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## Railways and Reform: How Trains Strengthened the Nation State

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# STANCE

State-Making and the Origins of Global Order  
in the Long Nineteenth Century and Beyond

## Railways and Reform: How Trains Strengthened the Nation State

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Lindvall

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## RAILWAYS AND REFORM: HOW TRAINS STRENGTHENED THE NATION STATE

ABSTRACT. We examine the relationship between the coming of the railways, the expansion of primary education, and the introduction of national school curricula. Using fine-grained data on national school inspectors in Sweden in the nineteenth century, we compare education outcomes in localities that school inspectors could travel to easily with more remote localities. Our findings provide support for the argument that the development of the national railway network enabled school inspectors to monitor remote schools more effectively. In localities that were connected to the railway network, a larger share of children attended school and took classes in state-building subjects such as geography and history. By contrast, the interests of local and religious authorities continued to dominate in remote areas. The railway, one of the defining technological innovations of the First Industrial Revolution, thus had a direct effect on state capacity: the state's ability to enforce public policies.

Modern technology has changed how states are governed. We know this because great scholars have told us so. The political scientist Samuel Finer wrote in his magnum opus *The History of Government* (1997a, Book III, 1610–1618) that the development of the modern state in the nineteenth century was only possible because of technological changes associated with the Industrial Revolution. A few years earlier, the sociologist Michael Mann observed in *his* magnum opus, *The Sources of Social Power* (1993), that the increase in the state's “infrastructural power” in the nineteenth and twentieth centuries was a consequence of new technologies that allowed the state to penetrate civil society, including, as Mann observed in an article from the 1980s, new means of transport and communication, such as “improved roads, ships, telegraphy,” and administrative practices made possible by high levels of literacy, “enabling stabilized messages to be transmitted through the state's territories” (Mann 1984). Long before that, in the 1960s, the economist John Hicks noted that new technologies have had profound effects on public administration: “Modern governments, one would guess, overuse the aeroplane,” Hicks wrote in his *Theory of*

*Economic History*, “but where would they be without the telephone—and the typewriter?” (Hicks 1969, 99).

Beyond such general observations, however, there are remarkably few empirical studies of the political effects of specific technological innovations (one important exception being the literature on the effects of military innovations on the conduct of war and foreign policy). In this paper, we examine the relationship between one of the defining technological innovations of the First Industrial Revolution—the railway—and one of the most momentous social and political changes of the nineteenth century—the expansion of primary education and the introduction of national school curricula (Aghion, Persson, and Rouzet 2012; Benavot et al. 1991; Benavot and Riddle 1988; Lindert 2004; Meyer, Ramirez, and Soysal 1992; Soysal and Strang 1989). We combine geographic-information-system data on the extent of the Swedish railway network in the second half of the nineteenth century with fine-grained, official data on the provision of primary education in different localities in the year 1868, allowing us to examine the effect of railway access not only on the provision of education per se, but also on the content of the curriculum.

Our empirical findings provide strong support for the idea that the development of the railway network enabled national school inspectors to monitor schools in remote localities more effectively, strengthening the implementation of national school policies. In remote localities without railway access, local and religious authorities continued to dominate. The coming of the railway thus had a direct impact on state capacity, which has been defined as the “government’s ability to make and enforce rules, and to deliver services” (Fukuyama 2013, 350), the “institutional capability of the state to carry out various policies” (Besley and Persson 2011, 6), and the “degree of control that state agents exercise over persons, activities, and resources within their government’s territorial jurisdiction” (McAdam, Tarrow, and Tilly 2001, 78; cf. Soifer 2015).

National and local authorities disagreed over the provision of public education since the national government wanted local authorities to pay for permanent public, or “popular,” schools (*folkskolor*), whereas local authorities tended to prefer less expensive ambulatory schools,

or even home schooling, since schools were funded by local taxation and rural voters wanted their children to be available for farm work. Moreover, national and local authorities disagreed on the content of the curriculum. The reason was that national-local conflicts were also state-church conflicts. The modernizing nation state wanted to mold children into loyal citizens by teaching subjects such as geography and history, whereas local priests most of all wanted children to learn the Lutheran Catechism.

One factor that mattered greatly in the development of the curriculum was that many of the first national school inspectors were themselves priests. Since we are interested in estimating the combined effect of the coming of the railway and the supply of school inspectors who were loyal to the nation state, some of our analyses combine fine-grained *geographical* data with fine-grained *biographical* data on each individual school inspector in Sweden in the 1860s.

## TRAINS AND THE NATION STATE

As Lipset and Rokkan (1967) observed long ago, the struggle between the “centralizing, standardizing, and mobilizing *Nation-State*” and the “historically established corporate privileges of the *Church*” was one of the nineteenth century’s defining political conflicts, and “the fundamental issue between church and state was the *control of education*” (Lipset and Rokkan 1967, 14–15, emphasis in original).

We argue in this paper that in the second half of the nineteenth century, new technologies, associated with the First Industrial Revolution, shaped these political struggles between modernizing elites in national capitals and conservative, often religious authorities in the periphery. The reason is simple: the new technologies allowed the nation state’s agents to travel more easily.

Mobility had this effect in the area of schooling since church–state conflicts were also local–national conflicts. The “school wars” of nineteenth- and early-twentieth-century Europe did not only involve the question of secularization (whether the responsibility for primary education should be shifted from religious authorities such as parishes and



dioceses to secular bureaucracies), but also the question of centralization (whether schools should be administered by local or regional authorities, or directly by the central government). The famous French school reforms of the 1880s, the “Ferry Laws,” are a particularly clear example, for when the French Republican government introduced legislation that made education secular—deepening the conflict between the French state and the Catholic Church that ended with the adoption of the Law of December 9, 1905 concerning the Separation of the Churches and the State—they also made the central government financially and administratively responsible for primary education.

It is a curious fact that these sorts of conflicts over the centralization of primary education only began in earnest in the second half of the nineteenth century (Ansell and Lindvall 2013), even if the latent conflict between modernizing elites in national capitals and conservative religious authorities in Europe’s peripheries existed well before that time. The first Western European government that sought to establish a fully centralized education system—a liberal government in Belgium—did so in the 1870s. The French followed in the 1880s. Until that time, all school systems in Western Europe were governed locally.

In our view, the best explanation for the increasing salience of local–national conflicts in the second half of the nineteenth century is that before the construction of the railways, national governments were simply unable to establish the direct control over the periphery that is required to run something as complicated as a school system. In other words, without modern technology, state capacity was too low to centralize—and secularize—education.<sup>1</sup>

This paper describes the effects of the railway on the first stages of the centralization of the Swedish school system, in the 1860s. Sweden is a hard case for our theory since it should be particularly difficult to detect an effect of the railway on local–national and church–state conflicts in a country where those conflicts were generally weak. Conflicts over education were most pronounced in Catholic and mixed-Catholic-and-Protestant countries, not in Lutheran Northern Europe. By demonstrating an effect of the railway in Sweden, our paper thus provides a great deal support for the idea that trains strengthened the

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<sup>1</sup>Not coincidentally, Belgium was an early adopter of the railway, its first railway line opening already in 1835.

nation state—while casting doubt on Lipset and Rokkan’s assertion that in Lutheran countries, “established national churches simply became agents of the state” as early as the seventeenth century (1967, 15).

#### SWEDISH SCHOOL INSPECTORS IN THE 1860S

Sweden’s nationwide compulsory public school system was established in 1842, when parliament, the Diet of the Estates, adopted the Education Ordinance, *folkskolestadgan*. Under the Education Ordinance, primary schools were funded and administered by local governments, which were, at the time, coextensive with the parishes of the established church (*socknarna*). Nevertheless, in the second half of the nineteenth century and the beginning of the twentieth, the Swedish school system underwent a process of centralization and secularization (Tegborg 1969). One event that mattered greatly in this process was the introduction of national school inspectors in 1861. Before 1861, schools were inspected by local authorities sorting under the parishes. Starting in 1861, the state sought to increase its control over local schools through the new school inspectorate.

As Thelin (1994) notes, the inspectors were meant to be the “government’s eyes in the parishes.” They were selected from the region in which the inspected school districts were located. The idea was to appoint individuals whose reputation was good enough to ensure that their inspections were not met with “a contemptuous grin” among local decision-makers and teachers (Thelin 1994, 14–15).

When the first school inspectors were appointed, the Ministry of Education relied on Sweden’s bishops for suggestions about suitable individuals. This practice was criticized by the county councils—Sweden’s regional political bodies—who petitioned parliament, without success, for more control over appointments. Thelin (1994) cites an 1864 article in *Skolvännen*, the chronicle of the school-teacher association in Sweden’s second city, Gothenburg, which asked, rhetorically, whether school inspectors who were themselves priests would really be willing to stand up to the priests who governed local schools, who might be their old friends from the church seminaries. Our statistical analyses suggest that these suspicions were warranted.

School inspectors were expected to visit local schools regularly. They promoted adherence to the Education Ordinance, inspected the school facilities, and advised teachers on how to improve their teaching methods. From time to time, inspectors taught their own classes. Starting in 1864—a few years before the period we examine—inspectors were also expected to examine all students once per semester. Anecdotal evidence suggests that the school inspectors were widely feared. Thinking back to his childhood in the late nineteenth century, the son of one station master at the railways remembered that as soon as the school inspector had exited the train station, “my father promptly ran to the telephone to warn the schools of his arrival” (Thelin 1994, 157).

Each year, the inspectors submitted exhaustive reports from their travels to the Ministry of Education in Stockholm. Many of the reports complained about considerable local resistance to the policies and ambitions of the national government. This resistance resulted from two different conflicts of interest between local and national authorities.

First of all, there was a conflict of interest over the provision of primary education *per se*, for parents were often reluctant to release their children from what they saw as more important work around the home, and tax payers were often reluctant to pay for teachers and school buildings. Where resources were thin and resistance was great, local authorities preferred to set up ambulatory schools, as a cheaper, temporary alternative to constructing permanent school buildings and employing teachers on regular contracts. The inspectors fought the ambulatory schools energetically, but this school form did not disappear entirely until the 1940s (Ekholm and Lindvall 2008).

Second, there was a conflict of interest between national and local authorities over the content of the curriculum. § 6 of the 1842 Education Ordinance provided that all teachers must be able to teach the Catechism of the Lutheran church, biblical history, natural and political geography, history, arithmetic, geometry, and natural sciences. In addition, writing, drawing, physical education, and singing were taught.<sup>2</sup> But § 7 of the Education Ordinance provided that children did not have

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<sup>2</sup>History was referred to as the “history of the homeland as well as the basics of general history” (*fäderneslandets historia och hufvuddragen af allmänna historien*); the emphasis was on the first part.

to pass exams in all these subjects—they were still allowed to graduate if they had enough knowledge in the Swedish language, sufficient knowledge of biblical history and the Catechism to be confirmed in the Lutheran church, and adequate skills in arithmetic, writing—and, except in truly hopeless cases, singing.<sup>3</sup>

As previous historical scholarship has shown, many local priests held the view that all children needed was enough knowledge of the Catechism and biblical history to be confirmed—or, in other words, that the basic knowledge and skills specified in § 7 of the Education Ordinance were enough. The national school inspectors, on the other hand, had a broader concept of learning. They sought to convince local priests, teachers, and school boards, to teach subjects related to civil citizenship, especially geography and history, as opposed to religion only (Evertsson 2012).<sup>4</sup>

## RESEARCH DESIGN, DATA, AND METHODS

The argument behind our idea that trains strengthened the nation state is simple: where school inspectors were able to travel more easily, they were better able to enforce national policies, ensuring that children attended permanent, regular schools and were taught subjects such as geography and history in addition to basic skills and the Catechism. To test this idea, we conduct an empirical investigation of official data from 1868—a decade and a half after the parliament’s 1854 decision to create a national railway network and a few years after the 1861 decision to appoint national school inspectors for all school districts.

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<sup>3</sup>In Swedish, “a) ren och flytande innanläsning af Swenska språket, så Latinsk som Svensk stil; b) Relionskunskap och Biblisk Historia, till den grad, som erfordras för att kunna hos Presterskapet börja den egentliga Nattwardsläsningen; c) Kyrkosång, med undantag för dem, som dertill sakna allt anlag; d) skrifwa; och e) de fyra Räknesätten i hela tal. Skol-styrelsen äge att bestämma den skillnad, som i hänseende till kunskapsfordringarna lämpligen må göras mellan gossar och flickor.”

<sup>4</sup>Because of the nation state’s demand for military recruits, the school inspectors also sought to improve physical education, and frequently complained that teachers lacked adequate training in this area. Local funding for wooden dummy rifles for military exercises was often deemed insufficient. One official publication noted: “De hinder, som möta deras utveckling, äro dels lärarnes bristande kännedom, dels äfven på vissa ställen obenägenheten att bekosta erforderligt antal trägevär.” (Statistiska Centralbyrån 1870, 15.)

In 1868, detailed data on education outcomes were compiled for each of the 174 “deaneries” of the Swedish church. The deanery, or *kontrakt*, is a level of church governance between the parish (the lowest level) and the diocese (the seat of a bishop). Our investigation is based on a cross-sectional comparison of 170 deaneries (we exclude four deaneries for reasons that we explain below).

In 1868, the Swedish railroad network was still in its infancy. Beginning in 1856, a first wave of state-sponsored trunk lines was built. The original plan of the network, which was proposed by the engineer Nils Ericson in 1856, consisted of five main trunk lines from north to south, connecting the entire country. Because of military concerns, however, and because of a desire to stimulate economic development in backward areas away from the more prosperous coasts, the network was routed through the interior of the country, avoiding many important towns and transport hubs. This plan did not impress the local representatives in the parliament—many of whom saw their home towns bypassed by the railway lines—so it was rejected by parliament due to its allegedly irrational “fear of waterways and towns” (Heckscher 1954, 241). Subsequent political infighting delayed railroad development construction. Hence, by 1868, there was a network of railroads that connected the three largest population centers—Stockholm, Gothenburg and Malmö (with the exception of a gap shown in Figure 2)—but many important parts of the country remained unconnected for decades.

Figure 1 describes the network in the year 1868. The figure also demonstrates that many of the areas through which the railways were drawn were not particularly prosperous (darker colors represent high levels of gross domestic product per capita) and that many cities remained unconnected. We mention these facts since it alleviates the concern that any observed correlations between railway access and education outcomes might be a result of underlying differences in prosperity and urbanization. Berger and Enflo (2017) show more formally that the early development of the Swedish railroad network was not a function of the level of economic development in different localities.

We must acknowledge, however, that the railway network was not *entirely* independent of previous economic structures, for the three main cities—Stockholm, Gothenburg, and Malmö—were the first to get a

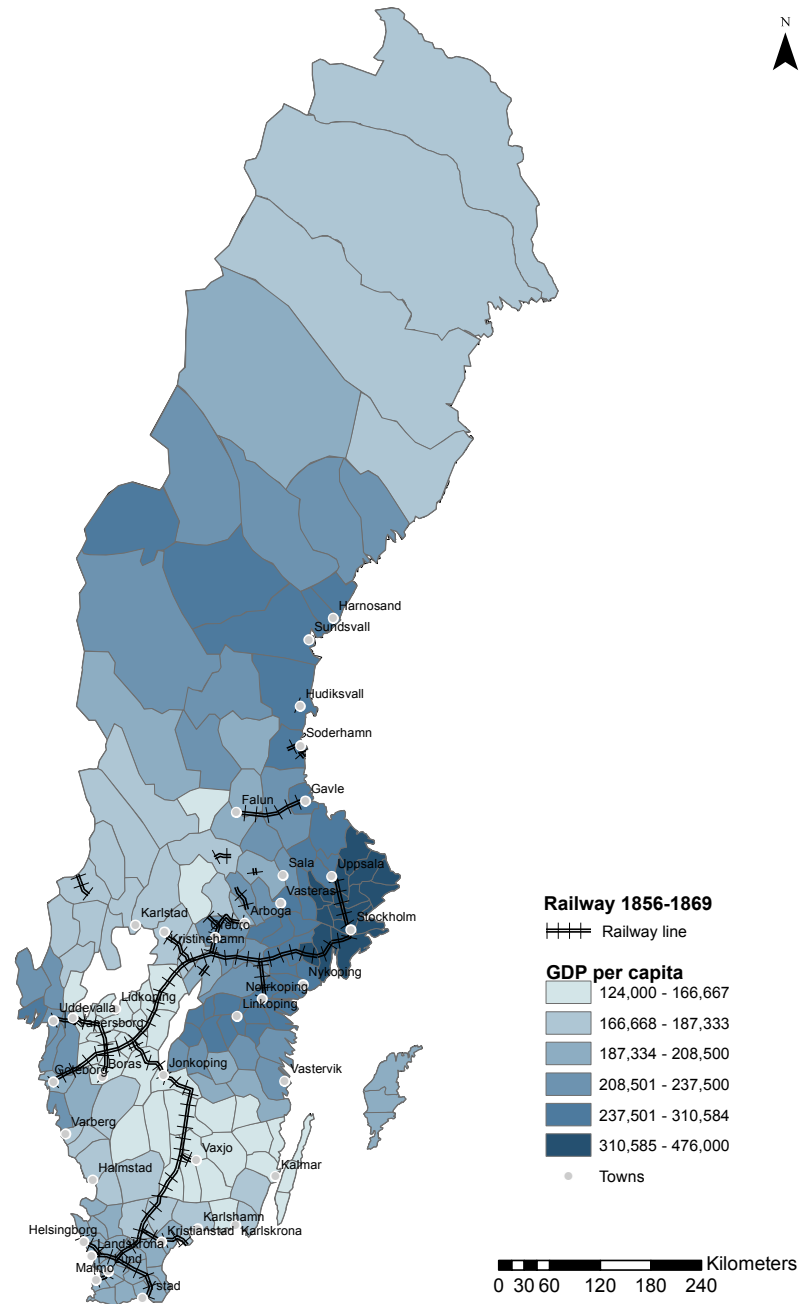


FIGURE 1. Railways, Cities, and GDP per Capita

rail connection. We therefore drop the deaneries covering these three cities from our analysis, to reduce the likelihood of biased results due

to endogeneity. In fact, the national school inspectors did not even inspect the schools in the two largest cities, Stockholm and Gothenburg. In the case of the capital, Stockholm, the city’s school board arranged its own inspections, and reported directly to the government.<sup>5</sup> In the case of Gothenburg, the school inspector responsible for the deaneries of Kind, Falkenberg, and Halmstad was formally responsible also for Gothenburg, but did not carry out inspections, relying instead on a report prepared independently by city authorities. Due to a border change in the diocese of Linköping, we are also forced to drop the deanery of Lysing from our sample, which leaves us with a sample of 170 deaneries for the analysis.

In parts of the country that were connected to the railroad network by 1868, travel times were reduced dramatically—up to ten times on many routes (Sjöberg 1956). Travelling between the two largest cities, Stockholm and Gothenburg, had previously taken several days, involving frequent stops and changing modes of transportation; the railroad made this journey possible to undertake in a single day.

Since each inspection report provides information about the location of the inspector when the report was filed, and since there is every reason to believe that these locations were the home addresses of the inspectors, we are able to describe the travel options for the inspector of each deanery with high precision. We distinguish between (a) deaneries to which the inspector could travel relatively easily even without taking the train, (b) deaneries that were further away but reachable by train, and (c) remote deaneries without railroad access. On this basis, we have constructed two dummy variables that we use to estimate the effect of the railroad network on education outcomes. The first dummy variable takes the value 1 if the inspector was close enough to a deanery to get there and back in less than a day using ordinary means of transportation, such as walking, riding, or travelling in a horse-drawn carriage. We call this dummy variable “Possible to walk or ride.” To be more specific, it takes the value 1 if the inspected deanery’s polygon centroid is within a straight-line distance that is possible to cover within a day’s travel from the exact location of the school inspector; otherwise it takes the value 0. Here, we follow previous research on

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<sup>5</sup>See “Berättelse om Folkskolorna i Stockholms stad. Till Kongl. Maj:t i underdånighet afgifven af Öfver-Styrelsen för stadens folkskolor.”

Swedish market towns in assuming that 65 kilometers was the maximum distance a horse-drawn cart could travel in a day (Bergenfeldt 2014, 131–133). Adding the assumption that an inspector would want to return to his home within a day, we categorize deaneries within a 32-kilometer straight-line from the exact location of the school inspector as possible to reach fairly easily. The second dummy variable is called “Railroad connection.” This variable takes the value 1 if the deanery’s centroid is further away from the inspector than a day’s travel by other means and (a) the inspector could reach a rail connection within 32 kilometers from his home that got him directly to the inspected deanery, or (b) the inspector lived close to a railway station and could travel by train to a station within 32 kilometers from the inspected deanery. Our expectation is that the effects of these dummy variables will be similar in magnitude (relative to the reference category, which is remote deaneries that were not possible to reach by train).

In Figure 2 we explain the construction of these variables by using the example of Peter Wingren, a school inspector who lived in the city of Lund in 1868. Inspector Wingren was responsible for inspection of six deaneries in the diocese of Lund (but unfortunately not the one in Lund itself, where he lived, since it was the responsibility of another inspector who also lived in Lund). He could reach three of these deaneries by horse or carriage: Skytts, Wernmenhögs, and Oxie (note that Oxie, which was also reachable via the new railway, includes the city of Malmö, and is thus excluded from our analyses). The other three deaneries were further away, but Inspector Wingren was luckier than other inspectors, for he could use the railroad to reach two of them—the Luggude deanery and the Ljunits och Herrestads deanery—even if he first had to use other means of transport to get to the railway station 15 kilometers away (the West-East railway line between Helsingborg and Ystad did not yet have a direct connection to Lund’s central station). Unfortunately, it was not easy for Inspector Wingren to reach Södra Åsbo, which was located 44 kilometers from his home in Lund.

For some of our analyses, we have also collected biographical data on each of the national school inspectors in Sweden in the year 1868, relying on biographies compiled in Paradis (1956). We have divided the school inspectors into two groups: those who were ordained as priests,



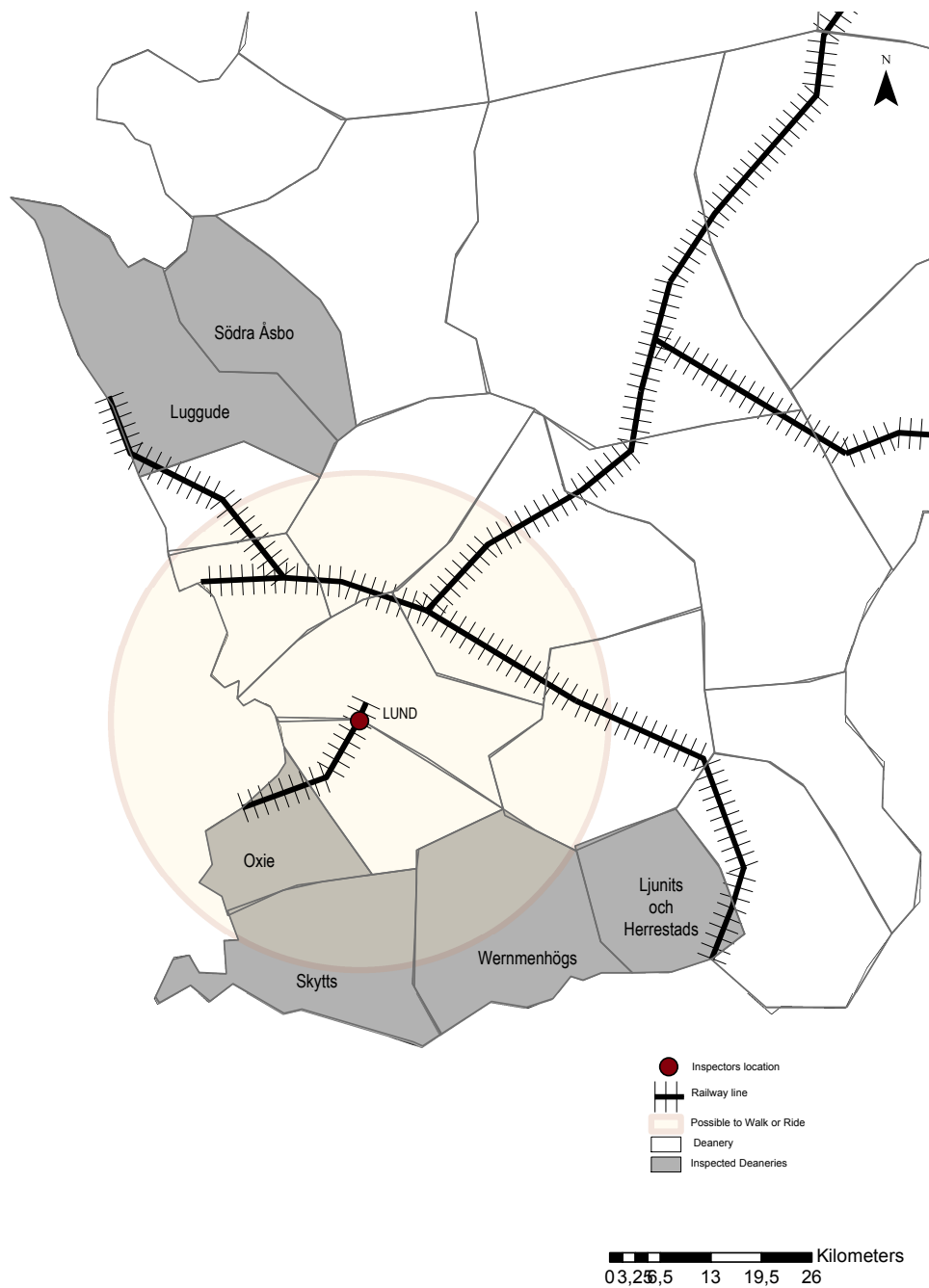


FIGURE 2. Inspector Wingren's Travels

and those who were not, expecting that when it came to the content of the curriculum, inspectors who were themselves priests had views that

were more similar to the views of local priests than inspectors who were not priests.<sup>6</sup>

When it comes to the outcome variables we are interested in—the provision of education and the content of the curriculum—we collect data from official sources (Statistiska Centralbyrån 1870) on the share of children being educated in different types of schools and in different subjects in the year 1868. For the year 1868, detailed data are available on the number of students in different forms of schooling, attendance rates, and the actual curriculum at the schools in each deanery. Unfortunately, data were not reported in this detailed form either before 1868 or after. Consequently, we only have access to a cross section of the deaneries in the year 1868. In the absence of detailed panel data, we are fortunate to have data from this particular year, however, for the railway network had not yet been extended to all the major towns and cities, which means that our main explanatory variable varies across all types of localities. Moreover, by 1868, the national school inspectorate had only existed for a few years, which allows us to study the tension between national authorities and local, religious authorities at an early stage of this political struggle.

We collect two types of data: the share of children in each locality receiving education in different types of schools (to test the effect of the railroad on the provision of education per se) and the number of children who received teaching in each subject (to test the effect of the railroad on the content of the curriculum).

As we discussed above, there was a conflict of interest between local authorities and national school inspectors concerning both of these outcomes, but the content of the curriculum was a particularly sensitive matter when it came to the conflict between religious and secular authorities. In the part of the analysis that is concerned with the curriculum, we therefore make use of the biographical data, distinguishing

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<sup>6</sup>There are a few ambiguous cases. For example, for the deaneries highlighted in Figure 2, there were two school inspectors, one of whom was ordained as priest, and one who was not (Peter Wingren, whom we discussed earlier). Since Wingren seems to have carried out the inspections—before taking up a new position in Karlstad on October 3, 1868—we have coded the school inspector in Lund as *not* a priest. We are grateful to the genealogist Josefine Nilson, who provided us with these details on Wingren. Another inspector, G. E. Psilander, was not ordained as priest, but had a clerical degree, *pastoralexamen*, and later served as a priest, so we counted him as a priest rather than a non-priest.

TABLE 1. Types of Schooling, 1868

School form	Percent
Popular school	55
<i>Permanent</i>	30
<i>Ambulatory</i>	25
Elementary school	24
Home school	15
Other school	4
Untaught	2
Source: Statistiska Centralbyrån (1870).	

between school inspectors who were themselves priests, and school inspectors who were not (the second group consisted mainly of teachers, schoolmasters, and professors at teacher colleges).

Concerning the number of children attending different types of schools (Table 1), we distinguish between the main form, popular schools (*folkskolor*, which could be either permanent and ambulatory), and other forms: elementary schools (*småskolor*), home schooling, and other institutions, including private schools. The residual category consists of untaught school-age children with no schooling at all.<sup>7</sup>

Concerning the relative importance of the different subjects that are listed in paragraph 6 of the Education Ordinance, official statistics for the year 1868 report the number of children that were taught each of these subjects. Unfortunately, we do not have information about how many hours the students were taught in each subject. Instead, the inspectors only took note of the number of students that had, at some point during the semester, received education in each of the subjects. Since the Catechism was taught to virtually all students, we compare the number of students who received education in each other subject to the number of students that were taught about the Catechism.

<sup>7</sup>The elementary schools were usually staffed by less educated female teachers and were introduced in 1858 as a response to demands for more preparatory schooling for children who had not yet entered the popular schools. In the subsequent statistical analysis, we will omit the elementary schools since they were not the primary target of the school inspectors.

## THE PROVISION OF EDUCATION

The first of the two main ideas we wish to test is that having a school inspector who could travel via the railway network increased the provision of schooling *per se* in remote localities. The idea is not that the railway increased the likelihood that students made it to school, for students did not travel far to go to school: statistics from 1868 suggest that the number of children who walked more than half a mile to get to school was only 9.4 percent in deaneries that were not connected to the railway network and 13.2 percent in deaneries that were. Our idea is rather that the presence of a school inspector who could get easily to the inspected schools increased the likelihood that education was provided in the favored form of permanent popular schools.

For descriptive evidence, see Figure 3, which shows that the proportion of children who attended permanent popular schools was typically higher in areas that were close to the first railways. See also Figure 4, which provides information about the percentage of children in all forms of schooling in the year 1868 (note that the bars do not sum to 100 since “permanent” schools are a subcategory of “popular” schools). The share of school-age children who went to popular schools was approximately 4 to 5 percent higher in deaneries that the school inspector could get to easily than in deaneries that were remote and had no railway connection. Deaneries that the inspector could walk or ride to and deaneries with a railway connection had similar outcomes, suggesting that the railway compressed time and space by allowing inspectors to monitor remote deaneries as effectively as if they had been able to get there by foot or by horse. When it comes to the share of children in *permanent* popular schools, the differences are even more stark. Here, we find that the share was as much as 10 percent higher if the inspector could get to the inspected schools easily.

Our research design relies on the assumption that the development of the railroad network in 1868 was largely independent from the previous level of economic development in connected localities, as suggested by Figure 1. However, it is easy to think of other potential confounders that one should control for. We now proceed to include those confounders in a regression analysis.

First of all, we control for local economic development, in spite of the evidence in Figure 1. If railroad lines were at least in some cases drawn through richer or faster-growing areas, a higher level of demand for education in some regions might be caused by those innate economic

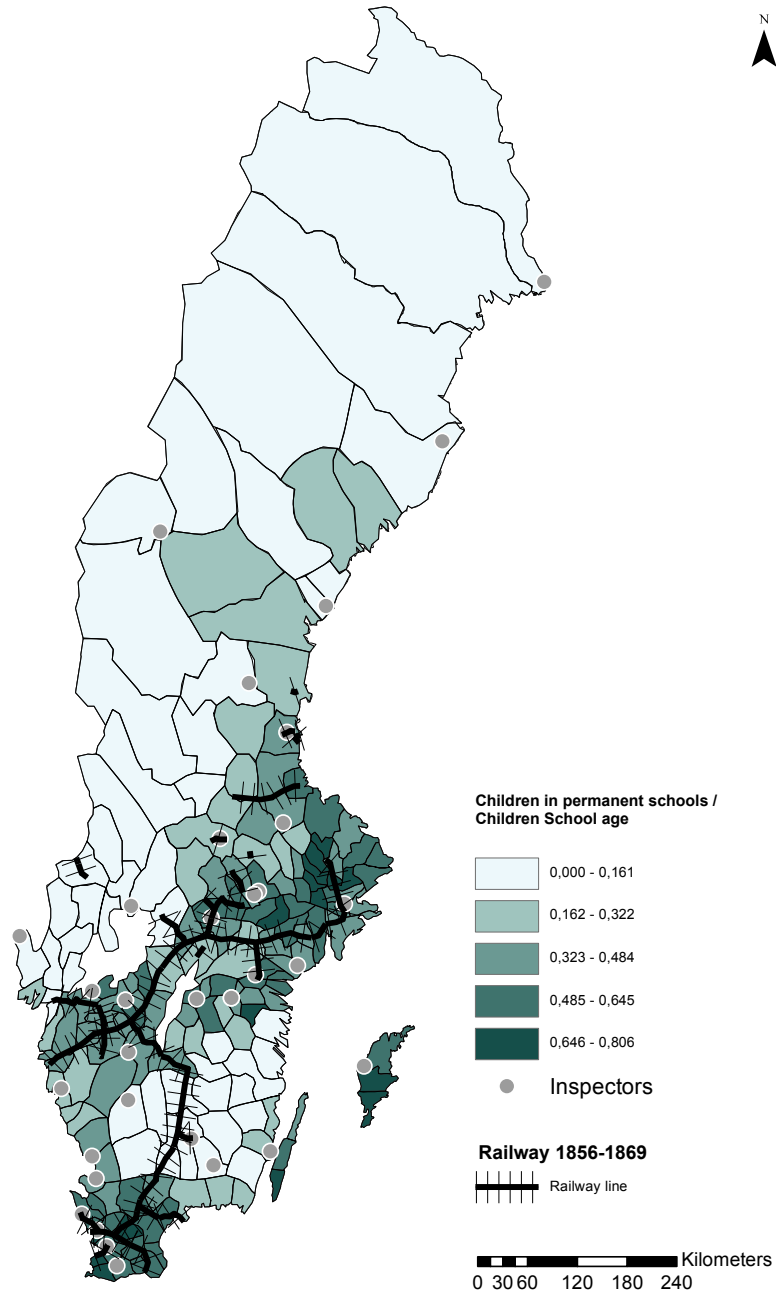


FIGURE 3. Share of Children in Permanent Schools

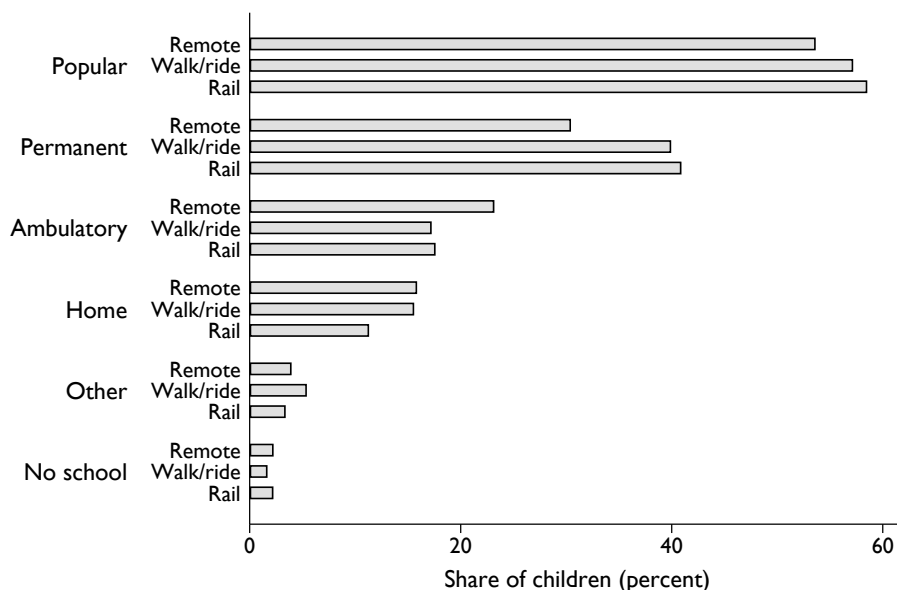


FIGURE 4. Share of Children in Different School Forms

*Comments:* Note that the bars do not sum to 100 since “permanent” popular schools were a subcategory of “popular” schools.

differences. To control for such economic effects, we rely on data on regional GDP per capita at the county level in 1860 from Enflo, Henning, and Schön (2014); we adapt the data for Sweden’s twenty-four counties to the borders of our deaneries using GIS methods.

Second, we control for urbanization by adding a dummy variable that takes the value 1 if there was a town holding administrative township rights within the deanery (and 0 otherwise). Although Swedish towns were by international standards tiny (most of them did not reach the population threshold of 5,000 inhabitants often used in the international literature to define a “town”), urban areas might have been more modern and hence prone to supply more education than rural deaneries.

Third, it is possible that the main town in each diocese—the seat of the bishop—differed from other localities in the willingness of local decision-makers to supply different forms of state-sponsored education. Therefore we also control for the seats of the bishops in the year 1868.

Fourth and finally, we add a control variable that measures the effect of the power of landed elites on the provision of schooling. The

literature about the potential effects of this variable is large and inconclusive. Important studies suggest that landed elites often blocked the introduction of public schooling when they had the power to do so (see, for example, Engerman and Sokoloff 1994, Lindert 2004, and Galor, Moav, and Vollrath 2009). However, a recent study of rural parishes in Sweden in the late nineteenth century has shown that local elites in fact promoted investments in primary schooling (Andersson and Berger 2016). To control for the power of landed elites, we use Andersson and Berger’s data on the share of the rural population with voting rights that have been compiled from maps in the official statistical publication *Bidrag till Sveriges officiella statistik*.

The results of the regression analyses can be found in Table 2. Since data from individual deaneries within the same inspection district are not independent, we cluster the standard errors on inspectors. As the table shows, the estimated positive effects of “Possible to walk or ride” and “Railway access” on the share of children in popular schools, and especially permanent popular schools, are estimated with reasonably high statistical precision, particularly the effect for permanent schools.

With regard to the control variables, we find that GDP per capita is correlated with the provision of popular education. There is not consistently more public schooling in towns and cities than in other localities, however; on the contrary, home schooling and other alternative forms of schooling appear to be more common in the urban deaneries. Finally, the effect of political participation, measured as the share of population with voting rights, appears to be negative, which is in line with the results obtained by Andersson and Berger (2016).

If we were to include the elementary schools in the analysis, the columns in Table 2, excluding column 2, would represent all school-age children, so the outcomes we analyze in the table are not unrelated, which suggests that the system of equations might be better estimated with a Seemingly Unrelated Regression (SUR) estimator (Zellner 1962). However, when the same set of explanatory variables enters all regressions, the SUR estimator can be generalized to OLS and the coefficients can be estimated separately across equations.

When it comes to the first of the two education outcomes we are interested in—the provision of education per se—there is thus strong

TABLE 2. Forms of Schooling (OLS)

	(1) Popular	(2) Permanent	(3) Ambulatory	(4) Home	(5) Other	(6) None
Possible to walk or ride	4.6 <sup>**</sup> (2.0)	11.0 <sup>**</sup> (4.7)	-6.5 (4.3)	-0.6 (1.6)	1.2 <sup>**</sup> (0.6)	-0.5 (0.4)
Railway connection	5.0 (3.1)	13.7 <sup>**</sup> (6.2)	-8.8 (5.7)	-3.9 (2.6)	-0.7 (0.9)	-0.0 (0.6)
Regional GDP per capita	1.9 (1.6)	12.0 <sup>***</sup> (3.7)	-10.1 <sup>***</sup> (3.2)	2.0 (1.3)	0.3 (0.4)	-0.2 (0.2)
Political participation	-1.5 <sup>**</sup> (0.6)	-1.1 (0.9)	-0.4 (0.7)	0.3 (0.8)	-0.3 <sup>**</sup> (0.1)	0.1 (0.1)
Town	-3.8 (2.4)	2.3 (3.4)	-6.0 <sup>**</sup> (2.7)	2.8 (2.5)	2.0 <sup>**</sup> (0.8)	-0.2 (0.3)
Seat of bishop	3.3 (4.2)	2.3 (7.4)	1.0 (5.7)	0.4 (4.1)	-0.2 (1.4)	-0.6 (0.5)
Constant	65.3 <sup>***</sup> (6.8)	11.7 (14.4)	53.6 <sup>***</sup> (14.5)	6.9 (8.6)	5.2 <sup>**</sup> (2.1)	1.6 (1.5)
N	170	170	170	170	170	170

Standard errors in parentheses

Standard errors clustered on inspectors.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



evidence that the railroad made it easier for school inspectors to ensure that the policies of the national government were implemented in remote school districts: there were more children in public schools in deaneries to which the inspectors could travel easily. In particular, there were many more children in *permanent* public schools.

## THE CURRICULUM

The historical literature suggests that school inspectors encouraged local teachers to teach secular, state-building subjects, especially geography and history, while downplaying the role of the Catechism. There were widespread concerns, at the time, that the church-run public schools merely encouraged repetitive memorization of the Catechism at the expense of modern teaching in non-religious subjects.

For descriptive evidence on the relationship between the location of school inspectors, railway access, and the proportion of children who studied geography and history, see Figure 5. As in Figure 3, there appears to be a strong correlation between railway access and education outcomes (here, the share of children who were taught geography and history, relative to the number who were taught the Catechism). Since the map shows the location of each school inspector, it also explains some examples of high levels of geography-and-history teaching away from the railway lines.

Interestingly, the higher relative share of students learning geography and history in the railway-connected deaneries is not because the share of children learning the Catechism was lower; essentially *all* children learned the Catechism, but children in deaneries that the inspector could get to easily also learned other things.

Table 3 analyzes evidence on the shares of children studying each different subject (in percent), relative to the share of children studying the Catechism. These results strongly suggest that deaneries whose inspector lived close enough to walk or ride to the deanery, or who was able to travel by train, were taught more geography and history—which were subjects that school inspectors were particularly keen to promote, judging from the historical literature.<sup>8</sup> We see a similar pattern when

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<sup>8</sup>The mean of the variable is 37 and its standard deviation is 13. The interpretation of the coefficient is that deaneries within reach of school inspectors were on average 5.4 points higher on this relative scale. This is a substantial effect, almost half a

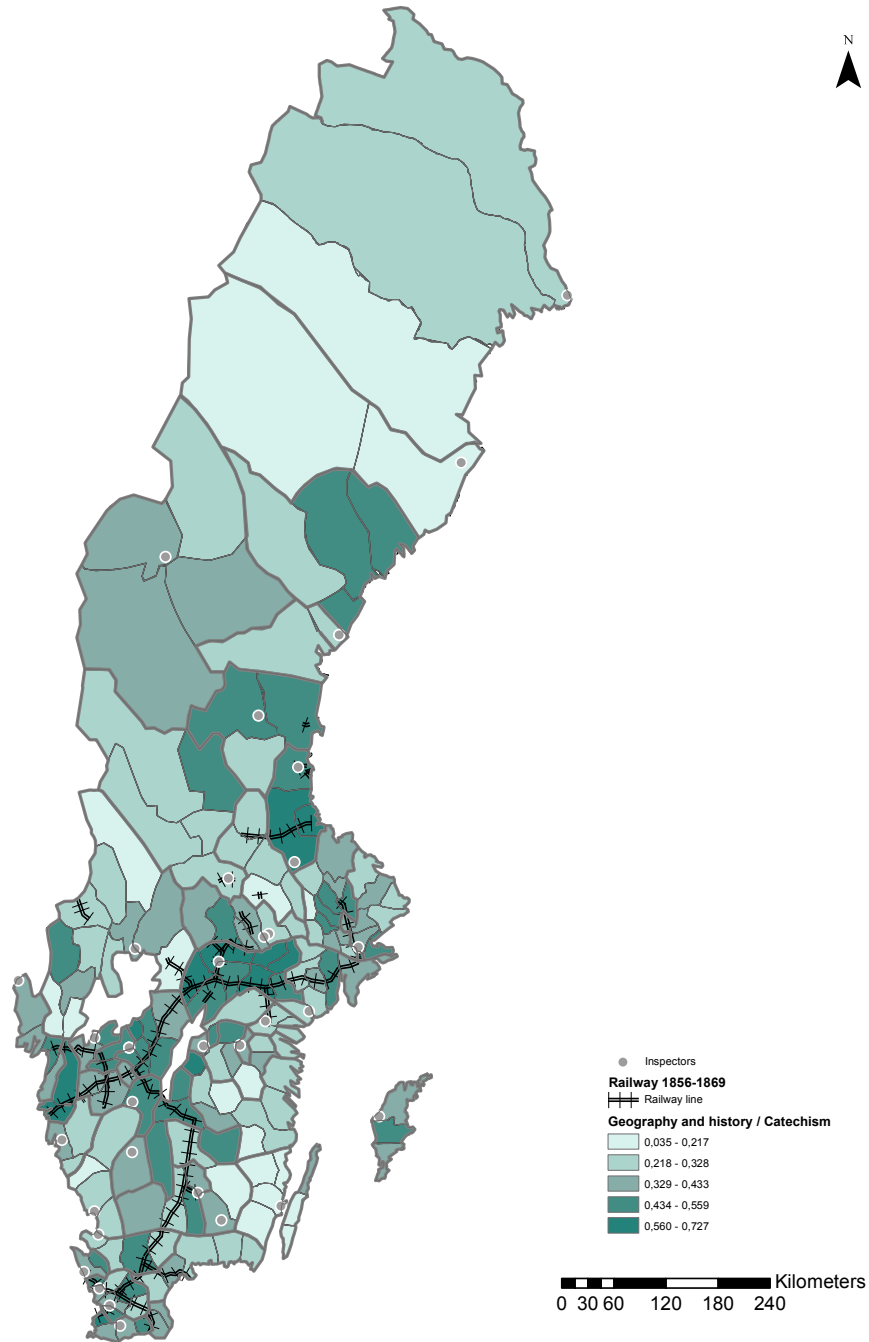


FIGURE 5. Geography/History Relative to Catechism

it comes to natural science. When it comes to other subjects, railway connections do not appear to have made much of a difference (with the exception of singing, which was less commonly taught in deaneries

standard deviation. The point estimate for having a rail connection is even larger, at 7.4.

that the inspector could reach by train). The proportion of students who learned basic skills in reading, writing, and arithmetic was higher when the school inspector could walk or ride, but not when the school inspector could travel by train.

To see what might drive the results for geography, history, and natural sciences, we have combined the *geographic* data about the distances that school inspectors had to travel with *biographical* information about whether the school inspectors were priests or not. In Table 4, we repeat the relevant in Table 3, but we now analyze deaneries that were inspected by priests and deaneries that were inspected by non-priests separately. As the table shows, the large effect of the inspector being able to travel easily to the deanery—either by foot, on horseback, in a carriage, or by train—is fully explained by education outcomes in the deaneries that were inspected by inspectors who were *not* priests. In other words, inspectors who were teachers, schoolmasters, or professors at teaching colleges seem to have been much more willing than inspectors who were themselves priests to insist, vis-à-vis local school authorities that sorted under the parish, on the inclusion of secular subjects such as geography, history, and natural science in the curriculum of local schools. The size of the estimated effect—up to 20 percentage points—is remarkably large.

## CONCLUSIONS

In this paper, we have examined the relationship between one of the defining technological innovations of the First Industrial Revolution—the railway—and one of the most momentous social and political changes of the nineteenth century—the expansion of primary education and the introduction of national school curricula. To accomplish this goal, we have combined geographic-information-system data on the extent of the Swedish railway network in the second half of the nineteenth century with fine-grained, official data on the provision of primary education in different localities in the late 1860s, allowing us to examine the effect of railway access not only on the provision of education per se, but also on the content of the curriculum. In some analyses, we have combined the geographic data with biographical information about individual school inspectors.

TABLE 3. The Curriculum (OLS)

	(1) Geo./Hist.	(2) Nature	(3) Geometry	(4) P.E.	(5) Swedish	(6) Arithmetic	(7) Writing	(8) Song	(9) Religion
Possible to Walk or Ride	5.4 <sup>***</sup> (1.8)	6.2 <sup>**</sup> (2.9)	4.1 <sup>**</sup> (1.8)	8.3 <sup>**</sup> (3.9)	5.9 (4.8)	7.5 <sup>***</sup> (2.2)	5.8 <sup>**</sup> (2.6)	-1.4 (4.5)	1.5 (1.1)
Railway connection	7.4 <sup>*</sup> (4.3)	8.6 <sup>**</sup> (4.2)	2.9 (1.9)	-1.1 (2.4)	-5.9 (7.7)	-1.9 (5.6)	1.1 (3.9)	-12.6 <sup>**</sup> (6.1)	-1.0 (1.7)
Regional GDP per capita	2.6 (2.0)	3.2 (2.4)	2.4 <sup>**</sup> (0.9)	1.6 (2.8)	-1.2 (4.4)	5.4 <sup>**</sup> (2.2)	5.3 <sup>**</sup> (2.0)	-1.3 (3.0)	0.7 (1.1)
Political participation	0.4 (0.8)	0.1 (0.8)	-0.0 (0.3)	-1.0 (0.8)	-2.9 <sup>**</sup> (1.2)	0.5 (1.0)	0.2 (0.6)	1.1 (0.9)	0.2 (0.2)
Town	-0.4 (1.6)	0.1 (2.1)	-0.2 (1.1)	-1.9 (2.1)	-5.8 (5.0)	-0.7 (2.5)	0.5 (1.9)	-8.6 <sup>**</sup> (3.2)	0.1 (1.4)
Seat of bishop	2.4 (3.1)	-1.2 (4.9)	0.1 (3.2)	2.1 (5.1)	-0.2 (4.2)	2.0 (6.7)	0.9 (6.2)	10.0 (6.6)	-2.3 (3.6)
Constant	24.7 <sup>**</sup> (11.9)	21.6 <sup>*</sup> (12.3)	5.4 (5.0)	47.1 <sup>***</sup> (12.5)	71.3 <sup>***</sup> (25.5)	74.4 <sup>***</sup> (12.7)	91.0 <sup>***</sup> (9.5)	61.7 <sup>***</sup> (15.9)	100.8 <sup>***</sup> (4.6)
N	170	170	170	170	170	170	170	170	170

Standard errors in parentheses

Standard errors clustered on inspectors.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

TABLE 4. Subjects, Priests and Non-Priests (OLS)

	Inspector was priest		Inspector was not priest	
	(1) Geo./Hist.	(2) Nature	(3) Geo./Hist.	(4) Nature
Possible to walk or ride	2.9 <sup>*</sup> (1.6)	2.0 (3.3)	10.9 <sup>**</sup> (3.6)	15.5 <sup>***</sup> (4.4)
Railway connection	-0.8 (3.2)	0.2 (3.8)	19.8 <sup>***</sup> (5.8)	20.8 <sup>***</sup> (5.8)
Regional GDP per capita	2.1 (1.6)	2.4 (1.9)	4.6 (4.4)	8.3 (5.4)
Political participation	0.7 (0.6)	0.0 (0.8)	-0.0 (1.4)	0.6 (1.4)
Town	-1.4 (2.3)	-0.2 (2.9)	2.8 (2.8)	-0.6 (3.0)
Seat of bishop	6.8 (4.1)	0.7 (5.2)	-5.6 (3.2)	-4.9 (10.1)
Constant	23.3 <sup>**</sup> (9.1)	26.0 <sup>**</sup> (11.4)	19.8 (20.3)	3.7 (21.7)
N	110	110	60	60

Standard errors in parentheses

Standard errors clustered on inspectors.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Our results strongly suggest that the coming of the railway strengthened the nation state vis-à-vis the local, religious authorities that had long controlled primary education, and there is every reason to believe that if this is true for Sweden, it is also true for other countries in Western Europe and elsewhere. By comparing three categories of localities—nearby school districts that national inspectors could get to easily from their homes, remote school districts that were reachable by train, and remote school districts that were not reachable by train—we are able to estimate, quite precisely, how the railway mattered. We find that the railway had a positive effect both on the provision of education *per se*, especially on the number of students in permanent popular schools, and on the content of the curriculum, especially on the share of children who were taught the subjects that the modernizing nation state was keen to promote: geography and history.

In other words, the detailed empirical evidence we present in this paper documents specific political effects of a specific nineteenth-century technological innovation, confirming the ideas of great social scientists such as Samuel Finer, Michael Mann, and John Hicks about the modern nation-state's dependence on quintessentially modern technologies.

More generally, our findings suggest that technological innovations in the nineteenth century had a powerful effect on state capacity: the ability of state agents to exercise control over persons, activities, and resources and enforce government policies. Existing theories of state capacity in economics and political science rightly emphasize the strategic interaction among political parties (Besley and Persson 2011) and the political struggle between local and national elites (Soifer 2015). But modern technologies, such as the railway, sharpened those conflicts by making it technically feasible for the state's agents to exercise control in the first place.

We also find, however, that the coming of the railway only mattered for the curriculum in Sweden's schools if the school inspector had a career as a teacher and not a career within the church. This suggests that technology is not enough. When it came to the content of the curriculum, the increasing mobility of the state's agents only mattered if national bureaucracies were able to recruit officials whose loyalty

lay with the ambitions of the nation state, and not with local elites, notables, or authorities.

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