Guilds and Growth: Evidence from the Free City*

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Abstract

Craft guilds were among the most widespread labor market institutions in history, yet whether they facilitated or stifled economic development remains an open question. We use a quasi-natural experiment in 18th-century Sweden where craft guilds were abolished in a single city to show that elimination of the monopoly and monopsony powers of guilds led to increases in growth and structural transformation, consistent with cross-city evidence from Sweden's nationwide abolition and patterns in cross-country data. The pre-industrial accumulation of artisanal skills is a key predictor of growth and innovation during industrialization, when barriers in input and output markets were sharply reduced.

JEL Codes: O43, J42, N13, N93, O14
Keywords: Economic growth, guilds, institutions, industrialization, structural transformation

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1 Introduction

Labor markets characterized by low entry barriers are central to the allocation of talent in the economy. Yet almost a quarter of American and European workers are today required to have an occupational license to practice their occupation.[1] While such barriers to entry have seen a resurgence over the past century, they were historically a central feature of labor markets.

For most of modern history, one had to obtain a license from a craft guild to practice a craft or service occupation in a European city. Despite their centrality, whether the monopsony and monopoly powers of guilds fostered or retarded growth remains a contested issue. Contemporary observers from Adam Smith to Karl Marx argued that guilds stifled growth and industrial development.[2] But revisionist historical scholarship has argued that guilds facilitated human capital accumulation, technological innovation, and generated social capital thus positively contributing to economic development.[3]

However, quantitatively establishing the causal effect of guilds on economic development is empirically challenging. To motivate our analysis, we document that GDP per capita in European countries with relatively weak guilds diverged from those with stronger guilds prior to the 19th century and that per capita incomes increased in the decades after a country abolished guilds. While suggestive, these correlations may not reflect a causal link between guilds and growth for at least two reasons. First, when guilds were abolished throughout 19th-century Europe such reforms covered entire countries, which makes identification inherently difficult. Second, the abolition of guilds was bundled with other institutional reforms and often took place against the backdrop of already accelerating industrial growth.

To identify the causal effects of guilds on economic development, we leverage a unique quasi-natural experiment from Swedish history. In 1771, a "free city" (literally, *Fristaden*) was established in the outskirts of the town of Eskilstuna. In the Free City, the guild system—that would remain in place in other Swedish cities until 1846—was abolished and virtually free entry and competition was established among the metal and metal-related craftsmen in the city. The estab-

[1] For the United States see Carollo et al. (2025) and for Europe see Pagliero (2019). At the end of World War II, Milton Friedman and Simon Kuznets anticipated the long-term expansion of occupational licensing, citing experts who warned that rising entry barriers in American professions were beginning to resemble the restrictive practices of medieval guilds (Friedman and Kuznets, 1945).

[2] Smith provided a scathing critique of the guilds arguing that they used their legal privileges to restrict entry into particular trades, which served to lower competition and inflate prices in what amounted to a "conspiracy against the public" (Smith, 1776 [1999], ch. X, pt. II, p. 232). Marx and Engels (1848 [2002], p. 206) similarly emphasized the growth-inhibiting effects of guilds in the opening paragraphs of the Communist Manifesto, which was later echoed by Marx (1867 [1976], p. 875) when he wrote: "the rise of the industrial capitalists appears as the fruit of a victorious struggle [...] against the guilds, and the fetters by which the latter restricted the free development of production" .

[3] Epstein (1998) provides a summary of the revisionist interpretation of the impact of the guilds (also see Putnam et al. (1992), De la Croix et al. (2018), and Greif et al. (2025)). See Ogilvie (2014, 2019) for theoretical and empirical challenges to the revisionist interpretation.

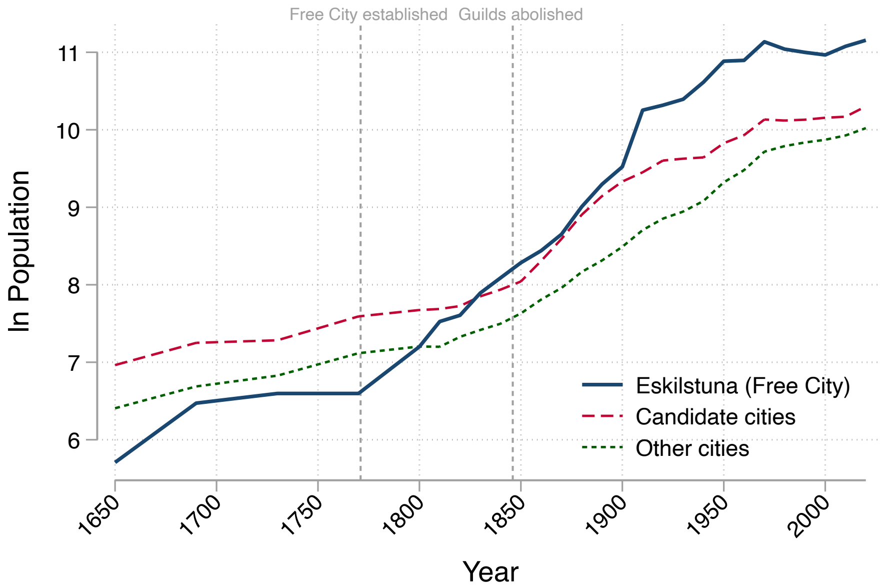


FIGURE 1: POPULATION IN ESKILSTUNA AND OTHER CITIES, 1650–2020.

Notes: This figure displays the ln population in Eskilstuna and the mean ln population across the four candidate cities and other Swedish cities respectively. Vertical lines denote the year (1771) when the Free City was established and the year (1846) that guilds were abolished in Sweden. See section 3 for details on the data sources.

lishment of the Free City has been termed an "experiment in capitalism" by historians, as it was imposed by the state with the explicit goal to facilitate competition, an increasing division of labor, and the use of machinery and new technologies in the metals sector (Hörsell, 1983, p. 174).

Guilds were abolished in the Free City in 1771, yet guild restrictions remained in place in the Old City of Eskilstuna. Thus, two initially similar parts of the urban area saw radically different institutions after 1771. We use population data for the Free and Old City to show that the population growth of the two parts of the city sharply diverged after 1771. Virtually all of the growth in Eskilstuna's population after 1771 took place in the Free City. In contrast, the Old City stagnated both in terms of industrial activity and population.

Our main analysis identifies the effects of guild abolishment by comparing relative changes in Eskilstuna to other (urban) areas in Sweden where guilds remained in place. Analyzing the impacts of the Free City on economic development is made possible by the fact that Sweden has the world's oldest continuously available demographic data. We use these data to compile a new dataset that allows us to track the population and occupational structure of parishes and cities from 1650 to the mid-19th century. After the establishment of the Free City in 1771, we find a sharp acceleration in population growth and structural transformation as shown in Figure 1. Notably, there are no similar trend breaks in the rest of Sweden, nor in four other cities that were proposed as alternative candidates to become a free city.

To substantiate these results, we examine the development trajectory of Eskilstuna compared to other Swedish cities using the Synthetic Control Method (SCM) (e.g., Abadie et al., 2010). The key idea in the SCM is to construct a synthetic counterfactual Eskilstuna, which consists of a weighted average of other cities that experienced similar trends in observable dimensions—e.g., city size, growth, agricultural productivity, occupational structure, etc.—prior to the establishment of the Free City. Reassuringly, the SCM results show a sharp break in Eskilstuna's population growth and structural transformation in the late-18th century compared to its synthetic counterfactual. We provide a battery of robustness checks showing that these results are similar when matching on a range of city characteristics including factors that may have influenced the location of the Free City.

An important question is whether one can generalize from our findings from the Free City experiment to the potential impacts of guild abolition in other contexts. To address this question, we first show that several cities in Finland and Sweden where guilds were abolished prior to the national abolishment in 1846 also experienced relatively more rapid growth, which suggests that our results are not unique to the case of the Free City. We then examine the impacts of the national abolition of guilds in 1846 on city growth in a difference-in-differences framework. We show that cities where guilds controlled a larger share of the urban economy before abolition experienced relatively more rapid growth after guilds were abolished. Taken together, these results bolster our finding of a negative effect of guilds on growth and suggest that our results are informative also in other historical contexts.

Our results document a plausibly causal link between the abolition of guilds and economic development in the short and medium run, but it is an open question whether the early abolishment of guilds also shaped Eskilstuna's long-run growth trajectory. An influential body of work has underlined that the origins of the Industrial Revolution can be traced to Britain's early accumulation of artisanal skills, which could readily be adapted to the increasingly complex production processes that emerged during industrialization (Mokyr, 2002; Allen, 2009; Voth et al., 2022; Kelly et al., 2023).[4] Was the accumulation of artisans skilled in blacksmithing and metal work in Eskilstuna similarly associated with better long-run outcomes during Sweden's industrialization a century later?

To explore this question, we examine the long-run development trajectory of the Free City. We first demonstrate that the industrial expansion of Eskilstuna was so rapid that by the mid-1830s,

[4] Mokyr (2002) and Allen (2009) both emphasize the role of artisans and skilled craftsmen that embodied the tacit knowledge essential to incremental innovation that turned breakthrough inventions into widely usable economic tools. Specifically, Kelly et al. (2023) stress the role of iron founding, tool making, and watch making as important for the industrial revolution. Also, see Atack and Margo (2019) for a similar view of the role of blacksmiths for the industrial revolution in the United States. Voth et al. (2022) show that labor shortages induced by the Napoleonic Wars led to the adoption of labor-saving technology, particularly in areas with an abundant supply of blacksmiths, watchmakers, and millwrights.

the Free City had become the most industrial city in Sweden almost solely due to growth in the metals sector. Eskilstuna had the highest levels of industrial employment among all Swedish cities still in 1900, when industrial production had shifted from the artisan shop to the factory. Drawing on plant-level data, we show that Eskilstuna experienced more rapid industrial growth than other urban areas, almost solely driven by the metals sector. We corroborate these patterns by drawing on rich qualitative historical evidence showing that individual artisans and master craftsmen in Eskilstuna went on to found large modern factories. Similarly, drawing on patent data we show that individuals in Eskilstuna were granted more patents than in other cities. The rise of innovation is evident in metal technologies and is driven by inventors with close connections to the metals sector.

To substantiate a role for artisanal skills in predicting industrial success, we use city-industry data showing that a city's pre-industrial supply of artisans in a sector in 1835 is strongly associated with industrial activity and innovation in that sector around 1900, when production had largely shifted from the artisan shop to the factory. These findings are consistent with the arguments of Mokyr (2002), Allen (2009), Voth et al. (2022), and Kelly et al. (2023) suggesting that the accumulation of artisanal skills was instrumental during the industrial take-off also in countries that initially lagged behind the technological frontier. Thus, our results also contribute to the literature on the role of human capital and skills in accounting for the spread of the industrial revolution in follower countries (e.g., Becker et al. (2011)). More broadly, the association between artisanal skills and growth and innovation during industrialization also is suggestive of a positive long-run effect of guild abolition on economic development.

Our paper provides the first causal evidence on the impact of guilds on economic development. While there is a rich body of work on the evolution of guilds and economic development across European states and detailed studies of their role in different industries and localities, economists and historians have failed to reach a consensus on whether guilds promoted or retarded development (e.g., Epstein, 1998, 2008; Ogilvie, 2008, 2014; Stasavage, 2014; De la Croix et al., 2018; Wahl, 2019; Desmet et al., 2020; Greif et al., 2025). We leverage a rare case where guilds were abolished in a single city within a country, which allows us to contribute clear-cut evidence on the negative effect of guilds on economic development. More broadly, the empirical approach of our paper thus aligns with a recent strand of research leveraging within-country variation to identify the effects of institutions on development (e.g., Dell, 2010; Dell and Olken, 2020; Montero, 2022; Cantoni et al., 2024). The most closely related paper to our work is Acemoglu et al. (2011), which investigates the impact of the French Revolution on economic institutions and economic development in the early 19th century German states. While their work includes guilds as one component of an index of economic institutions, it does not speak to what exact institutions were growth inhibiting.[5]

[5] Additional evidence for the German context is provided by Dohmen (2022) showing that counties in the King-

We provide novel evidence that guilds had detrimental causal effects on economic development, which is consistent both with cross-country associations and recent work by economic historians (Ogilvie, 2019).

Our findings may also be of relevance to ongoing debates regarding the economic consequences of labor-market barriers and occupational licensing. Recent work by Hsieh et al. (2019) documents that reduced barriers to entry into high skilled professions for minorities and women in the U.S. since the 1960s reduced the misallocation of talent, which explains a substantial part of U.S. economic growth. Kleiner (2000) points out the similarity between occupational licensing to the practices of guilds, while Kleiner and Soltas (2023) shows that occupational licensing reduces employment. Among the most important privileges awarded to guilds was the right to limit entry into an occupation, which guilds actively used to restrict the labor supply. We cannot quantify the resulting misallocation due to the existence of guilds. But our results suggest that the reduced barriers to entry after the abolishment of guilds in the Free City led to sharp increases in growth and structural transformation, which highlights the potential negative effects of high entry barriers in the labor market on growth and development.

2 Context and descriptive evidence

2.1 Guilds and growth in a European context

To motivate our analysis below, we first provide two pieces of suggestive evidence that guilds inhibited economic development across European countries: countries with stronger guilds developed relatively slower and the abolition of guilds is associated with increases in GDP per capita. Thus, this evidence is consistent with the view that guilds on average served to retard economic development in Europe, a question that remains a matter of great scholarly debate (Epstein, 1998, 2008; Ogilvie, 2008, 2019; Greif et al., 2025).

After a resurgence in the Middle Ages, craft guilds had become universal throughout Europe by the 14th century. Guilds had two key legal privileges: a monopoly over the production of a certain type of good and monopsony power in the local labor market, which they generally used to regulate prices and limit entry into a trade (Smith, 1776 [1999]). However, the precise role of guilds and their influence varied across time and space (Ogilvie, 2014). Usefully, the variation in the role of guilds and their strength across countries can provide some suggestive evidence on their association with economic development.

dom of Westphalia that were allocated to Prussia after division and thus experienced institutional changes (including freedom of enterprise and guild abolition) did not develop more rapidly, though these areas grew faster after the establishment of the Zollverein. Also see Wahl (2019) who finds no substantial growth advantage among cities where guilds were not part of the city council in the German Lands during the late-medieval and early modern period.

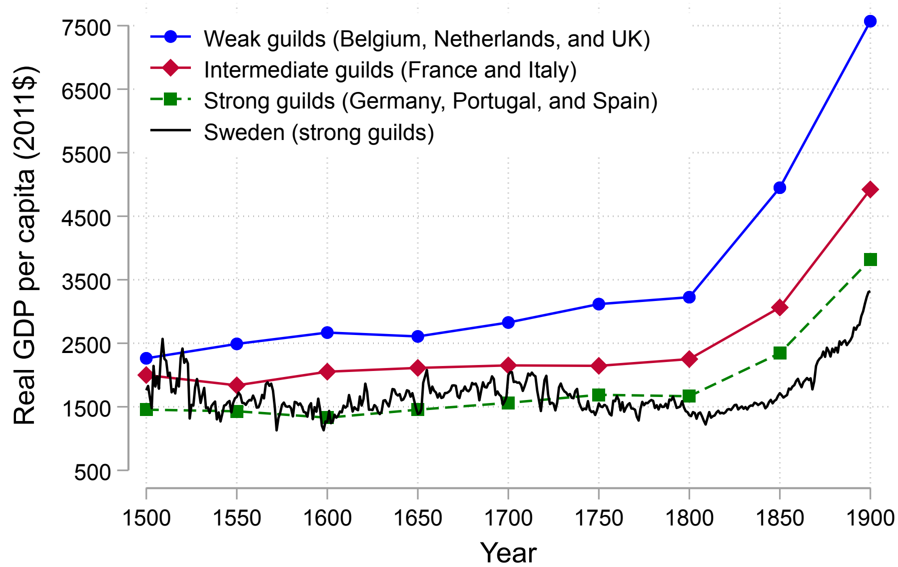


FIGURE 2: GUILD STRENGTH AND GDP PER CAPITA IN EUROPE, 1500–1900.

Notes: This figure shows that European countries with weaker guilds experienced relatively more rapid growth between 1500–1900. We display mean real GDP per capita (in 2011$) for groups of European countries based on the strength of their guilds based on the classification in Ogilvie (2019, Table 9.5). "Relatively weak guilds": Belgium, England, and the Netherlands. "Intermediate strength guilds": France and Italy. "Relatively strong guilds": Germany, Portugal, and Spain. We separately report data for Sweden that belongs to the "relatively strong guilds" group. GDP data is drawn from Bolt and Van Zanden (2025).

We first show that weaker guilds were associated with more rapid economic development across European countries between 1500 and 1900 as argued by Ogilvie (2019). Here we leverage the fact that the influence of guilds varied considerably across countries throughout the Early Modern Period. While guilds gradually weakened in Britain and the Low Countries after 1500, they remained intact in some Central- and Southern-European countries until the late-19th century. The variation in the strength of guilds across countries provides an opportunity to examine the association between the influence of guilds and comparative development.

Figure 2 shows that countries with relatively weaker guilds—England and the Low Countries—saw gradually increased levels of GDP per capita between 1500 and 1900.[6] In contrast, Sweden and other countries with relatively strong guilds (such as Germany or Spain) remained economically backward throughout the period, while countries with intermediate strength guilds (such as France or Italy) placed somewhere in between.

We then proceed to more directly examine the growth impact of guilds by leveraging the stag-

[6] To classify the strength of guilds, we rely on the classification by Ogilvie (2019). Sweden here is classified as having "relatively strong guilds", which also characterises Germany, Portugal, and Spain. Guilds in France and Italy had "intermediate strength", while Belgium, the Netherlands, and the United Kingdom had "relatively weaker" guilds.

gered abolition of European guilds between 1750 and 1914 and data on GDP per capita for 17 European countries.[7] While guilds had weakened in some parts of Northwestern Europe prior to the 18th century, the breakdown of guilds and *de jure* abolition was a drawn out process between the mid-18th century and the late-19th century (see Online Appendix Figure A.1). While guilds began to be abolished in small Italian principalities (e.g., Tuscany) in the 1770s, the main driving force was the French Revolution (Ogilvie, 2019). The Revolutionary parliament dissolved the French guilds in 1791 and guild abolition then spread throughout Europe through French conquest and occupation (Acemoglu et al., 2011). After the mid-19th century, guild abolition spread also to more peripheral countries such as Finland, Portugal, and Sweden.

Figure 3 displays event-study estimates from an OLS regression of GDP per capita on a set of event dummies, while controlling for country and year fixed effects. While there is no clear difference in the evolution of GDP per capita before guilds are abolished, there is a gradual increase after abolition.[8] As reported in the figure, a simple difference-in-differences estimates suggests that GDP per capita increased by about 9 percent after the *de jure* abolition of the guilds, though the small number of observations means that these effects are somewhat imprecisely estimated when clustering standard errors at the country level.

Taken together, these findings provide suggestive evidence that guilds were associated with slower economic development across European countries during the half millennia prior to World War I. Of course, the country groups depicted in Figure 2 differ in a wide variety of ways (other than guild strength) that may explain their different growth trajectories. Similarly, the abolition of guilds may have been correlated with other institutional reforms or other factors that shaped growth. Yet while these patterns are only correlational, they appear consistent with the argument that guilds inhibited growth and development in Europe. We next describe the characteristics of guilds in Sweden and how the establishment of the Free City provides a unique opportunity to examine the causal impacts of (abolishing) guilds on economic development.

[7] We limit the sample to countries where we observe GDP per capita in Bolt and Van Zanden (2025) before and after guild abolition: Austria, Belgium, Denmark, Finland, France, Germany, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, and the United Kingdom. We base the information on guild abolition on Ogilvie (2019, Table 9.4). In countries where guilds were first partially and then fully abolished, we define guild abolition to take place in the year of full abolition. We assign the year of abolition for Belgium based on abolition in the Southern Netherlands, for Germany based on Prussia, and for Italy based on Milan.

[8] Online Appendix Figure A.1 displays differences in GDP per capita in each country before and after guilds were abolished. While the pattern varies somewhat across countries, Sweden and many other countries saw sharply rising GDP per capita after the abolishment of guilds. Online Appendix Figure A.2 shows that the main event-study estimates are similar when not binning the endpoints (to limit the impact of vast increases in GDP per capita in the later periods), when limiting the sample to the post-1850 period (when annual GDP data is available for a larger number of countries), and when excluding each individual country and reestimating the baseline event study (to limit the influence of individual countries).

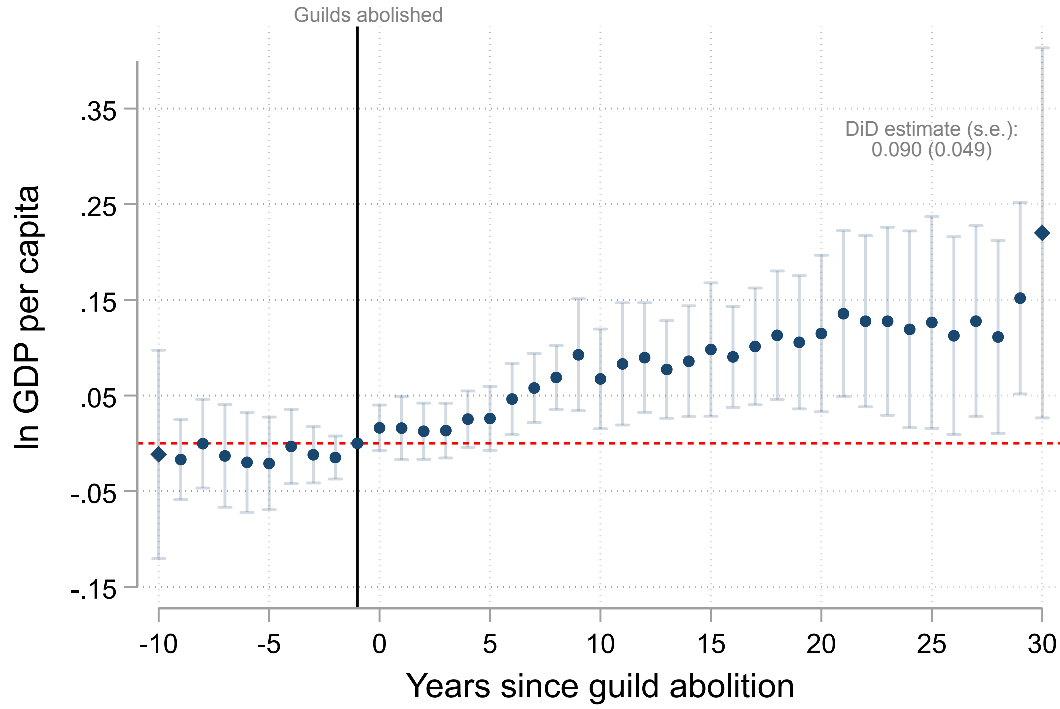


FIGURE 3: GUILD ABOLITION AND GDP P.C. IN EUROPE, 1750–1914.

Notes: This figure shows that GDP per capita increased in European countries after the abolishment of guilds. The figure displays event-study estimates from a country-level OLS regression of annual ln GDP per capita 1750–1914 on a set of event indicators, as well as a full set of country and year fixed effects. We also report a standard difference-in-differences estimate. Standard errors are clustered at the country level. The sample includes 17 European countries: Austria, Belgium, Denmark, Finland, France, Germany, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, and the United Kingdom. GDP data is drawn from Bolt and Van Zanden (2025) and information on guild abolition is based on Ogilvie (2019, Table 9.4).

2.2 Guilds in Sweden

Swedish guilds can be traced to the Medieval period and remained a central institution in urban labor markets until their abolition in 1846. A general guild ordinance was introduced in 1621 (the *General Embets Skrå* law), which allowed local magistrates to limit the number of artisans and to control prices. From the 17th century and onward, Swedish cities were characterized by guild compulsion (Ogilvie, 2019). In the 18th century, guilds spread outside of the major cities as guilds were formed in the smaller towns (Heckscher, 1954, pp. 192-193). The system was reformed throughout the 17th and 18th century, yet the guilds successfully defended their privileges up until abolition in 1846 (Lindberg, 2001).

Guilds had a number of legal privileges allowing them to regulate entry, prices, and output. Most importantly, the masters in a guild had monopoly rights for a particular craft in their city. Becoming a master was a costly and time-consuming process: an adult man was expected to serve three to five years as an apprentice, after which he was required to work as a journeyman for several years. To become a master required the production of a literal "masterpiece", which was evaluated by the existing guild masters (Lindström, 1991). Guilds also regulated *who* was admitted as an apprentice. Indeed, according to Heckscher (1954, p. 193) the main role of the guilds was to limit competition and entry to the sons or son-in-laws to the master craftsmen. Guilds often functioned as cartels, where production was restricted and divided equally between masters to maintain incomes and prices at high levels (Hörsell, 1983).

Guilds were abolished in all of Sweden with the 1846 Freedom to Trade Act.[9] Abolition took place against the backdrop of a long-running conflict between the government, represented by the Board of Trade, and the guilds. The Board had for a long time wanted to dismantle or weaken the guilds in order to increase industrial dynamism through competition and increasing the number of craftsmen.[10] In the 17th- and early-18th century, the Board had made attempts to introduce special economic zones (e.g., in the capital Stockholm) with lower entry barriers and favorable tax schemes.[11] Yet, direct and indirect local attempts of weakening the guilds were ultimately unsuccessful until 1771, when guilds were abolished in one Swedish city—the Free City of Eskilstuna.

2.3 The Free City of Eskilstuna

2.3.1 Establishment of the Free City

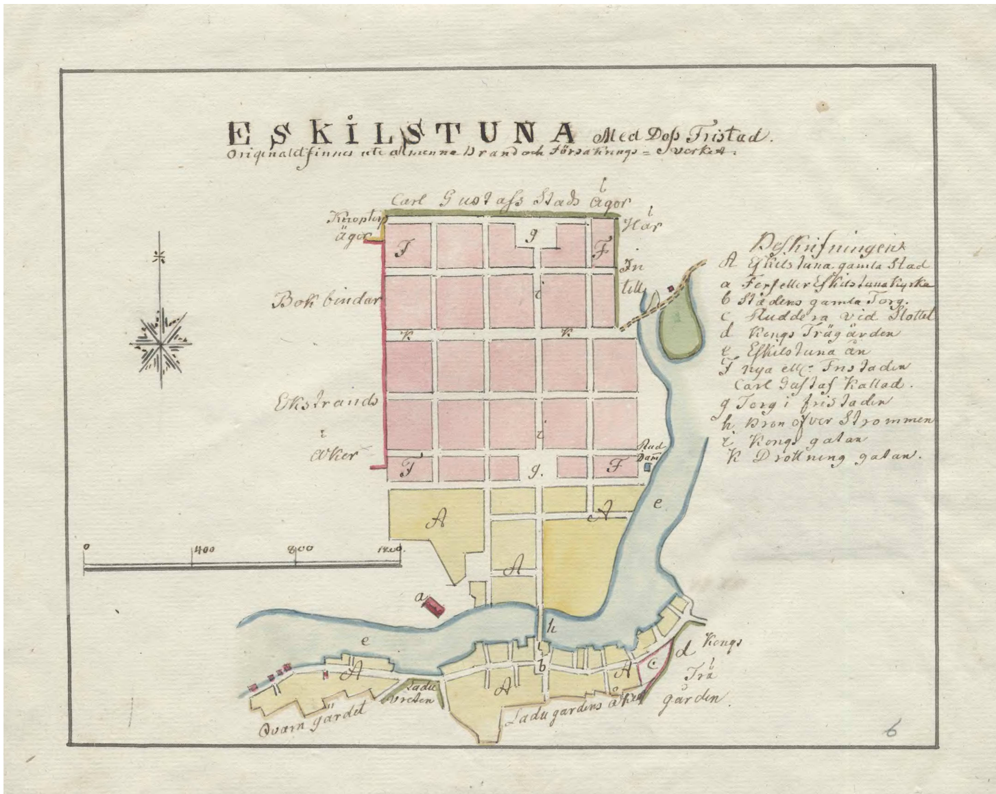
The establishment of the Free City in 1771 can largely be attributed to the efforts of Samuel Schröderstierna, a director (*bergsråd*) at the Board of Mining (*Bergskollegium*). In 1748–1751, Schröderstierna undertook a tour through England where he witnessed the onset of the Industrial Revolution first hand. He attributed England's precocious rise to the fact that its workers were free to produce and sell goods as they saw fit. He believed that if Sweden were to introduce similar liberal laws, it would be possible to create a "Swedish Birmingham" (Ohlsson, 1971, p. 181). Schröderstierna presented a report to the parliament where he argued that an appropriate city—with a favorable geographical location and access to natural water power—should be selected as the place for a "free city" where guild regulations should be dismantled to encourage workers in the metals sector to settle (Ohlsson, 1971, p. 20). The explicit aim was to facilitate a division of labor, competition, and production for a larger market (Hörsell, 1983, p. 42).

Five cities were discussed as potential sites for a free city during deliberations in parliament (Ohlsson, 1971, p. 23): Söderhamn, Norrtälje, Norrköping, Ronneby, and Eskilstuna (see Figure

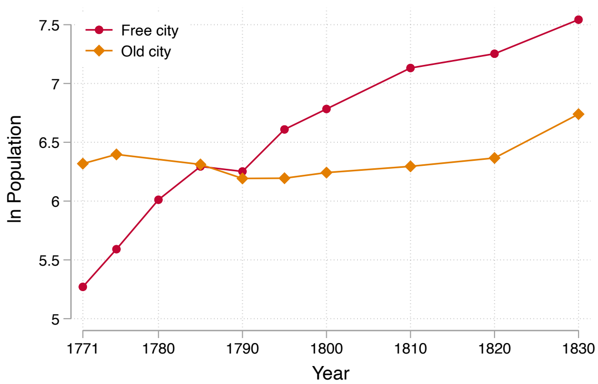
[9] In 1846, most guild regulations were abolished though the requirement of a master's certificate was still required in some crafts; in 1864, also this remnant of the guild system was wiped out by statute (Heckscher, 1954, p. 236).

[10] See Hörsell (1983, p. 23) and Heckscher (1954, p. 193).

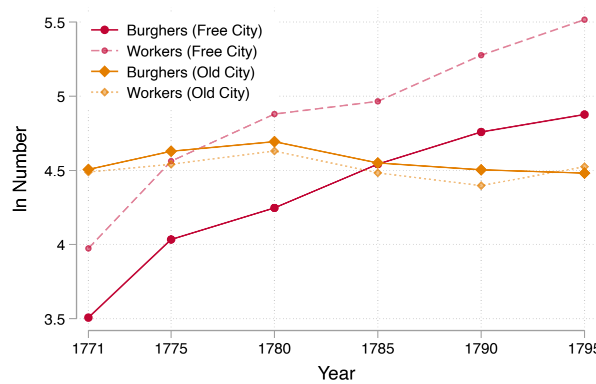
[11] See Hörsell (1983, pp. 26-27).



(A) FREE AND OLD CITY, 1790S



(B) POPULATION, 1771–1830



(C) EMPLOYMENT, 1771–1800

FIGURE 4: GROWTH IN THE FREE CITY AND OLD CITY.

Notes: This figure shows that virtually all of the growth in Eskilstuna between 1771 and 1830 took place in the Free City. A: Map of Eskilstuna in the 1790s that delineates the Old City (denoted by "A" and shaded in yellow) and the Free City (denoted by "F" and shaded in red). The map is available via *Riksarkivet* and Wikimedia Commons. B: Population in the Free and Old City of Eskilstuna based on *mantalslängder* compiled in Ohlsson (1971, pp. 54–55). C: The employment structure of the Free and Old City based on *mantalslängder* reported in Ohlsson (1971, p. 56). The burghers in the Free City exclusively consist of master craftsmen (*manufakturister*).

6). The choice of Eskilstuna was motivated in three ways: a number of smith workers were already settled there, the city had access to water power, and connections to Stockholm and the mining area of *Bergslagen* was relatively good.[12] Prior to the establishment of the Free City, Eskilstuna has been characterized as a "a fairly insignificant town" (Ohlsson, 1971, p. 14), or an "ordinary small Swedish town" (Hörsell, 1983, p. 174), by historians.

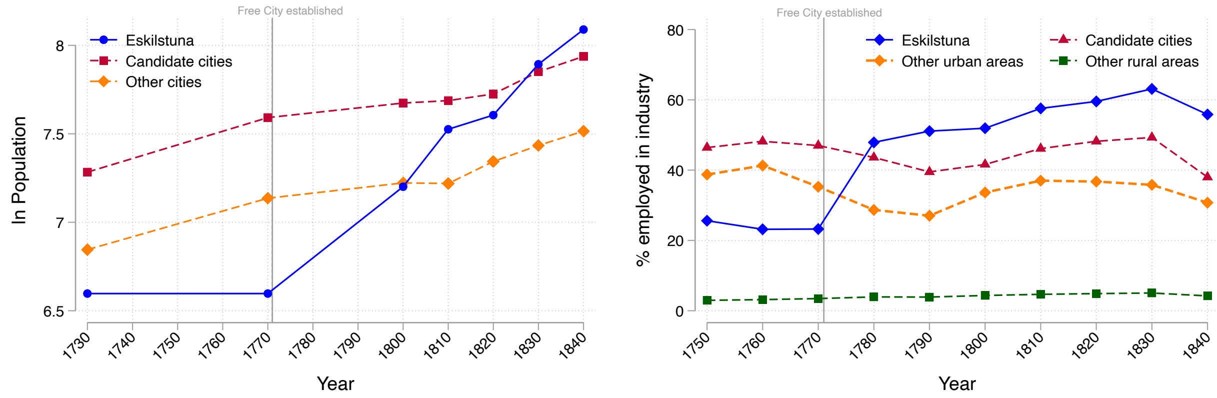
The rules governing the Free City were set out in a royal decree in 1771. Workers in the iron-, steel-, and metal industries should be attracted to the city through several privileges. Most importantly, guild restrictions were abolished and the craftsmen in the Free City were exempt from guild membership and regulation.[13] Consequently, prices and output were no longer restricted and divided up between masters. Individuals were free to produce goods and sell in whatever way they wanted. Master craftsmen could hire as many hands as they wanted; journeymen could work for themselves, or several masters at once. Barriers to becoming a master were also radically lowered: it simply required that an individual registered with the authorities, had his own tools and workshop, and paid a small fee to the city and the poor (Ohlsson, 1971, p. 51). No tests of skill (i.e., the production of a masterpiece) were required to become a master (Hörsell, 1983, p. 53). While the Free City was initially aimed at metal workers, the freedom to settle there was extended to craftsmen working with leather and wool, wheelmakers, watchmakers, carpenters and other craftsmen working with wood. Indeed, in a revision of the decree in 1787, the rights were extended to include all artisans that used smithing inputs in their production and those that produced important inputs for the metals industry (Hörsell, 1983, pp. 43-44).

2.3.2 Descriptive evidence: Growth in the Free City

The establishment of the Free City in 1771 meant that the city of Eskilstuna was split in two parts: one where guilds were abolished (the Free City) and the Old City, where guild compulsion still remained intact. Figure 4A provides a map of Eskilstuna in the 1790s, which shows the city's division into the Free and Old City. As preliminary evidence on the growth impacts of the Free City, Figure 4B compares population growth rates showing that the Free City exhibits much faster growth than the Old City. Already by 1787, its population had bypassed the Old City. By the early 19th century, the Free City had grown to twice the size of the Old City and metal craftsmen and their households constituted the vast majority (80 percent) of the population (Hörsell, 1983, p.

[12] See Ohlsson (1971, p. 28) and Hörsell (1983, p. 42).

[13] Moreover, inhabitants in the Free City were free from paying some taxes (*mantalspengar*) and were not required to pay tolls on imported goods. Although freedom from guilds also came with freedom from certain taxes, the impact of low taxes is likely minor for at least two reasons. First, Jonsson (2015) argues that tax freedoms had limited effects on settlement and mentions the case of Norrköping where tax freedoms were offered to settle in a new part of the town in 1600s as a case in point. Second, the level of taxes was low for the period we study and normally at 1 percent for income (Du Rietz et al., 2015), which also suggests that tax freedoms would play a limited role in explaining our results.



(A) CITY SIZE, 1730–1840 (B) INDUSTRIAL EMPLOYMENT, 1750–1840

FIGURE 5: POPULATION AND STRUCTURAL TRANSFORMATION IN ESKILSTUNA AND OTHER CITIES

Notes: This figure shows that Eskilstuna experienced substantial population growth and structural transformation after the establishment of the Free City in 1771. A: ln population in Eskilstuna, the mean across other Swedish cities, and the the four cities that were proposed as alternative locations for a free city. B: The share of industrial employment in Eskilstuna and the mean industrial share in rural and urban Swedish parishes, as well as the four cities that were proposed as alternative locations for a free city. Vertical lines denote the year (1771) when the Free City was established. See section 3 for details on the data sources.

176). At the same time, the Old City had stagnated. It had slightly fewer inhabitants than in the mid-18th century and the number of craftsmen had declined considerably. Notably, virtually all of the growth in Eskilstuna's population is driven by the Free City. Thus, comparisons of Eskilstuna's development relative to other cities is arguably informative about the Free City's growth impacts.

Figure 5A displays the ln population in Eskilstuna and the average population across other Swedish cities. After 1771, population growth sharply accelerated in Eskilstuna compared to other Swedish cities. Another relevant comparison is to the four cities that were suggested as potential free cities instead of Eskilstuna, which likely had more similar growth preconditions. Figure 5A further shows that the sharp break in Eskilstuna's population growth after 1771 is not evident among the other candidate cities.

We next examine whether Eskilstuna also experienced more rapid structural transformation after the establishment of the Free City. Figure 5B displays the fraction employed in industrial occupations in Eskilstuna and other rural and urban areas between 1750 and 1840. Eskilstuna was less industrial than the average urban area prior to the establishment of the Free City. Yet Eskilstuna underwent substantial structural transformation after its establishment. Figure 5B makes a similar comparison to the four candidate cities, again revealing a sharp break in Eskilstuna's industrial share after 1771, which is not mirrored among other cities.

Together, these descriptive results show that Eskilstuna outperformed the rest of Sweden and other cities that had been discussed as locations for a free city after 1771. However, these alternative control groups may not constitute the best counterfactual. We next describe the construction of our city- and parish-level datasets and then proceed to use the SCM approach as a way to obtain a more plausible counterfactual to Eskilstuna's growth trajectory.

3 Data

Our analysis draws on a newly compiled dataset on employment and population across Swedish cities and parishes from 1650 to 1900. To construct the dataset, we heavily draw on information from *Tabellverket*, the predecessor to Statistics Sweden. Due to the establishment of *Tabellverket* in 1749, Sweden has the world's oldest continuous data on local population that allows us to track population growth over the period before and after the creation of the Free City. The analysis below draws on three different datasets: (i) a city-level dataset covering urban population growth between 1650–1840; (ii) a parish-level dataset that tracks the occupational structure in rural and urban parishes between 1750–1840; and (iii) a city and city-industry dataset that contains information on industrial and innovative activity across cities and within city-industries over the latter half of the 19th century. We next describe the construction of each dataset in turn.

City dataset. Our main analysis uses city populations as a proxy for economic growth, which builds on an influential literature showing that urban population growth is as a useful proxy for growth in historical settings (e.g., Acemoglu et al., 2005; Nunn and Qian, 2011; Fernihough and O'Rourke, 2021). We use data from Stads- och kommunhistoriska institutet (2005) that have compiled city population data from Lilja (1996) for a number of benchmark years: 1650, 1690, 1730, and 1770; and decadal city population data from 1800 to 1950 from Nilsson (1992). We complement these data with decadal population data 1960–2020 for urban areas (*tätorter*) from Statistics Sweden. In our main analysis, we restrict our attention to the period from 1650 to 1840, where the latter year is the last year we observe city populations prior to the national abolishment of guilds in 1846. For our main sample, we include all 76 cities within present-day Sweden with consistently reported population data between 1650 and 1840.

Parish dataset. Our parish-level dataset contains information on the occupational structure of Eskilstuna and other parishes between 1750 and 1840 based on data from *Tabellverket* (Umeå universitet, 2022). Because data is only available for the district (*pastorat*) of Eskilstuna in the 18th century, we aggregate the urban area (*stadsförsamling*) of Eskilstuna and the (rural) parishes *Fors* and *Kloster* that together constitute the district. To calculate the industrial employment in each parish, we aggregate employment based on the classification of workers in *Tabellverket* by Umeå universitet (2022) according to the modern Swedish (SNI92) industrial classification system

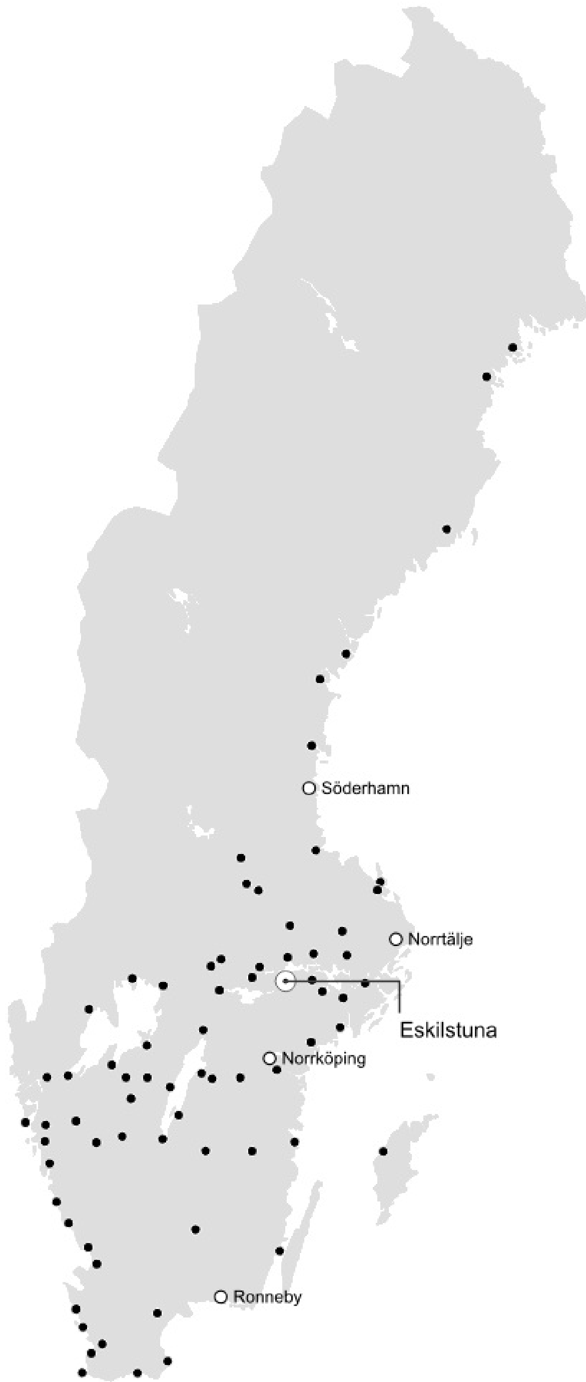


FIGURE 6: CITIES INCLUDED IN THE MAIN SAMPLE.

Notes: This map displays the location of cities included in our main sample. Eskilstuna and the four candidate cities are denoted with white circles, while all other cities are denoted by black circles. For presentational purposes, we include the location of the candidate city Ronneby in this map even though it is excluded from our main sample since it did not obtain formal city rights until 1882.

for the 18th century. For the 19th century, we make use of the fact that industrial workers are reported in a separate series, which we use to arrive at the aggregate number of manufacturing workers in each location. For all years, we restrict our sample to male workers, given the well-known underreporting of female workers in historical census data. While some parishes reported data annually or triennially during the early years of *Tabellverket*, we include all parishes and districts that consistently reports data at least once per decade between 1750 and 1840 to maximize our sample size. The main sample consists of 691 geographical units (i.e., parishes or districts) observed at a decadal frequency.

City- and city-industry dataset. For our long-run analysis, we draw on employment and population data for cities in our main sample drawn from Stads- och kommunhistoriska institutet (2005) that have compiled these data from official sources. We include all cities with a population of at least 1,000 inhabitants in 1830, as well as Ronneby that was one of the candidate cities to become a free city, but that did not gain formal city rights until the late-19th century. Thus, the sample consists of 58 cities.

For the same set of cities, we also construct a city-industry dataset that contains information on employment, the number of factories, and patents for each city and 12 industries. First, we map data on artisanal and industrial employment across sectors from *Tabellverket* in 1835 to the 12 broad industry groups delineated by Statistics Sweden in the early 20th century.[14] Second, we use plant-level data from the 1900 Swedish manufacturing census obtained from Almås et al. (2023). We aggregate industrial employment and the number of factories for each city and the 12 industry groups in our sample.[15] Thus, for each city we observe the share of employment in, for example, metals both in 1835 when production remained largely artisanal and in 1900 when industrial production had shifted toward the factory system. Third, we draw on data on the universe of patents granted to Swedish inventors by the PRV between 1880 and 1914 that have been georeferenced to the municipality-level by Andersson et al. (2023). We here focus on comparisons of differences in patenting activity between 1880 and 1914 between Eskilstuna and other urban parishes. Patents are assigned to a city based on the location of the inventor(s) and patent holder(s) and are allocated to the same 12 industry groups as above. The city-industry sample consists of 58 cities where we observe outcomes across 12 industries, yielding a total sample size of 696 city-industry observations.

[14] The industry groups are: Food and beverages; textiles; leather, hides, and hair; oil, tar, and rubber; wood; paper; plant-based products; clay, stone, coal, and peat; chemicals; metals; machinery and instruments; and graphical products and others.

[15] The manufacturing data is available at the district (*fögderi*) level, so the factory and employment data corresponds to the aggregate for the district that each city is located in.

4 Analysis and results

4.1 Empirical strategy

Our aim in the main analysis is to isolate the effect of the Free City of Eskilstuna on city population and occupational structure. We therefore apply the SCM, which is an example of a class of estimators known as Synthetic Control Estimators (SCE) (e.g., Doudchenko and Imbens, 2016). Importantly, the SCM is designed to deal with the fact that only one unit is treated and involves a comparison of population and structural change in Eskilstuna to a "synthetic" version of the city.

The SCE provides a treatment effect in the case of a single treated unit and a number of control units, with pre-treatment and treatment periods being observed for all units (Doudchenko and Imbens, 2016). Consider the following panel data setting with $N+1$ cross-sectional units observed in time periods $t = 1, \ldots, T$. Each of the cross-sectional units in each of the time periods is characterized by a pair of potential outcomes, $Y_{i,t}(0)$ and $Y_{i,t}(1)$, of the control and treatment, respectively, where the causal effects at the unit and time level are given by $\tau_{i,t} = Y_{i,t}(1) - Y_{i,t}(0)$ for $i = 0, 1, \ldots, N$ and $t = 1, \ldots, T$. Units $i = 1, \ldots, N$ are control units, which do not receive the treatment in any of the time periods. Unit 0 receives the control treatment in periods $1, \ldots, T_0$ and the active treatment in periods $t = T_0 + 1, \ldots, T_0 + T_1$. We are interested in the treatment effects of unit 0 denoted by $\tau_{0,t}$. Let treatment received during the active treatment period be the indicator, $W_{i,t}$. Hence, we observe:

$$Y_{i,t}^{obs} = Y_{i,t}(W_{i,t}) = \begin{cases} Y_{i,t}(0) & \text{if } W_{i,t} = 0 \\ Y_{i,t}(1) & \text{if } W_{i,t} = 1 \end{cases} ,$$

with the following data structure:

$$\boldsymbol{Y}^{obs} = \begin{pmatrix} \boldsymbol{Y}_{t,pre}^{obs} & \boldsymbol{Y}_{t,post}^{obs} \\ \boldsymbol{Y}_{c,pre}^{obs} & \boldsymbol{Y}_{c,post}^{obs} \end{pmatrix} = \begin{pmatrix} \boldsymbol{Y}_{t,pre}(0) & \boldsymbol{Y}_{t,post}(1) \\ \boldsymbol{Y}_{c,pre}(0) & \boldsymbol{Y}_{c,post}(0) \end{pmatrix} ,$$

where $\boldsymbol{Y}_{t,pre}^{obs}$ is a row-vector of dimension T_0 with the (t)th entry equal to $Y_{0,t}^{obs}$, $\boldsymbol{Y}_{c,pre}^{obs}$ is a $N \times T_0$ matrix with the (i,t)th entry equal to $Y_{i,c}^{obs}$ and similarly for the post-treatment row vector and matrix, $\boldsymbol{Y}_{t,post}^{obs}$ and $\boldsymbol{Y}_{c,post}^{obs}$.

We are interested in the pair $\boldsymbol{Y}_{t,post}(1)$ and $\boldsymbol{Y}_{t,post}(0)$, but we only observe $\boldsymbol{Y}_{t,post}(1)$. The problem lies in imputing $\boldsymbol{Y}_{t,post}(0)$ using the three different sets of control outcomes $\boldsymbol{Y}_{c,post}(0)$, $\boldsymbol{Y}_{t,pre}(0)$, and $\boldsymbol{Y}_{c,pre}(0)$, and then using the imputed values to estimate the causal effect, $\tau_{0,t}$. Setting aside covariates, Doudchenko and Imbens (2016) show that the SCM estimators as used in this paper share a common linear structure for imputing $\boldsymbol{Y}_{0,post}(0)$, here shown for the post-treatment period, χ:

$$\hat{Y}_{0,\chi}(0) = \mu + \sum_{i=1}^{N} \omega_i Y_{i,\chi}^{obs} \,, \tag{1}$$

where the imputed outcome is a linear combination of the control units with intercept μ and weight ω_i for unit i. When $T_0 < N + 1$, regularization or restrictions on μ and $\boldsymbol{\omega}$ is needed.

The SCM of Abadie et al. (2010), as applied in this study, imposes the following restrictions: no intercept, $\mu = 0$; the weights sum to one, $\sum_{i=1}^{N} \omega_i = 1$; and no-negative weights, $\omega_i \geq 0\,,\ i = 1, \ldots, N$. The weights, $\hat{\boldsymbol{\omega}}^{SCM}$, are chosen such that they minimize the squared distance between the pre-treatment outcome and possibly a set of pre-treatment covariates for the treated unit and the weighted control units.[16]

For inference both Abadie et al. (2010) and Doudchenko and Imbens (2016) suggest using permutation inference. An empirical p-value is obtained from the position of the estimated treatment effect of the actual treated unit within a distribution of counterfactual treatment effects. This distribution is formed by calculating a counter factual treatment effect for each control city. The individual p-values reported are based on the estimated effects for each year. The measure for overall significance is based on the root mean squared prediction error (RMSPE) (see Galiani and Quistorff (2017)). The p-value for overall significance is formed by using the RMSPE for the counterfactual for each city. As a rule of thumb, a large RMSPE for the treated unit indicates that the effects are significant, and the p-value for overall significance will be low.

Our baseline matching is based on using all the pre-treatment values of the outcome variables, but as explained below, we also provide additional estimates where we use pre-intervention population growth and and a richer set of city characteristics as the variables used for matching.

[16]Specifically, the weights $\hat{\boldsymbol{\omega}}^{SCM}$ are chosen to match the pre-treatment outcomes and a set of pre-treatment covariate matrices $(\boldsymbol{X}_t, \boldsymbol{X}_c)$ of dimensions $M \times N$, by solving:

$$\begin{aligned} \hat{\boldsymbol{\omega}}(\boldsymbol{V}) &=_{\boldsymbol{\omega}} \left\{ (\boldsymbol{X}_t - \boldsymbol{\omega}'\boldsymbol{X}_c)' \, \boldsymbol{V} \, (\boldsymbol{X}_t - \boldsymbol{\omega}'\boldsymbol{X}_c) \right\} \\ \text{s.t.} & \sum_{i=1}^{N} \omega_i = 1 \text{ and } \omega_i \geq 0,\ i = 1, \ldots, N \,, \end{aligned}$$

where the covariates may include the pre-treatment outcomes. $\boldsymbol{V}$ is an $M \times M$ diagonal weight-matrix chosen to match the lagged outcomes, such that:

$$\begin{aligned} \hat{\boldsymbol{V}} &=_{\boldsymbol{V}=\text{diag}(v_1,\ldots,v_M)} \left\{ \left(\boldsymbol{Y}_{t,pre}^{obs} - \hat{\boldsymbol{\omega}}(\boldsymbol{V})'\boldsymbol{Y}_{c,pre}^{obs}\right)' \left(\boldsymbol{Y}_{t,pre}^{obs} - \hat{\boldsymbol{\omega}}(\boldsymbol{V})'\boldsymbol{Y}_{c,pre}^{obs}\right) \right\} \\ \text{s.t.} & \sum_{m=1}^{M} v_m = 1 \text{ and } v_m \geq 0,\ m = 1, \ldots, M \,. \end{aligned}$$

4.2 Main results: Growth and structural transformation in the Free City

4.2.1 City growth, 1650–1840

Figure 7 displays the evolution of ln population in Eskilstuna and its synthetic control between 1650 and 1840 based on estimates using the SCM method. The figure is divided into three panels. Panel A shows the ln population for Eskilstuna and synthetic Eskilstuna. Between the late-17th century and 1771 when the Free City was established, the population in both Eskilstuna and its synthetic version experienced little growth. However, Eskilstuna experienced rapid population growth after the establishment of the Free City clearly outpacing its synthetic counterfactual. Panel B shows the difference in ln population for Eskilstuna and its synthetic version, as well as the estimated placebo effects for all other cities. The estimated difference in ln population for Eskilstuna relative to its counterfactual is positive and growing after 1770 reaching about a 100 log points by 1840. Panel C shows the empirical p-value which indicates the position of Eskilstuna in terms of RMSPE. As can be seen, Eskilstuna has the highest RMSPE overall. Reassuringly, the SCM results square well with the descriptive evidence above showing that Eskilstuna experienced more rapid population growth relative to other (candidate) cities after the establishment of the Free City (see Figure 5). Results are similar when matching on a more extensive set of population measures (average ln population, population growth, and lagged population growth in the pre-period) in Online Appendix Figure A.3. We provide additional estimates using a richer set of matching variables below.

4.2.2 Structural transformation, 1750-1840

We next show that the establishment of the Free City promoted structural transformation. Figure 8 displays similar SCM estimates for the share employed in industrial occupations in Eskilstuna and its synthetic control between 1750 and 1840. Again, panel A displays the share employed in industry in Eskilstuna and its synthetic counterfactual. Before the creation of the Free City, there was little change in industrialization. After the establishment in 1771, there is a sharp increase in the share employed in industry in Eskilstuna, while its synthetic counterfactual sees a gradual decline until 1840. Panel B displays the estimated difference between Eskilstuna and its counterfactual, as well as the set of placebos. The share employed in industry in Eskilstuna increases after 1771 with about 40 percentage points by 1840. In Panel C, the actual Eskilstuna is shown to produce the highest RMSPE. As in the case with population as the outcome, these results are in line with the comparison to the average of the whole of Sweden (see Figure 5B).

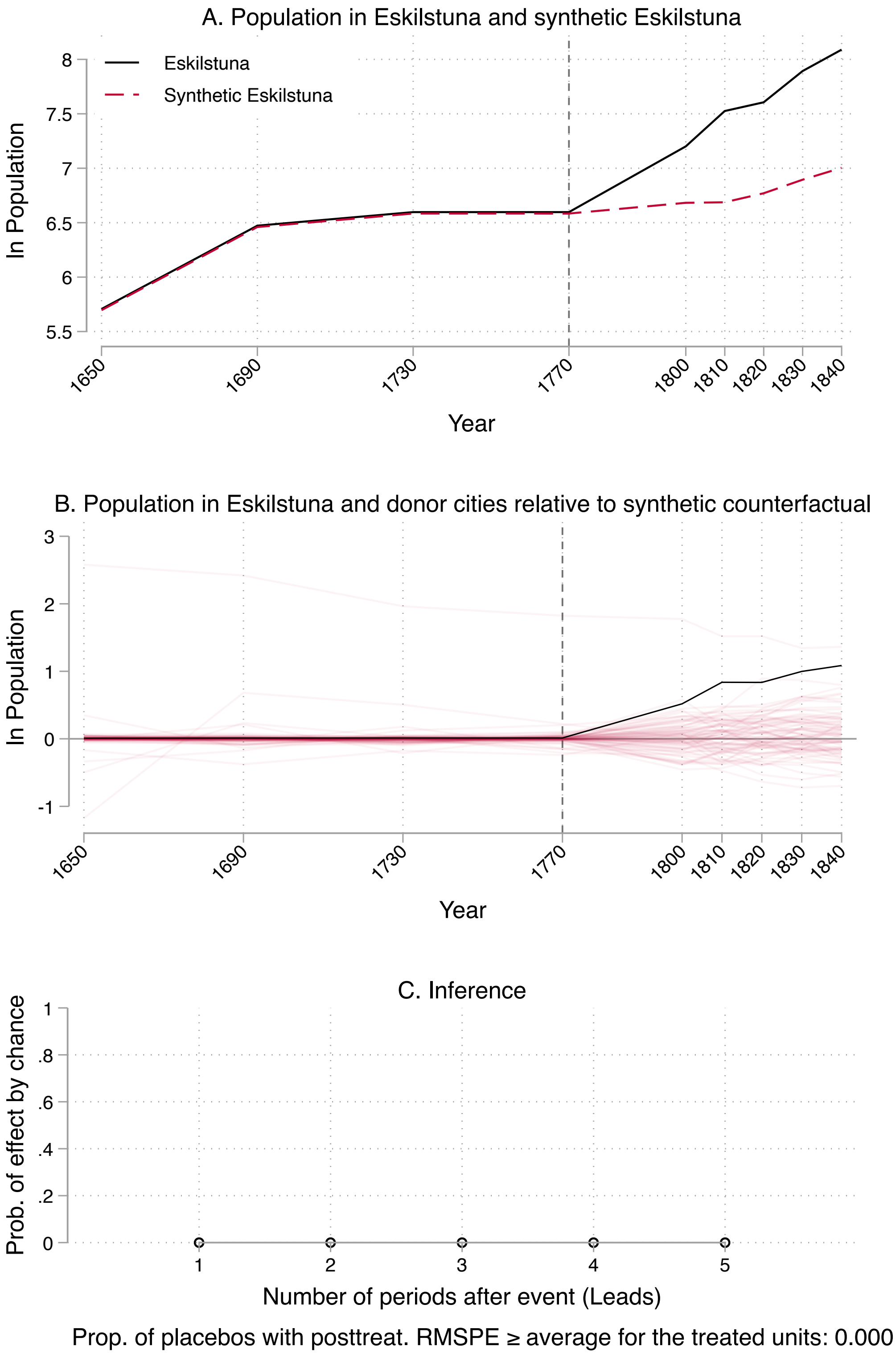


FIGURE 7: POPULATION IN ESKILSTUNA AND SYNTHETIC CONTROL.

Notes: This figure displays the impact of the Free City on ln population matching on ln population in 1650, 1690, 1730, 1770. Panel A compares Eskilstuna to synthetic Eskilstuna. Panel B shows the effect of the Free City. Panel C shows p-values for the estimated effects of the Free City at different points in time.

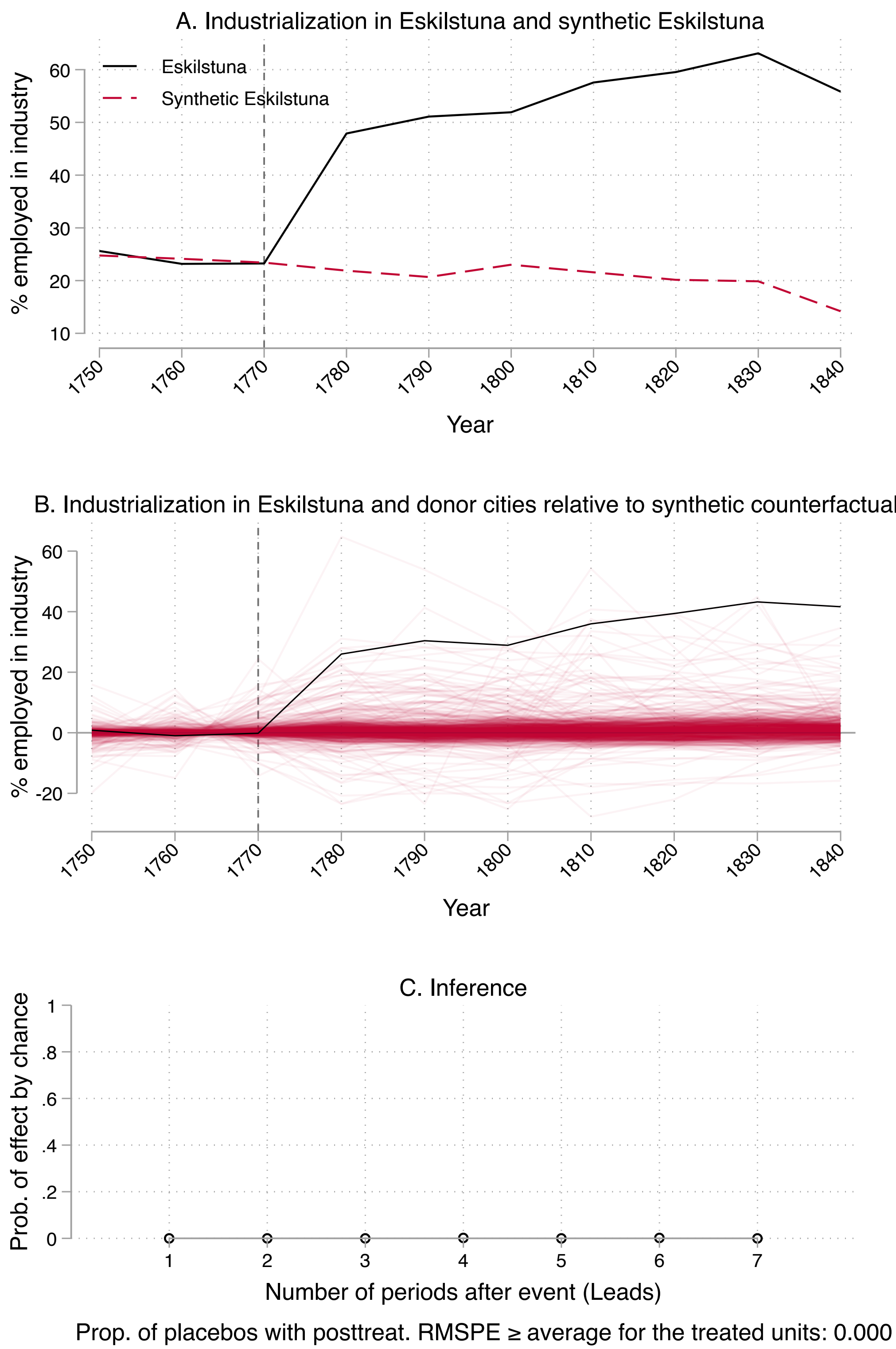


FIGURE 8: INDUSTRIAL EMPLOYMENT IN ESKILSTUNA AND SYNTHETIC CONTROL.

Notes: This figure displays the impact of the Free City on the percent employed in industry matching on the percent employed in industry in 1750, 1760 and 1770. Panel A compares Eskilstuna to synthetic Eskilstuna. Panel B shows the effect of the Free City. Panel C shows p-values for the estimated effects of the Free City at different points in time.

4.2.3 Additional estimates and robustness checks

We next address the robustness of our main SCM result. First, we show that the results are similar when accounting for factors that determined the location of the Free City in Eskilstuna. Second, we show that results are also similar when matching on other potential determinants of growth. Third, we show that the growth of the Free City is not simply due to a spatial reallocation of economic activity within the city, or across cities. Lastly, we provide suggestive evidence that other cities in Finland and Sweden where guilds were also abolished experienced growth rates similar to Eskilstuna.

Accounting for the selection of Eskilstuna: pre-industrial skills, geography, and market access. As described above, the choice of locating the Free City in Eskilstuna was motivated by the fact that a number of smiths were already located there, its access to water power granted by the presence of the Eskilstuna River (*Eskilstunaån*), and its good connections to the mining areas of *Bergslagen* and the capital Stockholm. We next show that including controls for each of these factors does not affect our main SCM results.

First, to rule out that the results are driven by having a relatively large number of craftsmen prior to the Free City (in contrast to what the data in Figure 5B on industrial employment suggest) we include a set of controls of initial artisanal activity. We collect data from Söderlund (1949, Table 2) on the number of artisan workshops, workers, and the number of distinct artisanal occupations represented in each city in 1750.[17] Matching on the number of masters, the number of other craftsmen, and the number of different crafts in a city in 1750 does not affect the results in a meaningful way (see Online Appendix Figure A.6).

Second, we use data on water power potential as an additional match variable in Online Appendix Figure A.7. We measure water power potential based on whether any industrial plant in a city relies on water in the 1900 manufacturing census. Using this match variable does not change the fact that Eskilstuna forges ahead in terms of (ln) population. Additionally, the fact that virtually all growth takes place in the Free City, while the Old City stagnates, suggests that it is institutional change rather than access to water power that drives the results (given that both parts of the city are located in proximity to the river, as shown in Figure 4A).

Third, we examine whether access to metals or proximity to Stockholm drive the results. We first compare Eskilstuna to cities in counties in the metal rich area known as *Bergslagen*. When we run the comparison to cities in the counties in *Bergslagen* with and without the county where Eskilstuna is located, we get similar results (see Online Appendix Figures A.8 and A.9). This suggests that the results are not driven by access to metal. We then include the great circle distance

[17] These data are based on reports of artisanal activity (*hantverkarförteckningar*) in each city in 1750 that were reported by the local magistrates to the Board of Trade (*Kommerskollegium*) in Stockholm.

to Stockholm as a matching variable, which does not change results substantially (Online Appendix Figure A.10).

Alternative determinants of growth: agricultural productivity and wages. Agriculture dominated the economy during the period we study and it is thus possible that agricultural productivity shaped city growth.[18] To measure differences in agricultural productivity, we use data on the yields of the principal grains (barley, rye, and wheat) drawn from Andersson Palm (2014). When including agricultural productivity in our set of matching variables, the baseline results remain similar (Online Appendix Figure A.11).

An alternative determinant of (industrial) growth is differences in wage levels. While some argue that high wages promoted industrialization (e.g., Allen, 2009), others emphasize that low wages may have promoted industrial growth (e.g., Kelly et al., 2023). We do not take a stance on whether low or high wages were important, but simply include county level agricultural (ln) real wages in 1770 as an additional matching variable.[19] The results, shown in Online Appendix Figure A.12 are again very similar to what we found in our other estimations.

Growth vs. spatial reallocation. Did the establishment of the Free City lead to a spatial reallocation of economic activity within Eskilstuna, or across cities? First, the growth of the Free City may have reflected an outmigration of people from the Old City. However, tracking individuals in historical population registers (*mantalslängder*) reveals that migration within the city of Eskilstuna was very low.[20] Moreover, the fact that the population of the Old City remains relatively constant while the city of Eskilstuna expands suggests that within-city reallocation cannot be the main driver of the growth of the Free City. A related question is whether Eskilstuna's population growth was driven by Malthusian dynamics or migration responses. Online Appendix Figure A.5 shows that the expansion in population was primarily driven by increases in inward migration to Eskilstuna, rather than Malthusian fertility and mortality responses.[21]

[18]Although the introduction of the potato fueled city growth in Europe during our period (Nunn and Qian, 2011), the widespread adoption of the potato took place first around 1800 in Sweden (Berger, 2019), which makes it an unlikely candidate to account for the differential growth experienced by Eskilstuna starting in the 1770s.

[19]County-level agricultural wages are collected from Prado et al. (2021).

[20]For example, only seven burghers moved from the Old City to the Free City between 1771 and 1800 (Ohlsson, 1971, p. 59). Similarly, the decline in the number of craftsmen in the metals sector did not reflect an outmigration, but rather that entry within the sector declined in the Old City (ibid.).

[21]Online Appendix Figure A.5 presents the total number of annual births and deaths in Eskilstuna based on data from *Tabellverket*, as well as the natural population growth (i.e., births minus deaths) before and after the establishment of the Free City. Eskilstuna exhibits a low rate of natural population growth, which is close to zero in most years. The sharp decline in natural population growth in the early 1770s was the result of a series of regional harvest failures, which led to similar aggregate mortality responses and declines in population growth at the national level. The fact that Malthusian dynamics played a limited role in accounting for Eskilstuna's growth is further corroborated by historians who argue that it was largely driven by inmigration after the establishment of the Free City in 1771 (Hörsell, 1983).

Second, a related concern is that Eskilstuna's growth may reflect negative spillovers on nearby cities. That is, Eskilstuna's population growth could be offset by lower rates of population growth in nearby cities. To investigate this, we exclude all cities closer than 100 kilometers to Eskilstuna and estimate our SCM model. The results, reported in Online Appendix Figure A.13 are largely unchanged, but we see that significance is increased for the early periods. This suggests that negative spillovers for cities relatively close to Eskilstuna do not drive the results.

Difference-in-differences estimates. Our preferred empirical strategy is the SCM because it is designed to deal with the fact that we only have one treated unit, but we here also show that results are similar when using a more standard difference-in-differences approach where we compare the population in Eskilstuna to other cities before and after the establishment of the Free City. We estimate:

$$ln(Population)_{it} = \gamma_i + \phi_t + \beta(Eskilstuna_i \times Post_t^{1771}) + \alpha(Candidate_i \times Post_t^{1771}) + \mathbf{X}_i' \delta_t + \varepsilon_{it}, \tag{2}$$

where the outcome is the natural logarithm of the population in city i in year t. $Eskilstuna_i$ and $Candidate_i$ are two indicator variables that take the value one for Eskilstuna and the candidate cities respectively, while $Post_t^{1771}$ is an indicator that switches from zero to one in 1771, when the Free City was established. We control for city fixed effects (γ_i) that absorb city characteristics that are fixed over time and year fixed effects (ϕ_t) that absorb temporal shocks. Additional specifications also include a set of time-invariant city controls (a city's longitude, latitude, ln distance to Stockholm, and ln population in 1650) interacted with year fixed effects and a set of region-by-year fixed effects in the vector $\mathbf{X}$. The standard errors are clustered at the city level in order to take possible serial correlation into account, but we also present empirical p-values to deal with the fact that we only have one treated unit as suggested by Conley and Taber (2011).

Online Appendix Table A.2 reports difference-in-differences estimates from Equation (2). Column 1 shows that Eskilstuna experienced a statistically significant 75.3 log point increase in population after 1771 relative to all other Swedish cities. As mentioned, because inference may be misleading we calculate a p-value based on Conley and Taber (2011), which equals 0. This shows that the estimated effect for Eskilstuna is the largest estimated effect in absolute value when comparing to placebo estimations in which the other cities are being treated as if they were the treated unit. Online Appendix Table A.2, column 2 shows that there are no similar increases in population in the four candidate cities after 1771, which is robust to controlling for additional city controls as well as region-by-year fixed effects in columns 3 and 4. The difference-in-differences results thus support our SCM estimates showing that Eskilstuna experienced a substantial increase in population after the establishment of the Free City.

4.2.4 External validity: evidence from the nationwide abolition of guilds

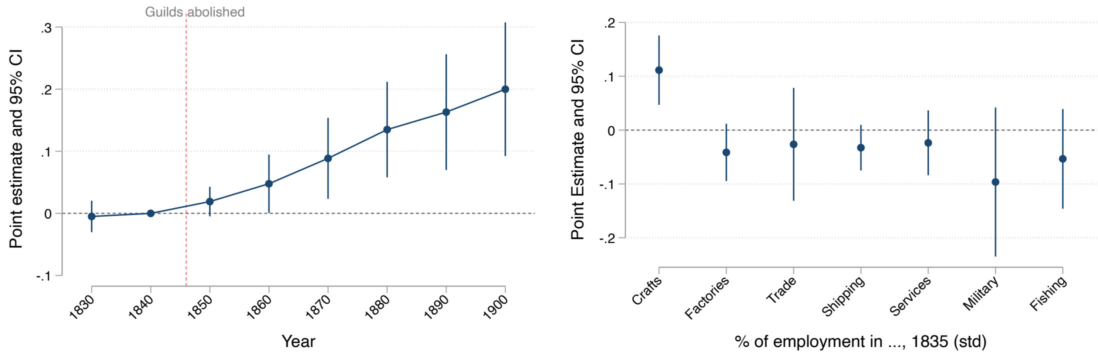
Our analysis is confined to a single city, which naturally raises the question whether we can generalize our findings to other settings. To corroborate the external validity of our findings, we first show that other cities where the guild system was abolished experienced similarly rapid growth as the Free City, which far outpaced the growth of cities where the guild system remained intact. We then estimate the impacts of the national abolition of guilds in 1846 showing that cities where guilds controlled a larger share of the urban economy before abolition grew relatively more rapidly than cities where guilds had been less influential after abolition.

Growth in other "free cities". Our first analysis leverages the fact that four new cities founded under the reign of the Swedish king Gustavus III gained similar privileges as Eskilstuna.[22] In Sweden, the city of Östersund was founded in 1786. In order to attract migrants, the guild restrictions that remained in place in the rest of the country (outside of Eskilstuna) were abolished and settlers were free from taxes for 20 years. Similarly, three cities with similar privileges were established in the Finnish part of Sweden: Kaskö (founded in 1785), Kuopio (1782), and Tammerfors (1779). If our results can be generalized, we would expect to see a relatively more rapid rate of growth in these cities after their foundation compared to other Swedish cities where the guild system remained intact until 1846.

Online Appendix Figure A.14A displays the mean ln population in our main sample of Swedish cities (excluding Eskilstuna), as well as the Free City, Östersund, Tammerfors, Kuopio, and Kaskö. We report the earliest available estimate of population after each city's foundation. Notably, the average population in Swedish cities changed little over time. Yet, the Free City and the other cities where the guild system was abolished all saw a more rapid and broadly similar rate of growth (see Online Appendix Figure A.14B). In sum, these results suggest that the growth that resulted from the abolition of guilds in the Free City was also evident in other cities where the guild system was abolished.

City growth and the national abolition of guilds in 1846. To further corroborate a negative impact of guilds on growth we next examine the effects of the national abolition of guilds in 1846

[22] Another set of privileges were granted to the city of Marstrand that was made a free port in 1775, which meant that goods sold and stored there would not be subject to tariffs. This lasted until 1794. The free port may have given a boost to population, and having Marstrand as a control unit may therefore be problematic. Yet we note that Marstrand only gets a weight of 0.03 percent and that results are similar when Marstrand is excluded, see Online Appendix Figure A.15. We also note that the significance of the effects increases in the early periods, which could be related to the fact that Marstrand unsurprisingly also experienced a boost in population between 1770 and 1800.



(A) FLEXIBLE DID

(B) PLACEBO TESTS

FIGURE 9: GUILD ABOLITION AND CITY GROWTH, 1830–1900

Notes: This figure shows that cities where guilds controlled a larger fraction of the urban economy in 1835 grew relatively faster than other cities after guilds were abolished in 1846. Panel A displays point estimates and 95% confidence intervals from flexible difference-in-differences estimates based on Equation 3. Panel B presents point estimates and 95% confidence intervals from seven standard difference-in-differences regressions based on Equation 4. The share of employment in crafts and other sectors in 1835 is standardized to take a mean 0 and a SD of 1. Both panels include a set of time-invariant city controls interacted with year fixed effects: a city's longitude, latitude, ln distance to Stockholm, and ln population in 1830. Standard errors are clustered at the city level.

on city growth. As a starting point, we use data on the sectoral composition of all Swedish cities in 1835 drawn from Stads- och kommunhistoriska institutet (2005). The intuition of our approach is that cities dominated by sectors that were untouched by the guilds—e.g., shipping—should see no differential growth effect after 1846, while cities where guilds controlled a larger share of the urban economy should exhibit a more rapid rate of growth after guilds are abolished.

We first estimate a flexible difference-in-differences specification of the following form:

$$ln(Population)_{it} = \gamma_i + \phi_t + \beta_t Crafts_i^{1835} + \mathbf{X}_i'\delta_t + \varepsilon_{it}, \tag{3}$$

where the outcome is the natural logarithm of the population in city i in year t. $Crafts^{1835}$ denotes the share of employment in crafts in 1835, prior to the abolition of guilds. To ease interpretation, we standardize the measure to take a mean 0 and a SD of 1. Throughout, we exclude Eskilstuna since guilds had been abolished in the Free City prior to the reform. We include a set of city controls (a city's longitude, latitude, ln distance to Stockholm, and ln population in 1830) interacted with year fixed effects in $\mathbf{X}$. We also include city fixed effects (γ_i) that absorb time-invariant and city-specific factors and year fixed effects (ϕ_t) that absorb temporal shocks that are common to all cities. Standard errors are clustered at the city level.

Figure 9A presents estimates of β_t from Equation 3 that capture average differences in ln population relative to 1840, the omitted baseline year. Prior to the abolition of guilds, there is no

TABLE 1: GUILD ABOLITION AND CITY GROWTH: CITY-LEVEL OLS REGRESSIONS.

	Outcome: ln Population			
	(1)	(2)	(3)	(4)
$\text{Crafts}_i^{1835} \times \text{Post}_t^{1846}$ (=1)	0.057*	0.099***	0.111***	0.108***
	(0.034)	(0.030)	(0.032)	(0.033)
$\text{Factories}_i^{1835} \times \text{Post}_t^{1846}$ (=1)				-0.031
				(0.027)
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	No	No
Region × Year FE	No	No	Yes	Yes
City controls × Year FE	No	Yes	Yes	Yes
Mean Dep. Var.	7.93	7.93	7.93	7.93
Observations	600	600	600	600

Notes: City-level OLS regressions. The set of time-invariant city controls interacted with year fixed effects include: a city's longitude, latitude, ln distance to Stockholm, and ln population in 1830. Regions correspond the eight NUTS-2 regions of Sweden (*Riksområden*). The share of employment in crafts and factories in 1835 is standardized to take a mean 0 and a SD of 1. Standard errors are clustered at the city level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

differential growth in cities where a greater share were employed in crafts under the control of guilds. But these cities grew relatively faster after the abolition of guilds in 1846 compared to cities were guilds were less influential before abolition. By 1900, a city with a 1 SD higher share of its population employed in crafts in 1835 had seen about a 20 log point relative increase in population.

We next corroborate a significantly faster growth rate using a standard difference-in-differences approach where we estimate:

$$ln(Population)_{it} = \gamma_i + \phi_t + \beta(Crafts_i^{1835} \times Post_t^{1846}) + \mathbf{X}_i' \delta_t + \varepsilon_{it}, \quad (4)$$

where the we include the standardized share of a city's employment in crafts in 1835 ($Crafts_i^{1835}$), prior to the abolition of guilds interacted with an indicator that takes the value one for all years after 1846 ($Post_t^{1846}$). Additional specifications also include the same set of time-invariant city controls interacted with year fixed effects in $\mathbf{X}$ as above. Again, standard errors are clustered at the city level.

Table 1, column 1, presents the baseline difference-in-differences estimate and columns 2 and 3 adds a set of city controls interacted with year effects and region-by-year fixed effects, respectively. The estimate in column 3 shows that a one standard deviation increase in employment in crafts is associated with a 11.1 log point increase in city population after 1846.

One concern is that the relatively more rapid growth reflects an overall increase in the demand for manufactured products. A compelling placebo test is offered by the part of manufacturing that were organized within "factories and manufactories" (e.g., textiles) that remained outside the control of guilds. Table 1, column 4, shows that cities where such manufacturing activities employed a greater share of the population before 1846 saw no increase in population after guild abolition. Figure 9B provides additional placebo tests presenting treatment effects based on share of employment in other sectors in 1835. Notably, the only sector that is positively and significantly associated with growth after the abolition of guilds is the crafts sector, which was controlled by the guilds and directly affected by the 1846 reform.

Together, these results suggest that the rapid growth in the Free City after the early abolition of guilds is also mirrored in more rapid growth in other cities after the abolition of guilds. While we cannot clearly establish a causal link, the fact that other free cities also grew more rapidly and that city growth accelerated after abolition in those cities that previously had been under more intensive control of guilds is highly suggestive of a negative effect of guilds on economic growth and development.

4.3 Long-run impacts of the Free City on industrialization

Our analysis shows that the establishment of the Free City in Eskilstuna in 1771 led to an accelerated pace of growth and structural transformation. In this section, we explore how Eskilstuna's early accumulation of artisans in metals shaped its comparative development during industrialization. In the 1870s—a century after the establishment of the Free City—Sweden experienced a rapid industrial take-off becoming one of the fastest-growing economies in Western Europe. Notably, Eskilstuna continued to experience more rapid population growth during industrialization and was still by the early 21st century larger than its synthetic counterfactual (see Online Appendix Figure A.4).

A controversial question is whether artisanal skills or "proto-industrialization" facilitated industrialization (Mendels, 1972). Influential Swedish economists such as Eli Heckscher, for example, argued that it did *not* provide a foundation for the new industries of the industrial age.[23] Yet a recent literature argues that the origins of the Industrial Revolution can be traced to Britain's early accumulation of artisanal skills that could readily be adapted to increasingly complex production processes (Kelly et al., 2023). In particular, the role of an accumulation of skills in metal works—e.g., iron founding, tool making, and watch making—is underlined as central to the development of the industrial sectors that drove the Industrial Revolution.[24] Did Eskilstuna's early concentra-

[23] Heckscher (1954, p. 193) argues that the guilds "barred any development toward more efficient forms of organization so that, as a result, handicraft was no more successful than manufactories in providing a foundation for the industries of the next century".

[24] A similar case is made Atack and Margo (2019) arguing that the diverse skillsets of American blacksmiths—"jacks

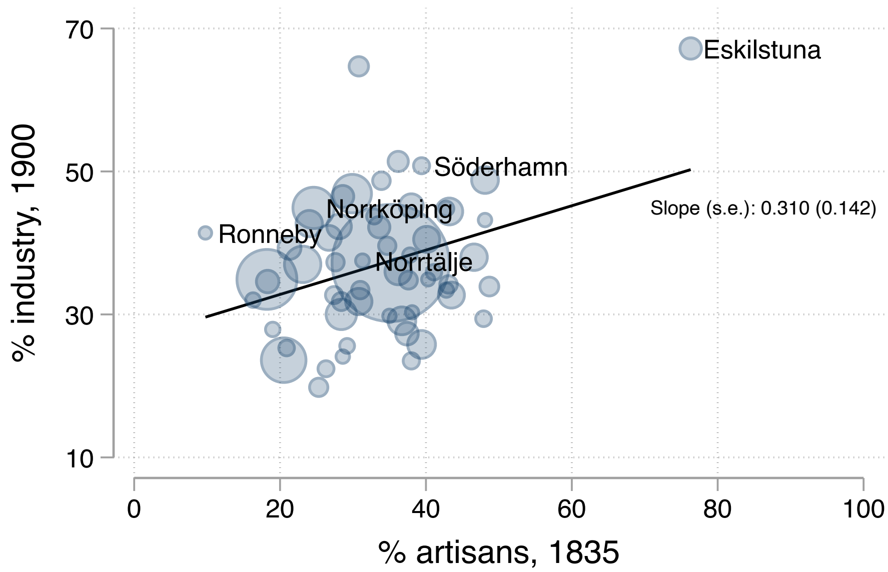


FIGURE 10: ARTISANAL EMPLOYMENT AND EMPLOYMENT IN INDUSTRY.

Notes: This figure shows that cities with a higher share of artisans prior to industrialization and the dismantling of guilds in 1846 also have a higher share of the population employed in industry after industrialization in 1900. The size of the circles denotes a city's population in 1830. Also reported is the slope from an OLS regression with robust standard errors.

tions of artisans, skilled in blacksmithing and metal works, similarly serve as the foundation for its rapid industrialization a century later?

We next provide three pieces of evidence suggesting that artisanal skills are highly predictive of subsequent industrialization. First, we document that cities with a higher fraction of artisanal employment in 1835 were more industrial by the early 20th century. Eskilstuna was the most industrialized city in Sweden in both years with virtually all of its industrial activity concentrated in the metals sector. Second, we show that Eskilstuna's accumulation of artisans skilled in blacksmithing and metal works served as the foundation for its rapid growth and industrialization. Third, we document a strong association between artisanal skills and industrial and innovative activity across city-industries before and after industrialization.

Artisanal skills and industrialization: cross-city evidence. We first document that the accumulation of artisanal skills facilitated the later transition to the increasingly more complex and mechanized production processes during industrialization. Figure 10 shows that Eskilstuna in 1835 had the highest share of artisans among all Swedish cities. Notably, by this time production was still carried out in small workshops and it would still be another decade before the guilds

of all trades"—constituted a gateway to more complex and high-skilled activities that became central to industrialization in the latter half of the 19th century.

were abolished in the rest of the country. By 1900, guilds had been abolished for half a century and the rise of the factory had largely displaced artisanal production methods in most industries (Berger and Ostermeyer, forthcoming). Yet, Figure 10 shows that Eskilstuna still was the most industrial city, which reflects a positive cross-city association between the presence of artisans before industrialization and factory workers in the early 20th century.

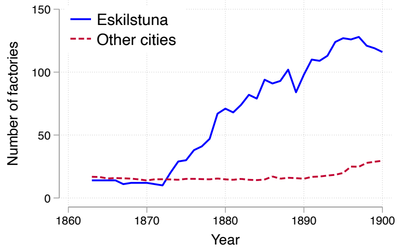
Artisanal skills and industrialization: the case of the Free City. Eskilstuna's rapid industrialization is highly suggestive of a central role of artisanal skills in accounting for industrialization. Figure 11A and 11B shows that the city experienced more rapid growth in the number of factories and industrial workers than other urban areas. A similar picture emerges when we instead focus on patenting output (Figure 11C). The high levels of patent output are consistent with the argument by historians that "a lively technical inventiveness in the region formed a contributory cause of [Eskilstuna's] rapid industrialisation" (Magnusson and Isacson, 1982, p. 81).

Eskilstuna's successful industrialization can be traced to its accumulation of artisanal skills in the metals sector after the establishment of the Free City. Industrial employment in Eskilstuna was mainly concentrated in the metals sectors both in 1835 and 1900 (Online Appendix Figure A.16). Similarly, the expansion of industrial activity was almost solely driven by the metals and machinery sectors (Figure 11D and 11E).

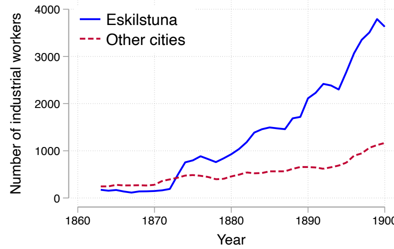
The successful transition from the artisan shop to the factory is directly linked to the abundant supply of entrepreneurs, skilled workers, and inventors with proto-industrial experience in Eskilstuna. First, individuals with roots in artisanal metal activities became increasingly prominent in the development of industrial enterprises from the mid-19th century.[25] Second, the role of an abundant supply of skilled workers with proto-industrial experience is evident in company records that highlight the key role played by skilled workers with artisanal knowledge.[26] Third, the development of new technologies was carried out by individuals with metals skills: apart from factory owners, the most common occupations among Eskilstuna's inventors were smiths, engineers, cutlers, grinders, engravers, locksmiths, instrument makers, and metal workers (see Online Appendix Table A.3). Moreover, patent output was concentrated in technologies revolving around metals (Figure 11F). Invention in other fields such as construction (e.g., locks) or food and beverages (e.g., cans) also often revolved around the use of metals (see Online Appendix Figure A.17).

[25] Indeed, Magnusson and Isacson (1982, p. 81) argues that "[m]any future business leaders began as skilled artisans, e.g. locksmiths, damasceners, cutlers and so on." Many of the city's large factories such as *Jernbolaget* (literally the "Iron Company") grew directly out of the metals workshops (Hörsell, 1983, p. 112).

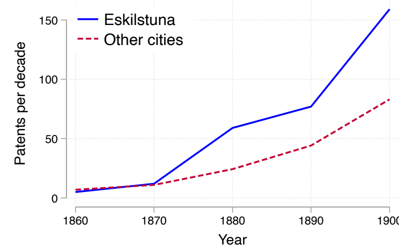
[26] At *Munktells mechanical workshop*, Eskilstuna's largest factory, 64 percent of mechanics—e.g., drilling-machine, lathe, and milling-machine operators—had proto-industrial experience (Magnusson and Isacson, 1982, p. 82). In contrast, among unskilled labourers less than one in five had proto-industrial experience. The key role of skilled workers with proto-industrial experience is consistent with the recent arguments that artisanal skills could often be adapted to the more complex production methods during industrialization (Kelly et al., 2023).



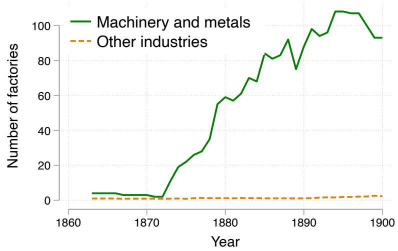
(A) FACTORIES



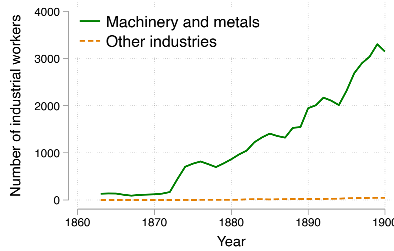
(B) FACTORY WORKERS



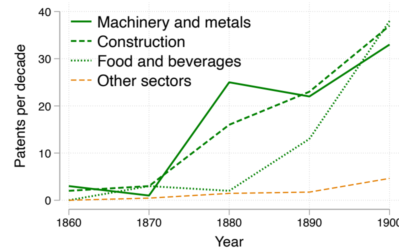
(C) PATENTS



(D) FACTORIES BY INDUSTRY



(E) WORKERS BY INDUSTRY



(F) PATENTS BY INDUSTRY

FIGURE 11: INDUSTRIALIZATION IN ESKILSTUNA

Notes: This figure shows that Eskilstuna experienced relatively rapid industrial and innovative growth during industrialization and that most of its growth took place within the metals sector. Panels A–C display the number of factories (A), factory workers (B), and patents granted by the PRV (C) for Eskilstuna and the mean across all other urban districts (*fögderi*) or parishes (*församling*) with at least one factory or patent in each year respectively. Panels D–F display the mean number of factories (D), factory workers (E), and patents granted by the PRV (F) in Eskilstuna separately by industry or sector.

Artisanal skills and industrialization: city-industry evidence. To extend the example of Eskilstuna and more systematically examine the association between artisanal skills and industrialization, we use our city-industry dataset where we observe the distribution of employment in each of the 58 cities across 12 broad industries in 1835 and the number of factories, factory workers, and patents within that city-industry in 1900. That is, we ask whether the presence of, for example, blacksmiths and shoemakers in 1835 is associated with more industrial and innovative activity in the metals and leather industry respectively in the early 20th century.

We estimate regressions of the following form:

$$Y_{im}^{1900} = \gamma_i + \phi_m + \beta Artisans_{im}^{1835} + \varepsilon_{im}, \tag{5}$$

where the outcome Y, for example, is the number of factories per capita in 1900 in city i in industry m. $Artisans$ is the share of a city's population that are artisans in 1835 in a particular city-industry. To facilitate interpretation, all variables are standardized to take a mean 0 and a SD of 1. We control for city fixed effects (γ_i) that adjust for the fact that all industrial sectors may

TABLE 2: PRE-INDUSTRIAL SKILLS AND INDUSTRIALIZATION: CITY-INDUSTRY OLS REGRESSIONS.

Dependent variable:	Factories p.c., 1900		% factory workers, 1900		Patents p.c., 1880-1914	
	All	Metals	All	Metals	All	Metals
	(1)	(2)	(3)	(4)	(5)	(6)
% artisans, 1835	0.607***	0.877***	0.353***	0.535***	0.377***	0.438***
	(0.163)	(0.052)	(0.132)	(0.019)	(0.076)	(0.014)
City FE	Yes	No	Yes	No	Yes	No
Industry FE	Yes	No	Yes	No	Yes	No
Observations	696	58	696	58	696	58

Notes: City-industry-level OLS regressions. Both the outcomes and the share of artisans in 1835 are standardized to take a mean 0 and a SD of 1. Standard errors are clustered at the city level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

expand in a particular city (e.g., because it gains access to the railroad network) and industry fixed effects (ϕ_m) that absorb differences in industrial growth across all cities (e.g., due to increased demand). Standard errors are clustered at the city level.

Table 2 presents city-industry OLS regressions from estimating Equation 5. A higher number of artisans in an industry in 1835 is associated with a greater number of factories and factory workers, as well as patents, per capita in the early 20th century. These associations are economically meaningful: a 1 SD increase in the share of artisans in a city-industry in 1835 is associated with about respectively 0.6 and 0.4 SDs more factories and factory workers per capita in that city-industry in 1900, as well as a 0.4 SDs higher number of patents granted per capita between 1880–1914. Moreover, these associations are similarly positive when when restricting the sample to the metals industry, which corroborates the role of an accumulation of artisanal skills within this sector in explaining Eskilstuna's rapid growth during industrialization.

Taken together, these results suggest that the establishment of the Free City and the early abolishment of guilds had positive long-run impacts on industrialization in Eskilstuna in part due to its accumulation of artisanal skills. Moreover, these findings are consistent with those who have emphasized the role of artisanal skills in general and the role of blacksmithing and metal skills in particular in accounting for the transition to sustained growth (Kelly et al., 2023). While these long-run results should be interpreted carefully given that we cannot identify causality, they appear inconsistent with the argument that guilds conferred advantages for long-run development.[27]

[27] Others have emphasized that the social capital generated within guilds had positive long-run impacts on economic development. Most famously, Putnam et al. (1992) argues that the social capital stemming from the medieval guilds in Northern Italy are important to explain its divergence from the South. Against that backdrop, one could expect that the early abolition of guilds in Eskilstuna may have lowered social capital compared to other Swedish cities. In contrast, Eskilstuna's early abolishment of guilds seems to have had no negative impact on organization within the "popular movements"—the labor movement, the temperance movement, and the free churches—of the late-19th century. By the early 20th century, Eskilstuna had the highest organizational rate of all large Swedish cities (Online Appendix

5 Conclusions

Craft guilds were among the most influential and widespread labor market institutions in modern history. Yet whether guilds served to promote or retard economic development remains a matter of great scholarly debate, not least due to the scarcity of quantitative evidence to bear on the question. We leverage a unique historical experiment to provide the first causal evidence of guilds on economic development. Using a variety of empirical strategies, we show that the abolishment of guilds due to the establishment of a Free City in the Swedish city of Eskilstuna in 1771 had a causal impact on subsequent growth and structural transformation. Moreover, we provide suggestive evidence that Eskilstuna's accumulation of artisanal skills in the metals sector contributed to its later success during industrialization. These findings thus suggest that guilds were detrimental for growth and industrial development both in the short and long run.

Figure A.18).

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Online Appendix (not for publication)
Guilds and Growth: Evidence from the Free City

TABLE A.1: SYNTHETIC CONTROL WEIGHTS FOR THE SYNTHETIC CONTROL RESULTS ON LN POPULATION, MAIN SPECIFICATION

City	Weight
Alingsås	0.002
Arboga	0.076
Askersund	0.004
Borås	0.008
Eksjö	0.007
Enköping	0.004
Falkenberg	0.26
Falköping	0.011
Falun	0.043
Gränna	0.337
Gävle	0.002
Göteborg	0.002
Halmstad	0.007
Hedemora	0.004
Helsingborg	0.007
Hjo	0.005
Hudiksvall	0.004
Härnösand	0.003
Jönköping	0.005
Kalmar	0.002
Karlstad	0.003
Kristianstad	0.002
Kristinehamn	0.003
Kungsbacka	0.005
Kungälv	0.003
Köping	0.005
Laholm	0.002
Landskrona	0.002
Lidköping	0.002
Lindesberg	0.008
Linköping	0.003
Luleå	0.003
Lund	0.003
Malmö	0.003
Mariefred	0.005
Mariestad	0.003
Marstrand	0.004
Nora	0.007
Norrköping	0.02
Norrtälje	0.009
Nyköping	0.002
Piteå	0.003
Sala	0.011
Sigtuna	0.003
Simrishamn	0.005
Skanör including Falsterbo	0.004
Skara	0.003
Skänninge	0.004
Skövde	0.004
Stockholm	0.002
Strängnäs	0.003
Sundsvall	0.002
Säter	0.004
Söderhamn	0.004
Söderköping	0.003
Södertälje	0.004
Torshälla	0.004
Trosa	0.006
Uddevalla	0.002
Ulricehamn	0.003
Umeå	0.003
Uppsala	0.004
Vadstena	0.003
Varberg	0.003
Vimmerby	0.002
Visby	0.005
Vänersborg	0.004
Västervik	0.002
Västerås	0.005
Växjö	0.003
Ystad	0.003
Åmål	0.003
Örebro	0.003
Öregrund	0.006
Östhammar	0.003

TABLE A.2: DID ESTIMATES: POPULATION GROWTH IN THE FREE CITY AND CANDIDATE CITIES, 1650–1840.

Dependent variable:	ln Population			
	(1)	(2)	(3)	(4)
$\text{Eskilstuna}_i \times \text{Post}_t^{1771}$ (=1)	0.753***	0.750***	0.882***	0.920***
	(0.036)	(0.037)	(0.062)	(0.082)
$\text{Candidate}_i \times \text{Post}_t^{1771}$ (=1)		-0.067	0.022	0.135
		(0.144)	(0.157)	(0.203)
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
City controls × Year FE	No	No	Yes	Yes
Region FE × Year FE	No	No	No	Yes
Observations	684	684	684	684

Notes: City-level OLS regressions. The set of time-invariant controls interacted with year fixed effects include: a city's longitude, latitude, ln distance to Stockholm, and ln population in 1650. Regions correspond to the eight NUTS-2 regions of Sweden (*Riksområden*). Standard errors are clustered at the city level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

TABLE A.3: INVENTOR'S OCCUPATIONS IN ESKILSTUNA, 1820–1914.

Occupation (English)	Occupation (Swedish)	% of inventors
Factory owner	Fabriksidkare	26.8
Engineer	Ingenjör	16.5
Foreman	Verkmästare	7.9
Merchant	Handlande	3.7
Smith	Smed	1.8
Accountant	Bokhållare	1.2
Farm owner	Gårdsegare	1.2
Cutler	Knivsmed	1.2
Tool maker	Verktygsarbetare	1.2
Factory manager	Disponent	1.2
Instrument maker	Instrumentmakare	1.2
Railing smith	Räcksmed	1.2
Metal worker	Metallarbetare	1.2
Engraver	Gravör	1.2
Locksmith	Låssmed	1.2
Grinder	Filare	1.2

Notes: This table reports the most common occupations reported among inventors in Eskilstuna that were granted at least one patent by the PRV between 1820 and 1914.

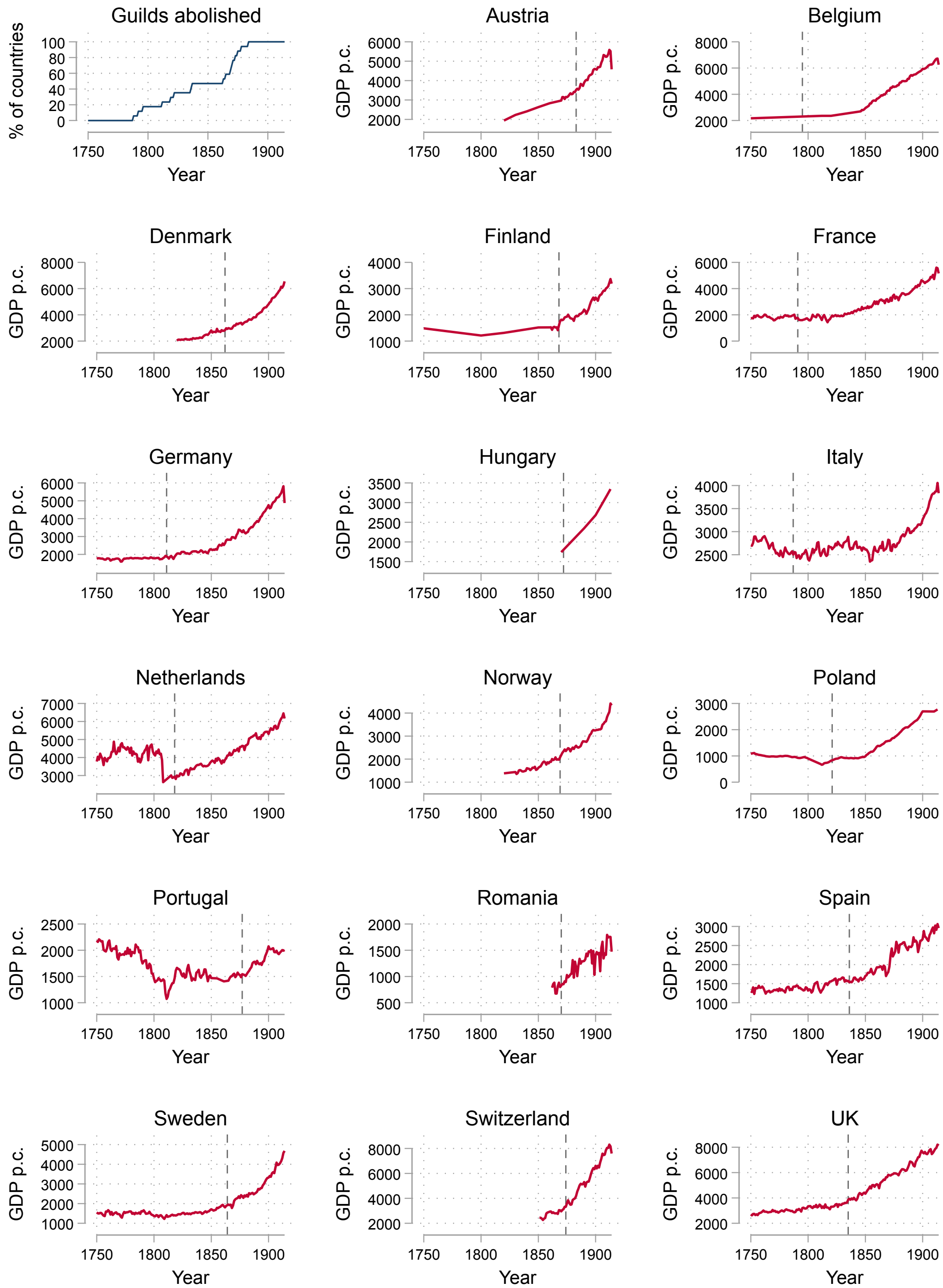
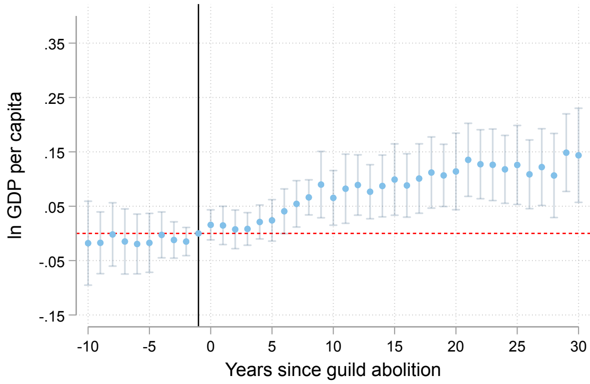
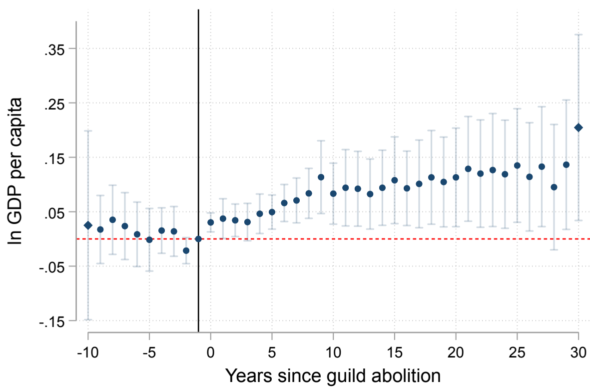


FIGURE A.1: GUILD ABOLITION AND GDP PER CAPITA IN EUROPE, 1750–1914.

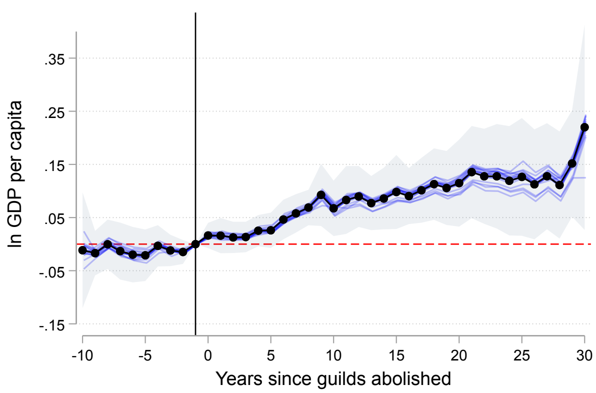
Notes: The top left panel displays the cumulative share of countries in the sample where guilds have been abolished. The other panels display GDP per capita based on Bolt and Van Zanden (2025) for each country included in the sample, where a vertical line denotes the year that guilds were abolished based on Ogilvie (2019).



(A) NO BINNING



(B) ONLY POST-1850S DATA



(C) LEAVE-ONE OUT

FIGURE A.2: GUILD ABOLITION AND GDP P.C. IN EUROPE, 1750–1914.

Notes: This figure displays event-study estimates from a country-level OLS regression of annual ln GDP per capita on a set of event indicators, as well as a full set of country and year fixed effects. Panel A estimates the baseline specification without binning the the endpoints. Panel B only includes post-1850 data. Panel C displays the baseline estimate as a black connected line and each blue line corresponds to estimates of the baseline specification when excluding one country at a time. The sample includes 17 European countries: Austria, Belgium, Denmark, Finland, France, Germany, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland, and the United Kingdom. GDP data is drawn from Bolt and Van Zanden (2025) and information on guild abolition is based on Ogilvie (2019, Table 9.4).

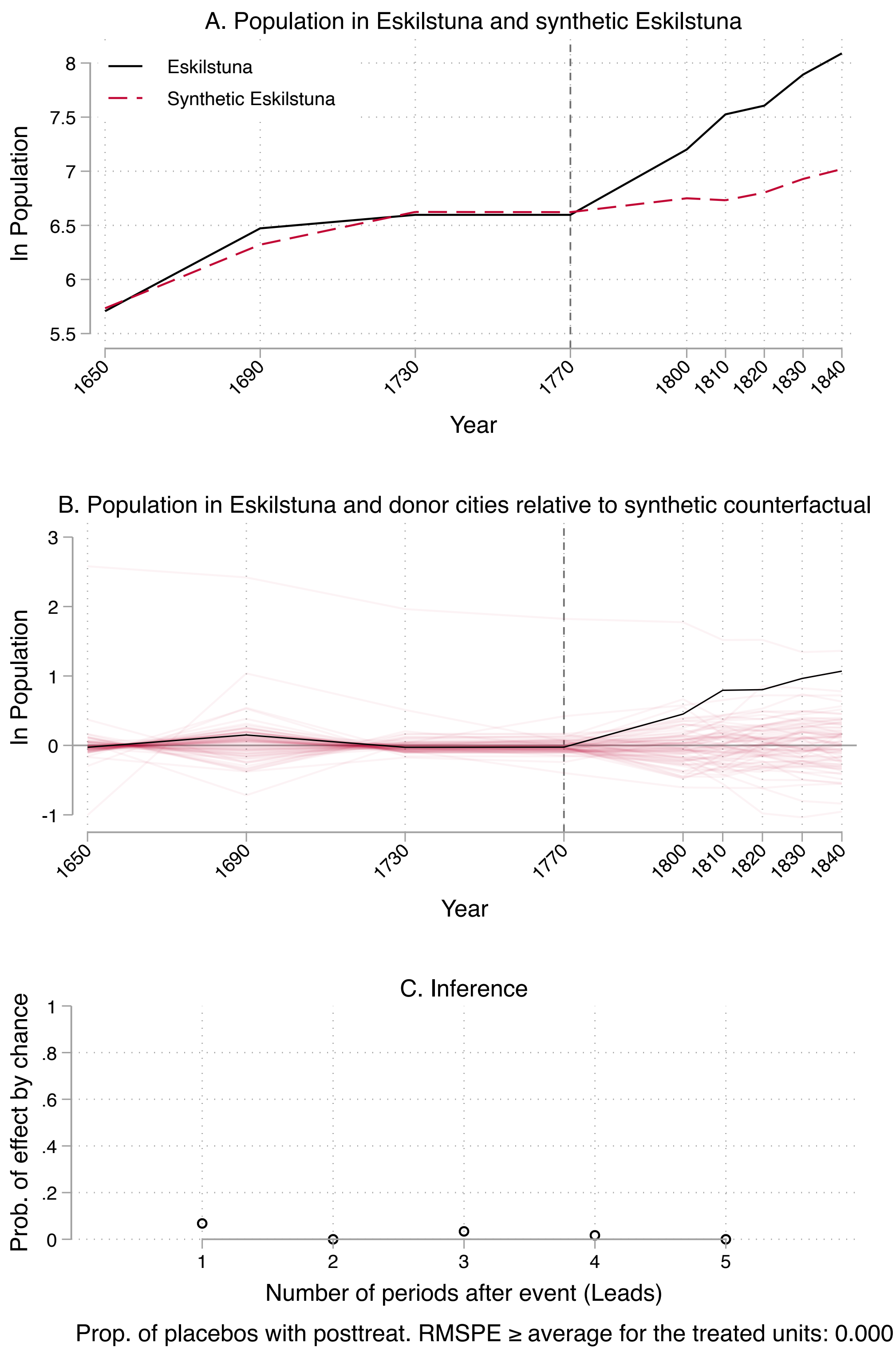


FIGURE A.3: ESKILSTUNA SYNTH USING PRE-PERIOD POPULATION AND POP GROWTH AS MATCH VARIABLES (SEE TEXT) .

Notes: As Figure 7, but using average pre-period population, average pre-period population growth and average lagged population growth.

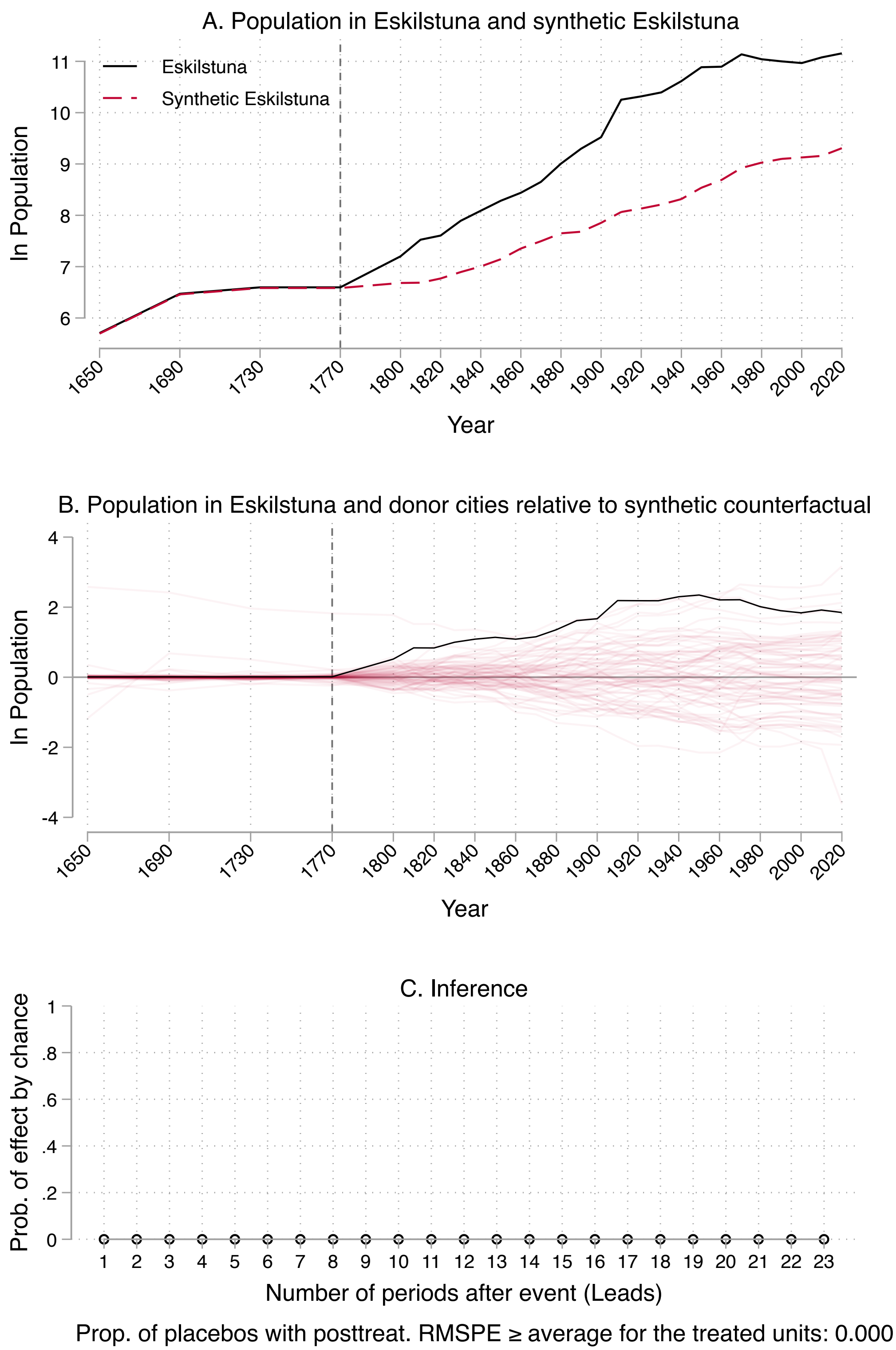
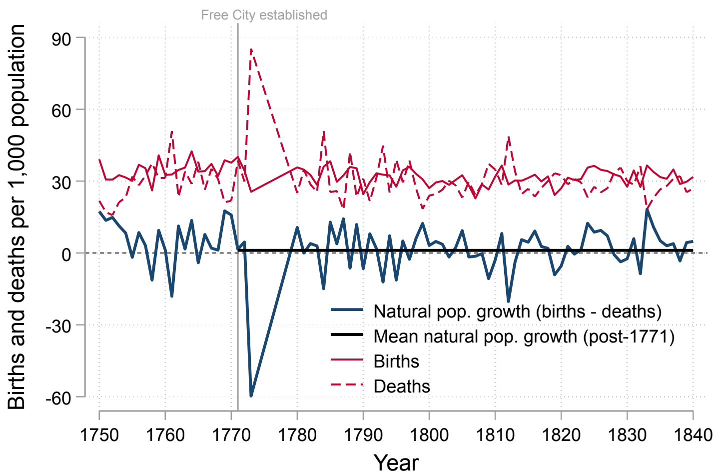
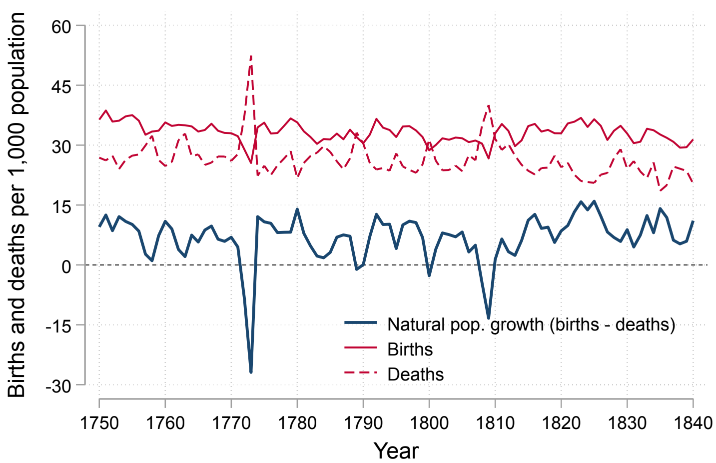


FIGURE A.4: LN POPULATION IN ESKILSTUNA AND SYNTHETIC ESKILSTUNA, 1650–2020.

Notes: As Figure 7, but with the years 1850-2020 added.



(A) ESKILSTUNA



(B) SWEDEN

FIGURE A.5: NATURAL POPULATION GROWTH IN ESKILSTUNA AND SWEDEN, 1750–1840.

Notes: This figure displays the annual total number of births/deaths and the natural population growth in Eskilstuna (Panel A) and Sweden (Panel B) based on data described in the main text and the Lund University Macroeconomic and Demographic Database (LU-MADD) that is developed and maintained by the Department of Economic History at Lund University (available at: www.ekh.lu.se).

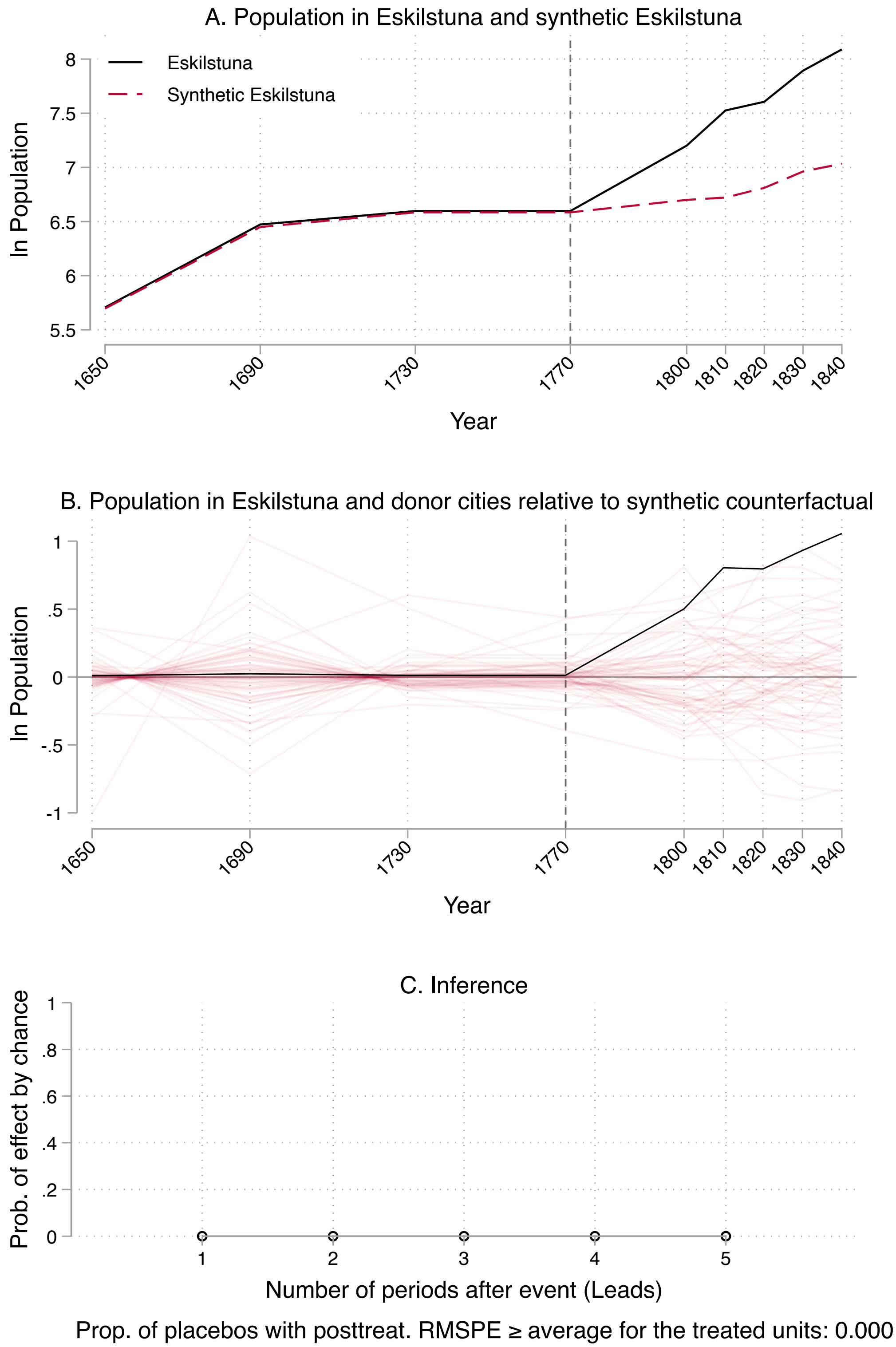


FIGURE A.6: ESKILSTUNA SYNTH MATCHING ON PRE-PERIOD ARTISANAL SKILLS

Notes: As Figure A.3 but with 1750 levels of artisanal activity added.

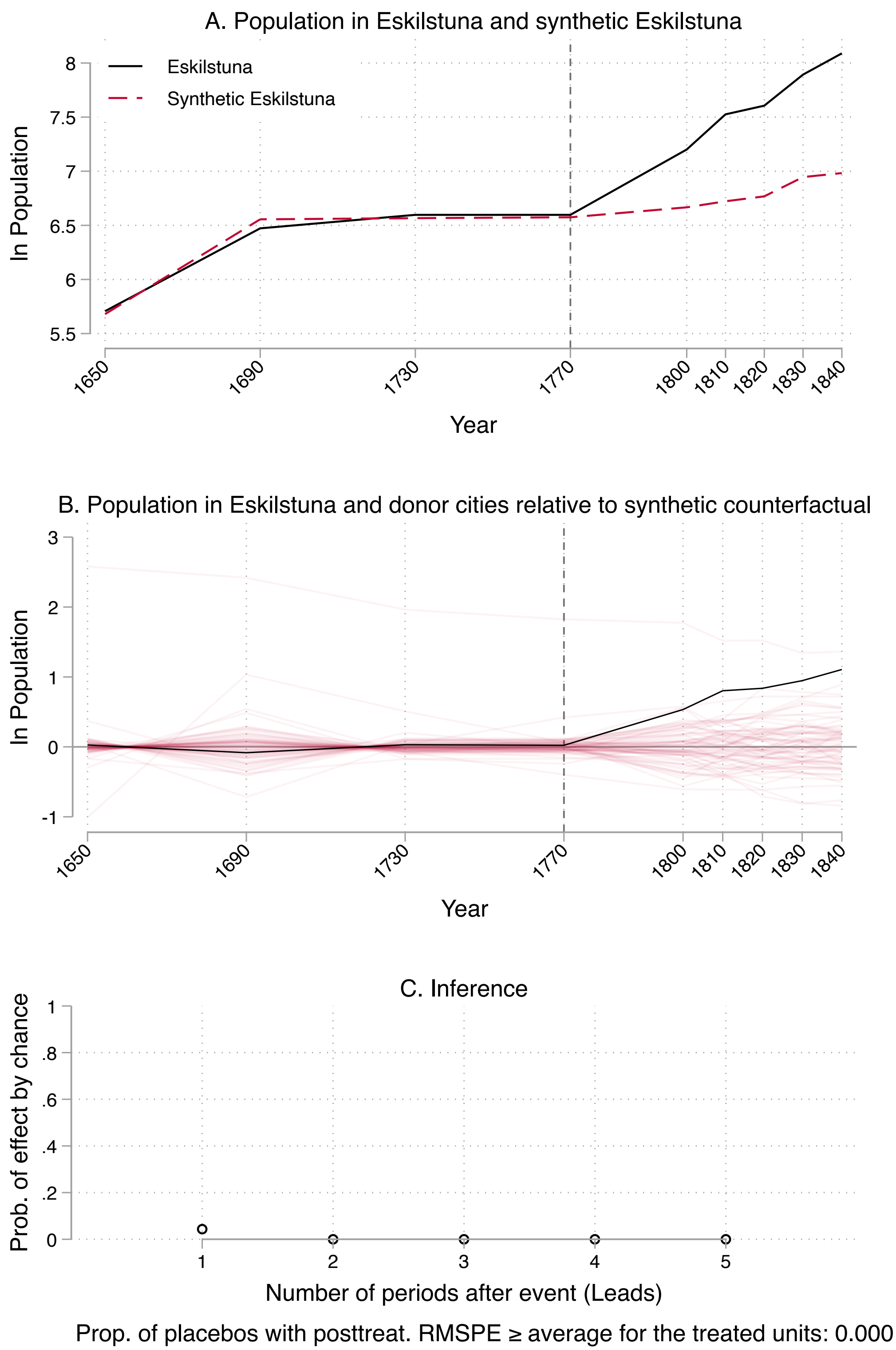


FIGURE A.7: ESKILSTUNA SYNTH MATCHING ON INDUSTRIAL WATER POWER USE

Notes: As Figure A.3 but with water power usage in 1900 added.

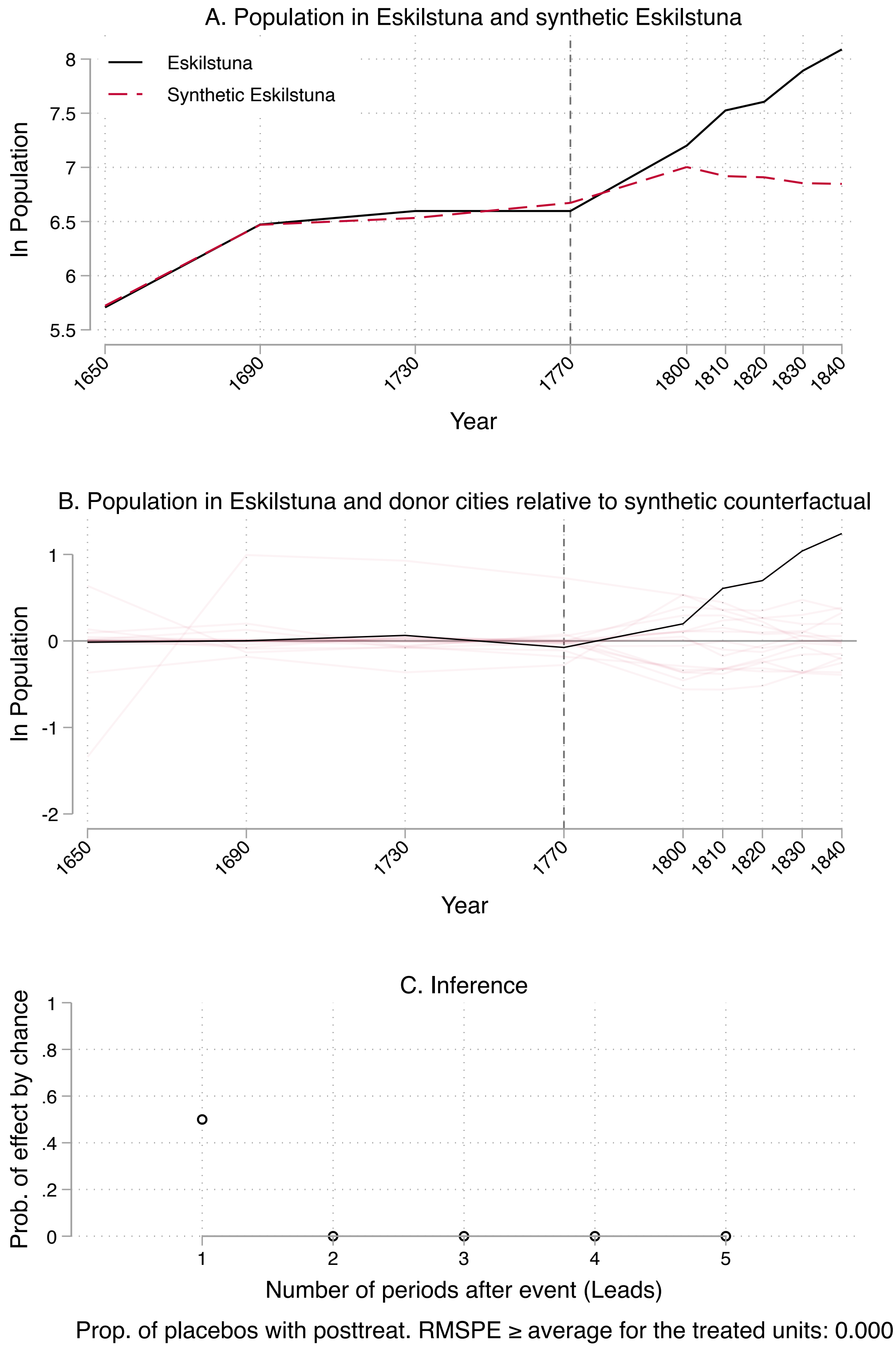


FIGURE A.8: ESKILSTUNA SYNTH INCLUDING ONLY CONTROL UNITS IN BERGSLAGEN, BROAD DEFINITION.

Notes: As Figure 7 but using only control units from Kopparbergs län , Södermanlands län, Västmanlands län, Örebros län.

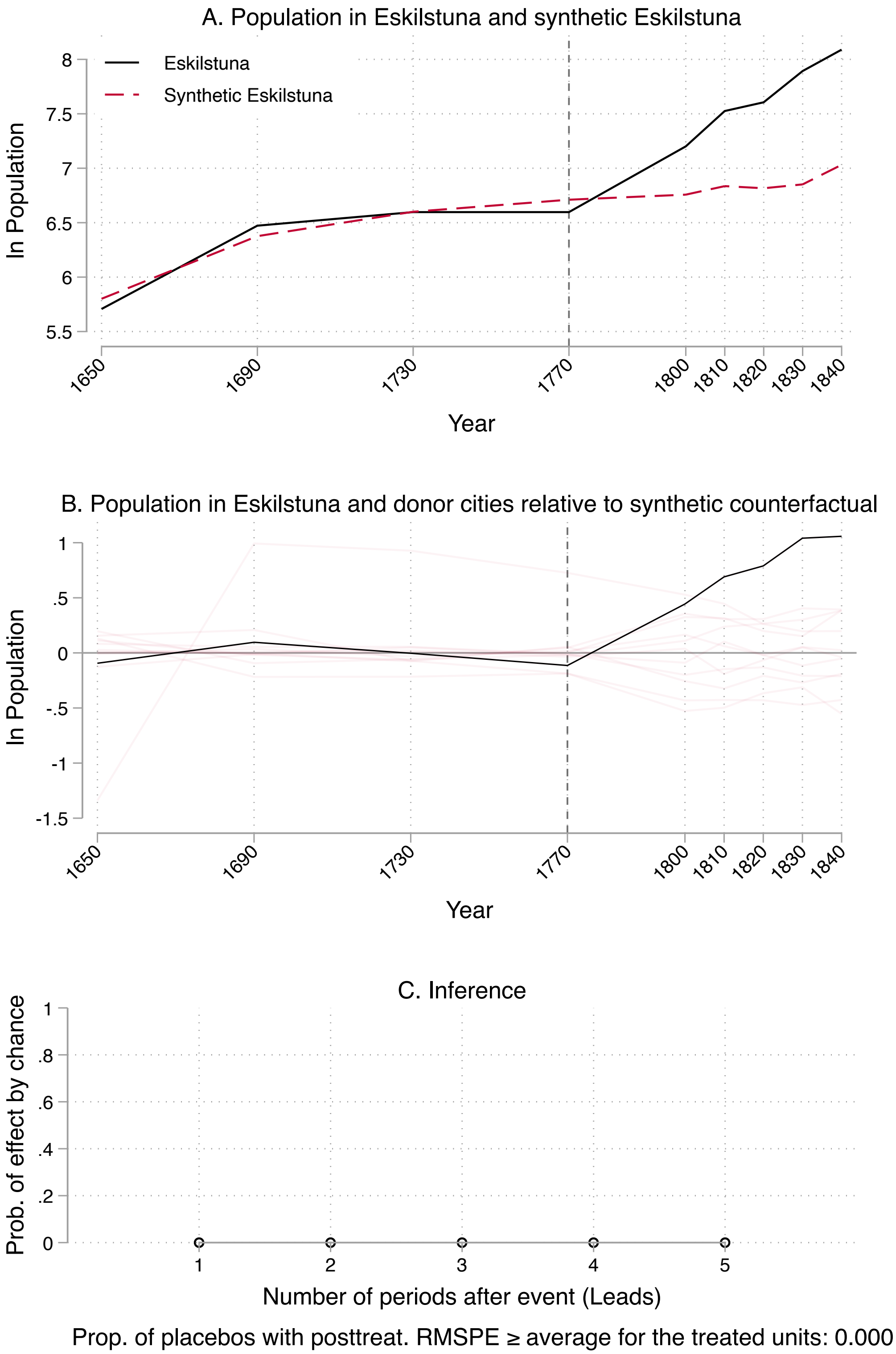


FIGURE A.9: ESKILSTUNA SYNTH INCLUDING ONLY CONTROL UNITS IN BERGSLAGEN, NARROW DEFINITION.

Notes: As Figure 7 but using only control units from Kopparbergs län, Västmanlands län, Örebros län.

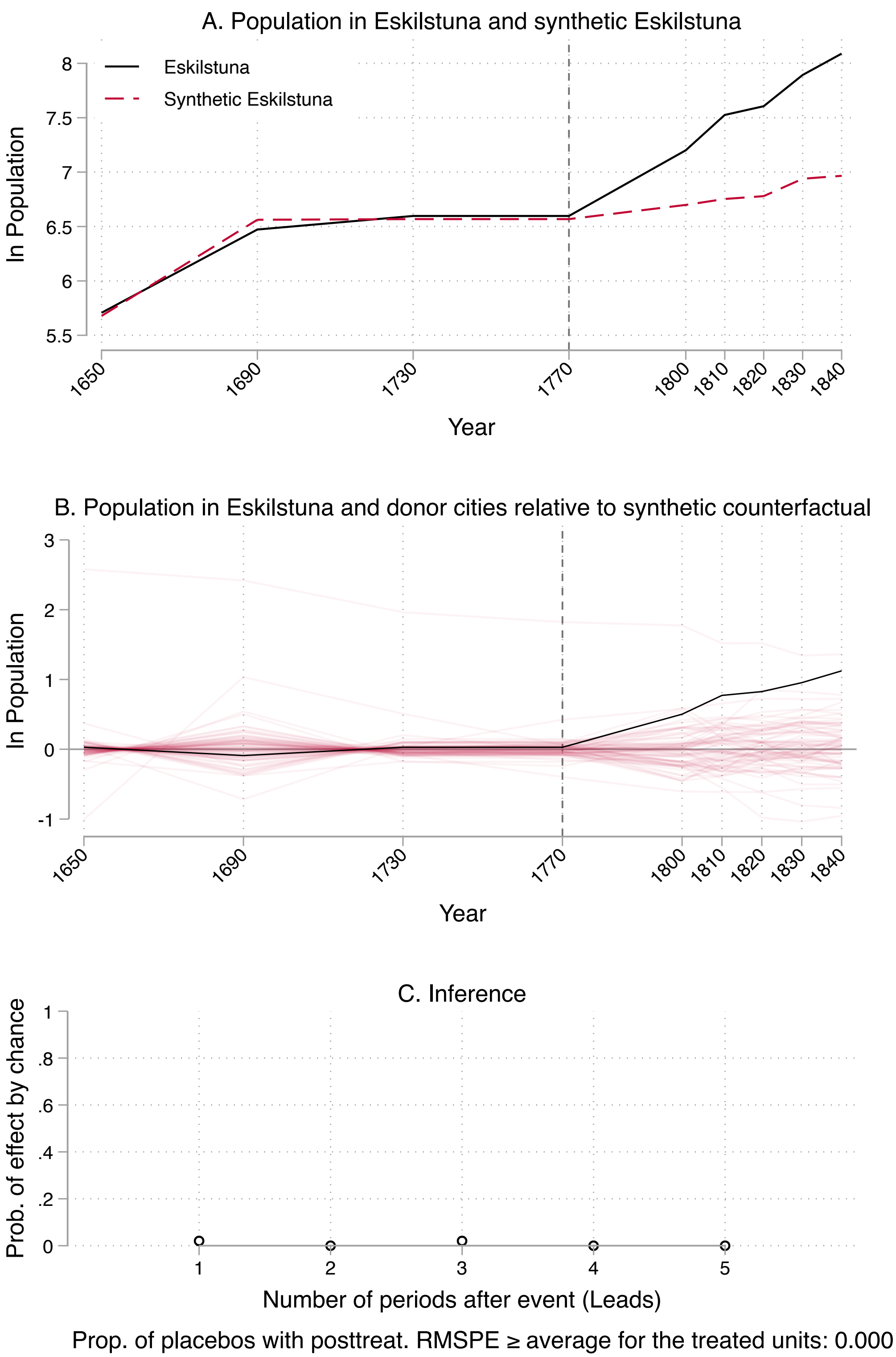


FIGURE A.10: ESKILSTUNA SYNTH WITH DISTANCE TO STOCKHOLM MATCH VARIABLES (SEE TEXT) .

Notes: As Figure A.3, but adding distance to Stockholm as a match variable.

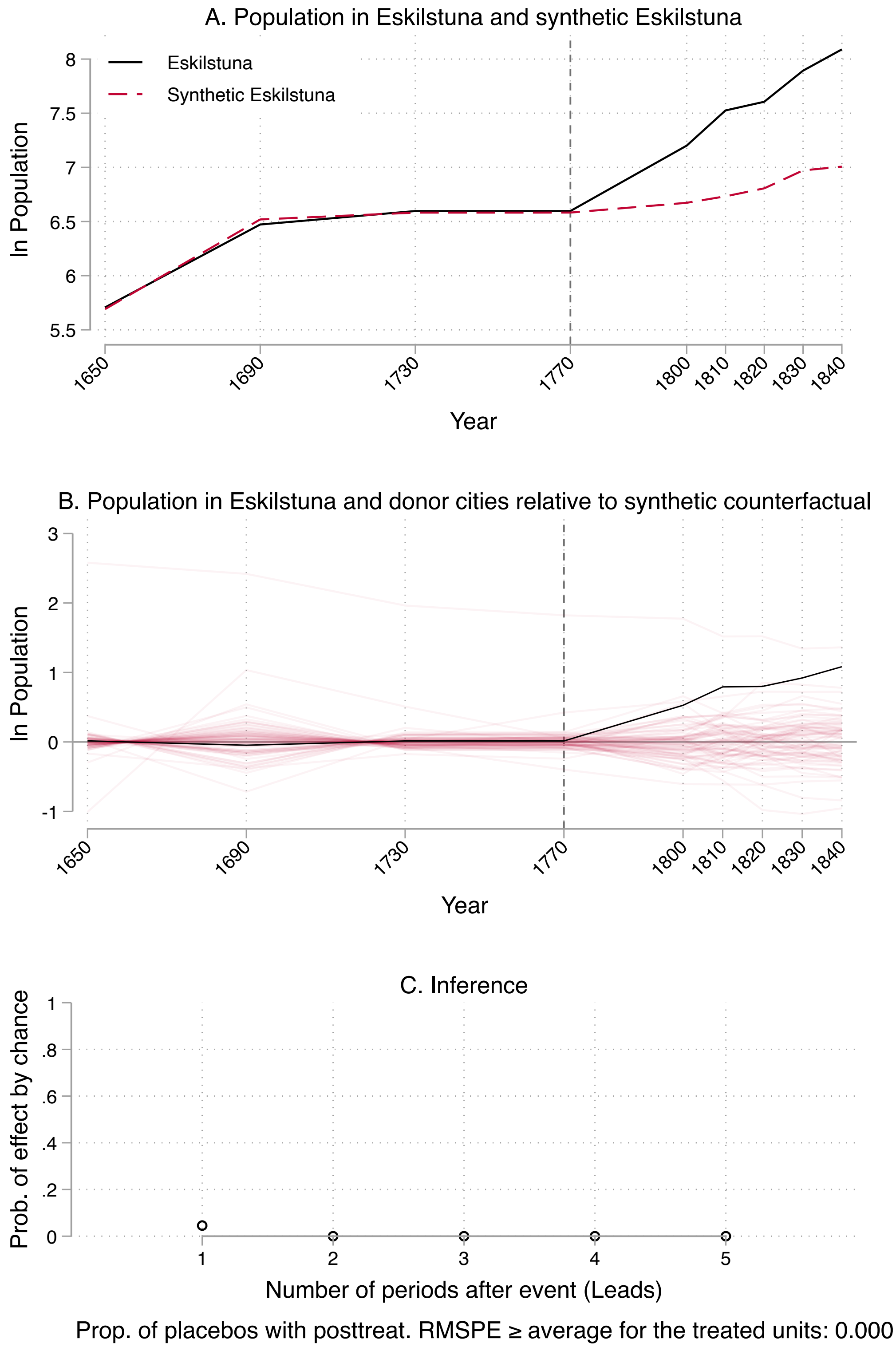


FIGURE A.11: ESKILSTUNA SYNTH WITH AGRICULTURAL PRODUCTIVITY MATCH VARIABLES (SEE TEXT) .

Notes: As Figure 7 but with yields for barley, wheat and rye in 1805 added.

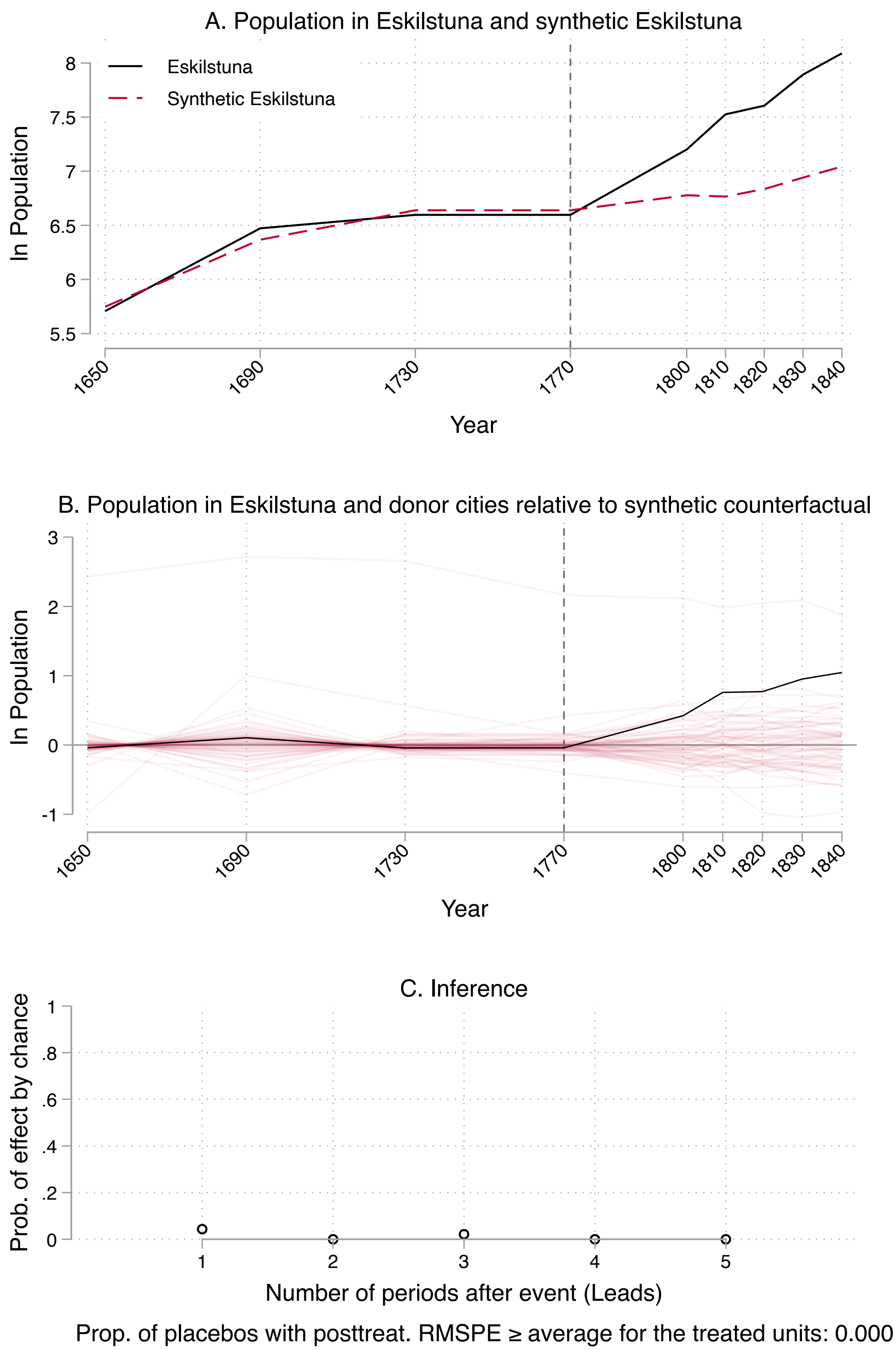


FIGURE A.12: ESKILSTUNA SYNTH MATCHING ON COUNTY LEVEL REAL WAGES

Notes: As Figure A.3 but with county level wages in 1770 added as match variable.

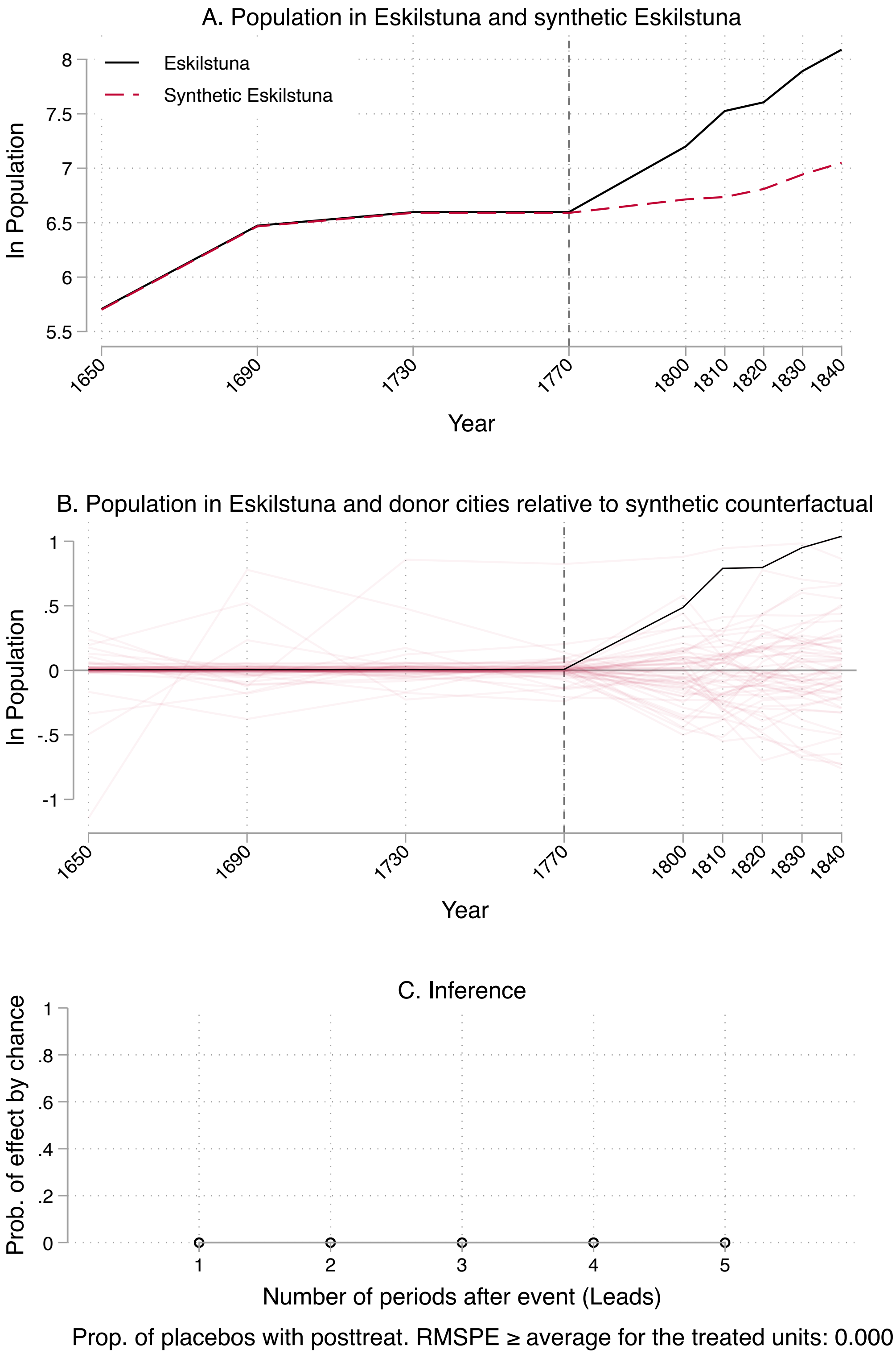
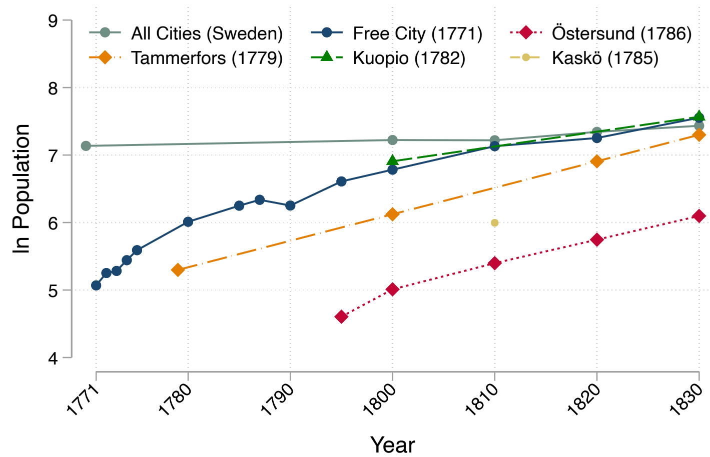
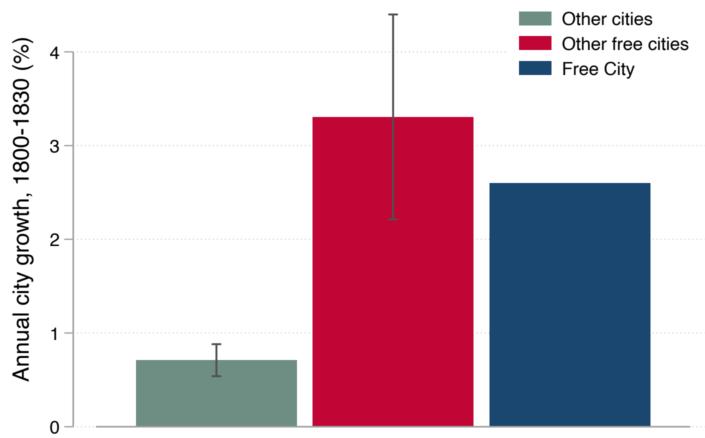


FIGURE A.13: ESKILSTUNA SYNTH EXCLUDING NEIGHBORS WITHIN 100 KILOMETERS FROM THE CONTROL UNITS.

Notes: As Figure 7 but neighboring cities are excluded from the possible control units.



(A) LN POPULATION



(B) ANNUAL POPULATION GROWTH

FIGURE A.14: POPULATION GROWTH IN THE FREE CITY AND OTHER FREE CITIES.

Notes: This figure shows that free cities in Finland and Sweden grew faster than other cities in the 18th and 19th century. Panel A displays the ln population of free cities in Finland and Sweden and the mean ln population in other Swedish cities. Panel B presents the average annual city growth rate for the Free City, other free cities, and other cities between 1800 and 1830. The year in parentheses denotes the year that each city was founded based on *Lilja, S., 2000, Tjuvehål och stolta städer: Urbaniseringens kronologi och geografi i Sverige (med Finland) ca 1570-tal till 1810-tal*. Population data is drawn from the following sources: We assign Östersund a population of 100 in 1795 based on Bromé (*Bromé, J., 1936, Östersunds historia, D.1, 1786–1862*) who reports that Östersund had less than 100 inhabitants in the mid-1790s. We then use decadal population for the period 1800–1830 drawn from Stads- och kommunhistoriska institutet (2005). We use population data for Kuopio in 1800 and 1850 from the Baltic Towns database (http://www.baltictowns.com/rostock/city/kuopio/info/fi_kuopio.html), which we use to estimate the population of Kuopio in 1830. Tammerfors had a population of about 200 inhabitants when it was founded in 1779 (https://sv.wikipedia.org/wiki/Tammerfors). In 1820, the city had about 1,000 inhabitants (https://sv.rilpedia.org/wiki/Tammerfors). We use these data points to estimate the population of Tammerfors in 1800 and 1830. Kaskö had 402 inhabitants in 1810 according to Lilja. See the main text for sources for the other cities including the Free City.

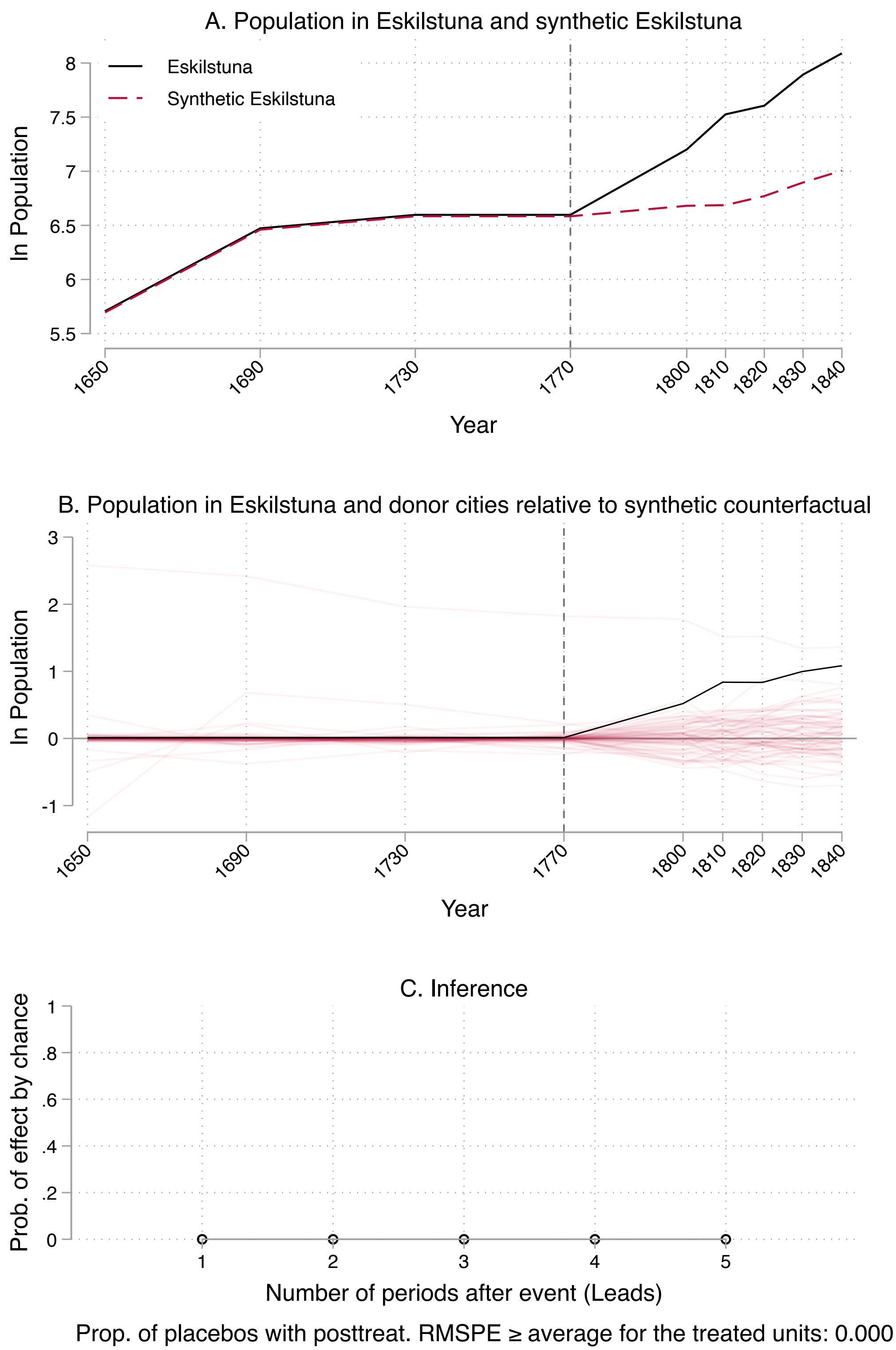


FIGURE A.15: SYNTHETIC CONTROL RESULTS WHICH EXCLUDES MARSTRAND FROM THE CONTROL UNITS.

Notes: As Figure 7 but Marstrand is excluded from the possible control units.

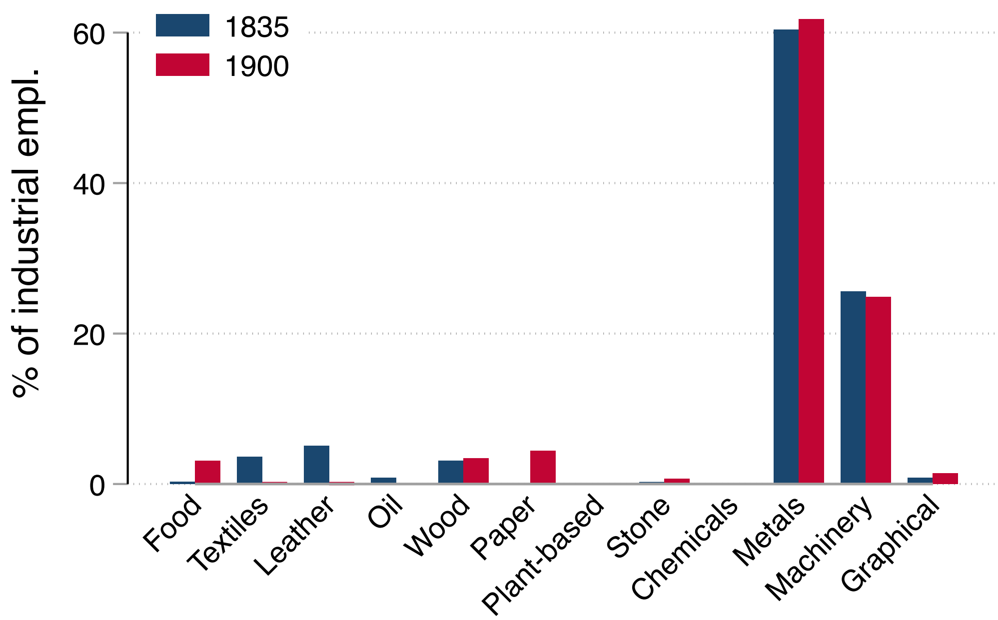


FIGURE A.16: INDUSTRIAL EMPLOYMENT ACROSS SECTORS IN ESKILSTUNA, 1835 AND 1900.

Notes: This figure shows that the majority of Eskilstuna's industrial employment was concentrated in the metals industry both in 1835 and 1900.

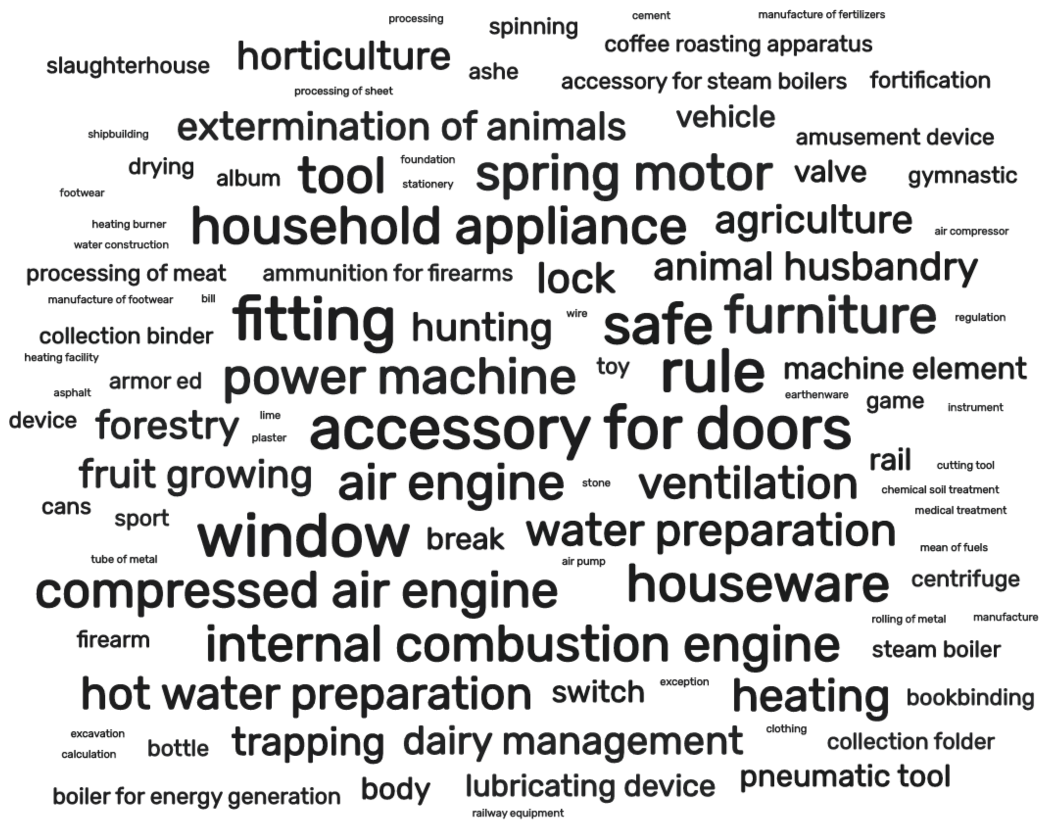


FIGURE A.17: KEYWORDS IN PATENTS GRANTED TO ESKILSTUNA INVENTORS, 1820–1914.

Notes: This figure displays the DPK technology class keywords on patents granted to Eskilstuna inventors by the PRV between 1820 and 1914. We translate the Swedish keywords to English using Google Translate and then use a word-cloud software (https://monkeylearn.com/word-cloud/) to create a word cloud where the size of each keyword is proportional to the number of times it appears in the patent data.

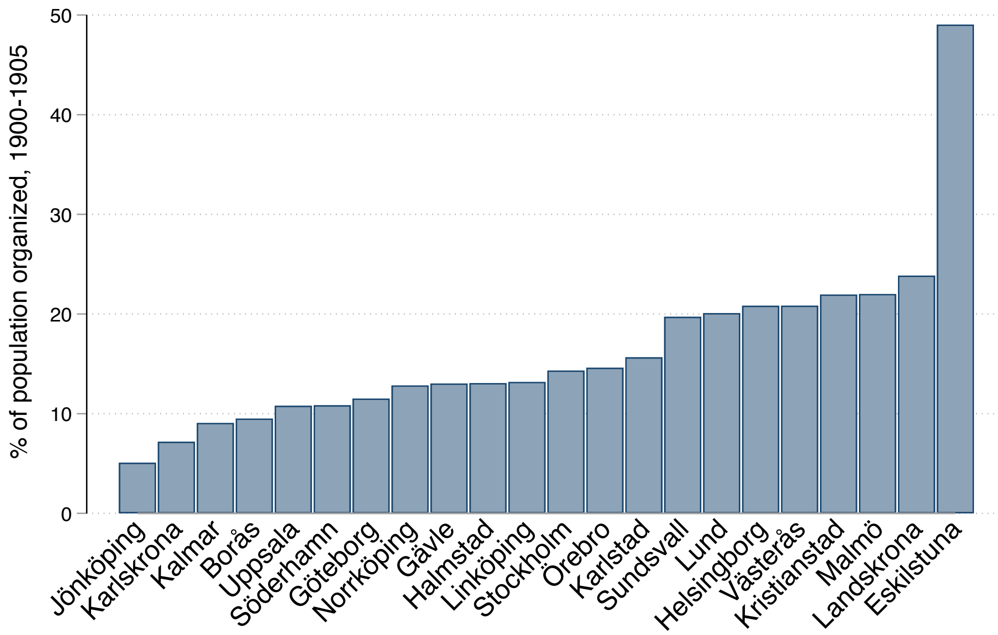


FIGURE A.18: MEMBERSHIP IN "POPULAR MOVEMENTS" IN THE EARLY 20TH CENTURY.

Notes: This figure displays the share of the population in the cities in our main sample (restricted to those with more than 10,000 inhabitants in 1900) that were members in the popular movements—the labor movement, the temperance movement, and the free churches—in 1900–1905. We calculate the average number of organizational members in each urban parish between 1900 and 1905 based on data from Lundkvist and Andrae (1998) and match it to our city population data for 1900. Note that the resulting membership rates are approximate because the geographical units (parishes and cities, respectively) do not perfectly overlap in all cases.