The Price of Nails since 1695: A Window into Economic Change
Appendix: Data Sources and Calculations[1]
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History of nails. Table A1 provides a detailed historical timeline of production technology for nails.

Number of 2" nails per pound. To convert price quotes for nails in cents/pound to cents per nail, data were needed for the number of 2" nails per pound. Table A2 reports the data and sources.

Nail prices. Table A3 provides detail on the sources used to construct the series on nail prices back to 1695. As noted, the real price series plotted in figure 4 in the main text was constructed as a matched-model index. Starting with the real prices for wire nails measured as cents/nail, the price series for cut nails was linked in assuming that the price for cut nails in 1890 matched the price for wire nails. Then, the growth rates of the series for cut nails were used to extend the price series back to 1814. The same procedure was followed for the switchover in 1814 between cut nails and mixed nails to extend the price series back to 1792. In 1792, the U.S. series is linked to the price series for the U.K. using the same procedure and extending the series back to 1695.

As noted in the text, most nail nominal price quotes were posted as dollars or cents per pound and were converted to cents per nail. The one exception is that starting in 1997 the

[1] All of the data and calculations used for this paper are included in three Excel spreadsheets available in the Data Replication Package for this paper.

Producer Price Index (PPI) provides index numbers—rather than prices in natural terms—and these PPIs are used to extend the price series on a cents per pound basis.

Nominal nail prices were converted to real prices in 2012 dollars using an index of consumer prices. That index is constructed using the chain-type price index for personal consumption expenditures from the National Income and Product Accounts from 1929-2018, the CPI for the U.S. for 1784-1928 from measuringworth.com, and the CPI for the United Kingdom for 1695-1783 from measuringworth.com.[2]

Domestic absorption of nails. Domestic absorption is calculated as production plus imports less exports. From 1872 forward, the quantity data are mostly from *Annual Statistical Reports* of the American Iron and Steel Institute (AISI and known as the American Iron and Steel Association in earlier years). For 1810, data on only production (French (1858, p. 18)) were available, and based on his description that imports of nails were significant until the War of 1812, the figure for production was arbitrarily doubled to get a figure for domestic absorption. For the 1992 and 2002 observations, numbers were obtained for the value of production from the Census of Manufactures, and data on exports and imports were pulled from the AISI reports, perhaps introducing an inconsistency. For the 2007, 2012, and 2017 observations, Census data for shipments, exports, and imports for "Other Fabricated Wire Product Manufacturing" were used to extend the domestic absorption figures for nails beyond 2002 because data on nails were no longer published separately. Specifically, domestic absorption for Other Fabricated Wire Product Manufacturing" was calculated using Census data for 2002, 2007, 2012, and 2017, and the implied growth rates were used to extend the series for domestic absorption of nails beyond

[2] For a description of the historical CPIs from measuringworth.com, see Officer (2011).

2002. One additional caveat for the earlier data: The values of production from the American Iron and Steel Institute covering the latter part of the 1800s and the early part of the 1900s are larger than the numbers from Shaw (1947), with the reason for the discrepancy remaining unclear.

These data were converted to inflation-adjusted real 2012 dollars by deflating by the index of consumer prices used to calculate real nail prices.[3] On this basis as shown in figure A1, domestic absorption rose from about $35 million in 1810 to over $340 million in 1872, and to about $1.5 billion in 2002 and 2007. Absorption then dropped back through 2017 with the financial crisis and collapse in construction.

Over the period since 1695, real domestic absorption of nails rose roughly in line with population. Figure A1 also plots real domestic absorption per capita since 1810. The series rose from 1810 to 1870 with the rising importance of construction but then declined, on balance through the mid-20th century. Since then, the series has fluctuated around a level not so different from its 1810 value.

Nail holding power. Stern (1952) finds that 2½" plain shank brads (wire nails) have 140 pounds of holding power—the amount of force required to pull the nail out of the wood—immediately after being pounded into wood and about the same amount after a year. He finds that 2½" cut flooring nails have about 360 pounds of holding power immediately after being pounded in and about 235 pounds after a year. The ratio for the immediate holding power of cut to wire nails is 2.6, and the ratio after one year is 1.7. Similarly, the *Woodworking Newsletter*

[3] The index of consumer prices is constructed using the chain-type price index for personal consumption expenditures from the National Income and Product Accounts from 1929-2018, the CPI for the U.S. for 1784-1928 from measuringworth.com, and the CPI for the United Kingdom for 1695-1783 from measuringworth.com.

(2009) from Lee Valley reports that "Academic studies of [cut and wire nails] show that cut nails have somewhere between 65 percent and 135 percent more holding power than wire nails." (Lee Valley is a popular seller of woodworking tools and hardware.) I take this information as being consistent with cut nails having about twice the holding power of wire nails.

In principle, nail prices could be adjusted for holding power to construct a series for prices per given amount of holding power. In particular, if cut nails have twice the holding power of wire nails, then prices for cut nails can be divided by two to translate them to price for the same amount of holding power as wire nails. That adjustment is shown in appendix figure A2, with the dashed lines showing prices of cut nails on a constant holding-power basis. On this basis, the price of cut nails in 1890 was below that of wire nails, raising the question of why consumers would have purchased wire nails at that time. The following information on shipping costs provides a partial answer to that question.

Shipping costs for nails. As noted in the main text, shipping costs per nail were lower for wire nails than for cut nails, and some simple calculations suggest that these differences would close a chunk of the discontinuity in 1890 between the prices shown in figure A2 for cut and wire nails on a constant holding power basis. For example, in 1897, a 100-pound keg of 2", 6d wire nails was listed in the Sears catalog for $1.85; a keg of cut nails was listed for $1.80. Fourth-class freight for 100 pounds from Chicago to Boston was 39 cents. With 85 nails per pound in the keg of cut nails and 150 nails per pound in the keg of wire nails, shipping costs would have amounted to 0.0026 cents per nail for wire nails and 0.0046 cents per nail for cut nails. And, with an index of consumer prices in 1897 of 4.51 (2012=100) the real cost per nail for shipping was 0.058 cents per nail for wire and 0.10 cents per nail for cut. Given these differences in shipping costs, if these costs were added in, the dashed lines in figure A2 would shift up by more than would the black solid line, helping to explain why wire nails came to dominate the market.

Import share of nails in domestic absorption. As noted, French (1858) suggests that imports were important in the 18th and early 19th centuries and that tariff policy was an important issue for the iron and nail industry in the first part of the 1800s, especially around the War of 1812. The AISA data indicate that by the 1870s, imports were pretty inconsequential and did not become important until after the second World War. Accordingly, I focus on import shares starting after the second World War, with the figures through 1987 calculated from the AISI data on imports, exports, and production. Starting in 1992, data for the value of nail production are obtained from the Census of Manufactures.

These data, graphed in figure A3, show a sharp rise in the import share from about zero in 1947 to about 70 percent in the 1980s. The import share appears to drop back in the 1990s, though this shift could reflect, at least in part, shifts in the source of import data in 1992. The import series for nails reflected in the solid blue line became unavailable after 2002 so I switched to the series for fabricated wire manufacturing that includes nails (NAICS 332618). This series is shown by the dashed red line, and, while the level of the import share is lower than that shown by the series that covers only nails, this series also shows a general uptrend.

Construction shares in GDP. According to Gallman (1966) gross investment in construction (including farm improvements) amounted to about 16 percent of nominal GNP in 1839, compared with about 6¾ percent in 2019 for nonresidential and residential private construction (2019 share based on National Income and Product Accounts data). Gallman reports gross capital formation for new residential and nonresidential *construction* of $137 million in 1839 in current dollars. In addition, Gallman estimates a value of *improvements to farmland* made with farm construction materials of $133 million in 1839. Adding in the farmland improvements figure to that for residential and nonresidential construction, gross investment in construction and improvements amounts to $270 million, which is about 16 percent of Gallman's estimate of GNP (plus the value of farm improvements) for 1839. The calculation is 0.27/(1.54+.133), with the figures coming from Gallman's tables A-1, A-3, and A-4.

Import prices of nails. For the period since 1974, the red line in figure A4 plots "real" import prices calculated as the import price divided by the measure of consumer prices. Just as for the PPI, the BLS import price series shifted to broader and broader categories over time. Specifically, from 1974 to 2005 the BLS import price series covers "Nails, screws, nuts, bolts, rivets of iron, steel, copper, or aluminum" and through 2010 it covers "Hardware manufacturing." The series in the figure then shifts to the even broader category of fabricated metal products.

The black line repeats the earlier matched-model index from figure 4 for real prices of nails (based on PPIs in this period). As noted in the main text, import prices fell significantly over this period relative to the matched-model index of prices for domestically-produced nails.

Factor Prices

Table A4 details the sources I used for nominal factor prices from 1790 to 2018. To assemble data back to 1790, I pieced together data from different sources for different time periods. In each case, I linked these series together using ratio splices to construct a consistent time series for the full period. In addition, each nominal factor price was converted to a real factor price using the same index for consumer prices used for the real nail price series. A brief summary of sources for nominal factor prices follows.

Capital. I used the standard formula for the nominal user cost or rental price of capital:

$$RC_N = P_K(r + \delta - \dot{P}_K)$$

where RC_N is the nominal rental cost of capital, P_K is the price deflator for capital, r is a long-term rate of return or interest rate, δ is the depreciation rate of capital, and $\dot{P}_K$ is the expected capital gain or loss on capital. For 1949-2018, I used the rental cost of capital for the production of fabricated metal products from in the KLEMS dataset published by the BLS. For 1790-1948, I built up a rental cost based on a price deflator for the capital stock from Gallman and Rhode (2019), the long-term rate of return from measuringworth.com, an assumed 6 percent depreciation rate for nail making capital, and an assumption that the expected capital gain/loss could be reasonably proxied by the current-year inflation rate in the price deflator for capital.

Labor (wages). I used the series for Production Workers' Compensation from measuringworth.com from 1790-2018. This series covers production workers in manufacturing and includes both wages and benefits. It draws on historical data from a number of authors including Margo's (2000) work on wages in the 19th century.

Energy. I used the series for the price of energy for the production of fabricated metal products from BLS' KLEMS dataset for 1949-2018. For earlier periods, I used an electricity price series from the BLS for 1913-1948, and a couple of different fuel and lighting price series for the earlier period from the BLS and Warren and Pearson (1933).

Materials. I used various prices for steel from 1886-2018 and prices of iron prior to that, drawing on, among other sources, BLS, the NBER MacroHistory database, Temin (1964), and Warren and Pearson (1933).[4]

Purchased services. For the price of purchased services, I used the BLS series from the KLEMS dataset for the production of fabricated metal products from 1949-2018. Prior to that period, data on purchased services is sparse, and I used the wage series described above to extend back the series for the price of purchased services.

Factor Shares

Table A5 details the sources of data used to construct factor shares. Because I am using a decomposition into five factors (plus multifactor productivity), the labor and capital shares will not be the familiar 2/3 and 1/3, although the five factor shares still sum to unity under the maintained assumption of constant returns to scale. In brief, here is how I constructed shares, with details in table A5. For 1949-2018, I used the factor shares in BLS' KLEMS decomposition for fabricated metal products. These data provide factor shares for all five inputs. For earlier years, I obtained estimates of factor shares only for selected years. Working in reverse chronological order, for 1897, I relied on the *Hand and Machine Labor* study published by the BLS in 1898 (which compared machine production technology in 1897 to hand production technology in 1813). For 1870 and 1850, I used the Atack and Bateman (1999) extracts from the 1850 and 1870 Census of Manufactures. From the 1870 Census, I pulled three firms from the State Sample whose principal or second output was listed as nails. All three of these firms reported the use of steam power. From the 1850 Census State Sample, I pulled seven firms. For

[4] Temin (1964) describes developments in the broader iron and steel industry during the 19th century.

six of these nails were the only output; nails were listed as the second output for one firm but were the dominant output. Of these seven firms, three reported water power, three reported hand power, and one reported steam power. For 1813, I used the three firms reported in the 1850 Census that used hand production techniques.[5] Prior to 1813, I used the 1813 factor shares. For all other years, I interpolated between my share estimates.

The factor shares reported in this paper do not seem inconsistent with the labor and capital shares reported by others. For example, Budd (1960) reports a noticeable increase in the labor share for industry service income (using a two-factor decomposition) from 54.5 percent in 1849-50 to 62.8 percent in 1909-10.[6] Budd attributes an important part of this increase to the on-going shift of workers from lower-wage agriculture jobs to higher-wage manufacturing jobs. The increase identified by Budd roughly parallels an increase in this paper's estimates during the same period as shown in figure 5 in the main text, even though he reports shares for labor and capital in value added rather than for five factors out of gross output.

Bakker, Crafts, and Woltjer (2019) report capital and labor shares out of value added for industries at roughly the two-digit level from 1899 to 1941. Because their labor and capital shares are out of value added they are not directly comparable to the five-factor shares in this paper. That being said, their capital share and the one estimated in this paper both are relatively flat during the period. Specifically, for fabricated metal products, their capital share is essentially constant, remaining at 23 percent from 1899 to 1929 and then edging down to 21 percent in

[5] I chose the year 1813 because that is the year of comparison for "hand" labor in the *Hand and Machine Labor* study.
[6] See Budd's table 7, column 8, on page 382. In addition, Gallman and Rhode (2019) undertake a growth accounting decomposition of real GDP from 1774-1900 based on a two-factor production function with labor and capital. They use a fixed labor share of 68 percent for the full period. (See table 4.10, p. 95.)

1941. The capital shares estimated in this paper rise a bit over this period, from 9.2 percent in 1899 to 10.8 percent in 1941.

Decomposition of nail prices into proximate sources. The decomposition reported in table 1 in the paper is based on a methodology described in the main text. The "fixed-weight" decomposition referenced in the man text uses the same factor shares for each input for 1949-2018 as used by the price decomposition reported in table 1. For all prior years, the factors shares for the fixed-weight decomposition are fixed at their 1949 values. The calculations are reported in the "DECOMPOSITION" spreadsheet included in the Data Replication Package for the paper.

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Table A1
Historical Time Line for Nails

Roman era to 1820	Hand forged nails • Slitting equipment for cutting iron bars into rods in Saugus, MA in 1645. (Lewis, p. 8.06.03) • From drawn iron rods up to about 1805 • From machine rolled and cut iron rods starting in 1600s to about 1820 • Took a nailsmith about 1 minute to make a nail from a prepared blank (Rybczynski, p. 71)
1790s – early 1890s	Cut nails from sheets of iron or steel • First patents for cut nails in 1770s and 1780s. Flood of patents in following years. (Lewis, p. 8.06.09) • Cutting and heading machines in operation near Boston in 1794. (Lewis, p. 8.06.09) • Cut nails became dominant by early 1800s • Machine heading starting around 1800 (Lewis, p. 8.06.09-8.06.10) • Iron sheets rolled by water-powered equipment in 1810 in a Philadelphia factory. Steam power used in a Pittsburgh rolling mill a year later. (Wells, p. 85) • Improved rolling of iron and inline grain starting in 1820s, prevalent by 1830s • Increasing mechanization (first water power and then steam power) • In 1880s, shift from iron to steel
1850s	Wire nails developed
1877	First American patent for wire nails (Adams, p. 69)
1880	Iron wire nails began to be manufactured in U.S. on large-scale
Late 1880s, early 1890s	Steel wire nails produced in sizable quantities
1920	Wire nails dominate (only 8 percent of produced nails were cut)
Early 1980s	Pneumatic nail guns appear in Sears catalogue for first time
Today	Typical fully automated machine makes 300-450 nails per minute (machinetools.com). Some advanced machines can make 2000 nails per minute. (email from Roelif Loveland).

Note: A number of authors have described the history of nails. For example, see Adams (2002), Lewis (1998), and Wells (1998). The description here summarizes key points from that literature, and, except where noted, the source of information is Wells (1998).

Table A2
Number of 2” Nails per Pound

Period	Count	Source
1695 – 1889	85	Average from multiple sources*
1890 – 1941	150	Counts from various Sears catalogs for 2”, 6d wire nails
1942 – 1944	181	Sears catalogs, 2”, 6d wire nails
1945 – 2018	168	Sears catalogs and Grainger.com, 2”, 6d wire nails

***The Tremont Nail company advertised, as of October 2020, 2” 6d cut nails described as “common standard black oxide,” at 92 nails per pound (see tremontnail.com). Lee Valley (2020) advertised 2” cut nails with wrought heads at 65 nails per pound and with rose heads at 90 per pound. A document from the early 1800s [*A List of Nails and Spikes Required for the Service of the Office of Ordnance* (1813), reprinted in the *Bulletin of the Association for Preservation Technology*] and pulled from the Public Archives of Canada lists clasp-headed 2” cut nails at 100 nails per pound and clout 2” cut nails at 83 nails per pound. I took 85 nails as a reasonable value capturing this range.

Table A3
Nail Prices, Sources

Dates	Nail Description	Quote	Source
1695 - 1792	Various, hand forged	Shillings/12 pounds, based on purchase records of Greenwich hospital. Converted to U.S. cents/lb using 1792 exchange rate of £1 = $4.47 from www.measuringworth.com	Beveridge (1939). No data are reported for selected years and values for these years are interpolated.
1784 - 1828	1784-1813 quotes include forged and cut nails (“mixed”); 1814-1827 quotes for “cut nails,” all sizes”; for other years, “assorted sizes.”	Philadelphia market, quotes for various size lots,	Cole (1938)*
1828 - 1834	Nails, cut	New York market, $/100 lbs	Report of the Director of the Mint, 1884, p. 54*
1835 - 1849	Cut nails	$/100 lbs	Report of the Secretary of the Treasury, 1849.*
1850 - 1890	Cut nails	$/100 lbs	American Iron and Steel Association. Prices from the Duncannon Iron Company outside of Harrisburg, Pennsylvania.*
1890 - 1947	Wire, 8d, fence and common	$/100 lbs	BLS reports*
1947 - 1960	Wire, common	$/100 lbs	BLS reports*
1962 - 1997	Wire, common, quoted at $/50	$/50 lbs	BLS reports

	lbs. From 1992-98 "bright nails."		For 1992-98, from PPI WPU10880211
1997-2009	Steel nails, staples, tacks, and spikes, made in plants that draw wire	Index number	PPI, WPU108812012
2009 – 2018	Steel nails, staples, tacks, spikes, and brads	Index number	PPI, WPU10881201
Sears Data			
1897- 1960	Wire, 6d, 2", iron and steel, roughly for every 2nd or 3rd year.	$/100 lbs for 1897- 1932 $/lb for 1936 – 1940 $/5 lbs for 1942-1960	Sears Catalogues

*Prices reprinted in whole or part in U.S. Bureau of the Census *Historical Statistics of the United States (1975).*

Table A4
Factor Prices, Data Sources

Variable	Time Period	Source
Price of Capital	**1949-2018**	Bureau of Labor Statistics, KLEMS decomposition for NAICS industry 332 (fabricated metal products). This series difference splices together the NAICS data for 1987-2018 with now discontinued SIC data from 1949-1986, index 2012=100. Data released July 21, 2020, and available at: https://www.bls.gov/mfp/mprdload.htm
	1790-1948	Formula = P [r + d – dlog(P)]. Standard formula for nominal user cost of capital. P = price deflator for capital from Gallman and Rhode (2019), Table 4.3, p. 87. Figures reported for 1774, 1799, 1805, 1815, 1850, 1860, 1870, 1880, 1890, 1929, 1953. Annual figures for other years interpolated. r = long-term nominal interest rate from measuringworth.com from 1798-2018 (consistent series). Entries for 1790-1797 set equal to 1798 value. This series measures corporate bond rates from 1899-2018, New England municipal bonds from 1862-1898, and U.S. government securities from 1798-1861. d = depreciation rate. Assumed to be 6 percent per year.
Wages (price of labor)	**1790-2018**	Production Workers' Compensation per hour from measuringworth.com. Series covers production workers in manufacturing and includes both wages and benefits. Drawn from Officer (2009) and extended since 2007 with BLS data for Employer Costs for Employee Compensation, Total compensation, Manufacturing, $/hr.
Price of Energy	**1949-2018**	Bureau of Labor Statistics, KLEMS decomposition for NAICS industry 332 (fabricated metal products). This series splices together the NAICS data for 1987-2018 with now discontinued SIC data from 1949-1986, index 2012=100.
	1913-1948	Bureau of Labor Statistics, CPI for electricity (composite). Reprinted in *Historical Statistics of the United States* (1975), Series E203.

	1890-1912	Bureau of Labor Statistics, Wholesale Price Index for Fuels and Lighting, reprinted in *Historical Statistics of the United States* (1975)*,* Series E46, index 1926=100.
	1787-1889	Warren and Pearson (1933), Fuel and lighting, reprinted in *Historical Statistics of the United States* (1975)*,* Series E57, index 1910-14=100.
Price of Materials	**1982-2018**	Bureau of Labor Statistics, PPI by commodity, Cold-Rolled Steel Sheet and Strip, Series WPU101707, index 1982=100.
	1981	Bureau of Labor Statistics, PPI by industry, Cold-Rolled Steel Sheet and Strip, Series PCU3312213312211, index 1982=100
	1947-1980	PPI by industry, Steel strip cold rolled carbon, Series WDU1013026, index 1967=100.
	1894-1946	NBER Macro History Database, U.S. Wholesale Price of Steel Sheets, Series m04154a, converted to annual. Original data from Bureau of Labor Statistics and *Iron Age,* cents/lb.
	1886-1893	NBER Macro History Database, Wholesale Price of Steel Billets, Bessemer at mills in Pittsburgh, Series m04149, converted to annual, $/long ton.
	1844-1885	Temin (1964), Best Refined Rolled Bar Iron at Stores at Philadelphia, Table C.15, $/gross ton.
	1840-1843	Temin (1964), Hammered Bar Iron, Philadelphia, Table C.15, $/gross ton.
	1825-1839	*Report of the Secretary of the Treasury on the State of Finances for the Year Ending June 30, 1863,* Scotch or English Pig, p. 370 and following, $/ton.
	1790-1824	Warren and Pearson (1933), Metals and Metal Products, reprinted in *Historical Statistics of the United States* (1975)*,* Series E58, index 1910-14=100.
Price of Purchased Services	**1949-2018**	Bureau of Labor Statistics, KLEMS decomposition for NAICS industry 332 (fabricated metal products). This series splices together the NAICS data for 1987-2018 with now discontinued SIC data from 1949-1986, index 2012=100.
	1790-1948	Series used for compensation per hour for production workers, described above.
Consumer Prices	**1929-2018**	Bureau of Economic Analysis, chain-type price index for personal consumption expenditures.
	1790-1928	Consumer Price Index from measuringworth.com.

Table A5
Factor Shares, Data Sources

Year	Source and Methodology
1949-2018	Bureau of Labor Statistics, factor shares for capital, labor, energy, materials, and purchased services from KLEMS data for fabricated metal products. NAICS data for 1987-2018 difference spliced in 1987 to SIC data for 1949-2001. Data released July 21, 2020, and available at: https://www.bls.gov/mfp/mprdload.htm
1897	US Department of Labor (1899), *Hand and Machine Labor.* The entries for nailmakers (Vol 2, beginning on page 1320) provide estimates of the total cost of labor for producing 100 pounds of size 4d nails (unit 468) and of size 10d nails (unit 469) by machine in 1897. I used the price for 100 pounds of 4d ($1.90) and 10d nails ($1.65) from the 1897 Sears catalog to gauge the dollar value of total revenue or gross output associated with 100 pounds of nails. In particular, I assumed that Sears marked up the price it paid for nails by a factor of 2 so I took one half of the Sears price for 100 pounds of 4d or 10d nails as my estimate of prices to calculate gross output (revenue) of the nail manufacturer. These calculations yielded a labor share of 0.308 for 4d nails and 0.243 for 10d nails. I averaged these two share to yield 0.276 as the labor share for nail manufacturing in 1897. The *Hand and Machine Labor* report does not provide sufficient detail to estimate non-labor factor shares. Accordingly, I set the labor share for 1897 equal to the estimate described above and obtained 1897 shares for other factors by adjusting the 1870 shares for those other factors. Specifically, I proportionally scaled the 1870 shares for non-labor factors so that, along with the 1897 labor share, all shares for 1897 would sum to 1. Because the 1897 estimate of the labor share is larger than that for 1870, this procedure amounted to scaling down all of the 1870 non-labor shares to get estimates for 1897.
1870	Bateman, Weiss, and Atack extract of 1870 Census of Manufactures as described in Atack and Bateman (1999). In particular, I extracted firms from the State Sample for which nails were the first output. This yielded three firms with reasonably complete data, all of which were steam powered. (One additional firm reported nails as the primary output using water power, but the data were incomplete and so not included.) From the entries for these firms, I could estimate the total value of output, the wage bill, the cost of energy inputs, and the cost of materials inputs. To obtain an estimate of the capital share for each firm, I took the reported estimate of capital multiplied by a factor of 0.10 divided by the total value of nail output. The 0.10 factor represents a rough guess of the return to nailmaking capital. I estimated the share of purchased services as 1 minus the shares estimated for the other factors. For each factor, I used the average share across these three firms.

1850	Estimates of 1850 factor shares were obtained using the Bateman, Weiss, and Atack extract of the 1850 Census of Manufactures. In the State Sample, I identified six firms for which nails were the only output. In addition, I identified one firm for which nails were listed as the second output but were the dominant output of the firm. Of these seven firms, one was steam powered, three were water powered, and three were identified as hand powered. (One other firm that I did not include listed nails as the first output, but the data for this firm were internally inconsistent.) For each factor I used the same procedure as for the 1870 shares, averaging shares across the seven firms.
1813	According to the *Hand and Machine* study, many manufacturing processes were done by "hand" in 1813. The data in that report did not provide a consistent estimate of the factor share of labor for 1813 (implied estimates of the labor share were very large, ranging from about 0.48 to greater than 1 depending on auxiliary assumptions. Instead, I estimated factor shares for 1813 using an average of the three "hand" firms identified in the 1850 Census of Manufactures extract.

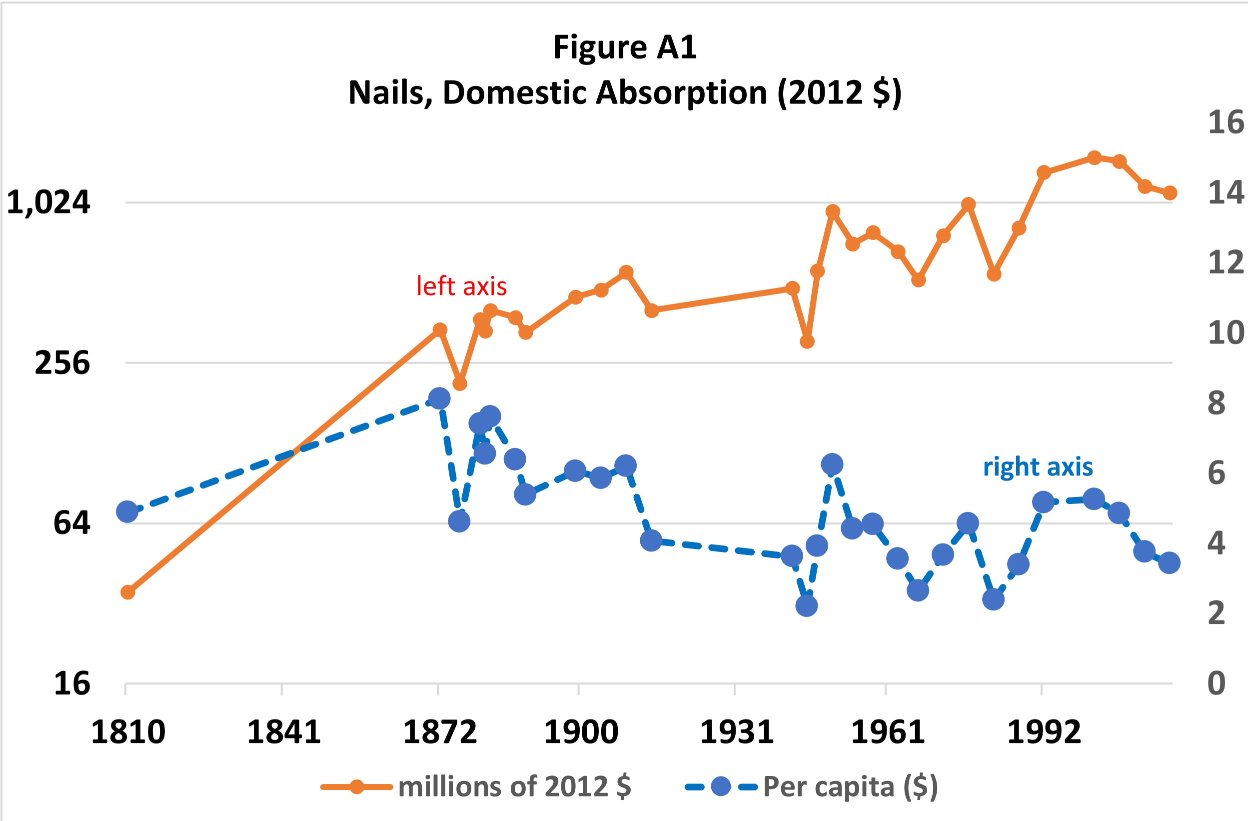
Figure A1
Nails, Domestic Absorption (2012 $)
1,024
256
64
16
16
14
12
10
8
6
4
2
0
left axis
right axis
1810
1841
1872
1900
1931
1961
1992
millions of 2012 $
Per capita ($)

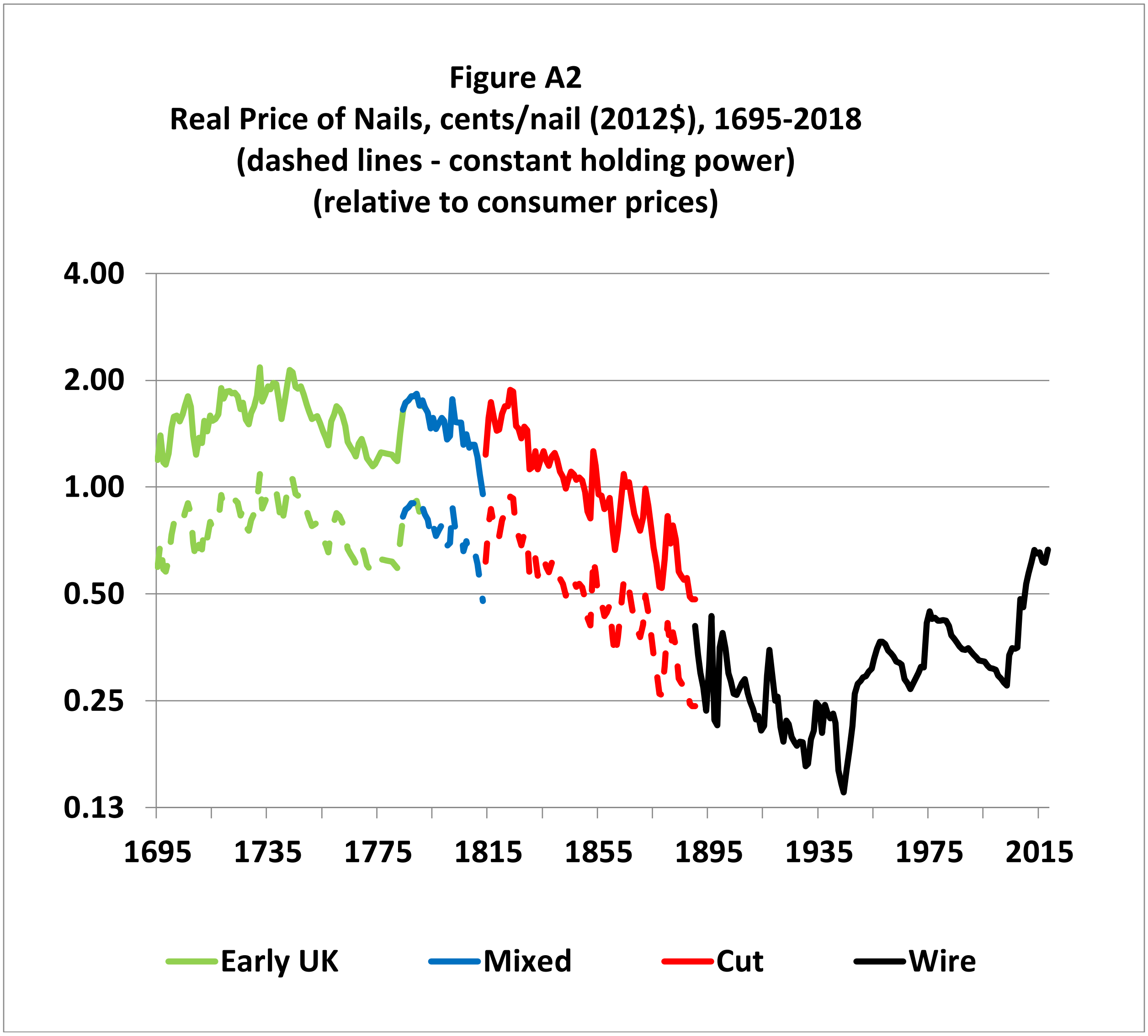
Figure A2
Real Price of Nails, cents/nail (2012$), 1695-2018
(dashed lines - constant holding power)
(relative to consumer prices)
4.00
2.00
1.00
0.50
0.25
0.13
1695
1735
1775
1815
1855
1895
1935
1975
2015
Early UK
Mixed
Cut
Wire

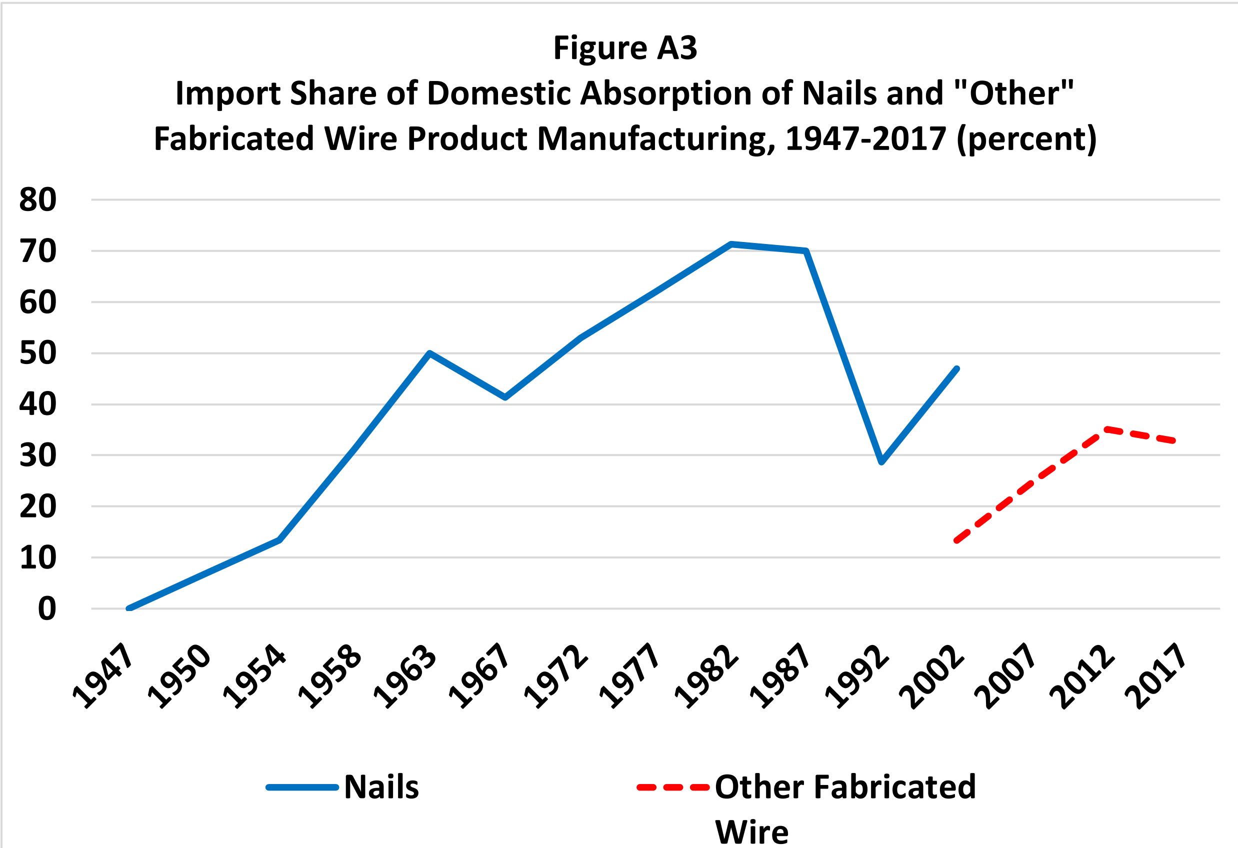
Figure A3
Import Share of Domestic Absorption of Nails and "Other" Fabricated Wire Product Manufacturing, 1947-2017 (percent)
80
70
60
50
40
30
20
10
0
1947
1950
1954
1958
1963
1967
1972
1977
1982
1987
1992
2002
2007
2012
2017
Nails
Other Fabricated Wire

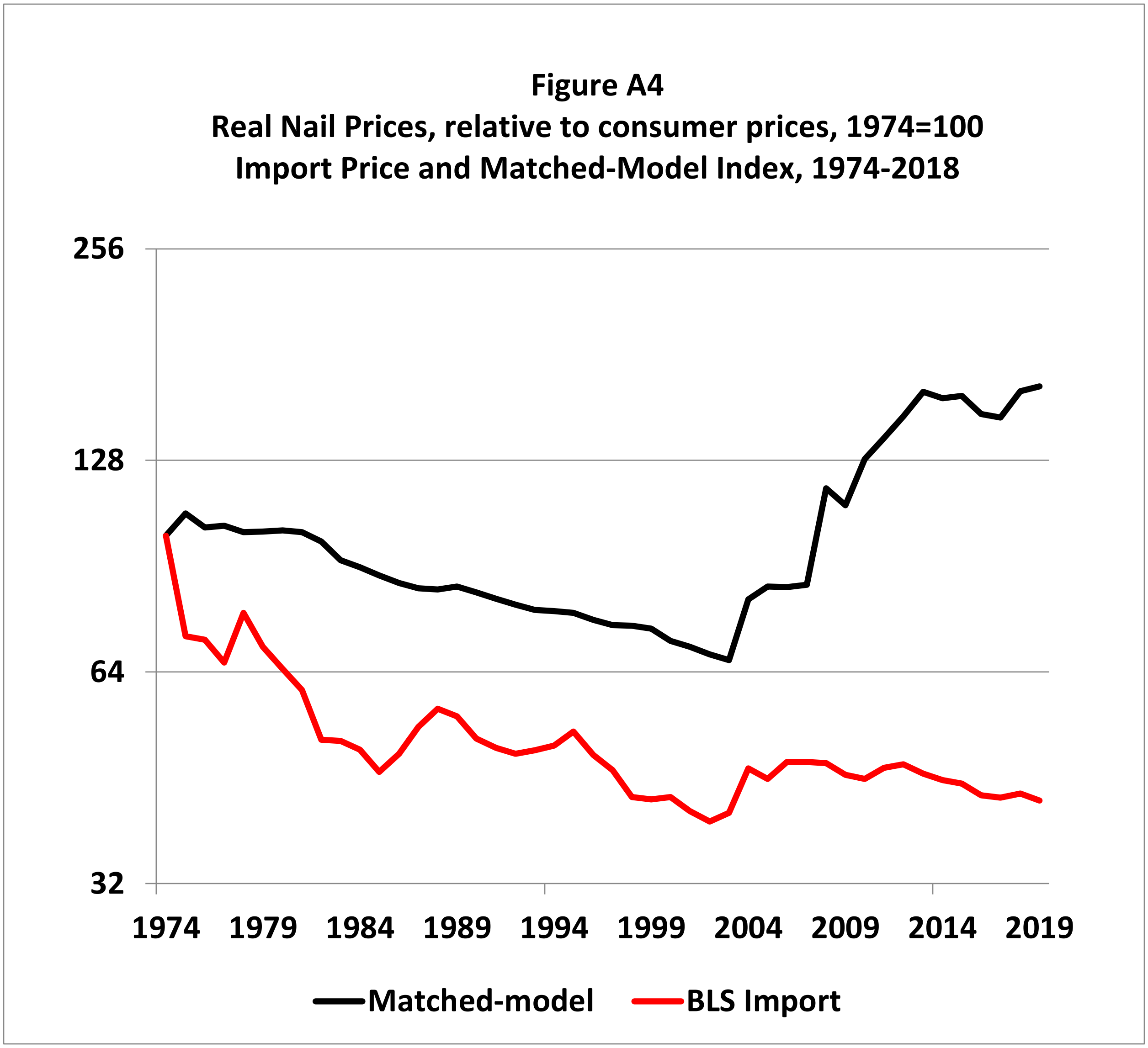
Figure A4
Real Nail Prices, relative to consumer prices, 1974=100
Import Price and Matched-Model Index, 1974-2018
256
128
64
32
1974
1979
1984
1989
1994
1999
2004
2009
2014
2019
Matched-model
BLS Import