Historical Differences in Female-Owned Manufacturing Establishments: The United States, 1850–1880

By Ruveyda Gozen, Richard Hornbeck, Anders Humlum, Martin Rotemberg*

We characterize female-owned manufacturing establishments using newly digitized manuscripts from the US Census of Manufactures (1850, 1860, 1870, 1880). Female-owned establishments were smaller than male-owned establishments and had lower capital-to-output ratios, which could reflect more-constrained financial access and other distortions. Female-owned establishments employed more women and paid women higher wages, potentially creating a virtuous cycle between increased female business ownership and increased female labor market participation. Female-owned establishments concentrated in sub-industries like women's clothing and millinery, which is associated with some but not all of these differences. We also show how female owners differed from other women in the Population Census.

The 19th century United States experienced substantial industrial growth and technological advancement, which altered women's roles in the economy. Views into women's business ownership have been limited by data availability, however, in contrast to a larger literature on women's labor market participation (e.g., Goldin and Sokoloff, 1982). Using newly digitized records from the Census of Manufactures, we identify female-owned establishments based on owner name and links to the Census of Population.

Female-owned manufacturing establishments represent only 1% of all establishments in our data, but these 3,589 establishments still provide a view into the distinctive features of female-owned manufacturing. These historical differences complement a modern literature that explores differences between female-owned and male-owned businesses, particularly in modern developing countries (Ashraf, Delfino and Glaeser, 2023; Asiedu et al., 2023).

I. Establishment-level Data

We use the decennial Census of Manufactures (CMF) from 1850 to 1880 (see Hornbeck et al. 2024 for a description of the data coverage). Enumerators recorded establishments' name, county, industry, output value, capital value, materials costs, labor costs, and number of female and male workers. In 1850 and 1860, establishments reported female wages, and in 1870 and 1880 they reported the number of child workers. We group establishments into 33 general industries and 316 detailed industries.

We classify 3,589 establishments as female-owned using the recorded "Name of Corporation, Company, or Individual Producing Articles." We manually designate these female-owned establishments, following Gozen (2024), excluding company names. When the CMF records a unisex name or a first initial only, we assign these as male-owned establishments. This process potentially understates total female-owned establishments, but provides a cleaner comparison between (likely) female-owned establishments and (likely) male-owned establishments. When there are multiple owners, we classify the establishment as female-owned if any owner is female (2% of female-owned establishments).

We attempt to hand-link 3,349 distinct owners of these establishments to the Census of Population, using: name, county, in-

* Gozen (LSE); Hornbeck (UChicago); Humlum (UChicago); Rotemberg (NYU). We thank Sam Abers for excellent research assistance and our team at Digital Divide Data. This research was funded in part by the Neubauer Family Faculty Fellowship and the National Science Foundation under Grant Number SES-1757050/1757051. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

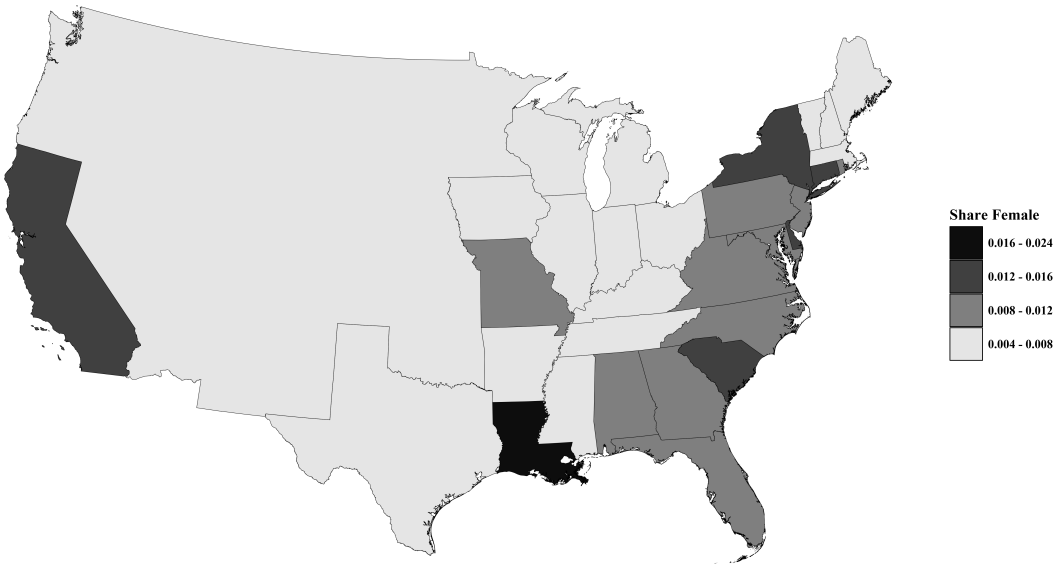


Figure 1. Female Ownership Shares Across States, 1850-1880

Note: These data are pooled across available decades for each state: GA, LA (1880 only); MD (not in 1870); all other mapped states (1850-1880); and the combined rest of the West (MN, OR Terr. in 1850; KS, NE, UT, WA Terr. and MN, OR in 1860; CO, ID, MT, UT, WA Terr. and KS, MN, NE, NV, OR in 1870; ID, Dakota, MT, UT, WA, WY Terr. and CO, KS, MN, NE, NV, OR in 1880).

dustry/occupation, and Census age. We link 1,495 to the Census of Population, and 74% of these linked owners are female.[1] For 1,085 distinct female owners, the Census of Population also provides a demographic comparison to other women in the Census.

II. Variation by State and Industry

Figure 1 shows geographic variation in the share of manufacturing establishments owned by women. Female-owned establishments were less than 2.4% of establishments in all states, though were more common along the East and Gulf Coasts and in California. In the South, the higher share of female-owned establishments accompanies a lower total number of establishments.

Figure 2, panel A, shows the 10 general industries with the highest share of female-owned establishments. Female-owned establishments are 8% of all clothing establishments, and no more than 2% in the others. In the 19th century, gender roles and social norms strongly influenced women's primary involvement in household production of clothing and food. These sectors are also particular areas of focus for women's market-focused manufacturing activity. This is similar to 19th century women inventors' focus on technologies related to household appliances and apparel (Gozen, 2024).

Figure 2, panel B, shows the 10 detailed industries with the highest share of female-owned establishments. Female-owned establishments were 40% of establishments producing women's clothing and hats (millinery), and 10-15% of establishments in hair-work and artificial flowers & feathers. This sub-industry focus could reflect greater relative experience, but also greater trust and connections with other women in these industries (Ashraf, Delfino and Glaeser, 2023; Asiedu et al., 2023).

III. Differences in Female-Owned Establishments

Table 1 reports average characteristics of female-owned and male-owned establish-

[1]The estimated differences for female-owned establishments could be divided by 0.74, to adjust for misgendered establishments in the CMF, though linkage errors to the Census of Population would understate the female share.

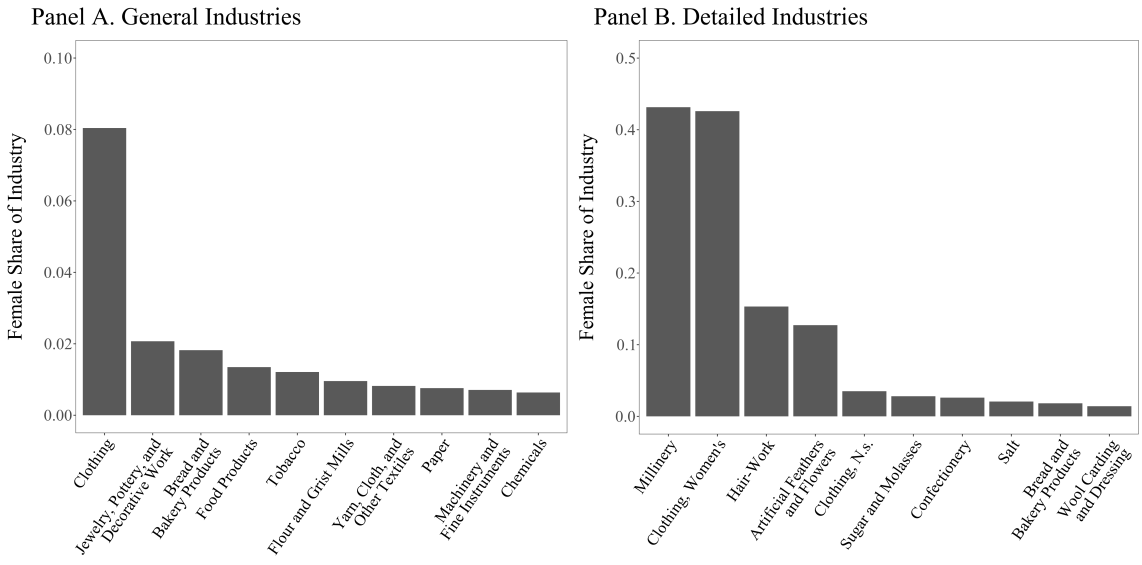


FIGURE 2. FEMALE OWNERSHIP SHARES ACROSS THE 10 MOST-COMMON INDUSTRIES

Note: These industries are restricted to those with at least 10 female-owned establishments.

ments (Columns 1 and 2), along with differences for female-owned establishments relative to male-owned (Column 3). Column 4 reports similar differences, comparing establishments within the same state and decade.

Female-owned establishments have lower output, along with lower input expenditures on capital in particular. Total expenditure, as a share of total output, is slightly lower for female-owned establishments. This is consistent with greater input distortions faced by female-owned establishments, along with any differences in markups, whereby aggregate productivity would increase through reallocating inputs to more-distorted female-owned establishments (Hornbeck and Rotemberg, 2024; Chiplunkar and Goldberg, 2024).

Female-owned establishments employed a substantially higher share of female workers. These establishments are also substantially more likely to employ only female workers, which was rare among male-owned establishments, and more likely to employ any female workers.[2] Female-owned establishments also paid female workers $2 more per month, or roughly 20% more. The combination of higher quantities and higher wages for female workers suggests a greater demand for female workers among female-owned establishments, along with perhaps also a greater supply of female workers to female-owned establishments. Increased female business ownership could then expand employment opportunities for women and vice versa (Hunt and Moehling, 2024). By contrast, female-owned and male-owned businesses employed child workers at similar low rates.

Industry is an endogenous choice, reflecting sorting of female business owners based on different opportunities. Within 33 general industries (Column 5): female-owned establishments are even smaller than male-owned establishments; expenditure is a smaller share of output, consistent with greater distortions (though the capital expenditure share is more similar, reflecting female owners sorting into less capital-intensive industries); and use of female

[2]When owners were working on their own account, Census enumerators were supposed to include them in worker counts. If we subtract one female worker from female-owned establishments, and one male worker from male-owned establishments, female-owned establishments continue to employ a greater share of female workers, only female workers, and any female workers.

Table 1—Estimated Differences for Female-Owned Manufacturing Establishments

	Average Outcomes:		Difference for Female-Owned Establishments, Relative to Male-Owned:				
	Female-Owned	Male-Owned					
Outcome:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. Log Output Value	7.90	8.13	-0.227	-0.253	-0.472	-0.287	-0.242
	[1.04]	[1.25]	(0.017)	(0.017)	(0.017)	(0.018)	(0.018)
2. Log Material Expenditure	7.04	7.20	-0.156	-0.184	-0.499	-0.302	-0.258
	[1.27]	[1.51]	(0.021)	(0.021)	(0.020)	(0.021)	(0.021)
3. Log Labor Expenditure	6.20	6.54	-0.342	-0.354	-0.530	-0.246	-0.212
	[1.08]	[1.23]	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)
4. Log Capital Expenditure	4.04	4.46	-0.417	-0.437	-0.519	-0.314	-0.273
	[1.32]	[1.43]	(0.022)	(0.022)	(0.021)	(0.021)	(0.022)
5. Capital / Total Expenditure	0.045	0.052	-0.0064	-0.0064	0.0007	-0.0001	0.0002
	[0.049]	[0.052]	(0.0008)	(0.0008)	(0.0008)	(0.0009)	(0.0009)
6. Expenditure / Output	0.778	0.787	-0.0093	-0.0069	-0.0199	0.0005	-0.0009
	[0.230]	[0.240]	(0.0039)	(0.0038)	(0.0037)	(0.0040)	(0.0041)
7. Female Share of Workers	0.408	0.040	0.368	0.365	0.199	0.044	0.039
	[0.475]	[0.151]	(0.008)	(0.008)	(0.005)	(0.004)	(0.004)
8. Only Female Workers	0.366	0.007	0.360	0.358	0.300	0.075	0.065
	[0.482]	[0.081]	(0.008)	(0.008)	(0.007)	(0.005)	(0.005)
9. Any Female Workers	0.449	0.086	0.363	0.357	0.113	0.030	0.026
	[0.497]	[0.281]	(0.008)	(0.008)	(0.005)	(0.005)	(0.005)
10. Female Monthly Wage ($)	13.0	11.1	1.91	1.52	0.97	0.37	0.49
1850 and 1860 Only	[5.6]	[6.3]	(0.22)	(0.21)	(0.21)	(0.26)	(0.28)
11. Child Share of Workers	0.0285	0.0233	0.0051	0.0046	0.0031	-0.0011	-0.0010
1870 and 1880 Only	[0.1168]	[0.1012]	(0.0026)	(0.0025)	(0.0025)	(0.0027)	(0.0027)
12. Any Child Workers	0.0801	0.0729	0.0073	0.0052	-0.0030	-0.0075	-0.0057
1870 and 1880 Only	[0.2716]	[0.2599]	(0.0059)	(0.0059)	(0.0059)	(0.0062)	(0.0062)
Number of Observations:	3,589	391,281	394,870	394,870	394,870	394,870	394,870
Included Fixed Effects:							
State-Year FE			No	Yes	Yes	Yes	Yes
Broad Industry-Year FE			No	No	Yes	Yes	Yes
Detailed Industry-Year FE			No	No	No	Yes	Yes
Detailed Industry-State-Year FE			No	No	No	No	Yes

Note: Columns 1 and 2 report average outcomes, with standard deviations in brackets. Columns 3 to 7 report differences for female-owned establishments, relative to male-owned establishments, conditional on the indicated fixed effects with robust standard errors in parentheses. We calculate annual capital costs as the book value of capital multiplied by a 7% interest rate. The sample is establishments with: output $\geq$ 500; non-zero materials, labor cost, capital expenditure, and workers; average wages between $1 and $200; total input expenditures less than twice output. Row 10 has 708 and 16,921 observations, and Rows 11 and 12 have 2,109 and 218,480 observations, in columns 1 and 2.

workers continues to be substantially distinct, though more similar, reflecting female owners sorting into industries with greater female employment. Within 316 detailed industries (Column 6): female-owned establishments have lower output and inputs, by similar percentages indicating similar total factor productivity as male-owned establishments under constant returns to scale; have similar capital shares and total expenditure shares, consistent with selection into more-distorted sub-industries; and more-similar employment of women. Column 7 reports similar estimates, conditional on detailed industry-state-year fixed effects.[3]

Table 2 reports average characteristics for linked female owners, and all women ages 14+, along with the difference conditional on state-year fixed effects (Column 2). Female owners are older, more often literate/white/immigrants, and less likely married. They are more likely widows, with widows making up 40% of female business owners in 1880 (when reported directly in the Census). Female owners are more likely to report owning real estate themselves, though their household overall owns real estate at similar rates, and the average value of household real estate is higher. Female owners are more likely to have a child at home, but this result flips conditional on age fixed effects (Column 3). The

[3]Estimates are similar restricting the sample to female-owned establishments linked to the Census of Population.

distinctive characteristics of female owners suggests highly varied opportunities to become owners of manufacturing establishments, with interacting individual circumstances and social structures.

Table 2—Demographics of Female Owners

	Female Owners Avg	Difference from All Women 14+	
Outcome:	(1)	(2)	(3)
Age	40.2	6.74	–
	[13.0]	(0.40)	
Literate	0.950	0.170	0.127
	[0.218]	(0.007)	(0.007)
White	0.989	0.049	0.045
	[0.105]	(0.004)	(0.004)
Immigrant	0.287	0.076	0.045
	[0.452]	(0.013)	(0.013)
Married	0.343	-0.197	-0.342
	[0.475]	(0.014)	(0.014)
Widowed	0.399	0.287	0.236
1880 Only	[0.491]	(0.029)	(0.026)
Owns Real Est.	0.338	0.303	0.288
1850 - 1870 Only	[0.473]	(0.017)	(0.016)
HH Owns Real Est.	0.538	0.035	0.011
1850 - 1870 Only	[0.499]	(0.018)	(0.017)
HH Real Est. Value	3566	983	896
1850 - 1870 Only	[9983]	(353)	(350)
Child at Home	0.643	0.108	-0.067
	[0.479]	(0.015)	(0.013)
Observations:	1,085	42,049,669	42,049,669
Fixed Effects:			
State-Year FE		Yes	Yes
Age FE		No	Yes

IV. Conclusion

This paper uses new data to show how female-owned manufacturing establishments differed from male-owned establishments in the 19th century United States. Female-owned establishments were more prevalent in specialized industries, particularly women's clothing and women's hat making, but also present across manufacturing more broadly. Female-owned establishments were substantially smaller, across industries and within industries, potentially reflecting constraints that vary with social and financial institutions. Female-owned establishments employed more female workers, and paid higher women higher wages, consistent with a virtuous cycle between increased female business ownership and increased female labor market participation. Our estimates highlight challenges and opportunities for women's historical participation in business ownership that complement ongoing research across modern contexts.

REFERENCES

Ashraf, Nava, Alexia Delfino, and Edward Glaeser. 2023. "Female Entrepreneurship and Trust in the Market."

Asiedu, Edward, Monica Lambon-Quayefio, Francesca Truffa, and Ashley Wong. 2023. "Female Entrepreneurship and Professional Networks."

Chiplunkar, Gaurav, and Pinelopi Koujianou Goldberg. 2024. "Aggregate Implications of Barriers to Female Entrepreneurship."

Goldin, Claudia, and Kenneth Sokoloff. 1982. "Women, Children, and Industrialization in the Early Republic: Evidence from the Manufacturing Censuses." *The Journal of Economic History*, 42(4): 741–774.

Gozen, Ruveyda. 2024. "Property Rights and Innovation Dynamism: The Role of Women Inventors."

Hornbeck, Richard, Anders Humlum, Shanon Hsuan-Ming Hsu, and Martin Rotemberg. 2024. "Gaining Steam: Incumbent Lock-in and Entrant Leapfrogging."

Hornbeck, Richard, and Martin Rotemberg. 2024. "Growth Off the Rails: Aggregate Productivity Growth in Distorted Economies." *Journal of Political Economy*, Forthcoming.

Hunt, Jennifer, and Carolyn Moehling. 2024. "Do Female–Owned Employment Agencies Mitigate Discrimination and Expand Opportunity for Women?"