

The Consequences of Radical Reform: The French Revolution

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Abstract

The French Revolution had a momentous impact on neighboring countries. It removed the legal and economic barriers protecting oligarchies, established the principle of equality before the law, and prepared economies for the new industrial opportunities of the second half of the 19th century. We present within-Germany evidence on the long-run implications of these institutional reforms. There is no evidence of a negative effect of French invasion: occupied areas experienced more rapid urbanization growth, especially after 1850. A two-stage least squares strategy provides evidence consistent with the hypothesis that the reforms instigated by the French had a positive impact on growth.

JEL: I10, O40, J11.

Keywords: institutions, civil code, guilds, oligarchy, political economy.

In this paper we exploit the variation in institutional reform created by the French Revolution in Europe, in particular within Germany, to investigate the consequences of radical, externally-imposed reforms on subsequent economic growth. After 1792 French armies occupied and reformed the institutions of many European countries. The set of reforms the French imposed in the territories that they conquered were extensive and radical; they included the imposition of the civil legal code, the abolition of guilds and the remnants of feudalism, the introduction of equality before the law, and the undermining of aristocratic privileges. The long-run implications of these reforms

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are of interest both because of historical reasons and also because they are related to current debates on institutional change. For example, the view that ‘designed’ and externally-imposed institutions are unlikely to foster economic progress would suggest that the French Revolution should have significant negative effects.¹ In contrast, the view that oligarchies, entry barriers and restrictions on trade in labor and other markets were the main impediment to economic growth in Europe at the turn of the 19th century would suggest that the Revolutionary reforms should have unleashed more rapid economic growth in affected areas (Olson, 1982, Acemoglu, 2008).²

We investigate the economic consequences of the French Revolution and the reforms that were imposed on certain German polities as a consequence of the Revolutionary Wars. Parts of Germany, primarily the west and northwest, were invaded, ruled directly by France or through satellite states, and reformed, while the south and the east were not. We first investigate the reduced-form relationship between our definition of ‘French treatment,’ the length of French occupation (in years), and our main proxy for economic prosperity, urbanization rates. There is no evidence of a negative relationship. Instead, many of our estimates show significantly faster growth of urbanization in treated areas during the second half of the 19th century.³

We then use data on the timing of institutional reforms across German polities to investigate both the effect of invasion on various institutional outcomes and on long-run economic development. We show a strong association between institutional reforms and French invasion (or control). Using this relationship as a first stage, we then estimate instrumental-variables models, which indicate sizable effects of institutional reforms on subsequent growth. The purpose of this two-stage strategy is twofold. First, it allows to distinguish the effect of the exogenous component of reforms

¹Hayek (1960) argued that institutions cannot be designed and have to evolve organically (and that this was the major reason for the inferiority of the civil code), and a recent literature has claimed that institutions have to be ‘appropriate’ to the specific circumstances of countries (e.g., Berkowitz, Pistor and Richard, 2003a,b, Rodrik, 2007). La Porta et al. (1998) emphasize several inefficiencies associated with the French civil legal code.

²These issues are also related to the classic historical debate about the extent to which the institutions of the *ancien régime* impeded capitalism and economic growth and whether or not the French Revolution played a constructive or destructive role in European political development. The historical debate about the consequences of the French Revolution is also about its impact on political institutions and democracy, which is beyond the scope of the current paper.

³The working paper version of our study reports cross-national (Europe-wide) evidence consistent with this pattern, and also explores different definitions of ‘French treatment.’

from endogenous, ‘defensive’ modernization. Second, it enables us to provide a test of the hypothesis that the effects of French invasion worked through the institutions that they imposed in the occupied parts of Germany. Overall, our results show no evidence that the reforms imposed by the French had negative economic consequences. On the contrary, there is fairly consistent evidence from a variety of different empirical strategies that they had positive effects.

Crucially for our identification strategy, parts of Germany did not *choose* the French institutions, but those institutions were *imposed* on them first by the Revolution and then by Napoleon.⁴ Moreover, territorial expansion by French armies did not target places with a greater future growth potential. Instead, it had two major motives. The first was defensive, especially in response to the threat of Austrian or Prussian (or later British) attempts to topple the Revolutionary regime. The second was ideological, as the French sought to export the Revolutionary ideals to other countries, and at the same time tried to establish France’s ‘natural frontiers.’⁵ Both motives meant that the French were more likely to conquer and occupy neighboring areas. In any case, the purpose of the institutional reforms of the French Revolution was not to foster industrialization per se, though they may have achieved this objective as a by-product of their major goal of destroying the grip of the aristocracy, oligarchy, and the clergy on political and economic power.⁶ Therefore, to a first approximation, we can think of the imposition of the institutions of the French Revolution as an ‘exogenous treatment’ and investigate the economic implications of radical institutional reforms. To bolster our identification strategy and this conclusion, we show that there were no systematic

⁴In most cases, there were local Jacobin (local radical) forces in the countries occupied by the French armies, but the presence of such forces did not play a major role in determining which countries and cities were occupied by the French. See, for example, Doyle (1989, Chapter 9).

⁵The Revolutionary leader George Danton stated: “Les limites de la France sont marquées par la nature, nous les atteindrons des quatre coins de l’horizon, du côté du Rhin, du côté de l’Océan, du côté des Alpes. Là, doivent finir les bornes de notre république.” (speech to National Convention, January 31, 1793; quoted in Blanning 1983, p. 2). Grab (2003, p. 1) summarizes these objectives and arguments as: “The revolutionary governments justified the occupation of foreign lands, using the theory of ‘natural frontiers’ and declaring their intention of liberating oppressed people from tyrannical regimes.”

⁶It is unlikely that the French could target areas with greater industrialization potential or that reforms were made specifically to encourage industrial growth. In fact, most likely no one at the turn of the 19th century could have anticipated the new technologies that were to arrive a few decades later (see the discussion in Mokyr, 2003). The exception to this statement is textiles. By 1800 the British and others had established some new technologies that increased productivity (e.g., in spinning) by an order of magnitude. Textiles are an important part of the economy in the Rhineland, discussed below, but there is no evidence that the French changed institutions in the Rhineland specifically because they foresaw great potential in the manufacture of cloth.

growth differences between occupied and non-occupied areas before the French Revolution. We also flexibly control for differential trends by longitude and distance to Paris.

An important aspect of our findings is that the positive effects of institutional reforms are strongest in the second half of the 19th century. This is not surprising. French reforms were accompanied by the disruptions caused by invasion and war and this often had quite destructive and exploitative aspects (see, for instance, Blanning, 1983, 1986). Thus, the short-term impact of French invasion may well have been negative. But this is uninformative about the long-run economic impact of Revolution-imposed institutional changes. The most plausible hypothesis—and our starting point—is that the major role of the reforms was in creating an environment conducive to innovation and entrepreneurial activity. This environment mattered most in the dissemination of the industrial revolution, which took place in Continental Europe in the second half of the 19th century.⁷ Our evidence of positive effects in the second half of the 19th century is consistent with this hypothesis.

Despite an extensive literature in history and economic history on the French Revolution, we are not aware of any other quantitative investigation of its long-run implications. In fact, the economic history literature seems to be divided on what its implications were. Many economic historians, like Landes (1969, p. 142), view the French Revolution as “a political roadblock” to technological adoption for Continental countries, and conclude that as a consequence of the Revolution, “the gap in technique [between the Continent and Britain] had widened, while most of the fundamental educational, economic, and social obstacles to imitation remained” (p. 147). Crouzet’s (2001, p. 121) view is similar, noting “the French Revolution and the wars that followed greatly slowed the transfer of technology.” Yet, many other economic historians also agree with Mokyr’s assessments that “the Revolution’s long-term effect was to clear up the debris of the *ancien régime* on the Continent, thus assuring Europe’s ability eventually to follow Britain in revolutionizing its

⁷This argument is similar to that of Engerman and Sokoloff (1997) and Acemoglu, Johnson and Robinson (2002) who argue that the divergence of institutions in colonial societies, which took place between 1500 and 1800, had little economic impact until the age of industry. Landes (1969, chs. 4–5) points out how the catch-up of continental Europe took place concurrently to the expansion of advanced industrial techniques to areas beyond textile manufacturing: railway construction, iron production, chemical industry.

productive system” (1990, p. 259).⁸ We view our work as providing both quantitative answers on the implications of the French Revolution and suggestive evidence on the possibility of successful externally-imposed institutional reforms.

The rest of the paper is organized as follows. Section 1 provides an overview of the history of the French Revolution and the subsequent invasion of Europe by the French. Section 2 discusses our data. Section 3 provides reduced-form evidence on the association between various measures of French occupation and our proxy for economic development, urbanization, across German polities. Section 4 uses data on the nature and timing of institutional reforms to document the relationship between French occupation and these reforms and to estimate instrumental-variables model linking economic growth in the 19th century to institutional reforms. Section 5 concludes, while several details on data collection and construction are contained in the Appendices.

1 Historical Overview

1.1 Europe Before the Revolution

Before the age of the French Revolution, much of Europe was dominated by two kinds of oligarchies, the landed nobility in agriculture and the urban-based oligarchy controlling commerce and various occupations, with explicit or implicit entry barriers.⁹ By the end of the eighteenth century, feudalism in its most rigid form had disappeared in many parts of Europe, but several attenuated variants of unfree labor relations in the countryside persisted. Serfdom still continued in much of Eastern Europe (see Blum, 1978), while it had been replaced by various forms of taxes and tributes to landowners in other areas, which could nonetheless be quite onerous and inhibited

⁸See also Crouzet (2001, p. 122), Cameron (1993, pp. 211-213) and Rosenthal (1992). Similarly, Rudé (1964), Kisch (1962), Trebilcock (1981), Doyle (1989), or Grab (2003) also argue that the French reforms were significant improvements relative to the situation at the time. None of these works systematically investigates the economic consequences of the Revolution either in the short or the long run.

⁹This historical overview draws on Doyle (1989), Palmer (1959, 1964), Rudé (1988), Grab (2003), and Blanning (1983, 1986, 1996). A summary of interpretations of the French Revolution is presented by Furet (1981).

the creation of flexible labor markets.¹⁰ For example, in the Rhineland, the first area in Germany to come under French control, an attenuated form of serfdom (*Grundherrschaft*) which severely restricted freedom of movement was still practiced (Blanning 1983, pp. 20–21). Moreover, various rights of the nobility and clergy created a very unequal political and economic situation in rural areas. These groups were frequently exempt from taxation by the state and enjoyed the right of taxation of the peasants under their control. In places where some form of seigneurial privilege remained, it was usual for nobility and clergy to be subject to different laws and courts. The principle of equality before the law was quite alien (or even revolutionary) in most of Europe in 1789.

The urban oligarchy was perhaps even more pernicious to industrialization. Almost all major occupations were controlled by guilds, significantly limiting entry into those professions by others, and often restricting adoption of new technologies and business practices. Several examples about guilds preventing innovation are provided by Kisch (1989), Ogilvie (2004), and Lindberg (2009). In the major cities of the Rhineland, Cologne and Aachen, the adoption of new textile (spinning and weaving) machines were significantly delayed because of guild restrictions.¹¹ In addition, many cities were controlled by a few families for many generations, amassing wealth at the expense of potential new entrants with greater ability or better technologies.

1.2 The Revolution and its Effect on Europe

The first war between revolutionary France and the major European powers—the so-called War of the First Coalition—did not break out until 1792.¹² Contrary to almost everyone’s expectations, the armies of the new Republic were victorious in an initially defensive war. Initial military success encouraged the Republic’s leadership to expand France’s borders, with an eye towards creating an effective buffer between the new Republic and the hostile monarchs of Prussia and Austria.

¹⁰Since one could be concerned that including Eastern Europe in the sample leads the control group to be very heterogeneous, in the empirical work we show that all our results hold when we restrict our sample to Germany west of the Elbe river.

¹¹Differing views, supporting the efficiency of guilds, have been expressed e.g. by Epstein (1998). On this debate, see also Ogilvie (2007).

¹²See Esdaile (1995, 2001) and Ellis (2003) for succinct overviews of all of the wars from 1792 to 1815, while Blanning (1996) and Gates (1997) provide more details.

The French quickly seized present-day Belgium, the Netherlands and also much of modern-day Switzerland. By 1795 the French had firm control over the Rhineland (the left bank of the Rhine); in 1802 the Rhineland was officially incorporated into France.

After Napoleon's takeover, the French impact spread much wider throughout Europe. In Germany, where the direct control of the Revolutionary armies had been limited to the Rhineland, Napoleon constructed a string of satellite buffer states on France's northeastern border. The Peace of Lunéville (February 1801) led to a massive reorganization of the territories that comprised the Holy Roman Empire. Literally hundreds of independent states, ecclesiastical territories and free imperial cities vanished and were consolidated into a cluster of larger kingdoms, principalities, and duchies; ultimately, their number shrank to fewer than 40 states (Grab, 2003, pp. 89–90). The main beneficiaries were the Grand Duchy of Baden and the Kingdoms of Württemberg and Bavaria (all in the South of Germany). These and most other German states except Prussia were brought together in 1806 in the *Rheinbund* (Confederation of the Rhine; see Schmitt, 1983).

At the same time, Napoleon proceeded to reorganize the territories in northwest Germany into satellite states under his control. The Duchy of Berg on the right bank of the Rhine was formed in March 1806 (ruled by his brother-in-law Joachim Murat), the Kingdom of Westphalia (ruled by his brother Jérôme) in August 1807, and the Grand Duchy of Frankfurt in February 1810 (it was planned that Napoleon's stepson, Eugene de Beauharnais, would inherit it). These were run by the French and persisted until the collapse following Napoleon's invasion of Russia. During this period Napoleon also took over parts of Northern Germany, including in December 1810 the annexation into France of Hamburg, Lübeck and Bremen (Hanseatic cities) and the plains of Lower Saxony, which would later comprise most of the Kingdom of Hanover.

1.3 Institutional Changes

Many of the most radical institutional changes both in Europe in general and within Germany were undertaken during the invasion of the French Revolutionary armies. While the impact of the French on the Rhineland during the 1790s remains controversial, especially because of the great

deal of plunder and the resulting resentment by the local population mentioned above (see, e.g., Blanning, 1983, Doyle, 1989), the importance of the revolutionary reforms in Rhineland is not in question. Most significantly, between 1795 and 1798 the seigneurial regime and the guilds were abolished (Blanning, 1983, pp. 137 and 155), paving the way to a relatively free labor market. Equally important were the legal changes. For example, the French created a commercial court in Aachen in 1794, and followed with similar courts elsewhere in the Rhineland (Diefendorf, 1980, pp. 159-160), which were to play an important role in the creation of commercial and industrial businesses in the years to follow.

Although Napoleon was an Emperor seeking to solidify his control, ruthlessly when necessary, he nonetheless continued to implement the reforms initiated by the Revolutionary armies (see Grab, 2003, Connolly, 1965, and Woolf, 1991). Napoleon saw the imposition of the civil code (*Code Napoléon*) in the areas he controlled as his most important reform (Lyons, 1994, p. 94). In practice, Napoleon's institutional legacy outside of France is complicated, especially since he was more inclined to compromise with local elites at some times. Nevertheless, in most places there was a genuine attempt to continue and deepen the reforms brought by the Revolution. The motivations for these reforms seem to have been several. First, Napoleon had been deeply involved with the reforms of the Revolutionary period and shared the ideological commitment of the early reformers. Second, like them, he wished to build a series of buffer states around France. Finally, reforms such as abolishing elites, feudal privileges and introducing equality before the law undermined existing elites and made it easier for Napoleon to establish control over the areas he conquered.¹³

In Germany, Napoleon sustained the reforms already introduced into the Rhineland particularly introducing the *Code Napoléon*. Kisch emphasizes the economic importance of this (1989, p. 212): "When the many strands of commercial legislation were subsequently consolidated in the *Code Napoléon*, the Rhineland (on the left bank) was not only given a most up-to-date legal framework, but also a system of government in close harmony with the needs of a buoyantly industrializing

¹³Prussia's desire to establish its own control seems to have been one of the reasons why it did not attempt to dismantle French reforms in the parts of Western Germany that it took over after 1815 (see Fisher, 1903, pp. 380–381).

society.” The consequence of all of these changes was the transformation of the Rhineland from an oligarchy-dominated area to one open to new business and new entrants. Instead of the traditional oligarchy, in 1810 merchants/manufacturers comprised about half the members of *Conseil Général* (municipal administrations) in leading Rhineland towns (Diefendorf, 1980, p. 115). Reforms were also systematically introduced into the German satellite kingdoms, such as the Kingdom of Westphalia, and the Grand Duchy of Berg.

After the final collapse of Napoleon in 1815 the institutional reforms implemented over the previous 25 years suffered various fates. In the Rhineland, whose largest part was assigned to Prussia as a consequence of the Congress of Vienna, the local elites successfully fought to preserve French institutions, such as the civil and commercial codes. Prussia itself was inclined to continue on the path of reforms begun under French rule. The presence of a new elite created by the reforms and determined to hang onto them was a key factor. Simms (2004, p. 39) sums this up as follows:

“In western and southern Germany there was no going back to the feudal status quo ante. The Prussian bureaucrats arriving in the newly acquired Rhine Province in 1815 found a population determined to hold onto the French law . . . The genie of the reform movement—freedom of movement, the standardization of taxation, the abolition of guilds—could not be put back in the bottle.”

In other places, where the old ruling dynasties returned to power, such as in Hanover, Brunswick, and Hesse-Kassel, most reforms were rolled back. A return to the status quo ante was functional to the rulers’ need to rely on *ancien régime* institutions to support their claim to power. In our econometric analysis in section 4 we specifically code reforms throughout the 19th century to examine this issue empirically.

2 Data

2.1 Outcome Variables

We consider 19 distinct pre-unitary polities in Germany, which represent either independent states in 19th-century Germany, or provinces of larger states (Prussia, Bavaria). Our main measure of

economic prosperity across these polities is the urbanization rate of the area, defined as the fraction of the population living in cities with more than 5 000 inhabitants. Bairoch (1988, Chapter 1) and de Vries (1984, p. 164) argue that only areas with high agricultural productivity and a developed transportation network could support large urban populations. Acemoglu, Johnson and Robinson (2002) present evidence that both in the time-series and the cross-section there is a close association between urbanization and income per capita before as well as after industrialization.

Urbanization rates at the level of pre-unitary German polities are computed based on city size data from Bairoch, Batou and Chèvre (1988), and on historical reconstructions of total populations based on various sources. Details on the construction of these data are given in (online) Appendix D. Urbanization rates after 1850 are obtained from the official statistical compilations of the German Empire. In addition to urbanization, we also use data on the sectoral composition of employment for 64 German districts for the years 1849, 1882, 1895, and 1907 (from Frank (1994)). The share of employment in industry is a good proxy for industrialization, and thus enables us to check whether the patterns we see in the urbanization rates are associated with changes in industrialization.

2.2 Other Variables

Our ‘treatment’ is defined as the number of years between 1792 and 1815 that the polity in question was under French occupation. We consider years in which the French had direct control over these territories or installed republics and principalities directly dependent on French directives; we exclude years and months of pure military invasion and control, such as for example in the case of Prussia. Table 1 lists all 19 polities considered in our dataset. The group of treated polities includes the areas of the Rhineland later under Prussian and Bavarian (Palatinate) control, the Prussian (post-1815) provinces of Saxony and Westphalia, from which we single out the former County of Mark (which would later become the core of the Ruhr mining region), and the states of Hanover and Hesse-Kassel. The untreated polities include, west of the Elbe, the southern German states Baden, Württemberg, Bavaria, and Hesse-Darmstadt, as well as the Kingdom of Saxony. In

some of our specifications, we also include the following East Elbian regions in the control sample: the Prussian provinces of Brandenburg, East Prussia, Pomerania and Silesia, the Danish territories of Schleswig-Holstein, and the Duchy of Mecklenburg-Schwerin. To the extent that some of these areas implemented modernizing reforms under pressure from France (e.g., through the implicit or explicit threat of invasion), this coding works against our hypothesis. Nevertheless, our two-stage least squares strategy will correct for this potential bias by instrumenting for our index of reform by using various measures of French treatment.

We construct an index of reforms in Germany, both to show the impact of the French occupation on institutional reforms and as the right-hand side variable in our instrumental-variables strategy. Historical sources (see online Appendix F for details) allow us to code the nature and timing of some of the reforms that took place. We focus on the enactment of the French civil code, the restructuring of agricultural relations and the abolition of guilds. We interpret these reforms as an index for the overall ‘package’ of institutional reforms, which also includes changes in areas that are less easy to classify, such as the nature of state administration and tax collection, or the secularization of church lands (the latter was only relevant for Catholic territories). Table 1 reports the incidence of reforms in Germany, as represented by the first date of implementation.

Column (2) shows the date at which the different polities introduced a written civil code that guaranteed equality in front of the law. The French civil code (*Code Napoléon*) falls under this category, but so do also the Saxon civil code of 1863 and the German civil code (*Bürgerliches Gesetzbuch*) of 1900.¹⁴ The Napoleonic civil code was introduced between 1802 and 1810 in the areas controlled by the French. Note that although Baden was never treated, it introduced a version of the French civil code in 1810.

The following two columns examine reforms in the agrarian sector: first, in column (3), the date of the effective abolition of serfdom (often a nominal though symbolic measure, as serfdom was not practiced any more around 1800 in most parts of Germany west of the Elbe) and, in column (4),

¹⁴Our results are robust to considering also other forms of written civil codes that did not recognize universal equality in front of the law, such as the Prussian *Allgemeines Landrecht* of 1795 or the Bavarian *Codex Maximilianeus* of 1756; see Appendix G.

the proclamation of measures determining the resolution of feudal landholding arrangements, such as the *Grundherrschaft*. In most cases, these measures consisted in laws allowing the possibility to turn feudal arrangements into free contracts, and determining the price needed to redeem the property of a parcel of land (usually, 20–25 times the annual payment due to the landlord). From the dates in columns (3) and (4), it is evident how polities in the treated area undertook these reforms earlier than the ones in the control regions. At the same time, it also appears that the polities that were assigned to Prussia after the Congress of Vienna mostly maintained these reforms (Prussia itself is the archetypal example of ‘defensive modernizer’). In contrast, other states such as Brunswick, Hanover, and Hesse-Kassel, where the old rulers returned after 1815, tried to roll back the Napoleonic reforms.

Column (5) records the date in which guilds were abolished, either effectively or indirectly, by removing mandatory membership for craftsmen. Even though we did not code that explicitly, the abolition of guilds often went hand in hand with a liberal stance in granting concessions to set up industries and manufacturing activities, outside of the traditional crafts. Again, we see that the treated polities were early reformers (even though with some setbacks), whereas the other states with the exception of Prussia liberalized the crafts system only later in the 19th century.

In columns (6) and (7) we construct a simple index of reforms at two exemplary dates, 1850 and 1900. For each polity, the index is computed simply by adding the number of years each particular reform had been in place and dividing by 4. As an example, consider the Duchy of Brunswick, which was controlled by the French through the Kingdom of Westphalia, and where the old ruling dynasty was restored by the Congress of Vienna. By 1850 there had been six years of validity of the *Code Napoléon*, the abolition of serfdom had been in place for 26 years, agrarian reforms for 25 years, and the abolition of guilds for 7 years. Therefore the value of the index for the Brunswick in 1850 is $(6 + 25 + 26 + 7)/4 = 16$. This index shows a clear distinction between parts of western Germany that were reformed by the French, those places which defensively modernized, like Prussia or Baden, and the rest of Germany—this distinction is evident in the average values reported at the bottom of each panel of Table 1, and in Figure 1. In 1850, for instance,

the reform index was 50.25 for the Rhineland and 28.25 for Westphalia. The fact that it was 27 for the Prussian provinces east of the Elbe and 34.25 for Baden highlights the potential extent of defensive modernization and suggests that to be able to interpret the differences between treated and untreated polities as being due to institutions, an instrumental-variables strategy is crucial.

2.3 Descriptive Statistics

Table 2 records some basic descriptive statistics for our dataset, both in the sample of 13 polities west of the Elbe (5 of which in the treatment area) and in the entire sample of 19 polities. Note that the treatment area (column (3)) lies entirely west of the Elbe. Areas to the east of the Elbe had stronger feudal labor relations before the 19th century and may thus be less comparable to, and thus may be worse controls, for the Western polities occupied by the French. We thus take these 13 polities to be our baseline sample. Nevertheless, we believe that the areas east of the Elbe are still useful because they provide evidence against a related but different hypothesis that part of the effects of French occupation within Germany are partly (or largely) due to defensive modernization efforts of Prussia.

The first six rows of Table 2 describe urbanization rates in the six time periods considered; this evolution is also depicted in Figures 2A and 2B. We can see that there is little difference between the urbanization levels of treatment and control groups prior to 1789. Indeed, in 1750 urbanization is slightly greater in the control group when the whole sample is considered; in contrast, urbanization is slightly greater in the treatment area when only polities west of the Elbe are considered.¹⁵ In both cases, however, urbanization grows more rapidly in the treatment group after 1800. West of the Elbe, for example, by 1900 urbanization is almost 8 percentage points higher in areas occupied by Napoleon. The remaining four rows give descriptive statistics of the control variables used in parts of our analysis. The treated polities lie slightly more to the north and to the west of the control polities (and are thus closer to Paris), whereas they are not significantly more Protestant.

¹⁵The panel is not balanced as urbanization rates are missing for the Rhineland, Westphalia, Brunswick, Baden, and Silesia in 1700.

3 Reduced-Form Evidence

In this section we use ordinary least squares (OLS) regressions to investigate the reduced-form relationship between our three measures of treatment and the urbanization rates across German polities. The panel includes data for the periods 1700, 1750, 1800, 1850, 1875 and 1900. Our basic reduced-form regression model is as follows:

$$u_{jt} = d_t + \delta_j + \sum_{\tau \in \mathcal{T}^{pre}} \alpha_\tau \cdot d_\tau \cdot I_j + \sum_{\tau \in \mathcal{T}^{post}} \alpha_\tau \cdot d_\tau \cdot I_j + \mathbf{X}'_{jt} \cdot \gamma + \varepsilon_{jt}, \quad (1)$$

where u_{jt} is the urbanization rate in polity j at time t , the d_t 's denote a full set of time effects, the δ_j 's denote a full set of polity fixed effects, \mathbf{X}_{jt} is a vector of other covariates, which will be included in some of the robustness checks, and ε_{jt} is a disturbance term. The key variable of interest is the treatment variable I_j , which corresponds to the number of years of French presence. The coefficients of interest are thus $\sum_{\tau \in \mathcal{T}^{pre}} \alpha_\tau$ and $\sum_{\tau \in \mathcal{T}^{post}} \alpha_\tau$, where \mathcal{T}^{pre} is the set of years before and \mathcal{T}^{post} is the set of years after treatment, which together allow us to look at both pre-trends and post-French Revolution differential effects ($\sum_{\tau \in \mathcal{T}} \alpha_\tau \cdot d_\tau \cdot I_j$ stands for a separate interaction for each τ in \mathcal{T}). Under our hypothesis that French occupation was ‘econometrically exogenous’, we expect the coefficients $\{\alpha_t\}_{t \in \mathcal{T}^{pre}}$ not to be significantly different from zero, and under our hypothesis that the French reforms were beneficial for long-run economic growth, we expect $\{\alpha_t\}_{t \in \mathcal{T}^{post}}$ to be positive.

Throughout the paper, all standard errors are robust, clustered at the country/polity level to allow for an arbitrary variance-covariance matrix capturing potential serial correlation in the residual error term (see Wooldridge, 2002, Chapter 7).¹⁶

¹⁶The Huber-White standard errors turn out to be smaller than the standard errors clustered at the country/polity level in almost all cases.

3.1 Main Results

We start in column (1) of Table 3 with our baseline sample, West of the Elbe. We also use population in 1750 as weights, since there are significant differences in the size of the polities in our sample.¹⁷ The set \mathcal{T}^{post} includes the treatment years 1850, 1875 and 1900, \mathcal{T}^{pre} comprises 1750 and 1800, with 1700 as the omitted year. In column 1 we see that $\hat{\alpha}_{1750} = -0.491$ and $\hat{\alpha}_{1800} = -0.247$, indicating that areas with greater years of French presence were growing somewhat more slowly in the 18th century, though this differential is declining toward 1800. $\hat{\alpha}_{1850} = -0.160$ with a standard error of 0.250, so that by 1850 there was no (statistical or economic) effect of years of French presence on the growth of urbanization. By 1875, however, there is a positive association between years of French presence and urbanization, and by 1900, this effect is stronger: the estimated coefficient $\hat{\alpha}_{1900}$ is equal to 0.634. This implies a positive differential of 12 percentage points for areas treated with 19 years of French presence, which corresponds to approximately one standard deviation—a magnitude that is economically large but reasonable.¹⁸ Even though the coefficients $\hat{\alpha}_{1875}$ and $\hat{\alpha}_{1900}$ are not individually significant, the p-value of the F-test for the joint significance of all post-treatment years (1850, 1875 and 1900) at the bottom of the table shows that post-treatment years are jointly statistically different than the pre-1850 dates (at 5 % level of significance).

Column (2) repeats the same analysis without population weights. The results are qualitatively similar: the negative pre-trend is reduced, but the coefficients relating to the years 1875 and 1900 are not jointly significant any more. Including also the territories east of the Elbe within the control region, as done in columns (3) and (4), reinforces the baseline results, both in the weighted and in the unweighted case. In column (3), the magnitudes of the coefficients are very similar to those of

¹⁷Total population size in 1750 varies between less than 200 000 inhabitants (Brunswick, Mark) and over a million (Rhineland, Silesia, Hanover, Bavaria).

¹⁸One concern is that the number of clusters in Table 3 is relatively small (13/19 polities), raising the possibility that asymptotic approximations may not be valid. As a remedy, we use the alternative wild bootstrap procedure (based on the t-statistics with the null hypothesis imposed) suggested by Cameron, Gelbach and Miller (2008), computing the significance levels in 10 000 replications. This procedure has varying effects on the significance levels of the results in Table 3. Results of weighted regressions usually become less significant using bootstrapped t-statistics, whereas results of unweighted regressions are generally unaffected or improved by this procedure. For example, in column (1) the p-value for $\hat{\alpha}_{1900}$ increases slightly from 0.146 to 0.285, whereas in column (2) the p-value for $\hat{\alpha}_{1900}$ falls from 0.212 to 0.115. Similar results apply to the other estimates in Tables 3, 4, and 6.

the restricted sample in column (1). The F-test for joint significance of the effects post-treatment years now rejects the null at 2%.

Overall, these results show no evidence of a negative effect of French occupation on German polities. On the contrary, the estimates, and particularly the joint significance tests of post-treatment years, suggest that polities occupied and reformed by the French experienced more rapid urbanization and economic growth after 1850. We find it reasonable that the positive effects of the French Revolution exhibit themselves after 1850, since, as discussed in Section 1, the main role of the French reforms was to remove the barriers against industrialization and industrial technology and such practices did not spread in continental Europe until the second half of the 19th century.

3.2 Robustness

Table 4 investigates the robustness of our basic reduced-form results. In column (1), we drop the coal-producing region of the Ruhr (corresponding to the former County of Mark), since the presence of coal might have created a differential growth advantage in the second half of the 19th century. The results are very similar to the baseline estimates.

Columns (2)–(6) add a full set of interactions between each of our year dummies and various time-invariant characteristics that may have caused divergent development paths. In column (2), for example, we include interactions between the year dummies and fraction of the population of the area that is ‘Protestant’ (i.e., $\sum_t \eta_t \cdot D_t \cdot \text{Protestant}_j$). Several influential social scientists have argued for the importance of the Protestant work ethic in causing, or at least facilitating, industrialization (e.g., Weber, 1905, Landes, 1998). Although there is some evidence of differential growth of Protestant territories (the set of interactions between Protestantism and the time dummies is significant at the 2% level), the inclusion of this set of covariates hardly affects the results about the differential growth effect of French treatment.

Column (3) instead includes a full set of year interactions with latitude (i.e., $\sum_t \eta_t \cdot D_t \cdot \text{latitude}_j$) to check whether our results could be due to time-varying effects of geography. The estimates are very similar to those of Table 3, and the latitude interactions are jointly insignificant.

More importantly, columns (4) and (5) include a full set of year interactions with longitude and with the distance to Paris. Since areas further west and closer to Paris are more likely to have been occupied by French forces, these interactions are important to check whether our exclusion restriction—that years of French presence are uncorrelated with other potential determinants of differential growth during the 19th century—is valid. Reassuringly, the results are now even stronger than in the baseline estimates. The positive effects in 1875 and 1900 are both larger and more precisely estimated. For example, $\hat{\alpha}_{1900}$ is now 0.893 (standard error = 0.321) in column (4) and it is 0.836 (standard error = 0.325) in column (5). The time interactions with longitude and distance to Paris are themselves jointly significant at the 10% level or less, and generally positive in value (coefficient estimates not reported), indicating somewhat faster urbanization growth in the eastern areas.

Column (6) investigates the possibility that differential growth across German polities in the 19th century is driven by the removal of internal borders, which followed the reorganization of territories between 1792 and 1815. Some polities, such as the post-1815 Kingdom of Württemberg or the Prussian Rhineland resulted from the dissolution and merger of dozens of minor duchies, counties, principalities and Church territories. To control for the possible effects of these changes, we include a set of interactions between the number of pre-revolutionary polities and post-1800 year dummies. If the removal of internal borders is a major impetus to economic growth, these interactions should be positive. In column (6), these interaction terms (not reported to save space) are jointly significant but negative. In any case, the point estimates for the effects of French presence are largely unaffected. For example, $\hat{\alpha}_{1900}$ is 0.656 with a standard error = 0.382 (though all of these effects together are now only significant at 10% rather than at 5% as in our baseline).

The presence of negative point estimates for 1750 and 1800 raise a potential concern that there might be mean-reverting dynamics in the growth of different polities, potentially confounding our estimates. To deal with this issue and as an additional check for differential trends, in column (7) we include a full set of interactions between initial urbanization $u_{j,1750}$ and the full set of year dummies (i.e., $\sum_t \eta_t \cdot D_t \cdot u_{j,1750}$, where 1750 is the first date with complete urbanization figures

for all polities). This is a flexible (and demanding) way of controlling for any mean reversion effects or pre-existing trends. Nevertheless, this flexible specification has little effect on our estimates. For example, $\hat{\alpha}_{1900}$ is now 0.650 (standard error 0.362) and the interactions between initial urbanization and the year dummies are individually and jointly insignificant.

Finally, column (8) adopts another strategy to check against the effects of mean reversion, which is to explicitly introduce the lagged dependent variable on the right-hand side. To ensure consistency, these models are estimated using the Generalized Method of Moments (GMM) strategy suggested by Arellano and Bond (1991). To implement this strategy, we drop 1875 so that we have a panel with equi-distant dates. The results are generally similar to the OLS estimates without the lagged dependent variable; the effect of the lagged dependent variable itself is insignificant. Also noteworthy is that in this specification we find no evidence of pre-existing trends favoring areas subsequently occupied by the French. We find this reassuring for our overall empirical strategy.

3.3 Additional Outcome Variables

In addition to the previous results based on urbanization rates as our outcome variable, in Table 5 we provide evidence using the the sectoral composition of employment as the outcome variable. Data are available for 64 districts across Germany for the years 1849, 1882, 1895, and 1907. The advantage of using sectoral shares is that it delivers a check on our results based on urbanization rates, through a variable that closely captures the move out of agricultural activities and into the industrial and manufacturing sectors. The disadvantage is that, given that the data start in 1849, we cannot check for pre-trends in the period before 1800. Given the lack of data before 1800, we simply report a series of cross-sectional regressions of the form:

$$y_{jt} = d_t + \alpha_t \cdot I_j + \varepsilon_{jt} \quad (2)$$

for each t . Here y_{jt} is the outcome variable (sectoral shares of agriculture or industry/manufacturing) in district j at time t , d_t now denotes a year-specific constant, I_j again represents years of French

presence in district j , ε_{jt} is a disturbance term, and α_t is the coefficient of interest. In particular, changes in α_t 's can be interpreted as differential growth related to French treatment.

The results in Table 5 show that, both west of the Elbe and in the whole sample, by 1849 there was already less agricultural and more industrial employment in areas occupied by the French, though these differences are not statistically significant. They become larger and statistically significant by 1882 and remain so until 1908. This evidence therefore corroborates the pattern that emerges from the urbanization data, suggesting that there was more rapid industrialization in areas that underwent more significant reforms because of French occupation and invasion.

4 Institutional Reforms and Economic Growth

In this section, we first use the data we collected on institutional reform across the German polities to document the relationship between French occupation and (the timing of) reforms, thus establishing a firm link between French control and dimensions of institutional reforms that we can measure. We then use this relationship as the first stage for a two-stage least squares (2SLS) strategy, where we estimate the effect of an index of institutional reforms on growth during the 19th century. This 2SLS strategy has three distinct advantages. First, it enables us to show a simple link between institutional reforms and growth in the 19th century. Second, the reduced-form evidence is difficult to interpret because some of the control polities, such as Baden or the provinces of Prussia east of the Elbe, also underwent institutional reforms, in part in a process of 'defensive modernization' in response to the threat of further French domination in continental Europe. The 2SLS estimates will be more readily interpretable. Third, this strategy will enable us to conduct over-identification tests to investigate whether we can reject the hypothesis that the effects of French occupation are working primarily or solely through the institutional reforms.

4.1 French Occupation and Institutional Reforms

Table 1 and Figure 1 depicted our overall reform index and illustrated the relationship between our various reform measures and years of French presence. To summarize the relationship between the reform index and French occupation more succinctly and in a way that can be used as the first stage for our 2SLS strategy, we posit the following simple regression equation:

$$R_{jt} = d_t + \delta_j + \psi \cdot t \cdot T_{t>1800} \cdot I_j + \eta_{jt}, \quad (3)$$

where R_{jt} is the value of our reform index for polity j at time t ; d_t and δ_j are time effects and polity fixed effects; as usual, I_j is our treatment variable, years of French presence, and η_{jt} is a disturbance term. The variable $T_{t>1800}$ is a dummy for post-1800 dates (1850, 1875 and 1900), so that $t \cdot T_{t>1800}$ is a linear time trend that turns on after 1800 (and is equal to 0 before then).¹⁹ Intuitively, this form implies that the longer it has been since a polity has undergone French occupation, the higher its reform index will be. This functional form is reasonable given the process of reform in Germany, which started earlier in areas under French occupation, but, by the late 1800s, witnessed similar reforms spread to the rest of Germany.

Estimates from equation (3) are shown in Panel B of Table 6. The first column, using the sample west of the Elbe and population in 1750 as weights, shows a strong relationship between our French occupation interaction variable and the reform index. The coefficient estimate is 1.166 (standard error = 0.107). This strong relationship indicates that even though there were reforms in German areas not occupied by the French (perhaps because of ‘defensive modernization’), occupation by the French was a significant determinant of reform. Column (2) replaces the French occupation interaction variable $t \cdot T_{t>1800} \cdot I_j$ with a set of interactions of year dummies (from 1850 on) with years of French presence, and reports the p-value of joint significance of all these interaction terms. This specification also strongly supports the hypothesis of a link between French rule and the implementation of reform (p-value = 0.000). Finally, columns (3)–(5) confirm these results by

¹⁹To simplify the interpretation of coefficients, time t is divided by 1000.

looking at specifications without population weights, and using the whole of Germany including areas east of the Elbe in the sample. The magnitudes of the estimated coefficients are very similar.

4.2 Two-Stage Least Squares Estimates

We next turn to the 2SLS/instrumental-variables estimates of the effect of our reform index on urbanization. We posit the following second-stage equation:

$$u_{jt} = d_t + \delta_j + \phi \cdot R_{jt} + v_{jt}, \quad (4)$$

where u_{jt} is urbanization, d_t and δ_j are time effects and polity fixed effects.

The results of estimating (4) using (3) as the first-stage relationship are also shown in Table 5. Panel A shows the OLS relationships for comparison. In the OLS, there is a positive and significant association between our reform index and urbanization in all specifications reported in Table 5.

Panel B reports the 2SLS estimates of (4). For our baseline setup, column (1) shows an estimate of $\hat{\phi} = 0.290$ (standard error=0.102), which is highly significant. Interestingly, this coefficient is of similar magnitude to the OLS estimate, which suggests that three biases likely to be present in the OLS could be canceling each other. The first of these biases is that the timing of reform is endogenous, which will lead to an upward bias. The second is that many of the ‘control’ polities also underwent reforms, perhaps in response to the French threat, causing a potential downward bias. The third is that the OLS coefficient might be subject to considerable (downward) attenuation, both because the extent of reform is measured with error and also because, conceptually, our reforms are only proxies for a broader range of institutional reforms undertaken during this era.

Column (2) estimates the same model on the same sample, but now using all post-1800 interactions (1850, 1875 and 1900) as instruments. This not only enables us to have an even stronger first stage, but also, having more instruments than endogenous variables, it allows us to perform an overidentification test for all of these interactions being jointly valid instruments. Econometrically, this is just a standard overidentification test. Economically, it amounts to testing whether we can

reject the hypothesis that the effects of the post-1800 time interactions with French occupation work primarily or solely through the reforms index (and thus through the institutional changes that the French imposed). To perform the overidentification test, we use the Huber-White variance-covariance matrix without clustering, since this corresponds to smaller standard errors and thus stacks the cards against our hypothesis. The p-value of the overidentification (F-)test reported at the bottom shows that we comfortably fail to reject the above-mentioned hypothesis. This gives some support to our interpretation that French occupation impacted urbanization and economic growth in German polities in the second half of the 19th century mainly through the institutional reforms that it imposed.

Column (3) estimates the same model as in column (1), now in an unweighted regression. The 2SLS estimate is now smaller, 0.204, with a larger standard error, and is thus significant only at 10%. In columns (4) and (5), we include polities to the east of the Elbe, and the 2SLS coefficient estimates are very similar to the corresponding estimates of columns (1) and (3)

Overall the results in this section are broadly consistent with our interpretation that occupation by the French induced significant institutional reforms and that these reforms paved the way for more rapid economic growth, particularly in the second half of the 19th century.

5 Concluding Remarks

The French Revolution of 1789 had a momentous impact on France and its neighboring countries. The Revolution violently toppled the established regime and started a complex process, involving among other things also radical institutional changes, such as the abolition of the remnants of feudalism in agriculture, the reduction of the power of the nobility and the clergy, the abolition of guilds and internal tariffs, and the declaration of equality before the law for all citizens. This process of change did not stop at the French borders: the French Revolutionary armies, and later Napoleon, invaded and controlled large parts of Europe, including areas of Germany. In all of these places, the Revolution undertook essentially the same radical political, legal, and economic

reforms as in France. However, invasion also came with chaos and the exploitation of the occupied territories. This paper is an attempt to gauge the long-run consequences of the French Revolution, considering the radical institutional reforms imposed on neighboring countries as a quasi-natural experiment.

We find no evidence that areas that were under French occupation experienced less rapid development. On the contrary, all of our evidence points to more rapid economic growth as proxied by urbanization in areas that underwent the radical institutional reforms brought by the French Revolution, especially after 1850. We also presented additional evidence suggesting that the primary channel of influence of French occupation was likely to have been the institutional reforms of the Revolution. These findings are interesting not only because they provide a historical appraisal of the economic impact of the French Revolution, but more importantly because of their implications about the consequences of radical institutional reform. Scholars have disagreed on the effectiveness of externally-imposed radical institutional changes since the debate between the conservative philosopher Edmund Burke and the radical writer Thomas Paine shortly after the Revolution. In *Reflections on the Revolution in France*, Burke condemned the brutality, the interventionist spirit and the radicalism of the French Revolution. He wrote:

“It is with infinite caution that any man should venture upon pulling down an edifice, which has answered in any tolerable degree for ages the common purposes of society, or on building it up again without having models and patterns of approved utility before his eyes” (Burke 1790/1969, p. 152).

On the other side, Thomas Paine hailed the French Revolution as the harbinger of freedom and equality before the law in his pamphlet *The Rights of Man*, and justified the radical actions needed to break the hold on land and people exercised by the *ancien régime*:

“It was . . . against the despotic principles of the government, that the nation revolted. These principles had . . . become too deeply rooted to be removed, and the Augean stable of parasites and plunderers too abominably filthy to be cleansed, by anything short of a complete and universal revolution” (Paine 1791/1969, p. 69).

The French Revolution is a clear example of a large-scale, radical and ‘designed’ institutional change. In this light, our findings support the centrality of institutional differences for comparative economic development. More importantly, the results are inconsistent with the view that externally-imposed, radical and ‘Big Bang’ style reforms can never be successful. On the contrary, the evidence supports our hypothesis that the institutions of the *ancien régime*, in particular feudal land and labor relations, urban oligarchies and guilds, and lack of equality before the law, impeded prosperity, and that the radical institutional reforms that removed these barriers paved the way for industrialization and economic growth.

Naturally, all of these findings have to be interpreted with caution for several reasons. First, the evidence we present is fairly clear that institutional changes imposed by the French Revolution did not have any negative effects, but the positive effects are significant only in some specifications. Second, our analysis was limited to the available historical data. Third, results from one historical episode cannot always be extrapolated to other eras.²⁰ Nevertheless, it is noteworthy that our findings do suggest that radical institutional reforms can have long-run beneficial consequences, at least in certain historical contexts. This conclusion, if valid, raises the question: why did they work when other externally-imposed reforms often fail? One possibility is that this was because the reforms were much more radical than is typically the case.²¹ The French reformed simultaneously in many dimensions and weakened the powers of local elites, making a return to the status quo ante largely impossible. Even when some pre-revolution elites returned to power after 1815, there was a permanent change in the political equilibrium. This scope and radicalism of the French reforms are common with the post-war reform experiences in Germany and Japan and stand in contrast with many other, less successful reform experiences.²² Nevertheless, we are not able to

²⁰Moreover, even if the imposition of French institutions did spur long-run growth, this would not mean that they were “welfare enhancing” since they were imposed by force, they entailed various short-run and medium-run costs, and most importantly, French occupation created major distractions and human suffering.

²¹See Acemoglu and Robinson (2008) for a model in which limited reforms can be counterproductive.

²²Our results also have some relevance to the literature on the role of culture in economic development and on the interactions between culture and institutions (e.g., Harrison and Huntington, 2000, Greif, 2006, Tabellini, 2010). In this context, the relatively successful transplantation of French institutions on several German polities with different histories, cultures and traditions also suggests that differences in culture do not create immutable barriers against institutional reform.

provide any evidence that this is the correct interpretation of the historical events surrounding the French Revolution, and we view a more detailed investigation of when and how externally-imposed institutional reforms could be effective and contribute to economic development as an interesting area for future theoretical and empirical work.

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A Appendix: Data Description

Variable	Description — Source
Distance to Paris	Great circle distance from a territory's capital to Paris — own calculation, based on latitude and longitude data.
Latitude	Latitude in degrees of a territory's capital. — Wikipedia.
Longitude	Longitude in degrees of a territory's capital. — Wikipedia.
Number of pre-revolutionary territories	Number of territories of the Holy Roman Empire (immediate to the Emperor) existing prior to the invasion of French Revolutionary armies and the dissolution of the Empire through the <i>Reichsdeputationshauptschluss</i> . — See online Appendix E.
Share Agriculture	Share of total population (in percent) whose primary employment is in the agricultural sector. — Frank (1994)
Share Industry	Share of total population (in percent) whose primary employment is in the industrial and manufacturing sector. — Frank (1994)
Share Protestant	Approximate share of the population of Protestant (Lutheran/Calvinist) faith around 1800. — Own projection, based on 19th century census data. Cf. also online Appendix D.
Urbanization rate	Percent of total population living in cities above 5 000 inhabitants. — See online Appendix D.
Years French Presence	Years of presence of French troops or rule by French-appointed rulers. — Grab (2003).

B Figures and Tables

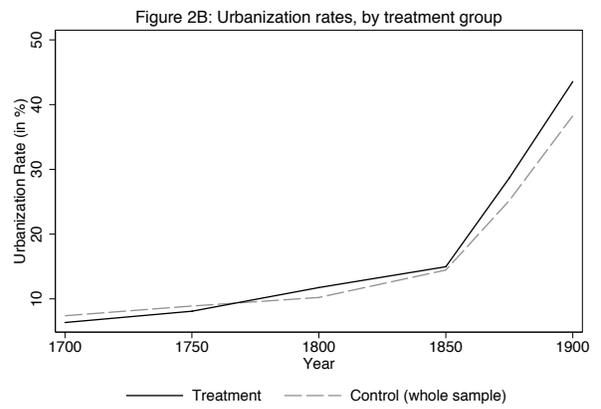
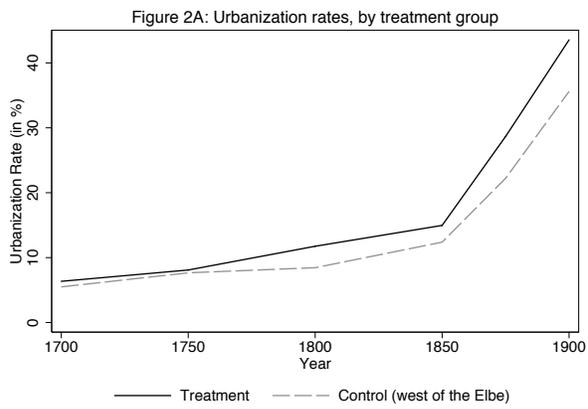
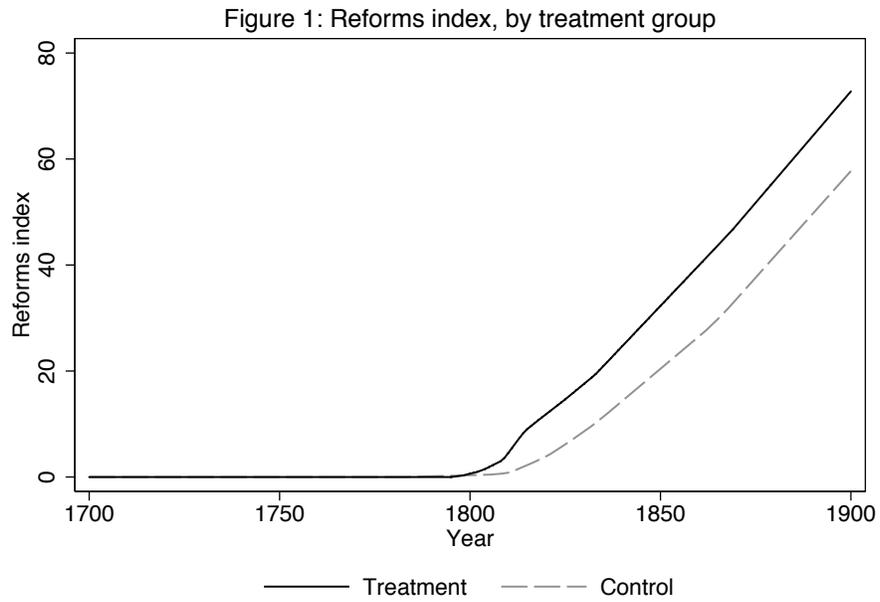


Table 1: Territories and reforms

Territory	Years of French Presence		Civil Code	Abolition of serfdom	Agrarian reform	Abolition of guilds	Reforms index as of	
	(1)	(2)					(3)	(4)
Panel A: Treatment								
Rhineland (Prussia)	19	1802	1798	1804	1795	1795	50.25	100.25
Palatinate (Bavaria)	19	1802	1798	1804	1795	1795	50.25	100.25
Mark/Ruhr (Prussia)	6	1810-15, 1900	1808	1825	1809	1809	28.25	65.75
Westphalia (Prussia)	6	1810-15, 1900	1808	1825	1809	1809	28.25	65.75
Brunswick	6	1808-14, 1900	1808-18, 1834	1809-18, 1834	1808-15, 1864	1809	16	50
Province of Saxony (Prussia)	6	1808-15, 1900	1808	1809	1809	1809	32.75	70.25
Hessen-Kassel	6	1808-14, 1900	1808-14, 1832	1809-14, 1832	1808-16, 1869	1808-16, 1869	15.25	48
Hanover	3	1808-13, 1900	1808-14, 1833	1809-14, 1833	1808-15, 1869	1808-15, 1869	14.25	47
<i>Average</i>	<i>10.12</i>						<i>32.97</i>	<i>73.67</i>
Panel B: Control								
Baden	0	1810	1783	1820	1862	1862	34.25	81.25
Bavaria, Southern half	0	1900	1808	1826	1868	1868	16.5	49.5
Hessen-Darmstadt	0	1900	1811	1816	1866	1866	18.25	51.75
Saxony	0	1865	1832	1832	1862	1862	9	52.25
Württemberg	0	1900	1817	1836	1862	1862	11.75	46.25
<i>Average</i>	<i>0</i>						<i>16.31</i>	<i>54.46</i>
Panel C: Control (East of the Elbe)								
Brandenburg (Prussia)	0	1900	1811	1821	1810	1810	27	64.5
East Prussia (Prussia)	0	1900	1811	1821	1810	1810	27	64.5
Pomerania (Prussia)	0	1900	1811	1821	1810	1810	27	64.5
Silesia (Prussia)	0	1900	1811	1821	1810	1810	27	64.5
Mecklenburg-Schwerin	0	1900	1820	1862	1869	1869	7.5	37.25
Schleswig-Holstein	0	1900	1805	1805	1867	1867	22.5	55.75
<i>Average</i>	<i>0</i>						<i>25.1</i>	<i>61.46</i>

Notes: Sources for the dates of reform are listed in the Appendix. Averages are weighted by total population in 1750. The reform index in columns (6) and (7) has been computed exemplarily for two dates (1850, 1900) according to the formula reported in the text.

Table 2: Descriptive Statistics

	West of the Elbe		treated	Whole Sample	
	all	control		control	all
	(1)	(2)		(4)	(5)
Urbanization in 1700	5.86 [4.22]	5.49 [2.89]	6.35 [5.93]	7.40 [5.75]	7.08 [5.61]
Urbanization in 1750	7.89 [4.12]	7.66 [4.19]	8.09 [4.4]	8.90 [4.91]	8.59 [4.61]
Urbanization in 1800	10.23 [4.37]	8.45 [3.47]	11.75 [4.71]	10.22 [5.16]	10.81 [4.92]
Urbanization in 1850	13.78 [6.01]	12.38 [5.42]	14.97 [6.65]	14.45 [7.9]	14.65 [7.26]
Urbanization in 1875	25.70 [10.7]	22.22 [9.15]	28.67 [11.69]	25.19 [11.2]	26.52 [11.21]
Urbanization in 1900	39.89 [13.92]	35.60 [12.12]	43.55 [15.2]	38.27 [14.4]	40.29 [14.54]
Share Protestant	0.579 [0.343]	0.532 [0.385]	0.618 [0.303]	0.677 [0.347]	0.654 [0.33]
Latitude	50.43 [1.5]	49.28 [1.15]	51.41 [0.98]	50.97 [2.22]	51.14 [1.85]
Longitude	9.89 [2.01]	10.89 [2.08]	9.03 [1.51]	12.78 [3.49]	11.34 [3.42]
Distance to Paris	592.4 [146.3]	631.8 [158]	558.7 [128.2]	808.9 [261.4]	712.9 [251]

Notes: Mean values (weighted by total population in 1750), standard deviations in brackets.

Table 3: Urbanization in Germany

	Dependent variable: Urbanization rate			
	West of the Elbe		All	
	weighted (1)	unweighted (2)	weighted (3)	unweighted (4)
Years French Presence * 1750	-0.491 [0.249]	-0.252 [0.172]	-0.488 [0.235]	-0.197 [0.164]
Years French Presence * 1800	-0.247 [0.225]	-0.0425 [0.153]	-0.268 [0.227]	-0.0471 [0.178]
Years French Presence * 1850	-0.160 [0.250]	0.0332 [0.153]	-0.221 [0.249]	-0.0235 [0.181]
Years French Presence * 1875	0.402 [0.326]	0.354 [0.295]	0.266 [0.303]	0.252 [0.299]
Years French Presence * 1900	0.634 [0.408]	0.529 [0.401]	0.503 [0.376]	0.506 [0.423]
Observations	74	74	109	109
Number of States	13	13	19	19
p-value for joint significance after 1800	0.0532	0.463	0.0205	0.214

Notes: All regressions have full set of territory and year dummies. Robust standard errors, clustered by territory. Weighted regressions are weighted by territories' total population in 1750.

Table 4: Urbanization in Germany, Controls

	Dependent variable: Urbanization rate							
	West of the Elbe							
	Without Mark/Ruhr (1)	Protestant (2)	Latitude (3)	Longitude (4)	Distance to Paris (5)	Number of old territories (6)	Initial Urbanization (7)	Arellano- Bond GMM (8)
Years French Presence * 1750	-0.565 [0.281]	-0.547 [0.308]	-0.600 [0.356]	-0.435 [0.244]	-0.446 [0.278]	-0.531 [0.294]	-0.458 [0.267]	
Years French Presence * 1800	-0.324 [0.249]	-0.336 [0.295]	-0.356 [0.324]	-0.256 [0.215]	-0.244 [0.248]	-0.288 [0.264]	-0.209 [0.245]	0.0520 [0.126]
Years French Presence * 1850	-0.235 [0.275]	-0.229 [0.310]	-0.261 [0.356]	0.0182 [0.210]	-0.0269 [0.242]	-0.114 [0.257]	-0.136 [0.261]	0.372 [0.379]
Years French Presence * 1875	0.324 [0.324]	0.353 [0.312]	0.292 [0.374]	0.623 [0.250]	0.561 [0.271]	0.374 [0.305]	0.418 [0.284]	
Years French Presence * 1900	0.552 [0.411]	0.573 [0.370]	0.512 [0.451]	0.893 [0.321]	0.836 [0.325]	0.656 [0.382]	0.650 [0.363]	1.249 [0.713]
Lagged urbanization								-0.955 [1.345]
Observations	68	74	74	74	74	74	74	35
Number of States	12	13	13	13	13	13	13	13
p-value for joint significance after 1800	0.128	0.0705	0.176	0.0791	0.0625	0.0959	0.109	0.0312
p-value for joint significance covariates		0.0217	0.414	0.0222	0.0815	0.0267	0.123	

Notes: All regressions have full set of territory and year dummies. Robust standard errors, clustered by territory. All regressions are weighted by territories' total population in 1750. Controls in columns (2)-(6) (Protestant, latitude, longitude, distance to Paris, number of pre-revolutionary territories, urbanization in 1750) are included as a full set of interactions with time dummies.

Table 5: Occupational shares in Germany

	Dependent variable: Share of population employed in agriculture			Dependent variable: Share of population employed in industry		
	West of the Elbe		All	West of the Elbe		All
	weighted (1)	unweighted (2)	weighted (3)	weighted (4)	unweighted (5)	weighted (6)
Years French Presence, 1849	-0.430 [0.468]	-0.411 [0.460]	-0.508 [0.346]	0.055 [0.376]	0.061 [0.342]	0.374 [0.369]
Years French Presence, 1882	-0.450 [0.285]	-0.486 [0.244]	-0.585 [0.253]	0.420 [0.256]	0.386 [0.240]	0.594 [0.267]
Years French Presence, 1895	-0.570 [0.266]	-0.601 [0.242]	-0.658 [0.182]	0.472 [0.248]	0.449 [0.231]	0.640 [0.222]
Years French Presence, 1907	-0.554 [0.281]	-0.585 [0.264]	-0.724 [0.237]	0.350 [0.284]	0.321 [0.251]	0.570 [0.237]

Notes: Each cell corresponds to one cross-sectional regression. District level data. Robust standard errors, clustered at the state level. All regressions weighted by the districts' total population in 1849. Number of observations (baseline/west of Elbe): 39/23 (1849), 62/44 (other years).

Table 6: Urbanization in Germany, Impact of Reforms

	Dependent variable: Urbanization rate				
	West of the Elbe			All	
	weighted (1)	weighted, overid (2)	unweighted (3)	weighted (4)	unweighted (5)
Panel A: OLS estimation					
Reforms Index	0.281 [0.114]	0.281 [0.114]	0.220 [0.122]	0.268 [0.110]	0.191 [0.105]
Panel B: First Stage					
French Presence * Post1800 * Trend	1.166 [0.107]		1.116 [0.143]	1.006 [0.108]	0.960 [0.145]
F-statistic excluded instruments	119.7	121.6	61.85	87.57	43.71
p-value F-statistic	0.000	0.000	0.000	0.000	0.000
Panel C: 2SLS estimation					
Reforms Index	0.291 [0.102]	0.321 [0.112]	0.204 [0.124]	0.284 [0.112]	0.193 [0.143]
Observations	74	74	69	109	109
Number of States	13	13	12	19	19
p-value overid test		0.328			

Notes: All regressions have full set of territory and year dummies. Robust standard errors, clustered by territory. Weighted regressions are weighted by territories' total population in 1750. The overidentified regression in column (2) uses a full set of interactions of "Years of French Presence" and year dummies as excluded instruments.

C Appendix: Definition of the Territories (NOT FOR PUBLICATION)

1. **Rhineland (Prussia).** The territory is defined using the borders of the post-1815 Prussian Rhine province. It lies mostly to the west of the Rhine, with the major exceptions of the former territories of the Duchy of Berg and the exclave of Wetzlar. The major territories lying on this area before 1815 are the French-controlled Rhineland and the original parts of the Grand Duchy of Berg.
2. **Palatinate (Bavaria).** The territorial definition is equivalent to the *Regierungsbezirk* of the Bavarian Palatinate after 1815. Before 1815, this area was part of the French-controlled Rhineland (as part of the *département* of Mont-Tonnerre).
3. **Mark (Prussia).** The territory is defined as to approximate the pre-1815 County of Mark, which would later become the core of the Ruhr mining area. Following Meister (1909), this is implemented for the 19th century data by using the Prussian counties of: Soest, Hamm, Dortmund (*Stadt* and *Land*), Hörde, Bochum (*Stadt* and *Land*), Witten (*Stadt*), Gelsenkirchen (*Stadt* and *Land*), Hattingen, Hagen (*Stadt* and *Land*), Schwelm, Iserlohn, and Altena. Total population for the period before 1815 is based on this definition as well, and not on the historical borders of the County of Mark.
4. **Westphalia (Prussia).** The territory as defined in the dataset is comprised of the Prussian (post-1815) province of Westphalia, excluding the Mark (see 3.). The reason to single out Mark from the time series for Westphalia its different social, economic, and political characteristics: the County of Mark was mainly Protestant and characterized by rapid industrialization due to the coal deposits of the Ruhr basin, whereas the rest of Westphalia was largely Catholic and agricultural.
5. **Brunswick.** The territorial definition follows the borders of the Duchy of Brunswick, or (equivalently) the ones of its predecessor state, the Duchy of Brunswick-Wolfenbüttel.
6. **Province of Saxony (Prussia).** The territory is defined following the borders of the post-1815 Prussian Province of Saxony, roughly corresponding to the present-day state of Sachsen-Anhalt (but excluding Anhalt, and including the southern exclaves of Erfurt and Suhl). Before 1815, the larger part of this province was composed of the Prussian territories of Magdeburg-Mansfeld and Halberstadt-Hohenstein, part of the Kingdom of Westphalia in Napoleonic times. It also comprises the area of the Principality of Erfurt, controlled by France after 1807.
7. **Hesse-Kassel.** The territory is defined according to the post-1815 borders of the Electorate of Hesse. It therefore also comprises the areas of Hanau and Fulda, ruled by the Grand Duchy of Frankfurt in Napoleonic times. After the annexation by Prussia in 1866, it corresponds to the *Regierungsbezirk* Kassel.
8. **Hanover.** The territory is defined according to its post-1815 borders (as Kingdom of Hanover), therefore including, for example, the former Prince-bishoprics of Osnabrück and Hildesheim, as well as East Frisia.
9. **Baden.** The territorial definition follows the borders of the Grand Duchy of Baden in the 19th century, after the expansion in Napoleonic times. The former Margraviate of Baden expanded considerably in 1803–1810, more than doubling in size and incorporating several smaller territories: the parts of the Palatinate on the right bank of the Rhine, former Church territories (Konstanz, and parts of Basel, Strasbourg, Speyer), and parts of the Habsburg Empire (Anterior Austria).
10. **Bavaria, Southern half.** The territorial definition follows the borders of the

Regierungsbezirke Oberbayern, Niederbayern, and Oberpfalz (Upper Bavaria, Lower Bavaria, Upper Palatinate) in the post-1815 Kingdom of Bavaria. This approximates Bavaria before its expansion in Napoleonic times (i.e., *Altbayern* and the Upper Palatinate), but also includes the former Church territories of Freising, Passau, and Regensburg, as well as the free imperial city of Regensburg.

11. **Hesse-Darmstadt.** The territory is defined according to the post-1815 borders of the Grand-Duchy of Hesse (Darmstadt), excluding the province of *Rheinhessen* (Rhenish Hesse). Due to its past under French control, different laws were in force in the latter province.
12. **Saxony.** The territory is defined following the borders of the post-1815 Kingdom of Saxony. It therefore does not include the territories lost to Prussia as a consequence of the Congress of Vienna (parts of Lusatia as well as the *Kurlande* around Wittenberg).
13. **Schleswig-Holstein.** The territory is defined following the borders of the 19th-century Duchies of Schleswig and Holstein (the later Prussian province of Schleswig-Holstein). It also includes the areas of Northern Schleswig, now part of Denmark.
14. **Württemberg.** The territorial definition follows the borders of the Kingdom of Württemberg in the 19th century, after the expansion in Napoleonic times. The former Duchy of Württemberg expanded considerably in 1803–1810, almost doubling in size and incorporating several smaller territories: free imperial cities (Ulm, Rottweil, Heilbronn, Hall, Gmünd, Ravensburg), Church territories, and parts of the Habsburg Empire (Anterior Austria and Swabian Austria).
15. **Brandenburg (Prussia).** The territory is defined following the borders of the post-1815 Prussian Province of Brandenburg (including Berlin). The territories of the *Kurmark*, the *Neumark* and Lower Lusatia (then part of Saxony) composed this region before 1800.
16. **East Prussia (Prussia).** The territory is defined following the borders of the post-1815 Prussian Province of East Prussia (excluding West Prussia).
17. **Pomerania (Prussia).** The territory is defined following the borders of the post-1815 Prussian Province of Pomerania, excluding Anterior Pomerania (*Regierungsbezirk* Stralsund), where different laws were in place due to its past under Swedish rule.
18. **Silesia (Prussia).** The territory is defined following the borders of the post-1815 Prussian Province of Silesia, therefore also including the territory of Upper Lusatia (formerly part of Saxony), annexed as a consequence of the Congress of Vienna.
19. **Mecklenburg-Schwerin.** The territory is defined following the borders of the post-1815 Grand Duchy of Mecklenburg-Schwerin.

D Appendix: Construction of Urbanization Rates (NOT FOR PUBLICATION)

1. **Rhineland (Prussia).** Urbanization rates for the years 1875 and 1900 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 16–21; vol. 150, pp. 24–27). Total population for 1850 is from HGIS Germany (Kunz and Zipf, eds, n.d.)²³, city sizes are from Mazerath (1985). Total population for 1800 is based on the total population size for 1822 (from HGIS Germany), projected back to 1800 as-

²³The principal source for the HGIS Germany data is Köllmann and Kraus, eds (1980).

- suming a growth rate of 0.4% p.a. City sizes in 1800 are from Bairoch et al. (1988). In the period before 1800, the major territories lying within the borders of this area were: the Duchies of Jülich and Berg, the Duchy of Kleve (under Prussian rule, including the territories of Geldern and Moers), the County of Nassau-Saarbrücken, and the Electorates (prince-bishoprics) of Cologne and Trier. Evidence on the evolution of population in those territories is very scarce, in particular for the case of the Church territories. The territories under Prussian rule have better records; population estimates are presented in Behre (1905, pp. 198, 462) for the combined territories of Kleve-Mark, Moers and Geldern. These figures are compared to the population estimates for the County of Mark alone in Meister (1909, p. 367) to obtain an estimate for Kleve, Moers and Geldern. Estimates of population growth in Jülich and Berg are provided by Dahm (1951, pp. 280–288). The total population size of the Rhineland for 1750 is thus constructed by back projection using the simple average of the growth rates of Mark and Berg for the years 1770–1800, and the simple average of the growth rates of Mark, Berg, and Jülich for the years 1750–1770. City sizes in 1750 are from Bairoch et al. (1988). Only few reliable figures for population growth rates in the period 1700–1750 could be found; therefore, no estimate of the urbanization rate in 1700 is provided.
2. **Palatinate (Bavaria).** Urbanization rates for the years 1875 and 1900 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 16–21; vol. 150, pp. 24–27). Total population for 1850 is from HGIS Germany (Kunz and Zipf, eds, n.d.; in turn based on a geometric interpolation of the official Bavarian censuses of 1849 and 1852), city sizes for urban centers above 5 000 inhabitants are from Bayern, ed (1855, pp. 48–197). Total population for 1800 is based on the total population size for 1816 (from HGIS Germany), projected back to 1800 assuming a growth rate of 0.4% p.a.
 - The population of the Bavarian Palatinate in 1750 and 1700 is computed by back projection, starting from the 1800 value and applying the growth rate of Baden in 1771–1789 (from Stiefel, 1977, p. 427) to the years 1775–1800, and the growth rate of the (Rhenish) Palatinate in 1664–1775 (from Boelcke, 1987, p. 96) to the years 1700–1775. City sizes in 1800 and 1750 are from Bairoch et al. (1988). No urban center in the Palatinate is larger than 5 000 inhabitants in 1700.
 3. **Mark (Prussia).** Urbanization rates can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 150, pp. 44–45) for the year 1900. Total population figures for 1875 and 1850 are from Meister (1909, p. 367; interpolated for 1850). Urban population in 1875 is from *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 41–42). Urban population for 1850 is from Mazerath (1985). Total population for 1800 is based on the total population size for 1818 (Meister, 1909), projected back to 1800 assuming a growth rate of 0.4% p.a. for the years 1804–1818, and the actual population growth rate of the County of Mark in 1800–1804. City sizes in 1800 are from Bairoch et al. (1988). Total population size for 1750 and 1700 is again constructed by back projection, starting from the 1800 estimate and using the actual population growth rates of the County of Mark from Meister (1909, p. 367). The population growth rate in 1700–1722 is assumed to be identical to the growth rate in the years 1722–1740. City sizes in 1750 and 1700 are from Bairoch et al. (1988).
 4. **Westphalia (Prussia).** Urbanization rates for the years 1900 and 1875 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 41–42; vol. 150, pp. 44–45), by subtracting the values for Mark (see above, 3.) from the total values for the province of Westphalia. The total population figure for 1850 is computed accordingly based on figures in HGIS Germany (Kunz and Zipf, eds, n.d.), city sizes are from

Mazerath (1985). The total population figure for 1800 is computed by projecting backwards the 1816 figures for the *Regierungsbezirke* Münster, Minden and Arnsberg, excluding the County of Mark from the latter; this is done separately for each *Regierungsbezirk*. The 1816 figures are from HGIS Germany. In the period before 1800, the major territories lying within the borders of Catholic Westphalia were: the Prince-bishopric of Münster, the Vest Recklinghausen, the Counties of Tecklenburg and Lingen, and the Duchy of Westphalia (part of the Prince-bishopric of Cologne). All of these territories kept little or no records of their population sizes. The population growth rate of the *Regierungsbezirk* Münster in 1800–1816 is assumed to be equal to the population growth rate of the prince-bishopric of Münster (*Oberstift*) in the years 1795–1818 as in Reekers (1964, p. 159). The population growth rate of the *Regierungsbezirk* Arnsberg (without the Mark) in 1800–1816 is assumed to be equal to the population growth rate of the Duchy of Westphalia in the years 1805–1818 as in Reekers (1967, pp. 101–102). Population of the *Regierungsbezirk* Minden in 1800 and 1750 is computed starting from its value for 1816 (HGIS Germany), projected backwards using the actual growth rates for 1800–1816 and 1750–1800 of the former territory of Minden-Ravensberg from Reekers (1965, p. 122). Population of the remaining area (Westphalia without RB Minden and the Mark) in 1750 is computed as follows. For the second half of the 18th century, only one estimate of population growth could be found for a territory partially coterminous with the *Regierungsbezirke* Münster and Arnsberg: for the (Catholic) Vest Recklinghausen, Hanschmidt (1982, p. 652) has an estimate for the period 1749–1806. Two more sources of information are considered. The adjoining Prince-Bishopric of Osnabrück probably had socio-economic characteristics similar to the Prince-Bishopric of Münster. The County of Mark was surrounded by the territory of Westphalia. For the former, we

have population growth estimates in Kaufhold and Denzel, eds (1988, p. 9) (based on Telkamp, 1846); for the latter, see section 3. above. The population of this part of Westphalia in 1750 is therefore estimated using a simple average of these three growth rates (i.e., Vest Recklinghausen, Osnabrück, and Mark). City sizes in 1800 and 1750 are from Bairoch et al. (1988). No reliable figures for population growth rates in the period 1700–1750 could be found; therefore, no estimate of the urbanization rate in 1700 is provided.

5. **Brunswick.** Urbanization rates for the years 1900 and 1875 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 16–21; vol. 150, pp. 24–27). Total population in 1850 is from HGIS Germany (Kunz and Zipf, eds, n.d.); urban population in 1850 is from Ritter (1855). Total population in 1800 is derived starting from the 1816 value (from HGIS Germany) by interpolation based on the implied growth rates for the periods 1760–1803 and 1806–1816; population sizes in 1760 and 1803 are from Lee (1977, p. 6), which in turn is based on Buchholz (1966, p. 4). Population in 1750 is estimated by using the actual population growth rate in the period 1760–1803 (as before) and assuming that the growth rate of the population in Brunswick in the years 1750–1760 was equal to the growth rate of the Hanoverian population in the same period (cf. section 8. below). City sizes in 1800 and 1750 are from Bairoch et al. (1988). No reliable sources for population growth rates in the period 1700–1750 could be found; therefore, no estimate of the urbanization rate in 1700 is provided.
6. **Province of Saxony (Prussia).** Urbanization rates for the years 1900 and 1875 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 16–21; vol. 150, pp. 24–27). The total population figure for 1850 is from HGIS Germany (Kunz and Zipf, eds, n.d.), city sizes are from Mazerath (1985). Population in the years 1800 and before is computed based on the actual

population growth rates of the combined Prussian territories of Magdeburg-Mansfeld and Halberstadt-Hohenstein (from Behre, 1905, pp. 457–458); lacking data, population growth in the years 1805–1816 is assumed to be equal to 0.4% p.a. Population in 1816 is from HGIS Germany. City sizes in 1800, 1750 and 1700 are from Bairoch et al. (1988).

7. **Hesse-Kassel.** Urbanization rates for the years 1900 and 1875 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 16–21; vol. 150, pp. 24–27). The total population figure for 1850 is from HGIS Germany (Kunz and Zipf, eds, n.d.), city sizes are from Ritter (1855). Population in 1800 is derived starting from the 1816 value (from HGIS Germany), projected backward assuming a population growth rate of 0.1% p.a. in 1805–1816 and of 1% p.a. in 1800–1805. From the 1800 value, total population in 1750 and in 1700 is constructed by back projection using actual growth rates of the Landgraviate of Hesse-Kassel in the years 1705–1750, 1750–1789, and 1789–1802 (all from Demandt, 1972, pp. 272, 288). Population growth rate in 1700–1705 is assumed to equal the rate in 1705–1750. City sizes in 1800, 1750 and 1700 are from Bairoch et al. (1988).
8. **Hanover.** Urbanization rates for the years 1900 and 1875 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 16–21; vol. 150, pp. 24–27). The total population figures for 1850, 1800 and 1750 are from Kaufhold and Denzel, eds (1988, p. 9), which presents data for the post-1815 territorial extension, based on estimates by Tellkamp (1846, pp. 103–112). Population in 1700 is reconstructed in the following way: population in the Electorate of Hanover (Calenberg) including the territories of Celle, Bremen and Verden is estimated to equal approx. 700 000 in 1714, and 775 000 in 1750.²⁴ The implied growth rate is then applied through back projection to the 1750 fig-

ure. Urban population in 1850 is derived from a comparison of the values in Bairoch et al. (1988), Ritter (1855) and Tellkamp (1846). City sizes in 1800, 1750 and 1700 are from Bairoch et al. (1988).

9. **Baden.** Urbanization rates for the years 1900 and 1875 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 16–21; vol. 150, pp. 24–27). Total population in 1850 is from HGIS Germany (Kunz and Zipf, eds, n.d.); urban population in 1850 is from Baden, ed (1855, pp. 217–220). Total population in 1800 is derived starting from the 1810 value (from Baden, ed, 1855, pp. 221–222), projected backward assuming a growth rate of 0.4% p.a. in 1800–1810. For the period before 1800, various sources of population growth rates are considered. Stiefel (1977, p. 427) and Rebmann et al., eds (1912, p. 350) provide estimates for the population of the Margraviates of Baden-Baden and Baden-Durlach. For Anterior Austria (the *Breisgau*), the figures in Metz, ed (1952, p. 12) and in Boelcke (1987, p. 95) provide wildly divergent estimates of the population growth rates in 1700–1790 (0.1% p.a. in the first, 0.5% p.a. in the second source). This information is therefore not used. The population of Baden in 1750 is calculated by applying to the estimated 1800 value (through back projection) the growth rate of the unified Margraviates of Baden in 1771–1789 and the growth rate of Baden-Durlach in 1746–1771. Baden's growth rate in 1789–1800 is assumed to be equal to the average growth rates of the unified Margraviates of Baden in 1771–1789. City sizes in 1800 and before are from Bairoch et al. (1988).
10. **Bavaria, Southern half.** Urbanization rates for the years 1900 and 1875 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 16–21; vol. 150, pp. 24–27). Total population in 1850 is from HGIS Germany (Kunz and Zipf, eds, n.d.); urban population in 1850 is from

²⁴Personal correspondence with Professor Peter H. Wilson, University of Hull. See also Hatton (1978, p. 78).

- Bayern, ed (1855, pp. 48–197). Total population in 1800 is derived starting from the 1818 value (from HGIS Germany), projected backward assuming a growth rate of -0.2% p.a. in 1800–1818. This growth rate is derived from an estimate of the population in the future *Regierungsbezirke* Oberbayern, Niederbayern, and Oberpfalz in 1795 (based on Rauh 1988, p. 477 and Schraut 2005, p. 21) and in 1818 (from HGIS Germany). Population growth rates for the 18th century are derived from Rauh (1988), excluding, where possible, figures about the *Innviertel*, which was lost to Austria in 1779 (107 000 inhabitants in 1771). City sizes in 1800 and before are from Bairoch et al. (1988).
11. **Hesse-Darmstadt.** Urbanization rates for the years 1900 and 1875 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 16–21; vol. 150, pp. 24–27). The total population figure for 1850 is from HGIS Germany (Kunz and Zipf, eds, n.d.), correcting for the loss of the “Hessisches Hinterland,” ceded in 1867 to Prussia (38 194 inhabitants in 1867); city sizes are from Ritter (1855). Population in 1800 is derived starting from the 1817 value (from HGIS Germany), projected backward assuming a population growth rate of 0.1% p.a. in 1805–1817 and of 1% p.a. in 1800–1805. From the 1800 value, total population in 1750 and in 1700 is constructed by back projection using actual growth rates of the Landgraviate of Hesse(-Darmstadt/Starkenburger) in the years 1669–1776 and 1776–1801 from Grossherzogliche Centralstelle für die Landes-Statistik, ed (1864, pp. 1–27). City sizes in 1800, 1750 and 1700 are from Bairoch et al. (1988).
 12. **Saxony.** Urbanization rates for the years 1900 and 1875 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 16–21; vol. 150, pp. 24–27). The total population figure for 1850 is from HGIS Germany (Kunz and Zipf, eds, n.d.), city sizes are from Engel (1853, pp. 158–165). Population in the years 1800 is constructed by geometric interpolation between the 1750 value in Blaschke (1967, p. 91) and the figure for 1815 in Böhmert (1890, p. 51). The population figure for 1750 (for Saxony in its post-1815 borders) is from Blaschke (1967, p. 91). Population in 1700 is reconstructed (by back projection) starting from the 1750 value and using the average of the 1550–1750 growth rate (as in Blaschke, 1967, pp. 78, 91) and of the 1700–1800 growth rate (as in Keyser, 1941, p. 363). City sizes in 1800 and before are from Bairoch et al. (1988).
 13. **Schleswig-Holstein.** Urbanization rates for the years 1900 and 1875 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 16–21; vol. 150, pp. 24–27). The total population figure for 1850 is from HGIS Germany (Kunz and Zipf, eds, n.d.), city sizes are from Ritter (1855). Population in the years 1800 and 1750 is computed based on the actual population growth rates of the Duchies of Schleswig and Holstein in 1803–1812, the population growth rate of Holstein in 1800–1803 and in 1750–1800 (from Gehrman, 2000, p. 391). Population in 1812 is from HGIS Germany. City sizes in 1800 and 1750 are from Bairoch et al. (1988).
 14. **Württemberg.** Urbanization rates for the years 1900 and 1875 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 16–21; vol. 150, pp. 24–27). Total population in 1850 is from HGIS Germany (Kunz and Zipf, eds, n.d.); urban population in 1850 is from Ritter (1855) and Bairoch et al. (1988). Total population in 1800 is derived starting from the 1816 value (from HGIS Germany), projected backward assuming a growth rate of 0.4% p.a. in 1802–1816, and applying the actual average growth rate of the Duchy of Württemberg in the years 1794–1802 to the period 1800–1802 (the latter growth rate is derived from Hippel, 1984, p. 29). For the period before 1800, two sources of population growth rates are considered. First, population

growth of the Duchy of Württemberg in 1697–1802 (with intermediate values), from Hippel (1984, p. 29) (these values are also checked against Röder 1787, pp. 69–70). Second, the growth rate of Swabian Austria in 1700–1771, as in Sapper (1965, p. 32). A weighted average of these rates is constructed to estimate the population of Württemberg in 1700 and in 1750. City sizes in 1800 and before are from Bairoch et al. (1988).

15. **Brandenburg (Prussia).** Urbanization rates for the years 1900 and 1875 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 16–21; vol. 150, pp. 24–27). The total population figure for 1850 is from HGIS Germany (Kunz and Zipf, eds, n.d.), city sizes are from Mazerath (1985). Population in the years 1800 and before is computed based on the actual population size of Berlin (from Bairoch et al., 1988) and actual population growth rates of the combined Prussian territories of Kurmark and Neumark (from Behre, 1905, pp. 457–458); lacking data, population growth in the years 1805–1816 is assumed to be equal to 0.4% p.a. Population in 1816 is from HGIS Germany. City sizes in 1800, 1750 and 1700 are from Bairoch et al. (1988).
16. **East Prussia (Prussia).** Urbanization rates for the years 1900 and 1875 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 16–21; vol. 150, pp. 24–27). The total population figure for 1850 is from HGIS Germany (Kunz and Zipf, eds, n.d.), city sizes are from Mazerath (1985). Population in the years 1800 and before is computed based on the actual population growth rates of the previous Prussian territory of East Prussia (from Behre, 1905, pp. 198, 457–458); lacking data, population growth in the years 1805–1816 is assumed to be equal to 0.4% p.a. Population in 1816 is from HGIS Germany. City sizes in 1800, 1750 and 1700 are from Bairoch et al. (1988).
17. **Pomerania (Prussia).** Urbanization rates for the years 1900 and 1875 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 16–21; vol. 150, pp. 24–27). The total population figure for 1850 is from HGIS Germany (Kunz and Zipf, eds, n.d.), city sizes are from Mazerath (1985). Population in the years 1800 and before is computed based on the actual population growth rates of the previous Prussian territory of Pomerania (from Behre, 1905, pp. 198, 457); lacking data, population growth in the years 1805–1816 is assumed to be equal to 0.4% p.a. Population in 1816 is from HGIS Germany. City sizes in 1800, 1750 and 1700 are from Bairoch et al. (1988).
18. **Silesia (Prussia).** Urbanization rates for the years 1900 and 1875 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 16–21; vol. 150, pp. 24–27). The total population figure for 1850 is from HGIS Germany (Kunz and Zipf, eds, n.d.), city sizes are from Mazerath (1985). Population in the years 1800 and before is computed based on the actual population growth rates of the previous Prussian territory of Silesia (from Behre, 1905, pp. 198, 457); lacking data, population growth in the years 1805–1816 is assumed to be equal to 0.4% p.a. Population in 1816 is from HGIS Germany. City sizes in 1800 and 1750 are from Bairoch et al. (1988). For the period before 1750, i.e. before the annexation by Prussia in the War of the Austrian Succession, no reliable figures for population growth rates could be found; therefore, no estimate of the urbanization rate in 1700 is provided.
19. **Mecklenburg-Schwerin.** Urbanization rates for the years 1900 and 1875 can be computed directly from the volumes of *Statistik des deutschen Reiches* (vol. 57 A.F., pp. 16–21; vol. 150, pp. 24–27). The total population figure for 1850 is from HGIS Germany (Kunz and Zipf, eds, n.d.), city sizes in 1850 and before are from Bairoch et al. (1988). Total population in 1800 is derived starting from the 1818 value (from HGIS Germany), projected backward applying the actual average

growth rate of the Duchy of Mecklenburg-Schwerin in the years 1800–1815 to the period 1800–1818 (the latter growth rate is derived from Gehrman, 2000, p. 410). Total population in 1750 is computed starting with the 1800 value, projected backward to 1790 by using the actual average growth rate of the Duchy of Mecklenburg-Schwerin in those years (from Gehrman, 2000, p. 410), and successively projected backward to 1750 ap-

plying the population growth rate of neighboring Swedish Anterior Pomerania in 1767–1790 (from Gehrman, 2000, p. 410) to the years 1750–1790. For the period before 1750, no reliable figures for population growth rates could be found; however, no urban center in Mecklenburg-Schwerin is larger than 5 000 inhabitants in 1700, hence the urbanization rate is assumed to equal zero.

E Appendix: Number of pre-revolutionary territories (NOT FOR PUBLICATION)

We count all territories that existed within the polities in the dataset (as defined in section C above) before the changes brought by the French invasion of the Rhineland, the *Reichsdeputationshauptschluss* of 1803, the *Rheinbundakte* of 1806, and the Congress of Vienna. We only consider territories that were immediate to the Emperor (*reichsunmittelbar*), excluding intermediate liege lords. We exclude monasteries from the count, but include other Church territories such as prince-bishoprics (such as Cologne, Trier, Speyer. . .) or Imperial abbeys (such as Isny or Gengenbach). We count territories in dynastic union (such as, e.g. the duchies of Jülich and Berg) only once.

The main source is Köbler's (1992) *Historisches Lexikon der deutschen Länder*. For the Rhineland, we looked up map 5.1 in Irisigler's (1982) *Geschichtlicher Atlas der Rheinlande*. For the Bavarian Palatinate, we used map #59 in Alter's (1963) *Pfalzatlant*. To complete the list of territories incorporated in Württemberg, we looked up the *Rheinbundakte*.

1. **Rhineland (Prussia).** Prussian territories (duchies of Cleves and Geldern, principality of Moers); Bavarian-Palatinian territories (duchies of Jülich and Berg, Electoral Palatinate, principalities of Pfalz-Simmern, Pfalz-Veldenz, county of Sponheim [partially]); Austrian territories (Geldern [partially], Limburg [partially], Luxembourg [partially]); prince-bishoprics of Cologne, Trier, Liège [partially], Mainz (partially); French territories (Lorraine); dukedoms of Arenberg (Arenberg, Kasselburg, Kerpen, Kommern, Saffenburg), Pfalz-Zweibrücken (partially); margraviate of Baden (partially); landgraviate of Hesse-Kassel (partially); counties of Limburg-Styrum, Schaesberg (Kerpen, Lommersum), Sayn-Wittgenstein-Berleburg (Homburg v. d. Mark), Sternberg-Manderscheid (Blankenheim, Dollendorf, Jünkerath, Gerolstein, Salm), Sayn-Hachenburg (partially), Sayn-Altenkirchen, Wied-Runkel (Wied, Saarwellingen), Wied-Neuwied, Rheineck, von der Leyen, Salm-Reifferscheid (Reifferscheid, Dyck), Metternich-Winneburg, Waldbott von Bassenheim (Ol[]brück, Pyrmont), Virneburg, Bretzenheim, Nassau-Weilburg, Kesselstadt, Oettingen (lordship of Dagstuhl); Wild- und Rheingrafen; lordships of Hörstgen, Millendonk, Wickrath, Gimborn-Neustadt; abbeys of Burtscheid, Kornelimünster, Essen (city and Imperial abbey), Werden, Elten, Stablo-Malmedy, Echternach; free Imperial cities of Aachen, Cologne; imperial knightships. [45]
2. **Palatinate (Bavaria).** Added to the Rhenish Palatinate (already in dynastic union with Bavaria before 1800): principalities of Pfalz-Zweibrücken, Leiningen-Hardenburg, Leiningen-Guntersblum, Leiningen-

- Westerburg-Altleiningen, Leiningen-Westerburg-Neuleiningen, Nassau-Weilburg (partially), Wartenburg, Sickingen, Löwenstein-Wertheim, von der Leyen; territory of Reipoltskirchen; territories of the Wild- und Rheingrafen; prince-bishoprics of Worms (partially) and Speyer (partially); free Imperial city of Speyer; former leftrhenish territories of Baden and Hesse-Darmstadt; and French territories (Landau). [19]
3. **Mark (Prussia).** Unchanged. [1]
 4. **Westphalia (Prussia).** Added to former Prussian territories (Mark, Minden-Ravensberg, Tecklenburg-Lingen): prince-bishopric of Corvey; free Imperial city of Dortmund; principalities of Reckenberg, Arenberg, Salm, Steinfurt, Gemen, Gronau, Rietberg, Rheda, Limburg; territory of Siegen; Oberstift Münster, Vest Recklinghausen; territories of Anholt, Bentheim, Dülmen, Rheina, Bocholt, Horstmar, Neukirchen; Duchy of Westphalia; county of Wittgenstein. [24]
 5. **Brunswick.** Added to the Duchy of Brunswick-Wolfenbüttel: abbeys Gandersheim, Helmstedt. [3]
 6. **Province of Saxony (Prussia).** Added to former Prussian territories (Altmark, Magdeburg, Halberstadt, Hohnstein, Wernigerode, Querfurt [partly], Mansfeld [partly], Quedlinburg) in 1802/3 (and again in 1813/15): free Imperial cities of Mühlhausen and Nordhausen; territory of Erfurt; principality of Eichsfeld; lordship of Treffurt. In 1815: former Saxon districts (Kurkreis Wittenberg, Merseburg, Naumburg, Thuringian territories, Mansfeld [partly], Stolberg, Barby, Querfurt [partly]). [7]
 7. **Hesse-Kassel.** Added in 1803: former Mainz districts (Fritzlar, Naumburg, Neustadt, Amöneburg, monasteries); free Imperial city of Gelnhausen; village of Holzhausen. In 1815: prince-bishopric of Fulda. [5]
 8. **Hanover.** Added in 1803 (and again in 1815): prince-bishoprics of Hildesheim and Osnabrück. In 1815: Niederstift Münster (Emsland, including Meppen), Niedergrafschaft Lingen, East Frisia, and Untereichsfeld; free Imperial city of Goslar. [8]
 9. **Baden.** Added to the Margraviate of Baden in 1803: part of the Rhenish Palatinate; Church territories of Konstanz, Basel (partially), Straßburg (partially), and Speyer (partially); districts of Lichtenau and Willstätt; territory of Lahr; abbeys Petershausen, Gengenbach, Odenheim, Salem (partially); free Imperial cities of Offenburg, Pfullendorf, Gengenbach, Zell, and Überlingen; Imperial territory of Hamersbach; various monasteries (among others, Reichenau). In 1805: former Austrian territories (Breisgau, Ortenau, Baar, city of Konstanz, Mainau). In 1806: principalities of Fürstenberg, Leiningen, Salm-Krautheim, landgraviate of Klettgau; territories of Bonndorf, Heitersheim, Wertheim (partially) and imperial knightly territories. In 1810: landgraviate of Nellenburg and county of Hohenberg. [30]
 10. **Bavaria, Southern half.** Added: prince-bishoprics of Passau and Freising; free Imperial city of Regensburg. [4]
 11. **Hesse-Darmstadt.** Added in 1803: former Mainz districts (Gernsheim, Bensheim, Hepenheim, Lorsch, Fürth im Odenwald, Steinheim, Alzenau, Vilbel, Rockenberg, Haßloch, Hirschhorn, Mönchhof, Gundhof, Klarenberg); former Palatinate districts (Kindenfels, Umstadt, Otzberg, Alzey [partially], Oppenheim [partially]); prince-bishopric of Worms; abbeys Seligenstadt and Mareinschloß; Imperial cities of Wimpfen and Friedberg. In 1806: county of Erbach and imperial knightly territories. In 1816: principality of Isenburg-Birstein; other former Mainz and Palatinate districts. [11]
 12. **Saxony.** Loses territories to Prussia. [1]
 13. **Schleswig-Holstein.** Unchanged. [1]
 14. **Württemberg.** Added in 1803/06: provostry of Ellwangen, Imperial abbeys of Schöntal,

Gutenzell, Isny, Rot (an der Rot), Schussenried, Weißenau, Weingarten, and Zwiefalten; Imperial cities of Reutlingen, Esslingen, Rottweil, Heilbronn, Giengen, Aalen, Weil der Stadt, Biberach, Schwäbisch Hall and Schwäbisch Gmünd; village of Dürrenmettstetten; former Austrian territories (Austrian Swabia: Hohenberg, Landvogtei Schwaben, Danubian cities [Mengen, Munderkingen, Riedlingen, Saulgau, Waldsee], Ehingen, Wiblingen, Burgau); territories of the Teutonic Order (district of Hornegg: Neckarsulm and Gundelsheim; Mergentheim); territories of the Order of St. John; imperial knightly territories; principalities of Hohenlohe, Königsegg, Thurn und Taxis, Waldburg (partially), Eglofs (Windischgrätz); territories of Neuravensburg, Tannheim, Straßberg, Gundelfingen, (Limpurg-)Gaildorf, Wiesensteig, Wald-

see, Schelklingen; former Mainz territories (Krautheim). In 1809/10: territories of Crailsheim and Creglingen; Imperial cities of Bopfingen, Buchhorn, Leutkirch, Ravensburg, Ulm and Wangen; principality of Hirschlatt. [48]

15. **Brandenburg (Prussia)**. Unchanged. [1]
16. **East Prussia (Prussia)**. Unchanged. [1]
17. **Pomerania (Prussia)**. Unchanged (1815 addition of Anterior Pomerania, formerly Swedish, is not included in the data). [1]
18. **Silesia (Prussia)**. Added former Saxon territories (upper Lusatia). [2]
19. **Mecklenburg-Schwerin**. Added in 1803: former Swedish territories (Wismar, Poel, Neukloster). [2]

F Appendix: Coding of Treatment and Reforms (NOT FOR PUBLICATION)

In this section we describe the coding of institutional reforms presented in Table 1. When reforms were conducted prior to 1815, their attribution to the 19 polities in the dataset can be problematic, as they are often defined according to their post-1815 borders (see Appendix C). To minimize these problems, we have defined some polities in such a way to exclude areas with different legislations. As detailed in Appendix C, for example, our definition of the Prussian province of Pomerania excludes the areas of Anterior Pomerania (ruled by Sweden before 1815), and Hesse-Darmstadt excludes the left-rhenish province of *Rhein Hessen* (where, as in the Bavarian Palatinate, French laws remained in place after 1815).

In other cases, the post-1815 polity is matched—for the purposes of coding—to the preceding territory that occupied the largest part of its area. Specifically, we match the County of Mark and the Prussian province of Westphalia to the Napoleonic Grand Duchy of Berg; we match Hanover, Hesse-Kassel and the province of Saxony to the Napoleonic Kingdom of Westphalia. The lists below describe, where applicable, also the reforms as they took place in other parts of the territory.

F.1 Treatment Definition

We define treatment as effective rule through France or through a French-controlled satellite state (the Grand Duchy of Berg, Kingdom of Westphalia, the Grand Duchy of Frankfurt), excluding periods of pure military occupation. The number in brackets indicated the total number of years of French control.

1. **Rhineland (Prussia)**. After initial setbacks, the French controlled the left bank of the Rhine definitively starting in the winter of 1794/1795. This status quo was recognized by the peace of Campo Formio in 1797. In 1802, the Rhineland was annexed by France

- and subdivided into départements. French rule ended in 1814. [19]
2. **Palatinate (Bavaria).** See 1. [19]
 3. **Mark (Prussia).** The former County of Mark was annexed by the (already French-ruled) Duchy of Berg as a consequence of the Peace of Tilsit, July 1807. French rule ended with the collapse of Napoleonic troops at the battle of Leipzig, 19 Oct 1813. [6]
 4. **Westphalia (Prussia).** The Kingdom of Westphalia was created as a French satellite state in 1807 as a consequence of the Peace of Tilsit. In 1807–1808, the Duchy of Berg was considerably expanded to comprise the territories of Essen, Werden, Dortmund, Münster, Tecklenburg—later part of the Province of Westphalia. French control ceased after the Battle of the Nations in 1813. [6]
 5. **Brunswick.** The former territory of the Duchy of Brunswick-Wolfenbüttel became part of the newly created Kingdom of Westphalia as a consequence of the Peace of Tilsit, in 1807. French control ceased after the Battle of the Nations in 1813. [6]
 6. **Province of Saxony (Prussia).** The former Prussian territories East of the Elbe (Magdeburg, Halle, Mansfeld, Halberstadt, Hohenstein and the Altmark) became part of the newly created Kingdom of Westphalia as a consequence of the Peace of Tilsit, in 1807. The territories of Eichsfeld, Erfurt, Mühlhausen and Nordhausen, acquired by Prussia in 1802, were ceded to France in 1807. The *départements* of the Elbe and the Saale approximately corresponded to the later Province of Saxony (without its Eastern and Southern bits). French control ceased after the Battle of the Nations in 1813. [6]
 7. **Hesse-Kassel.** The former territory of the Landgraviate of Hesse-Kassel became part of the newly created Kingdom of Westphalia as a consequence of the Peace of Tilsit, in 1807. The southern parts of the future Electorate of Hesse-Kassel (Fulda, Hanau) were incorporated into the Grand Duchy of Frankfurt in 1810. French control ceased after the Battle of the Nations in 1813. [6]
 8. **Hanover.** The former territory of the Electorate of Hanover, limited to the Duchy of Brunswick-Lüneburg, became part of the newly created Kingdom of Westphalia as a consequence of the Peace of Tilsit, in 1807. The northern parts of the Electorate (Bremen-Verden) were annexed to France in 1810. East Frisia was incorporated into the (French-Ruled) Kingdom of Holland in 1806. French control ceased after the Battle of the Nations in 1813. [6]
 9. **Baden.** No French rule. Under the auspices of Napoleon, Baden was elevated to Grand Duchy and its territory expanded fourfold. [0]
 10. **Bavaria, Southern half.** No French rule. [0]
 11. **Hesse-Darmstadt.** No French rule. Under the auspices of Napoleon, the Landgraviate of Hesse-Darmstadt was elevated to Grand Duchy. [0]
 12. **Saxony.** No French rule. [0]
 13. **Schleswig-Holstein.** No French rule. [0]
 14. **Württemberg.** No French rule. Under the auspices of Napoleon, the Duchy of Württemberg was elevated to Kingdom and its territory doubled in size. [0]
 15. **Brandenburg (Prussia).** No French rule. [0]
 16. **East Prussia (Prussia).** No French rule. [0]
 17. **Pomerania (Prussia).** No French rule. [0]
 18. **Silesia (Prussia).** No French rule. [0]
 19. **Mecklenburg-Schwerin.** No French rule. [0]

F.2 Civil Code

We code the years in which a written civil code, guaranteeing universal equality in front of the law to all citizens, was in place (this often correlated with the presence of written penal and/or commercial codes). This definition excludes the the *Allgemeines Landrecht* (ALR), the ambitious Prussian civil code of 1794, a 19 000 paragraphs-long codification of all legal matters which was a progressive work for its times, heavily influenced by the ideals of the Enlightenment, and the Bavarian *Codex Maximilianeus Bavaricus Civilis* of 1756—both of these codes still allowed for the existence of the *Patrimonialgerichtsbarkeit*, i.e. separate courts for peasants, held by their landlords.

Appendix G explores different definitions of this coding that include the ALR and the *Codex Maximilianeus*. For most states unaffected by the French ‘treatment,’ a universal written civil code was in place only in 1900, after the introduction of the German civil code (*Bürgerliches Gesetzbuch*)

1. **Rhineland (Prussia).** In September 1802, the *départements* on the left bank of the Rhine were declared legally equivalent to all other French *départements*, which means they were considered French territory and the *Code Napoléon* was in force. See below (4.) for the right-Rhenish parts of the Rhineland, formerly part of the Duchy of Berg. The *Code Napoléon* remained in force until the introduction of the German Civil Code (BGB) on 1 Jan 1900. (Coing, 1973, pp. 1441–1442) (Schubert, 1977b, pp. 85, 89, 97–98) (Schubert, 1977a, pp. 170–173) [**1802**]
2. **Palatinate (Bavaria).** See above, 1. In this part of Bavaria, the *Code Napoléon* remained in force until the introduction of the German Civil Code (BGB) on 1 Jan 1900. (Coing, 1973, p. 1441, 1442–1443) (Schubert, 1977b, pp. 85, 89, 97–98) (Schubert, 1977a, pp. 170–173) [**1802**]
3. **Mark (Prussia).** The *Code Napoléon* was enacted on 1 Jan 1810 in the Grand Duchy of Berg. Prussia introduced the ALR (Prussian Civil Code) in the province of Westphalia on 1 Jan 1815. (Schubert, 1977b, p. 140) (Schubert, 1977a, p. 155) [**1810–1815, 1900**]
4. **Westphalia (Prussia).** The *Code Napoléon* was enacted on 1 Jan 1810 in the Grand Duchy of Berg, and on 1 Jan 1808 in the Kingdom of Westphalia. Only the parts that constituted the old Duchy of Berg—hence excluding the ones lying in the new Province of Westphalia—retained French law after the end of French rule. Prussia introduced the ALR (Prussian Civil Code) in the province of Westphalia on 1 Jan 1815. (Coing, 1973, p. 1449, 1450) (Schubert, 1977b, pp. 100, 140) (Schubert, 1977a, pp. 150, 155) [**1810–1815, 1900**]
5. **Brunswick.** Part of the Kingdom of Westphalia: see 4. The Duchy of Brunswick reintroduced customary law on 1 Mar 1814. (Coing, 1973, p. 1450) (Schubert, 1977a, p. 140) [**1808–1814, 1900**]
6. **Province of Saxony (Prussia).** Part of the Kingdom of Westphalia: see 4. Prussia (re)introduced the ALR (Prussian Civil Code) in the province of Saxony on 1 Jan 1815. (Schubert, 1977a, p. 150) [**1808–1815, 1900**]
7. **Hesse-Kassel.** The *Code Napoléon* was enacted on 1 Jan 1808 in the Kingdom of Westphalia, and on 1 Jan 1811 in the Grand Duchy of Frankfurt. Hesse-Kassel reintroduced its old laws on 4 Jan 1814 (16 Jan 1814 for the territories of Hanau and Fulda, formerly part of the Grand Duchy of Frankfurt). (Coing, 1973, pp. 1449–1450, 1452) (Schubert, 1977b, pp. 100, 244) (Schubert, 1977a, p. 142) [**1808–1814, 1900**]
8. **Hanover.** The *Code Napoléon* was enacted on 1 Jan 1808 in the Kingdom of Westphalia. Ostfriesland (the territory including Emden) and Jever were part of the Batavian Republic from 1807–1811, and of France 1811–1813; here, the *Code Napoléon* was in force 1809–1811. Hanover reintroduced its old laws in the course of 1813. French law

was abolished in the territories of East Frisia, Meppen, Emsbüren and the former bishopric of Hildesheim in 1815. (Schubert, 1977b, pp. 100, 150–160) (Schubert, 1977a, pp. 134–135) [1808–1813, 1900]

9. **Baden.** French law was introduced without any pressures on the French side to do so. The *Badisches Landrecht* is essentially the *Code Napoléon*, with no exclusions and only some minor additions; it went in force starting from 1 Jan 1810, and remained in force until the introduction of the German Civil Code (BGB) on 1 Jan 1900. (Coing, 1973, pp. 1443–1446) (Schubert, 1977b, pp. 193–236) [1810]
10. **Bavaria, Southern half.** In 1808 Bavaria (under its liberal prime minister Montgelas) set up a commission to adapt the *Code Napoléon*. However, in 1811 they gave up the project of adapting and adopting the C.N. and opted for a profound revision of their own old *Codex Maximilianeus Bavaricus Civilis*, a civil code of 1756, one of the first codices in German language. The revised Cod. Max. remained in force until the introduction of the German Civil Code (BGB) on 1 Jan 1900. (Coing, 1973, p. 1455) (Schubert, 1977b, pp. 163–181) [1900]
11. **Hesse-Darmstadt.** Hesse-Darmstadt started some efforts to adapt and adopt the *Code Napoléon*, but eventually gave up. (Coing, 1973, p. 1455) (Schubert, 1977b, pp. 242) [1900]
12. **Saxony.** No enactment of the French civil code. A modern codification of private law (the *Sächsische Bürgerliche Gesetzbuch*) was enacted on 1 Mar 1865, and remained in force until the introduction of the German Civil Code (BGB) on 1 Jan 1900. (Coing, 1973, pp. 1540–1553) [1865]
13. **Schleswig-Holstein.** No enactment of the French civil code. [1900]
14. **Württemberg.** No enactment of the French civil code. [1900]
15. **Brandenburg (Prussia).** No enactment of the French civil code. ALR (Prussian Civil Code) in force since 1794. [1900]
16. **East Prussia (Prussia).** See above, 15. [1900]
17. **Pomerania (Prussia).** See above, 15. [1900]
18. **Silesia (Prussia).** See above, 15. [1900]
19. **Mecklenburg-Schwerin.** No enactment of the French civil code. [1900]

F.3 Agrarian Reforms

We code two types of reform: one is the abolition of serfdom. Even though in most of the lands west of the Elbe serfdom did not subsist in the late 18th and early 19th century, its abolition was often more than a symbolic gesture, indicating the political will to embark on a set of agrarian reforms. The second reform we code is the implementation of a law describing the amount needed to exit the feudal relationship of the *Grundherrschaft*, usually in terms of a multiple of annual rents. Laws that only declared the redeemability of land parcels, as implemented by some states early on, had little or no effect, as landlord and peasant would often not agree on the terms of the sale. Instead, laws (*Ablösungsordnungen*) that determined the exact amounts proved to be a crucial precondition for a successful agrarian reform. The first date in brackets indicates the abolition of serfdom, the second date the implementation of a law regulating the redemption of feudal lands.

1. **Rhineland (Prussia).** France abolished serfdom without compensation in 1794; it was enacted only with a decree of 26 Mar 1798; other duties (*Grundrenten*) were redeemable for 15 times the annual value. However, the definition of redeemability caused trou-

- bles, that were partly cleared with a law in 1804. (Lütge, 1963, pp. 204–5) (Dipper, 1980, pp. 50–53) [1798, 1804]
2. **Palatinate (Bavaria).** See 1. [1798, 1804]
 3. **Mark (Prussia).** In the Grand Duchy of Berg, French legislation was introduced on 12 Dec 1808 (abolition of serfdom) and 11 Jan 1809 (abolition of feudal bonds), and led to endless processes about the determination of what was defined as “serfdom” and hence required no compensation. This situation of ambiguity determined that little reform took place. A delegation of peasants even went to Paris, where Napoleon decreed that all duties had to be redeemed at once, which obviously made it an unbearable burden for peasants. The processes were all turned down with a decree of 28 Mar 1812, which effectively put a halt to all agrarian reforms. When the Prussians took over, they recognized the French legislation (and the changes that had taken place up to then), but they continued to suspend all processes until 1825, when a clarifying law was approved. (Lütge, 1963, p. 206) (Dipper, 1980, p. 54) [1808, 1825]
 4. **Westphalia (Prussia).** For the parts belonging to the Grand Duchy of Berg, see above, 3. In the Kingdom of Westphalia, the French abolished serfdom on 23 Jan 1808. The law of 18 Aug 1809 established that all other duties could be redeemed against 25 times their annual value. French legislation ultimately was not successful (among other reasons, because many peasants did distrust the French government). As Prussia took over, they accepted French legislation; the redemption of duties was regulated with successive waves of legislation, the most important of which was the *Ablösungsordnung* of 13 July 1829. (Lütge, 1963, pp. 201–2) (Dipper, 1980, pp. 54–55) [1808, 1825]
 5. **Brunswick.** See 4. for the period under the Kingdom of Westphalia. The Westphalian laws about agricultural reform were revoked in 1818. Finally, the redemption of feudal duties was regulated with the *Ablösungsordnung* of 20 Dec 1834. (Schneider and Seedorf, 1989, pp. 76–77) [1808–1818 and 1834, 1809–1818 and 1834]
 6. **Province of Saxony (Prussia).** For the parts that lay in the Kingdom of Westphalia, see 4. The so-called Duchy of Saxony, i.e. the parts ceded to Prussia from Saxony, had seen no reforms in the Napoleonic period. Prussia abolished serfdom in 1819, and declared feudal duties redeemable with the *Ablösungsordnungen* of 1821 and 1829 (Lütge, 1963, p. 204) [1808, 1809]
 7. **Hesse-Kassel.** For the parts that lay in the Kingdom of Westphalia, see 4. Kurhessen did not recognize French legislation, as opposed to Prussia. It was only on 23 June 1832 when a new law declared all duties to be redeemable (20 times the annual value), and established a bank to give credit to peasants. (Lütge, 1963, p. 219) (Dipper, 1980, p. 81) [1808–1814 and 1832, 1809–1814 and 1832]
 8. **Hanover.** For the parts that lay in the Kingdom of Westphalia, see 4. Like other successor states, Hanover returned to the old system immediately after the fall of Napoleon in 1814. It was only through two laws on 10 Nov 1831 and on 23 Jul 1833 (*Ablösungsordnung*) that serfdom was abolished (again), and duties were made redeemable for 25 times their annual value. (Lütge, 1963, pp. 220–221) (Dipper, 1980, pp. 74–76) (Schneider and Seedorf, 1989, pp. 65–68) (Achilles, 1993, pp. 154–162) [1808–1814 and 1833, 1809–1814 and 1833]
 9. **Baden.** The original territory of Baden (before the fourfold expansion under Napoleon) abolished serfdom (partly) on 23 Jul 1783, reduced feudal duties in 1773 and 1786, and permitted the redemption of duties on 25 Jul 1785. However, scarcely anyone took advantage of these possibilities. In 1820 Baden abolished all remaining duties derived from relations of serfdom or and made payments resulting from feudal relationships redeemable.

Redemption was made easier by two new laws on 28 May 1831 and on 15 Nov 1833, when the a part of duties was abolished and redemption was made easier through financing instruments. (Lütge, 1963, pp. 218–219) (Dipper, 1980, pp. 82–85) [1783, 1820]

10. **Bavaria, Southern half.** In 1779, the first attempt to improve the peasants' situation was made, starting (as in Prussia) with those that were immediate subjects of the King (*landesherrliche Bauern*); they were offered to exchange their variable duties against a fixed rent and the guarantee of inheritability. However, scarcely anyone took advantage of it because of the high required sums. In 1803, in the aftermath of secularisation, peasants that used to be subjects of an ecclesiastical institution were given the chance to redeem properties from the kingdom (that had taken over). In 1808 serfdom was abolished and duties were made redeemable. However, both parties had to agree on redemption, and so, also due to the agrarian depression until the 1830s, little happened. Two laws, on 8 Feb 1825 and on 13 Feb 1826, fixed the amounts needed to redeem annual duties (25 times). (Lütge, 1963, pp. 212–215) (Coing, 1973, pp. 1733–1735) (Dipper, 1980, pp. 89–91) (Achilles, 1993, pp. 143–146) [1808, 1826]
11. **Hesse-Darmstadt.** Duties from serfdom (rather irrelevant in those territories) and feudal bonds were made redeemable (against 20-fold annuity) with laws on 6 Jun 1811 and 13 May 1812 respectively. These laws were enacted more effectively only when the state started mediating between peasants and nobility, which happened only in 1816 in the southern parts (aka Starkenburg and Rheinhessen), in 1827 for the northern part (aka Oberhessen). (Dipper, 1980, pp. 79–80) [1811, 1812]
12. **Saxony.** Saxony did not introduce any reforms at first; however, it should be noted that Saxony was one of the most advanced regions at that time; 77 percent of farmers were on land that was freely inheritable, only one eighth of the population was subject to feudalism (*Grundherrschaft*). Finally, after the revolutionary movements in 1830, a comprehensive law was enacted on 17 Mar 1832 that made all duties redeemable and even created a bank to provide credits. (Lütge, 1963, pp. 219–220) (Coing, 1973, pp. 1737–1739) (Dipper, 1980, pp. 76–79) (Achilles, 1993, pp. 150–154) [1832, 1832]
13. **Schleswig-Holstein.** Here, forms of land tenure varied considerably across the different types of landscapes. A commission propelled a series of reforms from 1768 to 1823, which made S.-H. one of the states with the most advanced agrarian constitutions. While serfdom had already been abolished for several classes of peasants starting in the late 18th century, a generalized abolition occurred, starting from 1 Jan 1805, only with the law of 19 Dec 1804. This law also regulated the purchase of land from the lords, or alternatively the peasants' claims. (Coing, 1973, p. 1741) (Brandt, 1976, pp. 208–209) (Dipper, 1980, pp. 71–74) [1805, 1805]
14. **Württemberg.** Serfdom was abolished in 1817; feudal duties were declared redeemable with the same edict of 18 Nov 1817. No clear rules were set for redemption, though, until the laws of (*Ablösungsordnung*) 27, 28 and 29 Oct 1836. (Lütge, 1963, pp. 216–217) (Coing, 1973, pp. 1735–1736) (Dipper, 1980, pp. 85–88) (Achilles, 1993, pp. 146–150) [1817, 1836]
15. **Brandenburg (Prussia).** *Domänenbauern*, i.e. peasants serving the king directly, were “liberated” (given inheritable rights) in 1799. The edict of 9 Oct 1807 was the radical turning point for Prussia under Napoleon's threat. It promised, among other things, the abolition of feudal bonds (*Gutsuntertänigkeit*), starting in 1810. However, the definition of what was meant with “feudal bonds” was given only in 1809, and an edict on 14 Sep 1811 finally defined how to proceed: peasants subject to *Laßrecht* (which means they were given a concession to farm the land, a concession

that could be revoked anytime) were given the property of their land if they ceded one third of it to the feudal lord. This process was interrupted from 1812-15 because of the wars, and resumed with a declaration of 29 May 1816. However, Lütge (1963, pp. 192–195) notes that peasants started reforming their farms, improving their conditions etc. already after 1811. Laws from 1821 regulated the liberation of peasants within the system of *Grundherrschaft*, i.e. those that were already guaranteed the heritability of their land lease, who could now liberate themselves from their duties against a compensation payment of 25 times the annual duty. (Lütge, 1963, pp. 190–200) (Dipper, 1980, pp. 62–66) (Achilles, 1993, pp. 134–143) [1811, 1821]

16. **East Prussia (Prussia).** *Domänenbauern*, i.e. peasants serving the king directly, were “liberated” (given inheritable rights) in 1763. For the remaining aspects of agrarian reforms, see 15. [1811, 1821]
17. **Pomerania (Prussia).** *Domänenbauern*, i.e. peasants serving the king directly, were “lib-

erated” (given inheritable rights) in 1799. For the remaining aspects of agrarian reforms, see 15. [1811, 1821]

18. **Silesia (Prussia).** *Domänenbauern*, i.e. peasants serving the king directly, were “liberated” (given inheritable rights) in 1807. For the remaining aspects of agrarian reforms, see 15. [1811, 1821]
19. **Mecklenburg-Schwerin.** The territories of Mecklenburg (M.-Schwerin and M.-Strelitz) are considered the archetype of resistance to reform. At the same time, however, they had one of the most advanced and productive forms of agriculture, with large farms. This was the result of a long period of peasant migration and abandonment of farms, that led to consolidation. Serfdom was finally abolished in 1820. Other feudal duties (for those peasants that were subjected to knights) were declared redeemable in 1862 in M.-Schwerin, but freeing peasants was not mandatory. (Coing, 1973, pp. 1741–1743) (Dipper, 1980, pp. 69–71) [1820, 1862]

F.4 Guilds

We code the year in which the regulation of crafts through the requirement of membership in a guild was abolished. This so-called *Gewerbefreiheit* (“freedom of commerce,” including the abolition of guilds) often coincided with equivalently liberal granting of concessions to set up manufacturing activities. For those states that did not liberalize before, the abolition of guilds came through the *Reichsgewerbeordnung* of 1869, extended to the whole German Empire in 1871.

1. **Rhineland (Prussia).** For the Rhineland, incorporated into France, the French decrees of 8, 15 Mar 1790 and 17 Mar 1791 effectively meant the abolition of guilds. This situation was maintained by Prussia. (Mascher, 1866, p. 492) (Wernet, 1963, pp. 201, 205) [1795]
2. **Palatinate (Bavaria).** See above, 1. The liberalization was maintained under Bavarian rule. (Coing, 1973, pp. 3576-2577) [1795]
3. **Mark (Prussia).** Guilds were abolished and crafts liberalized in the Grand Duchy of Berg in a decree on 31 Mar 1809. This situation was maintained by Prussia. (Mascher, 1866, p. 492) (Wernet, 1963, p. 205) [1809]
4. **Westphalia (Prussia).** For the parts belonging to the Grand Duchy of Berg, see above, 3. Guilds were abolished and crafts liberalized in the Kingdom of Westphalia through two decrees, of 5 Aug 1808 and 12 Feb 1810. Prussia maintained the liberalizations after it took over, but also kept the guilds system in parts of the province, notably the former Duchy of Westphalia (under Hesse-Darmstadt in Napoleonic times). (Mascher, 1866, p. 497) (Wernet, 1963, p. 205) [1809]

5. **Brunswick.** For the period under Westphalian rule, see 4; reversion in 1815. Liberalization starting on 3 August 1864. (Mascher, 1866, p. 636) (Wernet, 1963, p. 205) (Coing, 1973, p. 3601) [**1808–1815, 1864**]
6. **Province of Saxony (Prussia).** For the parts that lay in the Kingdom of Westphalia, see 4. Prussia maintained the liberalizations after it took over, but also kept the guilds system in parts of the province, notably the territories ceded by (the Kingdom of) Saxony, Erfurt, and the areas East of the Elbe. (Mascher, 1866, p. 497) (Roehl, 1900, pp. 173–186) [**1809**]
7. **Hesse-Kassel.** For the parts that lay in the Kingdom of Westphalia, see 4. Reintroduction of guilds on 5 Mar 1816. Varied situation, with areas where guilds had been abolished, and others where they were still in place. Final liberalization through the *Reichsgewerbeordnung* in 1869. (Mascher, 1866, pp. 496, 644–645) (Coing, 1973, p. 3582) [**1808–1816, 1869**]
8. **Hanover.** For the parts that lay in the Kingdom of Westphalia, see 4. Reintroduction of guilds in 1815. An intended, liberalizing law of 1847 had no effect because of the revolution of 1848. Final liberalization through the *Reichsgewerbeordnung* in 1869. (Mascher, 1866, pp. 496, 648) (Wernet, 1963, p. 206) [**1808–1815, 1869**]
9. **Baden.** Either guilds or concessions needed until full liberalization of 15 Oct 1862 (law of 20 Sep 1862). (Mascher, 1866, p. 625) (Coing, 1973, p. 3588) [**1862**]
10. **Bavaria, Southern half.** Strict concession-based system through a law of 11 Sep 1825 (originally intended to be a liberalization, but interpreted very strictly); very high entrance fees. Abolition in 1868. (Mascher, 1866, pp. 649–660) (Coing, 1973, pp. 3575–3576) (Georges, 1993, p. 36) [**1868**]
11. **Hesse-Darmstadt.** Partial freedom of commerce: in the province Oberhessen, 20% of craftsmen belonged to a guild, in the province Starkenburg, 58% (according to Mascher, 1866, p. 645). Full liberalization only through the law of 16 Feb 1866. (Coing, 1973, p. 3581) [**1866**]
12. **Saxony.** Schmoller (1870) reckons that the legislation was rather liberal, but no formal liberalizations until the law of 9 Dec 1840, which eased the conditions for craftsmen in the countryside. Full liberalization starting on 1 Jan 1862 (law of 15 Oct 1861). (Mascher, 1866, pp. 616–617). (Coing, 1973, p. 3591) [**1862**]
13. **Schleswig-Holstein.** Guilds continue to exist and have privileges until 1867. (Mascher, 1866, p. 661) (Lorenzen-Schmidt, 1996, p. 386). [**1867**]
14. **Württemberg.** Liberalization of 13 out of 57 professions in 1828, classic guilds remained in power generally until full liberalization starting of 1 May 1862 (law of 12 Jan 1862). (Mascher, 1866, p. 622). (Coing, 1973, pp. 3585–3586) [**1862**]
15. **Brandenburg (Prussia).** Liberalization starting with the law of 2 November 1810. The decree of 8 Feb 1849 reintroduced the examination for master craftsmen, but fell short of making the participation in a guild mandatory. (Mascher, 1866, pp. 487–489) (Wernet, 1963, pp. 204–206) (Coing, 1973, pp. 3558–3569) [**1810**]
16. **East Prussia (Prussia).** See above, 15. [**1810**]
17. **Pomerania (Prussia).** See above, 15. [**1810**]
18. **Silesia (Prussia).** See above, 15. [**1810**]
19. **Mecklenburg-Schwerin.** Guilds continue to exist and have privileges. Liberalization only through the *Reichsgewerbeordnung* in 1869. (Mascher, 1866, p. 660) (Mast, 1994, p. 153). [**1869**]

G Appendix: Additional Regressions (NOT FOR PUBLICATION)

In this section we explore alternative definitions of the reforms index used in section 4 to estimate the two-stage least squares models. Column (1) of Table Appendix 1 uses a wider definition of “Presence of a written civil code,” including also the Prussian and Bavarian codices of 1794 and 1756 respectively. This change increases the score of the reforms index for five territories in the control area (Bavaria and the four provinces of Prussia east of the Elbe) and for three territories in the treatment area (Mark, Westphalia, and the Province of Saxony, all of which abandoned the French civil code in favor of the ALR after 1815). The OLS estimate is now smaller (and weaker) than in the baseline case of Table 6, column (1); however, the IV estimate does not differ substantially.

Columns (2)–(6) eliminate one reform at a time from the definition of the reforms index (column (5) eliminates both reforms relating to the agricultural sector). This explores the robustness of the index to the exclusion of some items. In fact, both the OLS estimates in Panel A and the 2SLS estimates in Panel C are very similar to the baseline case of of Table 6, column (1), providing evidence that the results do not depend on the coding of one single area of reforms.

Table Appendix 1: Urbanization in Germany, Alternative Definitions of Reforms

	Dependent variable: Urbanization rate					
	incl. ALR and Cod. Max. (1)	incl. "Civil Code" (2)	incl. "Serfdom" (3)	incl. "Ag. Reform" (4)	incl. "Ag. R." and "Serfdom" (5)	incl. "Guilds" (6)
Panel A: OLS estimation						
Reforms Index	0.157 [0.137]	0.248 [0.173]	0.265 [0.0806]	0.253 [0.0969]	0.219 [0.0594]	0.282 [0.143]
Panel B: First Stage						
French Presence * Post1800 * Trend	0.994 [0.211]	0.995 [0.0899]	1.399 [0.106]	1.320 [0.127]	1.747 [0.143]	0.950 [0.157]
F-statistic excluded instruments	22.24	122.5	173.6	108.6	149.1	36.67
p-value F-statistic	0.000	0.000	0.000	0.000	0.000	0.000
Panel C: 2SLS estimation						
Reforms Index	0.341 [0.151]	0.341 [0.136]	0.242 [0.0811]	0.257 [0.0891]	0.194 [0.0636]	0.357 [0.123]
Observations	74	74	74	74	74	74
Number of States	13	13	13	13	13	13

Notes: All regressions have full set of territory and year dummies. Robust standard errors, clustered by territory. All regressions are weighted by territories' total population in 1750.

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