COMPULSORY LICENSING: EVIDENCE FROM THE *TRADING WITH THE ENEMY ACT*

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WEB APPENDIX

TABLE A1 – TWEA Trusts by Nationality of Enemy

| Nationality	Number of trusts	Estimated value
German enemies	17,339	326,855,090.39
Austrian enemies	7,580	39,555,557.34
Interned enemies	140	3,457,898.17
American enemies	648	91,866,053.40
Other enemies	1,567	40,371,354.63
Net income from Treasury investments	-	839,770.82
Total	**27,274**	**502,945,724.75**

Notes: In nominal 1919 dollars; from *Custodian of Alien Property Report, 1919*.

TABLE A2 – USPTO Classes Affected by The TWEA

Class	Title	Licenses
534	Organic Compounds—Containing a noble gas	62
8	Bleaching and dyeing; fluid treatment and chemical modification of textiles and fibers	42
552	Organic Compounds—Azides	45
548	Organic Compounds—Containing 5-membered hetero rings	23
544	Organic Compounds—Containing 6-membered hetero rings with at least one nitrogen	21
106	Compositions: coating or plastic	27
546	Organic Compounds—Containing 6-membered hetero rings with 5 carbons and 1 nitrogen	34
549	Organic Compounds—Containing sulfur hetero rings	13
528	Synthetic resins or natural rubbers	15
564	Organic Compounds—Containing amino nitrogen	28
562	Organic Compounds—Persulphonic acids and salts	26
536	Organic Compounds—Carbohydrates and derivatives	10
74	Machine element or mechanism	9
101	Printing	1
204	Chemistry: electrical and wave energy	24
416	Fluid reaction surfaces (i.e., impellers)	1
430	Radiation imagery chemistry: process, composition, or products	2
568	Organic Compounds—Containing boron	25
570	Organic Compounds—Containing halogen	2

Note: Data from Haynes (1939) and *www.uspto.gov*. Class numbers and class names refer to (main) classes within the USPTO classification system. Classes are divided into subclasses, which are the unit of observation for the empirical analysis. Licenses are the total number of enemy-owned patents that were licensed to U.S. firms in a given USPTO class under the TWEA.

FIGURE A1– HAND-COLLECTED VS. ALGORITHM-ASSIGNED NATIONALITIES BY USPTO CLASS
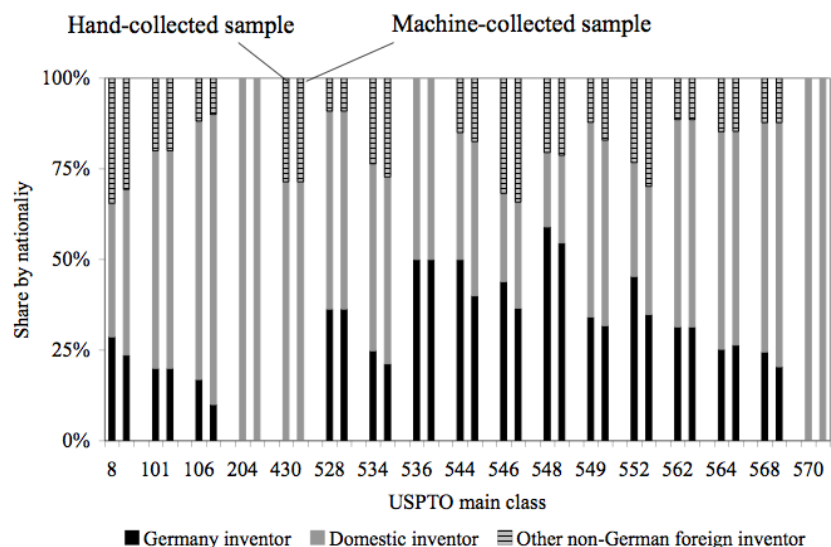

Note: Classes are 19 (main) USPTO classes that received at least one license under the TWEA (see Table A2 for class names). Data from Haynes (1939), www.uspto.gov, the *Lexis Nexis Chronological Patent Files (1790-1970),* and www.patents.google.com. To collect data on inventor nationality, we create an algorithm that performs keyword searches on *LexisNexis*. This algorithm relies on Optical Character Recognition (OCR), which is worse at recognizing misspelled names or untidy script than the human eye. To check for measurement error, we hand-collected an alternative data set that includes all 625 patents for the most important dyes of the early 20th-century (Delamare and Guineau, 1999): alizarin, indigo, azo dyes, and aniline. In the hand-collected sample, inventors come from Argentina, Australia, Austria, Belgium, Brazil, China, England, France, Germany, India, Italy, the Netherlands, Russia, Scotland, Spain, Switzerland, and the United States.

TABLE A3 – CONFIDENCE INTERVAL OF THE BLOCK BOOTSTRAP COEFFICIENTS

| Treatment coefficient	99% confidence interval		BDM test
Subclass includes at least one license	0.0794083	0.2459407	99%
Number of licenses	0.0350827	0.1227493	99%
Remaining lifetime of licensed patents	0.0030757	0.0106559	99%

Note: Data from www.uspto.gov and the *Lexis Nexis Chronological Patent Files (1790-1970)*. Our data consist of all 128,953 patents between 1875 and 1939 in 19 USPTO main classes that contained at least one licensed enemy patent. These 19 main classes are subdivided into 7,248 subclasses. Data on inventor nationality are based on a key word search for country names in *Lexis Nexi*s. Confidence intervals are based on OLS regressions for 79 block bootstrap samples of the full data, these samples draw entire subclasses to maintain the structure of correlations of the full sample (Bertrand, Duflo, and Mullainathan 2004).

FIGURE A2- PRICE OF CHEMICALS RELATIVE TO GENERAL PRICE INDEX
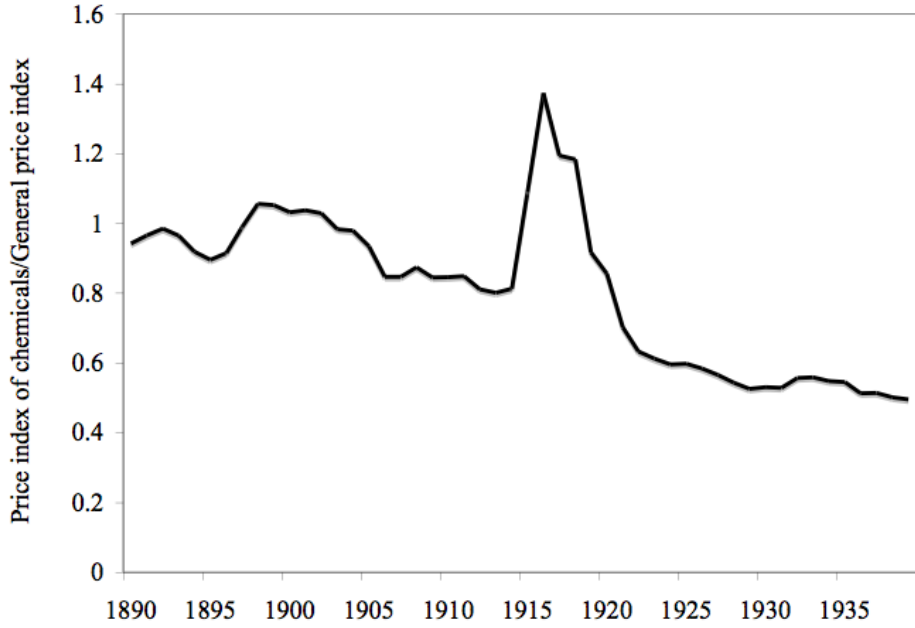
Note: This series plots the ratio of the Bureau of Labor Statistics *U.S. Index of Wholesale Price of Chemicals and Drugs* to the *U.S. Index of the General Price Level* (*NBER Macrohistory Series*, 2007).

FIGURE A3 – PRICE OF INDIGO PER POUND
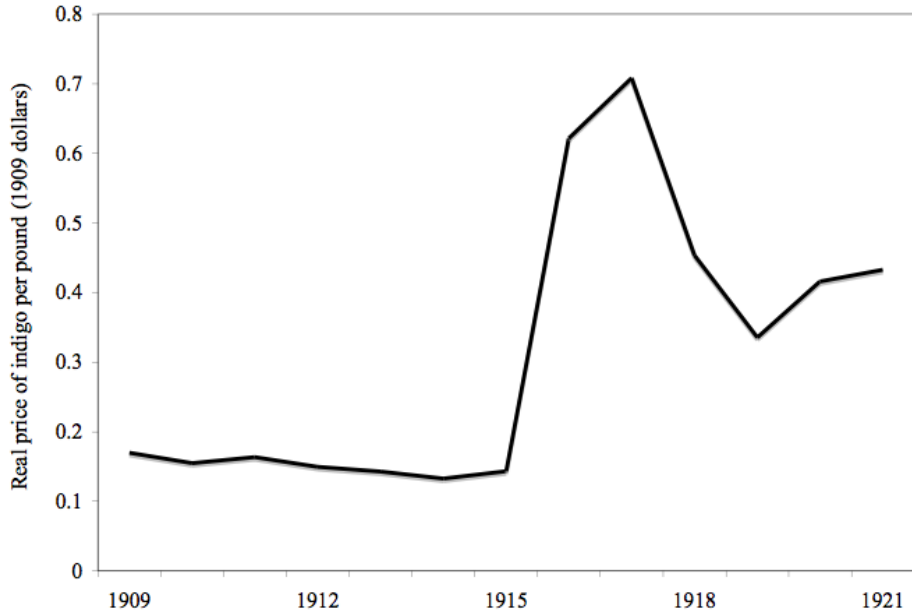
Note: Price data from Haynes 1945 and Haber 1971, p.185.