to factors which really exert their effects upon the growth of productivity by retarding or accelerating the rate of technological diffusion.”³⁰

Role of Private Business in the International Diffusion of Technology,” with Kozo Yamamura commenting. For the full program of the EHA’s meeting, see the Front Matter of *JEH*, 33, 2 (June 1973) at <http://www.jstor.org/stable/2116683>.

²⁸ Footnote 29, p. 158, “A Tale.” Thanks to the good work of Gavin Wright and his network of other Parker students who studied at Yale in the era Gary Saxonhouse was there, we have had an opportunity to read several published and unpublished papers written by Parker dating to this era that probably bear much of the content and style of Parker’s thinking about technical change, technology diffusion, and economic growth. But we have not yet located the exact paper (or “mimeo”) cited by Saxonhouse.

²⁹ *Explorations in Economic History* 10 (Fall 1972): 3–33. Quotation appears on p. 3.

³⁰ *Ibid*, p.29.

In an unusually extensive criticism, Rosenberg provided a “recent example” of economists’ going too far: Douglas C. North’s “otherwise admirable” article, “Sources of Productivity Change in Ocean Shipping, 1600–1850,” which argued that reduction in piracy and organizational improvement explained most of the productivity increase measured during this period and that technological change played little or no role.³¹ Quoting North’s main argument at length in which North said that a superior ocean vessel had been developed in the Baltic region by 1600 but had not been adopted in Atlantic and Pacific shipping because of the prevalence of piracy, Rosenberg argued, “The trouble with this paragraph is that the diffusion [of technology] process has been completely lost from view.” North, Rosenberg stressed, “in his legitimate concern with deflating the overblown spectre of technological change, gives the impression—doubtless unintended—that it was scarcely of any significance whatever in the period with which he is concerned.”³²

Rosenberg expressed considerable irritation that Robert Fogel and Stanley Engerman had “regularly” trumpeted North’s argument, quoting them in at least two instances, such as, “In the case of ocean shipping, Douglass North . . . found that a rapid and protracted increase in total factor productivity took place despite the absence of a single major *new* invention” and “[t]hus *new* equipment plays virtually no role in Douglass North’s explanation . . .” Rosenberg then nailed down his own argument about the role of institutions in technological diffusion:

“But if a superior ship designed specifically for improved cargo carrying capacity had been developed by 1600, it is no verbal quibble to say that the improvements in ocean shipping productivity due to the eventual adoption of this design should correctly be regarded as belonging to the category of technological change. The portion of North’s paper dealing with piracy is not an explanation of productivity growth, which is *independent* of technological change, although it is frequently made to sound that way. Rather it is a cogent and forceful explanation for the very slow *diffusion* of a major technological innovation.”³³

Thus, as the chairperson of the session devoted to the agencies for technological diffusion, as a scholar particularly interested in understanding factors affecting the rate of diffusion, and as incoming editor of *JEH*, Nathan Rosenberg unquestionably affected the way in which Gary Saxonhouse framed his paper dealing with Japanese cotton spinning.³⁴

Although the structure of “A Tale” is not as clearly delineated as it might have been, Saxonhouse sought to highlight two main factors affecting the diffusion of

³¹ *Journal of Political Economy* 76 (1968): 953–70.

³² *Ibid*, p 31.

³³ *Ibid*, pp. 32–33. Rosenberg had identified the offending statements of Fogel and Engerman in their volume, *The Reinterpretation of American History* (New York: Harper and Row, 1971), pp. 5, 206.

³⁴ Of course, Saxonhouse cites Rosenberg’s paper (and the paper by Douglass North) in “A Tale” (immediately before he cites William N. Parker’s manuscript), in footnote 28, p. 158.

spinning technologies in the Japanese cotton spinning industry in the Meiji period. First, he wanted to convey that the transfer of British spinning technology to Japan and its diffusion throughout the emergent Japanese cotton spinning industry was “extremely rapid” and thorough.³⁵ Second, he sought to explain why this was so. Specifically addressing the theme of the conference session, Saxonhouse identified “the unique institutional arrangements which facilitated such diffusion.”³⁶ In doing so, he relied upon the arguments and evidence that were reasonably well known to Japanese-reading students of Japanese economic history: that the formation and effectiveness of an association of firms in the cotton spinning industry named Dai Nihon Bōseki Rengōkai (All Japan Cotton Spinners Association), known simply by its acronym, Bōren, largely explained why British technology diffused so rapidly in the industry. In terms familiar to economists, the mechanism of Bōren’s influence on technological diffusion was in lowering of transaction costs, specifically lowering the “costs associated with acquiring information about new technologies.”³⁷ As to the significance of cotton spinning to Japan’s economic growth, Saxonhouse succinctly stated the case:

This industry was the main Japanese manufacturing activity during much of the first third of the twentieth century. Indeed, the development of this industry culminating in the astonishing ascendance of Osaka over Lancashire stands as the first completely successful instance of Asian assimilation of modern Western manufacturing techniques.³⁸

Saxonhouse divided his paper into four main sections, with the fifth serving as short conclusion. In the first section, Saxonhouse recounted the establishment of Osaka Spinning Company in 1883, which “combine[d] what came to be the ingredients of a successful cotton enterprise in Japan”³⁹: comparatively large scale (i.e., a large number of spindles), up-to-date British-made spinning equipment laid out by British spinning mill engineers, adequate steam power rather than unpredictable waterpower, double labor shifts made possible by the installation of electric lighting, and a Japanese manager who had worked in a British spinning mill and who had studied the cotton spinning industry. As Saxonhouse emphasized, “The records available on the Japanese cotton spinning industry are so complete that it can be stated unequivocally that every mill subsequently established, and many were established, mimicked the leader [i.e., Osaka Spinning Company].”⁴⁰

He then provided several anecdotes that underscored the speed and thoroughness of technology diffusion in the Japanese cotton spinning industry. Firms that soon followed Osaka Spinning Company ordered the same type of spinning mules from the Platt Brothers textile machinery company of Oldham, Lancashire, England, as had

³⁵ Saxonhouse selected the modifiers “extremely rapid” in “A Tale,” p. 150 and (set off in quotation marks) “super-fast” on p. 159 to describe the speed of diffusion of state-of-the-art spinning technology in Japan after the mid-1880s.

³⁶ “A Tale,” p. 150.

³⁷ “A Tale,” p. 159.

³⁸ “A Tale,” p. 150.

³⁹ “A Tale,” p. 150.

⁴⁰ As explained in the main text, this is not fully accurate. Saxonhouse also left out one other important ingredient in Osaka Spinning Company’s success: it was a joint stock company with transferable shares and limited liability for its stockholders.

Osaka Spinning. When it later became clear that American-style ring-spinning frames would better suit the Japanese factors of production and several leading firms switched their Platt Brothers orders from more mules to new ring frames, all other firms followed. Virtually every new Japanese cotton-spinning mill bought Platt Brothers-made ring frames in what became exponential growth of the industry in the late Meiji period. If one Japanese mill found ways to expand production or lower costs through minor technological changes, as one British engineer quoted by Saxonhouse noted, “We can expect that the entire [Japanese] industry will follow suit.”⁴¹ By constructing and interpreting two tables showing percentages of Japanese mill orders given to English textile machinery manufacturers for two particular technologies (hank-cop reels and bundling presses), Saxonhouse drove home how the Japanese firms behaved in terms of both followership of lead innovators and also emulation (i.e., domestic production of such ancillary equipment).⁴² Saxonhouse summed up his qualitative findings:

“What is emerging here is a historical example which fits a much less sophisticated view of technological diffusion than economic historians have recently become accustomed to accepting. There do not appear to be any great technological puzzles which demand rationalization. Seemingly inferior techniques do not continue to be embodied in the industry’s new investment. Older techniques from which it would appear no quasi-rents could be squeezed do not remain unscrapped.”⁴³

Although Saxonhouse concluded that “[t]he foregoing evidence is most persuasive,” he was not content to rely solely upon anecdotal evidence to make the case for the rapid diffusion of cotton spinning technology among Japanese firms. Despite the “unequivocally” clear qualitative evidence in the records of the Japanese cotton spinning industry, Saxonhouse devoted the second main section of his paper to “additional and more systematic examination [i.e., quantitative proof] of the issue of uniformity of practice among Japanese cotton spinning firms” Saxonhouse’s quantitative exercise seems quite a kludge from the vantage point of twenty-first century statistical methods and standard statistical software packages. From the vantage point of his listeners in 1973 and readers of his article after its appearance in March 1974, however, the work surely passed muster for its *Cliometrics*, which had become *de rigueur* in economic history. Both the nature of the quantitative data Saxonhouse had gathered in Japan (some firm-level and some industry-level) and the computing power available in his day prevented him from using a linear regression model that directly tested what was the most straight-forward, rigorous statement of the null hypothesis.⁴⁴ Therefore, he constructed an alternative “homogeneity of practice hypothesis” for thirty firms in the industry over a 45-year period that yielded a result that, technically speaking, still did not allow him to reject the null hypothesis. In the end, lamented Saxonhouse, “I choose to interpret the result as supporting the hypothesis of substantially uniform technical and managerial practice throughout the industry.”⁴⁵ Thus, ironically, Saxonhouse’s statistical analysis of quantitative data on

⁴¹ Letter from Dohrenfeld to Platts, July 25, 1889 quoted in “A Tale,” p. 154.

⁴² Tables 1 and 2, “A Tale,” p. 155.

⁴³ “A Tale,” p. 153.

⁴⁴ Saxonhouse does state the straight-forward null hypothesis in footnote 25, p. 158, of “A Tale.”

⁴⁵ “A Tale,” p. 158.

the Japanese cotton spinning industry's homogeneity of practice was hardly more convincing, in spite of his commitment to scientific rigor and Cliometric practice, than the abundant qualitative evidence he had gathered in Japan and England, which he had only partially marshaled in the preceding section. Moreover, though not formally proved, his homogeneity of practice hypothesis was but one part of a two-part argument about technological diffusion in Japanese cotton spinning—that the diffusion was extremely rapid and that it was uniformly the same (presumably cutting-edge) technology.

Only in his third section did Saxonhouse get down to the real business of the paper and the focus of the paper session in which he had presented it: “the role of institutional development in the explanation of [Japanese cotton spinning] technology diffusion.”⁴⁶ His discussion here was based entirely on qualitative historical data and devoted entirely to the role of the All Japan Cotton Spinners Association (Bōren) in facilitating the transfer of best-practice spinning technology to and its diffusion within Japan. Bōren's creation and operation over a very long period of modern Japanese history had not only facilitated the rapid diffusion of relatively homogeneous best-practice spinning technology within the Japanese cotton spinning industry, but its systematic collection and analysis of data had been critical to this process—and to Saxonhouse's project. This is the section in which Saxonhouse narrates—or *tells*—the *tale* of the incredibly swift rise of the Japanese cotton spinning industry from near-feudal practice in a non-Western culture to become the world's leading manufacturer of cotton textiles. The regular reports, meeting minutes, and other records of Bōren, recast in the language of modern economic development, made for an absorbing—and compelling—story. This was true, even though Saxonhouse perhaps worried that he had been unable to demonstrate quantitatively his claims about the diffusion of best-practice cotton spinning technology in Japan. Diffusion of pretty much the same technology was “super-fast,” and it stemmed from the manner in which a single, remarkably effective organization (Bōren) had been able to dramatically lower the costs of information to entrepreneurs and investors entering the industry. Indeed, this section demonstrates how only through a deep reading of the history of this industry and the national and international context in which it developed could a student of Japanese economic development such as Saxonhouse truly comprehend just how remarkable and tale-like this history is.⁴⁷

By deeply reading and understanding the qualitative history of Japanese cotton spinning during this era, Saxonhouse positioned himself to extemporize in the paper's fourth section on the mechanisms that might have been at work in this “tale.” Was the “extremely low” cost (“by international standards”) of technological information available to “any given Japanese spinning firm” socially optimal or suboptimal? What about intellectual property practices, and how did they interact with the flow of technological information and incentives to innovate? If free-flowing information sharing about technological practices at the best-practice frontier was indeed the case in Japan, did any negative consequences accompany this information sharing? On this question Saxonhouse drew from his dissertation work and his chapter in his mentor

⁴⁶ “A Tale,” pp. 158–59.

⁴⁷ Moreover, that Gary Saxonhouse and his fellow Yale economic history grad student and later Michigan colleague Gavin Wright became life-long students of the history of cotton spinning technology and the cotton spinning industry as it diffused throughout the world in the nineteenth and twentieth centuries provides abundant evidence of just how deeply he and Wright read the history of this phenomenon.

Hugh Patrick's forthcoming volume, *Japanese Industrialization and Its Social Consequences*. Specifically he argued that the extreme uniformity of technological practice in Japan cotton spinning was somehow "linked" to the extremely high and persistent turnover rates of the female workforce in Japanese spinning mills.⁴⁸

In a very short and concluding fifth section, Saxonhouse posed several questions about why Japanese cotton spinners had cooperated so thoroughly on matters technological, why they had adopted uniform technologies procured from a sole supplier (Platt Bros.), and whether and why this proved to be profitable. These questions would remain for future exploration, much of it comparative in nature and most of it carried out over many years in collaboration with Gavin Wright. Saxonhouse concluded his first *JEH* article by echoing session chair Nathan Rosenberg: "While the study of technological diffusion has surely been pursued with great vigor in the last fifteen years[,] attention could still be profitably focused on the nature of the institutions which gather and transmit technological information."⁴⁹

Remarkably, for all its qualities in addressing issues related to technological diffusion and institutions, its display of virtuosity in quantitative analysis, and its evidence of deep reading (most of it in Japanese) of the history of the cotton spinning industry in Japan, Saxonhouse's "A Tale" is not a highly cited paper in economic history, economic development, or English language works in Japanese history. As of 1 September 2013 Google Scholar showed only 58 citations to "A Tale." Our analysis of these citations shows that at least one is in error and that nine are self-citations, with the last one being his *JEH* article with Gavin Wright, which appeared four years after Saxonhouse died. We were also surprised to learn from our citation analysis that 13 of the 58 citations from Google Scholar were by one of us (Braguinsky) and his collaborators.

Moreover, looking at the citation count to "A Tale" in Web of Science, we were shocked to see that "A Tale" has received only 18 citations, including two self-citations and three citations by one of us (Braguinsky) and colleagues.⁵⁰ Surely, we suggest, this pioneering article has had greater impact on the economic history profession—and, more broadly, on our understanding of Japanese industrialization in the Meiji and pre-WWII eras—than is indicated by citation counts. Subsequent to its publication in 1974, Saxonhouse used "A Tale" as a kind of scaffolding for different and/or broader studies of Japanese industrialization and the global diffusion of technology. Indeed, over the course of his illustrious career, in each instance in which Saxonhouse self-cited "A Tale," he displayed either more extensive research on or a deeper understanding of cotton spinning and its role in the industrialization of Japan—and other "non-Western" nations. Saxonhouse and Gavin's article in the *JEH* in 2010 constitutes a real milestone in two lifetimes of scholarship in economic history that began in Yale University's Economics Department in the late 1960s.⁵¹ Regrettably,

⁴⁸ "A Tale," p. 164 and footnote 46, pp. 164–65.

⁴⁹ "A Tale," p. 165. Indeed, owing to the work of another major thinker on the economics of technical change, Kenneth Arrow, the subfield of the economics of information was then gathering steam in the economics profession.

⁵⁰ Data on Web of Science/Web of Knowledge database downloaded 17 October 2013. There is a slight discrepancy in the data since the citation count to "A Tale" in the list of Saxonhouse publication shows 20 citations, but the succeeding two-page list of actual citations to "A Tale" includes only 18 citations.

⁵¹ Gary Saxonhouse and Gavin Wright, "National Leadership and Competing Technological Paradigms: The Globalization of Cotton Spinning, 1878–1933," *The Journal of Economic History* 70 (2010): 535–66.

Saxonhouse did not live to see and to celebrate the appearance of “National Leadership and Competing Technological Paradigms: The Globalization of Cotton Spinning, 1878–1933”; thankfully, Gavin Wright saw this incredibly extensive body of research to publication.