Trade Disruptions and America's Early Industrialization

Joseph H. Davis
The Vanguard Group

Douglas A. Irwin
Dartmouth College and NBER

This Version: February 3, 2024

Abstract: Between 1807 and 1814, U.S. imports were slashed dramatically by a trade embargo, non-importation measures, and the War of 1812. These disruptions kept foreign manufactured goods out of the domestic market and are commonly thought to have spurred early U.S. industrialization. This paper uses disaggregated data on U.S. industrial production and finds that the trade disruptions did not accelerate U.S. industrialization as trend growth in industrial output was little changed over this period. However, the disruptions may have played a role in shifting resources from trade-dependent industries (such as shipbuilding) to domestic infant industries (such as cotton textiles).

Word count: 5856

JEL Codes: F1, N7

Trade Disruptions and America's Early Industrialization

1. Introduction

The role of government policy in promoting infant industries has been a controversial issue in the United States since the country's founding. In 1793, Treasury Secretary Alexander Hamilton's famous "Report on Manufacturers," which called for limited, targeted subsidies for some domestic producers and higher tariffs on some imported manufactured goods, encountered stiff political opposition and was only partially implemented (Irwin 2003). Other pre-Civil War U.S. policies tended to represent incremental changes rather than the sharp breaks from which economists like to identify and estimate causal impacts. Even if more aggressive industrial policies had been pursued, of course, assessing their impact on output and other outcomes would be difficult because the selection of supported industries was not random and was influenced by political economy factors.[1]

Consequently, recent research has sought to exploit historical episodes in which large, exogenous shocks to trade (rather than policy measures) can be used to help identify the effect of changes in trade flows on economic outcomes.[2] The Napoleonic wars, which constitute one of the greatest shocks the world economy has ever experienced, is often used in this way (O'Rourke 2006). For example, Juhász (2018) finds that the British blockade of continental Europe during

[1] Lack of data has been an obstacle to research on the antebellum period, although Irwin and Temin (2003) study the effect of a sharp reduction in import duties on the cotton textile industry in the 1840s. There are more studies of the late nineteenth century, including Irwin (2000) on tinplate as an infant industry, Jaremsky (2014) on the role of the National Bank Act in promoting manufacturing, and Atack, Margo, and Rhode (2022) on transportation improvements and manufacturing.

[2] See the recent survey by Juhász and Steinwender (2023). For example, Hanlon (2015, 2017) finds that the reduction in cotton supply during the U.S. Civil War promoted technical change in the British textile industry but reduced the growth of cities devoted to textile production. Some studies based on the geographic location of industry, or some other measure of economic activity may overstate their results due to spatial autocorrelation (Kelly 2020).

this period promoted the development of mechanized cotton spinning in France with effects that lasted well after the blockade had been lifted.

The United States also faced large trade shocks in the early nineteenth century. Between 1807 and 1815, U.S. foreign trade was severely disrupted by a trade embargo, non-importation measures, and the British blockade during the War of 1812. These disruptions prevented imported goods from reaching the U.S. market, thereby protecting nascent domestic industries from foreign competition. As a result, new manufacturing firms were established and existing domestic producers rapidly expanded output to replace previously imported goods.[3] With the resumption of normal commerce after the war, however, a flood of imported manufactured goods in 1815 and 1816 threatened to eliminate many of the new producers and set back any gains to domestic manufacturing.

An unanswered question is whether the seven-year trade disruption permanently affected the course of America's industrialization or merely provided a temporary and short-lived boost to certain producers. The lack of sufficient data on early U.S. production have prevented any clear-cut answer from emerging. Older works testify to the blossoming of manufacturing around this period, but these studies mainly provide descriptive and somewhat impressionistic evidence.[4]

This paper uses the industrial production series constructed by Davis (2004) to examine

[3] For example, Taussig (1931, pp. 16-17) observed that a "series of restrictive measures blocked the accustomed channels of exchange and production and gave an enormous stimulus to those branches of industry whose products had before been imported. Establishments for the manufacture of cotton goods, woollen cloths, iron, glass, pottery, and other articles, sprang up with a mushroom growth. . . . It is sufficient here to note that the restrictive legislation of 1808-15 was, for the time being, equivalent to extreme protection."

[4] Some research has focused on indirect measures of manufacturing activity, such as incorporations or patents, where limited quantitative evidence is available. Lebergott (1984, p. 126), Rosenbloom (2004), and others have observed the striking inverse correlation between shipping volume and incorporations of cotton textile firms. In addition, Sokoloff (1988) notes a small wave of patenting activity around the time of the trade disruptions.

how the trade disruptions affected early U.S. manufacturing. The aggregate index can be decomposed into its constituent elements, permitting a more refined look at the impact of trade disruptions on different parts of the early manufacturing economy, such as domestic infant industries (e.g., cotton textiles) and trade-dependent industries (e.g., shipbuilding).

We find that the trade disruptions did not lead to an acceleration in industrial production as its trend growth is little changed over this period. However, the steady growth in overall production masks a sharp divergence between the fate of infant industries (which boomed) and trade-dependent industries (which busted). After the import surge in 1815 and 1816 temporarily reversed these outcomes and trade flows settled, however, the composition of U.S. industrial output had been significantly altered. In the 1820s, the United States had nearly 20-40 percent more production in infant industries, and about 20-40 percent less production in trade-dependent industries, than would have been expected based on pre-disruption trends. Other factors also may have contributed to this shift in resource allocation, such as new technology, the changing composition of domestic and foreign demand, and the Tariff of 1816.

The paper studies the trade disruptions of the 1808-14 period in the spirit of the narrative approach to macroeconomic identification (Hamilton 1983, Nakamura and Steinsson 2018, Romer and Romer 2023). This literature seeks to find exogenous variation in the historical record to identify the impact of such factors as oil price shocks or fiscal and monetary policy changes on national income. The large trade disruptions provide historically unique exogenous variation with which we can identify the impact of trade shocks on early industrial activity. Section 2 sets out the historical background and describes the trade disruptions experienced during this period. Section 3 separates the Davis (2004) industrial production series into two groups – trade/commercial industries and domestic/infant industries – to how they are affected

by the trade shocks of the period. We use a basic forecasting model and vector autoregression (VAR) to examine the effects of trade shocks on industrial output. Section 4 concludes.

2. Trade Disruptions and Domestic Industries

In the late eighteenth century, the United States was largely an agrarian society with a few commercial cities on its eastern seaboard and little manufacturing activity. This was reflected in its foreign trade: The country exported agricultural goods and raw materials and imported (from Britain) most of the manufactured goods that it consumed. Of course, the United States was not completely devoid of manufacturing, ranging from large scale industries such as shipbuilding to smaller local ones such as shoe making, but manufacturing was a small part of the overall economy.

When war broke out between Britain and France in 1793, the United States remained neutral, and U.S. foreign commerce initially benefitted. American merchants took advantage of the void left by the combatants in shipping goods from North America and the Caribbean to Western Europe. U.S. re-exports boomed, growing from about $1 million in 1792 to nearly $40 million by 1800.[5] As the European hostilities intensified, however, the United States gradually became embroiled in the conflict. The British and French navies began harassing American merchants, confiscating their ships and cargoes, and impressing their sailors as each country sought to strangle the economy of the other.

In response, in December 1807, President Thomas Jefferson requested that Congress enact a trade embargo, preventing U.S. ships from sailing to foreign destinations. The purpose was not to promote domestic production of manufactured goods, but to prevent further losses to the merchant marine. Jefferson also believed that, by denying Britain and France much needed

[5] Adams (1980) and Goldin and Lewis (1980) examine the impact of the re-export trade on the U.S. economy.

American supplies, the embargo would force the countries to stop their depredations against U.S. merchants. The embargo inflicted a sharp blow to the value of trade in 1808. Exports fell 82 percent while imports for consumption fell only 60 percent, mainly because American ships in Europe were allowed to return home and unload their cargoes. The staggering loss of trade produced a sizable welfare cost, estimated to be about 5 percent of GDP.[6]

Although domestic opposition forced the embargo to be abandoned just fifteen months later, in March 1809, a non-intercourse measure was then imposed banning trade with Britain and France for part of 1809. This measure was suspended for most of 1810, but in 1811 a non-importation policy was put in place against Britain. When these actions failed to ease tensions on the Atlantic, Congress declared war on Britain in June 1812. The conflict severely disrupted trans-Atlantic trade. The United States maintained its embargo against Britain, but a British blockade of the North American seaboard thwarted U.S. attempts to continue trading with other parts of the world. The war and blockade almost eliminated U.S. foreign trade in 1813 and 1814. The value of U.S. imports for consumption fell from $70 million in 1812 to $13 million in 1814, a decline of over 80 percent. The Treaty of Ghent ended the conflict in December 1814 and normal trade was restored in the spring of 1815. The resumption of commerce brought a flood of foreign goods into U.S. ports: the value of imports surged to $79 million in 1815 and then $134 million by 1816, before receding.

Figure 1 illustrates the volatile path of U.S. trade over this period by presenting three different measures of the volume of U.S. imports. They are highly correlated with each other and

[6] Using different methods, several papers arrive at similar estimates of the welfare cost. Irwin (2005) calculates that it was about 4-6 percent of GDP, while O'Rourke (2007) finds about 3-6 percent, and Esposito (2020) estimates about 3-8 percent. The embargo also inflicted significant costs on European countries, see Frankel (1982) and O'Rourke (2007).

indicate the embargo did not have as great an impact on trade as the war (Glick and Taylor 2010). Figure 1a shows the tonnage of ships entering U.S. ports fell 50 percent in 1808 and nearly 90 percent between 1811 and 1814. The trade that took place during this period was largely with the Caribbean rather than with Europe and probably did not include many industrial products.

The second measure is the official value (real) British exports to the United States, the source of most imports of manufactured goods. As figure 1b show, imports from Britain fell to extremely low levels from 1811 until 1815, suggesting that the United States was cut off from virtually all imports of manufactured goods. The third measure is real U.S. imports, the value of imports divided by a price index of imports, calculated by North (1966). Manufactured goods comprise a large share of imports – 64 percent in 1821, the first year for which disaggregated data exist – but other goods are included in this measure as well.

As noted earlier, the lack of economic data from the period has hampered past efforts to determine how these trade disruptions affected early American industry. However, Davis's (2004) index of industrial production for the 1790-1915 period provides a clearer picture of the state of U.S. manufacturing during this time. This annual index incorporates 37 physical-volume series in the pre-Civil War period to gauge manufacturing activity in a manner similar to how the Federal Reserve Board's index currently measures U.S. industrial production. While Davis's original index has complete coverage from 1826 on, moderate attrition occurs further back in time.[7]

[7] For complete details on the constituent elements and construction of the index, see the Technical Appendix to Davis's paper maintained at the NBER website: https://www.nber.org/research/data/us-industrial-production-index-1790-1915

For this paper, we have constructed a version of the original Davis index whose coverage preserves comparability of index changes over time. Specifically, the special variant of the index includes only industries that existed on the eve of the embargo (and whose annual direct or indirect output measures were available before 1808) or that emerged as entirely new industries between the embargo period and the base 1850 census year of the index. These selection criteria retained 27 of the 37 original antebellum industries in the original Davis index, representing 61.4 percent of the value-added weight of the 1850 base year.

Figure 2 presents the industrial production index from 1790 to 1830. The shaded portions highlight the period of disrupted trade (1808, 1811-14). There does not appear to be any pronounced acceleration in industrial production during this period. However, the lack of a distinct effect of the trade disruptions on overall industrial production may be due to its differing effects on different types of industries from different regions. The impact on ship builders and fish preservers in New England, who were dependent on foreign trade, was vastly different from the impact on new iron and glass manufacturers around Philadelphia, which faced direct competition from imports.

An 1810 report by Treasury Secretary Albert Gallatin documents the diversity of domestic industries at the time. Gallatin's (1810, p. 124) report considered between three categories of industry. The first category comprised eight commerce and trade-dependent industries that often exported their product: manufactures of wood (ships, furniture, etc.), leather, soap and tallow candles, spermaceti oil and candles, flaxseed oil, refined sugar, coarse earthenware, and powders (snuff, hair, etc.). The second category included eleven industries that were "firmly established" and supplied "a considerable part of the consumption of the United States" but still faced foreign competition in the domestic market: cotton, wool, and flax

manufactures, iron, hemp products, hats and straw bonnets, paper and printed books, spirits and malt liquors, gunpowder, window glass, jewelry and clocks, lead, and wax candles. The third category consisted of seven industries in which some progress had been made in establishing domestic production, but where imports satisfied almost all domestic consumption: paints and colors, chemical preparations and medicinal drugs, salt, copper and brass manufactures, plated ware, calico printing, other earthen and glass wares.

The components of the Davis index can be separated into two categories – commerce and trade-dependent industries and domestic import-competing "infant" industries – that roughly correspond to Gallatin's designation. (For our analysis, Gallatin's second and third categories are combined because, on the eve of the embargo, few if any of these industries were entirely free from import competition.) The 27 quantity-based components in this index of early American output correspond closely with the 26 industries cited by Gallatin in his three categories of industry. Commerce and trade-dependent industries include merchant shipbuilding, refined sugar, sperm- and whale-oil refining, wheat flour milling, fish curing, whale bone and copper. In general, these sectors were export-oriented or dependent upon foreign commerce. Domestic infant industries include cotton textile production (proxied by domestic cotton consumption), paper production (proxied by newspaper circulation), coal production, hog packing, navy vessels, music organs, hand fire engines, firearms, salt production, army wool stockings, cloth regalia, and army boots and shoes. These sectors faced more or less direct competition from foreign suppliers.

Figure 3 shows the markedly different effect of the trade disruptions on these two categories of domestic production. Trade-dependent industries were adversely affected by both the embargo and the wartime blockade, but much more severely by the latter. Production in

trade-dependent industries dropped nearly 70 percent between 1811 and 1814, but quickly rebounded after the war. Among the domestic infant industries, there does not appear to have been much import substitution during the brief 1808-09 embargo, but a substantial amount more during the war. Infant industry production nearly tripled between 1811 and 1814 but fell back once normal commerce resumed.

This separation reveals why total industrial production shows little sign of change during this period. Any production advances by domestic infant industries were largely offset by production declines by trade-dependent industries, muting the overall impact. In fact, the effect may have been slightly detrimental to total industrial production since production in commerce and trade-dependent industries exceeded that in infant industries. According to our rough calculations, around the time of the embargo about 32 percent of production was in trade-dependent industries, 27 percent in infant industries, and the remainder in other domestic industries.[8] Although the United States was far from being a net exporter of manufactured goods, the country still had a sizeable export-oriented traded goods sector.

3. The Effect of Import Shocks on Industrial Production

This section considers two methods of examining whether the trade disruption had temporary or permanent effect on the levels of industrial production: linear forecasting regressions and impulse response functions from a vector autoregression (VAR) model.

A. Linear Trend Forecast

[8] In terms of the 1850 value-added weights, the relative value-added weights are split rather evenly among Gallatin's classifications of (1) trade-dependent industries (eight series, representing 32 percent of the index's value added), (2) "firmly established" domestic industries (14 series, 27 percent), and (3) import-competing "infant" industries (five series, 41 percent). Thus, in comparing the structure of industries around 1808 to that in 1850, trade-dependent industries accounted for about the same share of output, but infant industries (largely cotton textiles and iron) now made-up 41 percent of industrial production, a share that grew at the expense of other domestic industries.

We first consider whether the different periods of trade fluctuations had an impact on industrial production beyond its usual trend growth. We consider simple specification in which industrial production evolves according to a deterministic trend and a stationary autoregressive component, as in:

(1) $\log y_t = \mu + \beta\, t + \alpha \log y_{t-1} + \gamma_1$ disruption $+ \gamma_2$ resumption $+ \gamma_3$ postwar $+ \varepsilon_t$

where y_t is industrial production, μ is a constant, t is a time trend, and ε_t is a random error term.

This specification includes three dummy variables that allow for shifts in the level of production during the embargo and blockade years (disruption, taking the value of one in 1808 and from 1812-14), during the readjustment to international trade (resumption, taking the value of one in 1815-16), and during the post-war period (postwar, which takes the value of one for the period from 1817-40). The reason for separating 1815 and 1816 from the postwar period is that imports were unusually high in those years, reflecting the readjustment of foreign commerce to peace. The behavior of imports and industrial production in these two years was not representative of the postwar period, but by 1817 both had stabilized.

We estimate this equation using the three measures of industrial production and annual data from 1790 to 1840. To conserve space, we do not report the fully statistical results but describe them as follows. For total industrial production, the coefficient on time indicates that trend production increases about 1.6 percent per year, on average. The coefficient on lagged production suggests that most innovations to production (70 percent) are permanent and carry through to subsequent periods. The coefficients on the dummy variables for the trade disruption, resumption, and postwar periods are negative and statistically significant, indicating that the trade disruptions had an adverse impact on overall industrial production. The coefficient on the dummy variable for the postwar period implies that total industrial production was 9 percent

lower after 1817 than might otherwise have been expected. This suggests that the harmful impact of the disruptions on trade-dependent industries exceeded the beneficial impact on infant industries, because the output of trade-dependent industries exceeded that of industries.

As expected, the results are quite different for infant and trade-dependent industries. Infant industry production was 31 percent higher, while trade-dependent production was 58 percent lower, during the trade disruption period than otherwise expected. When trade resumed in 1815 and 1816, infant industry production plunged 22 percent while that of trade-dependent industries rose just 11 percent, a very incomplete recovery. After 1817, the level of infant industry production was 13 percent above what might have been expected prior to the trade disruptions, while trade-dependent production was 26 percent below what would have been expected. The asymmetry may not only reflect the larger size of the trade-dependent industries, but the fact that trade-dependent production falls directly with the reduction in trade, whereas some imports cannot be replaced by domestic production.

These results suggest that infant industries came out of the war with a higher level of production than might have been anticipated. Similar results come from asking whether infant industry production was higher in the 1820s than one would have expected based on a simple linear extrapolation of its trend growth from the period prior to the trade disruption. Figure 4 compares actual and predicted infant industry and trade dependent industry production based on a simple forecast of production using only a constant and time trend from 1800 to 1807.[9] In figure 4a, actual infant industry production is about 40 percent higher than forecast in the early

[9] In the regression for infant industries, the coefficient on time is 0.045, with a standard error of 0.007, and an adjusted R^2 of 0.89. Data from the 1790s is not used in this regression because the trend rate of growth was much higher during that decade; the coefficient on time from 1790 to 1807 is 0.12 with a standard error of 0.01. The period of 1800-1807 is more likely to be representative of the period right before the trade disruptions.

1820s, although it seems to be returning to trend by the end of the decade. Similarly, figure 4b shows the actual and forecasted path of trade dependent production and shows that postwar production remains about 40 percent lower than expected in the 1820s.

This evidence suggests that the United States did not emerge from the trade disruptions with a higher overall level of industrial production. Consistent with this finding, Davis (2004) reports that U.S. industrial production does not show a pronounced acceleration during the 1810s or 1820s relative to that of the United Kingdom (based on the Crafts and Harley 1992 index). Rather, U.S. industrial output surges, both in absolute and relative terms, much later, in the early 1830s and again in the mid-1840s. However, the United States came out of this period with a different allocation of resources between these two industrial sectors.[10] The next question is whether the change in industry composition can be linked to the trade disruptions themselves.

B. Effect of Trade Shocks

To examine the impact of trade disruptions on industrial production directly, we turn to reduced form estimates of the relationship between the two. In many ways, the question of how import shocks affect industrial production is analogous to how oil price shocks (Hamilton 2003) and monetary policy shocks (Romer and Romer 2023) affect GDP. These papers start with a simple autoregressive distributed lag specification such as, in this case:

$$(2) \qquad \Delta \log y_t = \mu + \alpha \Delta \log y_{t-1} + \beta_0 \Delta \log TON_t + \beta_1 \Delta \log TON_{t-1} + \beta_2 \Delta \log TON_{t-2} + \varepsilon_t,$$

where y is industrial production, TON is the tonnage of ships engaged in foreign trade entering U.S. ports, and ε_t is a random error term. The sum of the coefficients on tonnage can be used to

[10] The interactions of the dummy variables with time are not statistically significant, suggesting that there was no acceleration of growth in industrial production during those periods, i.e., the level of production was affected, not its growth rate. In addition, other variables, such as the average tariff rate or annual estimates of gross domestic product (a potential demand-shift variable), are not statistically significant and do not greatly affect these estimates.

trace out the impact of changes in tonnage on the dependent variable.

A standard concern is that changes in industrial production and tonnage could be driven by a common factor, such as demand shocks. For example, an increase in domestic demand for manufactured goods could lead to an increase in both imports and domestic production.

Therefore, following Hamilton (2003) and Romer and Romer (2023), we attempt to isolate changes in trade that can be attributed to exogenous, non-demand factors – namely, the embargo and war – by creating a quantitative dummy variable (QDV) for the change in the log of shipping tonnage for the years 1808 and 1812-14. This quantitative dummy variable is not a zero-one variable, but one that takes the actual value of the change in those specific years and is zero otherwise. Because these shocks (all negative) are determined by American or British policy decisions about military security, they are likely to be independent of other factors driving industrial production, such as demand or supply shocks.

Figure 5 presents the impulse response function to a one standard deviation (negative) shock to shipping volume (along with the two standard error bands) in a simple vector autoregression (VAR). The first panel for total industrial production shows that a negative shock has essentially no impact on production. The second panel shows the effect on infant industrial production. The impact suggests that a one standard-deviation negative shock to shipping volume raises production – significantly and persistently – by about 6 percent. Given that the reduction in shipping volume in 1812-14 was a 5 times standard deviation move, that disruption would have increased production by about 30 percent. The third panel shows that the effect of a shipping shock is to reduce trade/commercial industrial production – significantly and persistently – by about 8 percent. The finding that a negative shipping shock hurts trade and commercial industries slightly more than it helps domestic infant industries is consistent with the

result that overall industrial production is unaffected (or slightly reduced) as a result of such shocks.

As a check, in results we do not report, we also examined the impulse response functions using the data on real U.S. imports and the official value of British exports to the United States (i.e., real imports from Britain). The results are similar: a negative shock to imports has no effect on overall industrial production, a positive impact on infant industries, and a negative impact on trade-dependent industries. As another check, we examined the impulse response using local projection methods rather than a VAR and find no material difference in the results.[11]

C. Interpretation of the Results

The previous subsection concluded that, after 1817, the United States had a level of infant industry production that was about 20-40 percent higher than one would have anticipated based on prewar trends. In addition, the level of trade-dependent industry production was about 20-40 percent lower than one would have anticipated. This implies that, after foreign trade returned to normal levels, the composition of U.S. industrial output was changed, even if the overall level of industrial production was not.

This implies that the disruption of trade led to hysteresis in the industrial sector of the United States. After certain firms entered the market with the absence of foreign competition, some survived and continued to produce even after imports returned to their previous level or were even somewhat lower than before (to judge from Figure 1).[12] Other factors also could have intervened in the immediate post-war period to alter the mix of production between infant and

[11] Romer and Romer (2023) and others have used local projection methods instead of impulse response functions from a VAR, but Plagborg-Moller and Wolf (2021) suggest that the results are similar under certain circumstances.
[12] For example, Rosenbloom (2004) argues that the expansion of U.S. textile production in the early nineteenth century is best understood as a path-dependent process initiated by the protection provided by the trade disruptions of this period.

trade-dependent industries. Likely candidates include the tariff of 1816, technological changes, and the changing composition of international demand.

The tariff of 1816 explicitly aimed to protect domestic industries from foreign competition arising from the import surge of 1815 and 1816 (Irwin 2017, Peart 2018). By changing the structure of duties across different goods, the legislation could have shifted the composition of imports away from manufactured goods. Although Figure 1 shows that the volume of imports (shipping tonnage) returned to its pre-trade disruption level by 1816, the measure of import volume includes all imports, not manufactured goods. Except for 1815 and 1816, real imports from Britain, perhaps the best proxy for imports of manufactured goods, never reached their pre-trade disruption peak (1806) from 1817 through the 1820s. As a result, there may have been a permanent reduction in the volume of imported manufactured goods. For example, the value and volume of imports of cotton textiles from Britain was much lower in 1816 and 1817 than it had been in 1815 or even prior to the war (although determining whether this was due to the postwar recession, or the tariff of 1816 is difficult).[13]

The problem with attributing great importance to the Tariff of 1816 is that its duties were lower than those in effect during the previous four and a half years and only slightly higher than those in effect prior to the War of 1812 (Irwin 2017). Congress doubled existing duties in 1812 and maintained those duties for more than a year after the end of the war. (Although it is commonly believed that the import surge of 1815 could have been prevented had the Tariff of 1816 been enacted more quickly, the surge in that year in fact paid the higher wartime duties that remained in effect until the end of June 1816.) Thus, in the case of cotton textiles, the pre-war duty was 17.5 percent, then raised to 35 percent in 1812 until the Tariff of 1816 reduced them to

[13] See Irwin and Temin (2001), Table 4 and Figure 5.

25 percent (with a minimum valuation provision, although this was not thought to have been binding on British imports until about 1820). The duty on manufactured glass (not windows or bottles) was 22.5 percent prior to the war, 45 percent during the war, and 20 percent in the Tariff of 1816. Thus, the Tariff of 1816 was not markedly higher than pre-war tariffs and may not have shifted policy so decisively as to bring about the reallocation of production between infant and trade-dependent industries.[14]

The rise in infant industry production, most notably cotton textiles, could also be due to technological change, namely, the introduction of the power loom. The power loom brought about a rapid shift from household to factory weaving of cloth. Zevin (1971, p. 136) notes that in 1815 less than one seventh of the cloth produced from New England yarn was woven in factories, but that it was one hundred percent by 1824. The enormous substitution of home production by factory production raised domestic production permanently, even if imports remained at high levels. A comparison of the New England and Philadelphia cotton textile industries suggests that the adoption of the power loom was essential to the survival of entrants in the postwar period of trade competition.[15] The New England industry adopted the power loom and easily weathered the restoration of trade, while the industry around Philadelphia boomed

[14] In constructing the tariff of 1816, Congress relied heavily on the report prepared by Alexander Dallas, the Secretary of the Treasury in the Madison administration. Like Gallatin's 1810 report, Dallas considered three classes of industry, (i) mature industries that were "firmly and permanently established" and supplied most of domestic consumption, (ii) industries "recently or partially established" which supplied part of domestic consumption but, "with proper cultivation, are capable of being matured to the whole extent of demand," and (iii) industries "so slightly cultivated as to leave the demand of the country wholly or almost wholly dependent upon foreign sources for supply." The first class included wood, hats, iron castings, window glass, leather, paper and printing; the second class included course cotton and woolen goods, larger iron goods, and beer and spirits; the third class included fine cotton goods, linens and silk goods, woollen blankets and carpets, china and earthenware, other glass products.

[15] The intensification of foreign competition after the war also promoted the diffusion of the power loom. "The principal motive for introducing the power loom was a desire to regain competitive viability by cutting costs," Zevin (1971, 141) notes. "The stimulus which brought this desire to the fore was the traumatic pressure which material and product price movements put on the manufacturers' gross margins. The result of adopting the power loom was to lower direct operating costs by a very substantial margin."

with the trade disruption but lacked significant investment in power looms and withered once normal commerce resumed.[16]

Another possible explanation for the compositional shift in industrial production is the change in domestic and international demand after the war. For more than a decade prior to the trade disruptions, Britain and France were engaged in a protracted war. This war raised the demand for U.S. ships and other exported goods to abnormally high levels. After the war, as European demand for these products fell to normal levels, U.S. production by these trade-dependent industries fell permanently as well. The shipbuilding industry, one of the largest trade-dependent industries, illustrates this phenomenon. The industry boomed after 1793 as a result of the European conflict and the rise of U.S. re-export trade. But from 1817 through 1824, domestic production of ships fell back to the levels seen during the early 1790s. As a result of the end of the Napoleonic wars, there was a reduction in demand for U.S. ships and shipping services through the 1820s that had little to do with the trade disruptions of the 1808 to 1814 period (Davis 2004, Technical Appendix C).

4. Conclusions

This paper has analyzed the impact of the disruptions to U.S. foreign trade between 1807 and 1815 on production by domestic manufacturers. The trade disruptions did not accelerate U.S. industrialization in the sense that total industrial production appears to have been little changed by these events. After 1817, however, the United States had a different mix of production between domestic infant industries and trade-dependent industries. This lasting shift in the

[16] The 1810 Census records that 206 looms were in operation in Philadelphia, but only 140 – of which just 65 were in operation – in 1820. Textile employment fell from 3,500 in 1816 to 400 in 1819 and just 200 in the Census of 1820 (Scranton 1987, p. 88). As a result, "Philadelphia millmen, by 1820, looked back on the midteens as a set of golden years," Scranton (1987, p. 76) writes.

structure of production may be due to the trade disruptions themselves, although other factors, such as higher tariffs on manufactured imports, technological changes (such as power looms in cotton textiles), and lower demand (for producers in shipbuilding), may also have contributed to this change.

References

Adams, Donald R., Jr. 1980. "American Neutrality and Prosperity, 1793-1808." *Journal of Economic History* 40 (5): 713-737.

Atack, Jeremy, Robert A. Margo, and Paul H. Rhode. "Industrialization and Urbanization in Nineteenth Century America," *Regional Science and Urban Economics* 94 (May 2022): 103678.

Crafts, N. F. R., and C. Knick Harley. "Output Growth and the British Industrial Revolution: A Restatement of the Crafts-Harley View." *Economic History Review*, New Series, 45 (November 1992): 703-730.

Dallas, Alexander J. "Tariff of Duties on Imports, February 12, 1816." *American State Papers, Finance*. Vol. III. Washington, D.C.: Gales and Seaton, 1832.

Davis, Joseph H. "An Annual Index of U.S. Industrial Production, 1790-1915." *Quarterly Journal of Economics* 119 (November 2004): 1177-1215.

Esposito, Federico. 2020. Estimating the Welfare Costs of Autarky: A Sufficient Statistics Approach. *Economic Letters* 194: 109361.

Frankel, Jeffrey A. 1982. "The 1807-1809 Embargo Against Great Britain." *Journal of Economic History* 42 (2): 291–308.

Gallatin, Albert. "Report on Manufactures." 11th Congress, 2d Session, April 19, 1810. *American State Papers, Commerce*. Vol. 2. Washington, D.C.: Gales and Seaton, 1832.

Glick, Reuven, and Alan M. Taylor. 2010. "Collateral Damage: Trade Disruption and the Economic Impact of War." *Review of Economics and Statistics* 92 (1): 102–27.

Goldin, Claudia, and Frank D. Lewis. "The Role of Exports in American Economic Growth during the Napoleonic Wars, 1793-1807." *Explorations in Economic History* 17 (January 1980): 6-25.

Hamilton, James D. "What is an Oil Shock?" *Journal of Econometrics* 113 (April 2003): 363-398.

Hanlon, W. Walker. 2015. "Necessity is the Mother of Invention: Input Supplies and Directed Technical Change." *Econometrica* 83(1): 67-100.

Hanlon, W. Walker. 2017. "Temporary Shocks and Persistent Effects in Urban Economies: Evidence from British Cities after the U.S. Civil War." *Review of Economics & Statistics* 99(1): 67-79.

Irwin, Douglas A. 2000. "Did Late-Nineteenth-Century U.S. Tariffs Promote Infant Industries?

Evidence from the Tinplate Industry." *Journal of Economic History* 60 (2): 335–60.

Irwin, Douglas A. "The Aftermath of Hamilton's Report on Manufactures." *Journal of Economic History* 64, no. 3 (2004): 800–821.

Irwin, Douglas A. "The Welfare Effects of Autarky: Evidence from the Jeffersonian Embargo, 1807-1809," *Review of International Economics*, 13 (4) (2005), pp. 631-645.

Irwin, Douglas A. 2017. *Clashing over Commerce: A History of U.S. Trade Policy.* Chicago: University of Chicago Press.

Irwin, Douglas A., and Peter Temin. "The Antebellum Tariff on Cotton Textiles Revisited," *Journal of Economic History* 61 (September 2001): 777-798.

Jaremski, Matthew. "National Banking's Role in U.S. Industrialization, 1850–1900." *Journal of Economic History* 74, no. 1 (2014): 109–40.

Jeremy, David J. *Transatlantic Industrial Revolution: The Diffusion of Textile Technologies between Britain and America, 1790-1830s*. Cambridge: MIT Press, 1981.

Juhász, Réka. "Temporary Protection and Technology Adoption: Evidence from the Napoleonic Blockade." *American Economic Review* 108, no. 11 (2018): 3339–76.

Juhász, Réka, and Claudia Steinwender. 2024. "Industrial Policy and the Great Divergence." *Annual Review of Economics,* forthcoming.

Kelly, Morgan. 2022. Understanding Persistence. Working paper, University College Dublin.

Lebergott, Stanley. *The Americans: An Economic Record*. New York: Norton, 1984.

Mitchell, Brian R. *British Historical Statistics*. New York: Cambridge University Press, 1988.

Nakamura, Emi, and Jón Steinsson. 2018. "Identification in Macroeconomics." *Journal of Economic Perspectives*, 32 (3): 59-86.

North, Douglass C. *The Economic Growth of the United States, 1790-1860*. New York: Norton, 1966.

O'Rourke, Kevin H. 2006. "The Worldwide Economic Impact of the French Revolutionary and Napoleonic Wars, 1793–1815." *Journal of Global History* 1 (1): 123–49.

O'Rourke, Kevin H. "War and Welfare: Britain, France, and the United States 1807–14," *Oxford Economic Papers*, 59 1: October 2007, Pages i8–i30,

Peart, Daniel. 2018. *Lobbyists and the Making of US Tariff Policy, 1816–1861*. Baltimore: Johns

Hopkins University Press.

Plagborg-Moller, Mikkel, and Christian K. Wolf. 2021. “Local Projections and VARS Estimate the Same Impulse Responses.” *Econometrica* 89 (2): 955–980.

Romer, Christina D., and David H. Romer. “Presidential Address: Does Monetary Policy Matter? The Narrative Approach after 35 Years.” *American Economic Review* 2023, 113(6): 1395–1423

Rosenbloom, Joshua. “Path Dependence and the Origins of Cotton Textile Manufacturing in New England.” In Douglas Farnie and David Jeremy (eds.), *The Fiber that Changed the World*. New York: Oxford University Press, 2004.

Scranton, Philip. *Proprietary Capitalism: The Textile Manufacture at Philadelphia, 1800-1885*. Philadelphia: Temple University Press, 1987.

Sokoloff, Kenneth L. “Inventive Activity in Early Industrial America: Evidence from Patent Records, 1790-1846.” *Journal of Economic History* 48 (December 1988): 813-850.

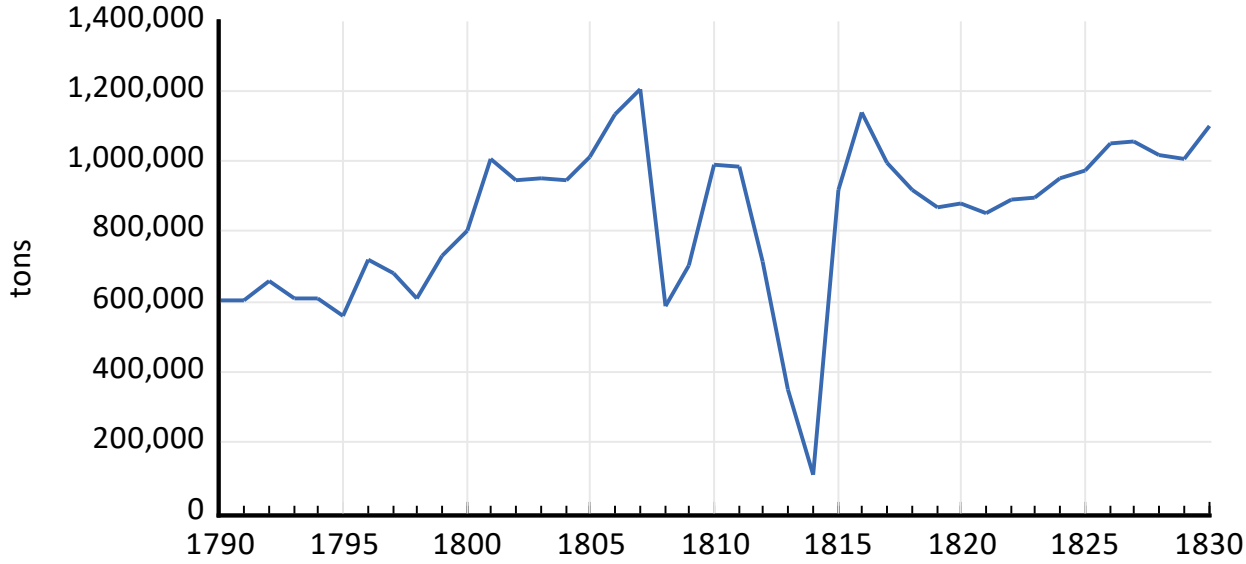
Taussig, Frank W. *A Tariff History of the United States*. 8th Edition. New York: Putnam’s Sons, 1931.

U.S. Department of the Treasury. *Statistics of the Foreign and Domestic Commerce of the United States*. Washington: Government Printing Office, 1864.

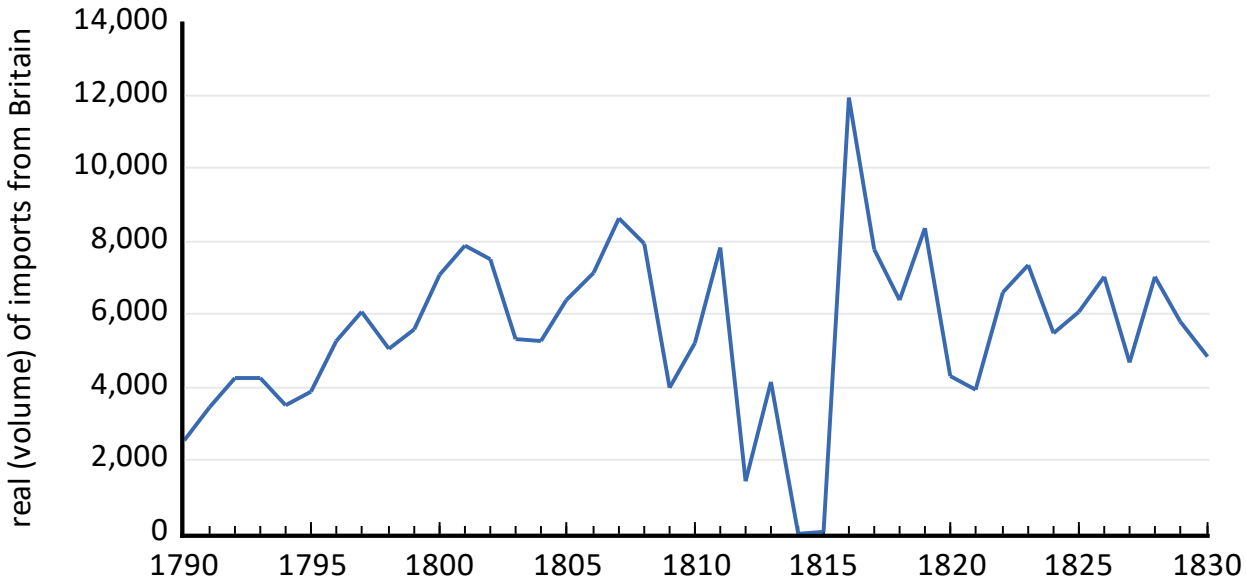
Zevin, Robert B. “The Growth of Cotton Textile Production after 1815.” In Robert Fogel and Stanley Engerman (eds.), *The Reinterpretation of America’s Past*. New York: Harper & Row, 1971.

Figure 1: Volume Measures of U.S. Import Trade, 1790-1830

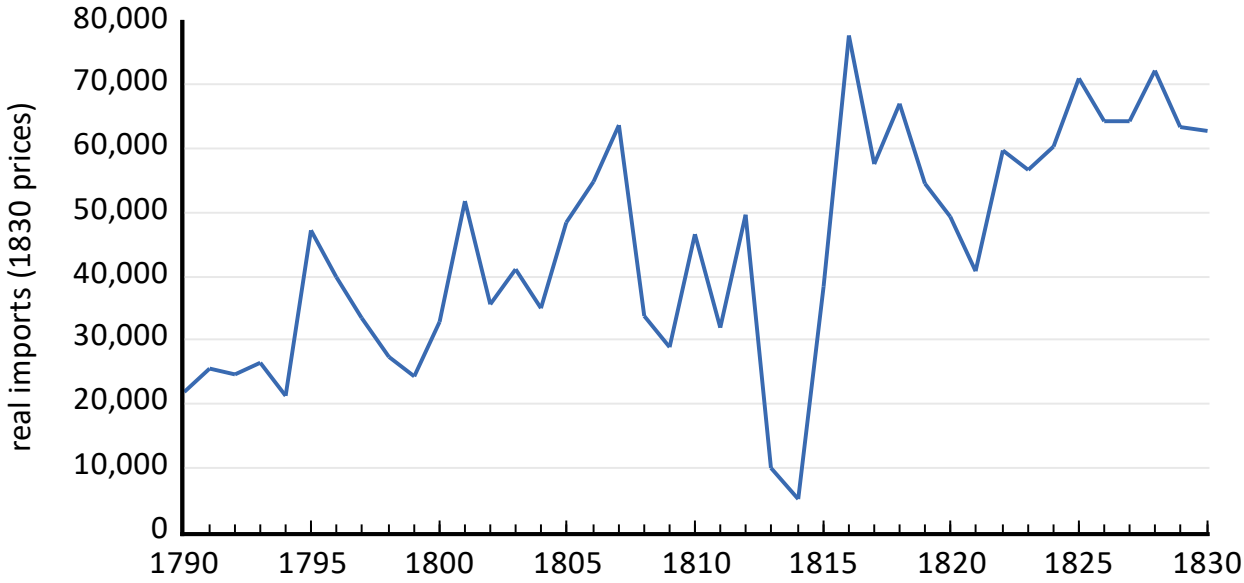
A. Tonnage of Ships Engaged in Foreign Trade Entering U.S. Ports



B. Imports from Great Britain (volume)

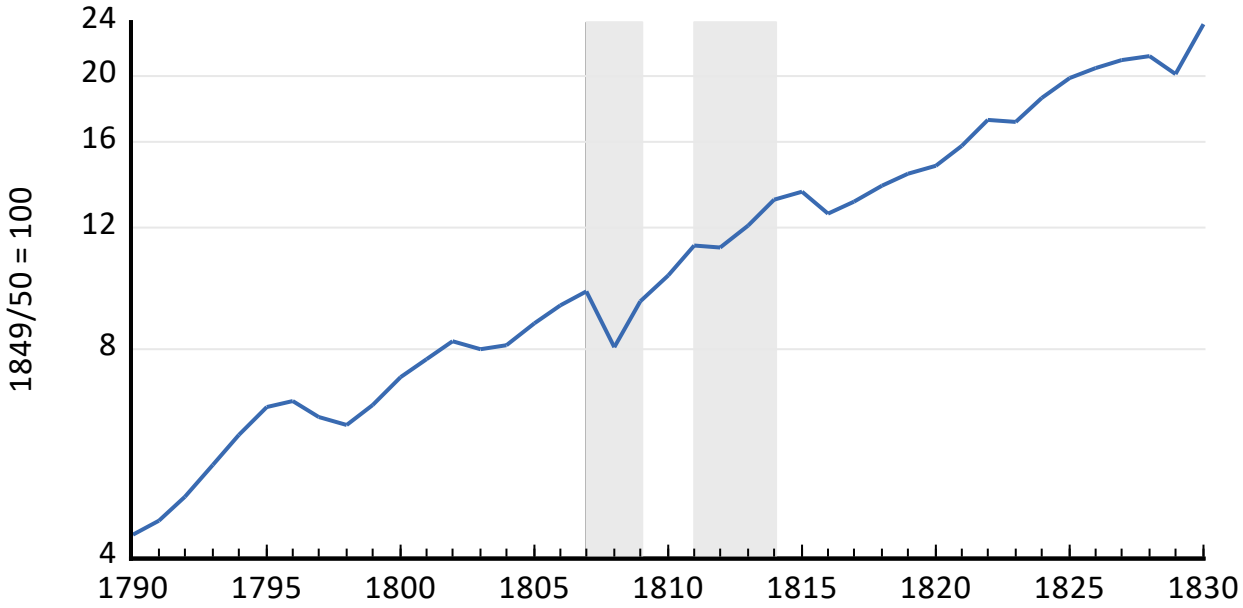


C. Volume of U.S. Imports



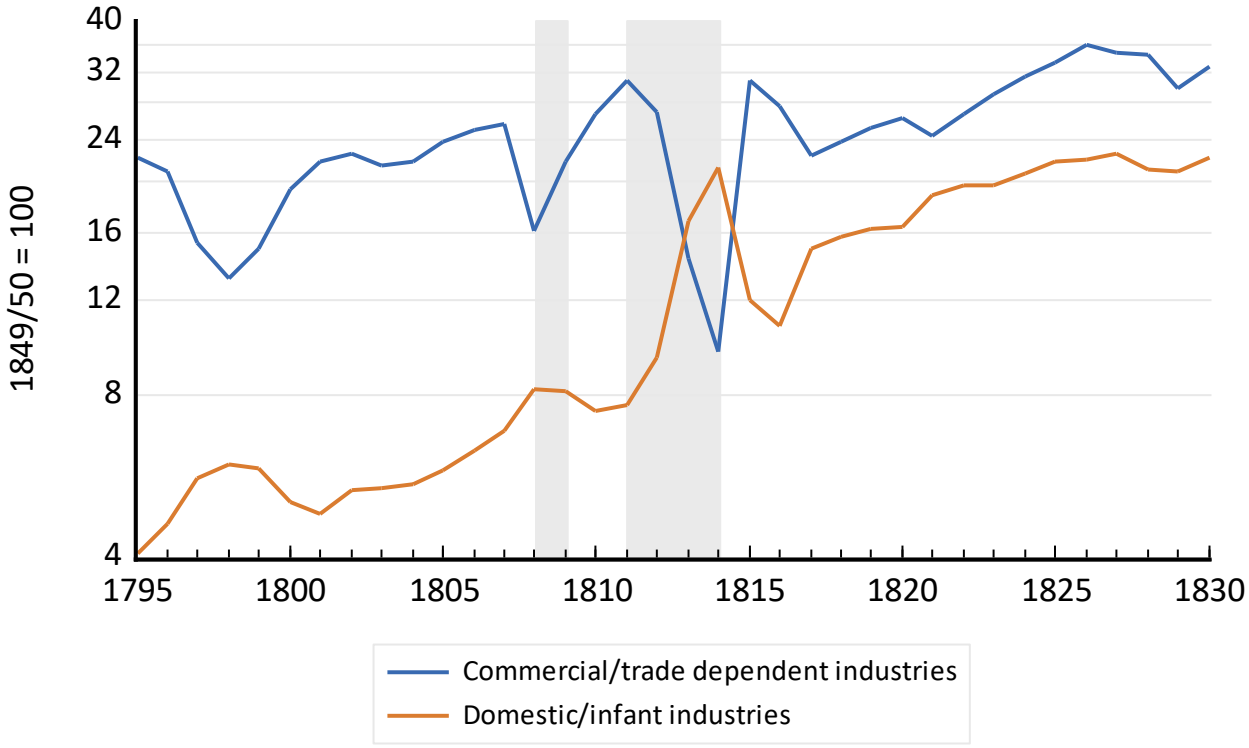
Source: Tonnage: U.S. Treasury (1864), pp. 6-7; Real British Exports: Mitchell (1988), p. 495; Real U.S. Imports: North (1966), pp. 228-9, 243.

Figure 2: U.S. Industrial Production, 1790-1830



Source: Davis (2004). Shaded areas are periods of disrupted trade (1808, 1811-14).

Figure 3: The Two Faces of U.S. Industrial Activity, 1795-1830



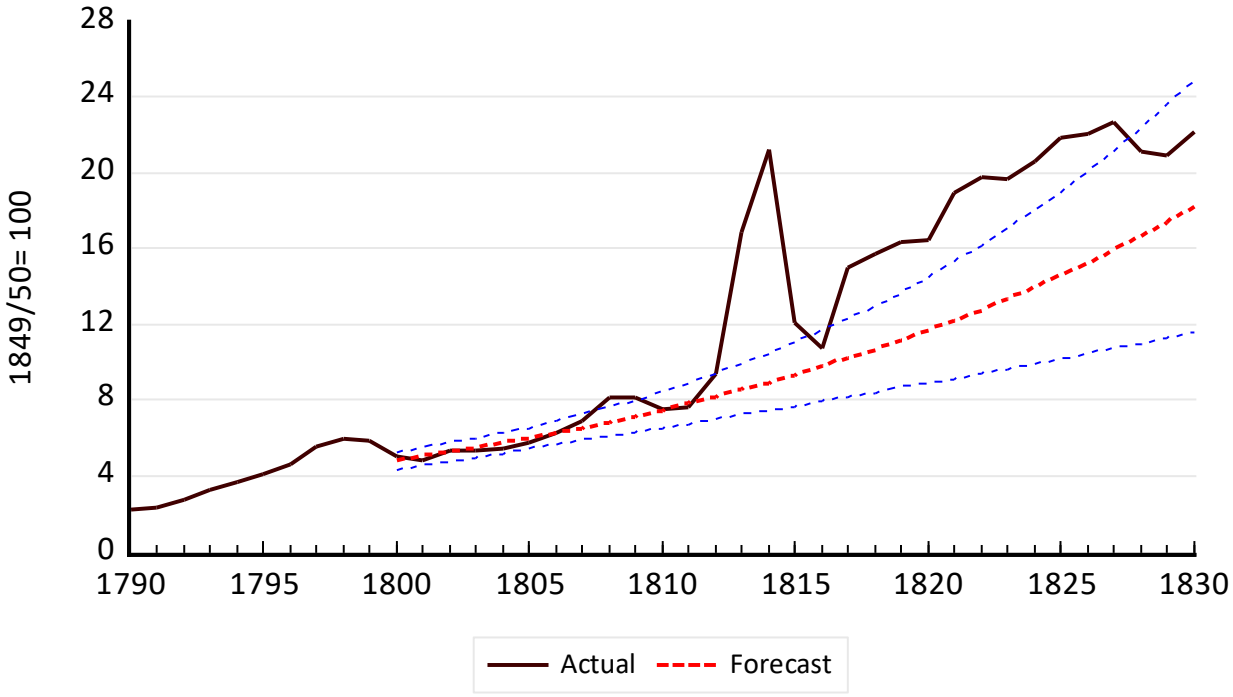
Note: Shaded area indicates periods of disrupted trade (1808, 1811-14).

Source: Derived from Davis (2004). Commerce and trade-dependent industries include merchant shipbuilding, flour milling, sugar refining, whale refining, fish curing, and copper consumption; these follow Treasury Secretary Gallatin's contemporaneous designation of industries dependent upon foreign markets. Domestic/infant industries constitute all other (17) components of series beginning on or before 1808.

Figure 4: Actual and Forecast Industrial Production, 1790-1830

Note: Forecast based on 1800-1807 trend

A. Domestic & Infant Industries



B. Commercial & Trade-Dependent Industries

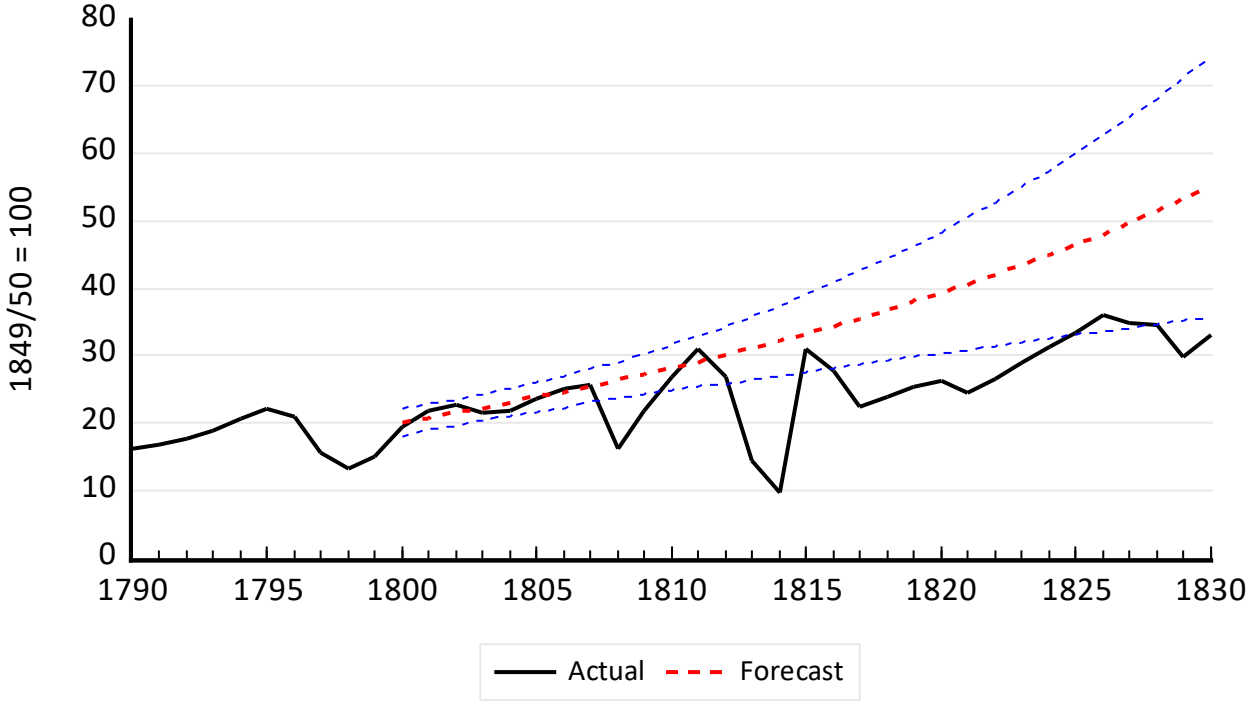
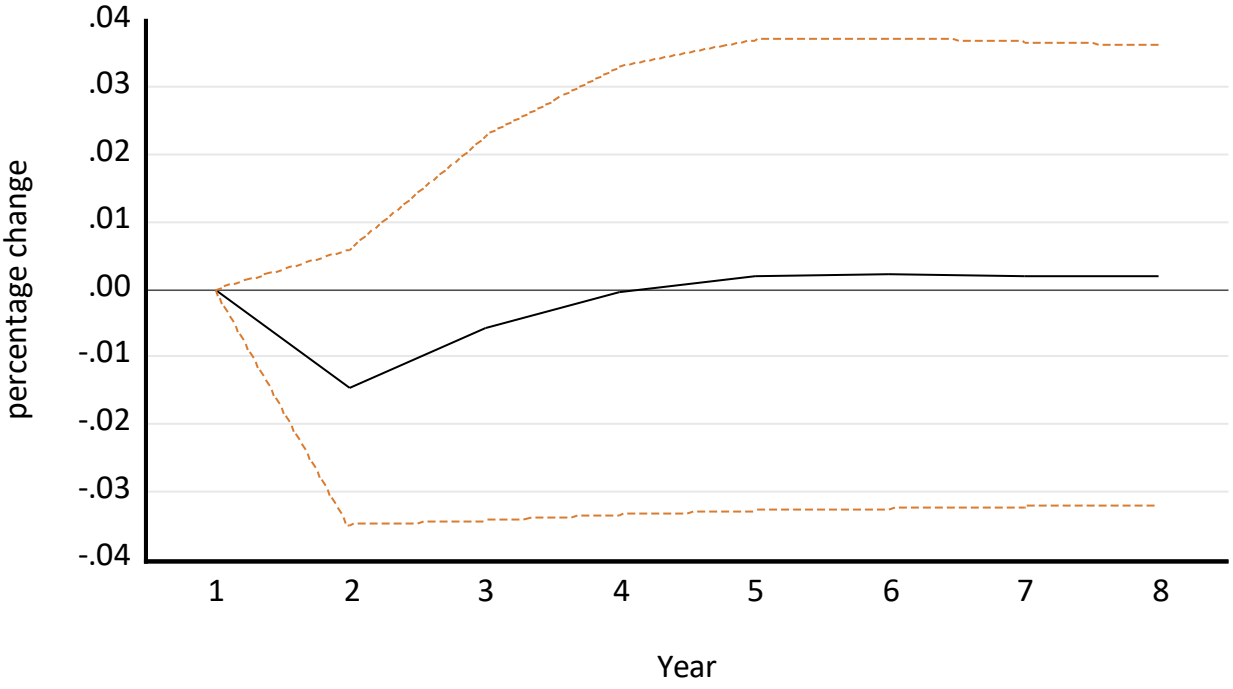
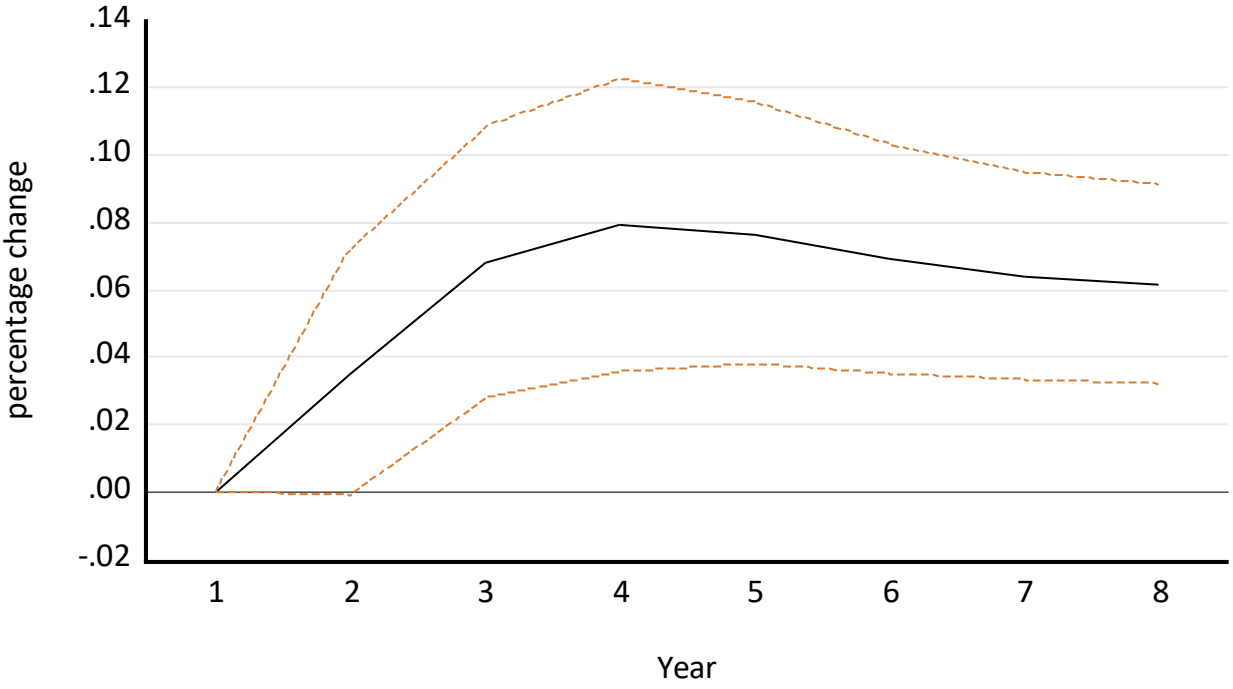


Figure 5: Impulse Response to One-Standard-Deviation Negative Shock to Shipping Volume

A. Overall industrial production



B. Domestic & Infant Industry Production



C. Commercial & Trade-Dependent Industrial Production