Education and Military Rivalry[*]

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1   Introduction

What makes countries engage in mass education investments? A common view is that such investments are the flipside of democratic transitions (see e.g., Bourguignon and Verdier, 2000). Absent democracy, the elite chooses to deny mass access to education in order to secure its power, while the introduction of democracy – extending the franchise, increasing electoral competition, or putting tighter constraints on the executive – promotes decisions that favor mass education. This explanation might look quite convincing, and seemingly accounts for the history of education enrollment in Europe starting with France. Indeed, Figure 1 (drawn from Lindert, 2004), suggests that public contributions to primary-school education go up sharply in 1880, once France has completed its transition from the Second Empire to the Third Republic, which clearly reflected a move towards greater democracy.[1]

Figure 1 about here

However, another event that precipitated the fall of the Second Empire is France's defeat against Germany in the 1870 Battle of Sedan. In the words of Lindert

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[1]The complementary view that education favors democracy is analyzed, in particular, by Glaeser et al. (2007).

"The resounding defeat by Prussia tipped the scales in favor of the education reformers. Enrollments and expenditures accelerated across the 1870s, with local taxation leading the way. The real victory of universal tax-based education came with Jules Ferry's Laic Laws of the 1880s, especially the 1881 law abolishing all fees and tuitions charges in public elementary schools....While national politics could not deliver a centralized victory for universal schooling before the military defeat of 1870....after 1881 centralization performed the mopping up role..." (Lindert, 2004a)

One reason why a military defeat may spur centralized investment in mass education is suggested in the work of Eugene Weber on the modernization of rural France between 1870 and 1914. A highly disintegrated population, largely illiterate, speaking a multiplicity of dialects, and with sense of nationhood[2], was to be transformed into a unified people sharing the same patriotic values, a spoken and written language[3], a set of moral principles, that was motivated and able to defend France in future conflicts.

In this paper, we study historical data on education spending and enrollment in panel data for 19th century Europe and a larger set of countries to assess the correlation between military rivalry (or war risk) and primary education enrollment (or the occurrence of educational reforms). We find that mass education is positively and significantly associated with military rivalry, or involvement in external war in the past 10 years. Moreover, while the coefficient on democracy (gauged by the Polity2 index) comes out negative when we control for military rivalry, the interaction between the two variables is positively and significantly associated with mass education. The coefficient on military rivalry remains stable when we control for the political regime, suggesting that the military rivalry explanation has a stable and independent influence on mass education.

Our paper relates to, at least, three literatures. As for the relationship between public education investment and democracy, Lott (1999) suggests that non-democracies could invest more than democracies in public education as a means of indoctrination. On the other hand, Glaeser et al. (2007) argue that education and democracy should be positively correlated, due to

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[2] As a French novelist of that time would put it "In Velay, the word "patrie" signifies nothing and stirs nothing. It exists no more in local speech than in local hearts".

[3] As Leon Gambetta would say to the leader of the Breton forces: "I beg you to forget that you are Bretons, and to remember only that you are French".

the need for civic participation in rasing support for transition from dictatorship into democracy. But the evidence for a positive relationship between education spending or enrollment and democracy is mixed, at best. In particular, Mulligan, Gil, and Sala-i-Martin (2004) present cross-country evidence indicating that more democratic political institutions do not seem to be correlated with higher levels of social expenditures and, in particular, higher public education spending. More recently, Bursztyn (2011) provides evidence that poor voters might prefer the government to allocate resources to redistributive policies, yielding immediate income increases (such as cash transfers), instead of allocating resources to public primary education. Also related to our analysis is Bourguignon and Verdier (2000) who develop a model to explain why the ruling class may sometimes decide to invest in education even schooling enhances political participation. Along similar lines, Galor et al (2006) argue that capital accumulation gradually intensifies the importance of skilled labor in production and therefore generates support among the ruling class for investing more in human capital. Galor et al. (2008) argue that higher concentration of land ownership typically discourages the development of human capital enhancing institutions, in particular schooling. However none of these papers looks at the effect of military.

A second related literature, on the economic impact of wars, starts with Anderton and Carter (2001), Blomberg and Hess (2006), and Glick and Taylor (2005). More recent work by Martin, Mayer and Thoenig (2008a, b) and by Acemoglu and Yared (2009), who evaluate the extent to which wars reduce trade flows. However, none of these papers looks at the effects of wars on public education spending.

A third related literature deals with fiscal capacity and state capacity more generally. Hintze (1975) and Tilly (1975), preceding many others, provide historical accounts on the importance of wars in state building. More recently, an economic literature summarized in Besley and Persson (2011) considers theoretically investments in fiscal and legal capacity, and finds robust correlations between past wars and current state capacity in international panel data. Analogously, we find support for a correlation between past wars (and military rivalry more generally) and current educational investments. In addition we find a positive effect of the interaction between military rivalry and democracy on educational investment, something possibly quite specific to education. Also, in contrast to this literature, we treat state capacity as exogenous, both in the theory part and in our empirical analysis.

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The remainder of the paper is organized as follows. Section 2 describes three historical examples that speak to the relationship between military rivalry and education reforms. Section 3 presents data, descriptive statistics, and the specification of our regressions. Section 4 describes the results and discuss their robustness. Section 5 outlays a simple model that rationalizes our main empirical findings. Section 6 concludes.

2 Three historical examples

While each national history has unique elements that cannot be forced into a unified framework, the examples of France, Japan, and Prussia over the 19th century all suggest a relationship between military defeats or rivalry and educational reforms. Prussia led the way in terms of primary enrollment rates in Europe from 1815 until about 1860. In the 1880s, France overtook Prussia as the European enrollment leader. In addition we look at Japan, a leading Asian country at the end of the 19th century, which ended up emulating the Prussian and French models in its own transition to mass education. For each of these examples, we describe the historical context, the debate that emerged due to a risky international environment, and the subsequent education reforms with a particular focus on primary enrollment.

2.1 Prussia under Stein and Humboldt

2.1.1 Military and educational background

Elite self-interest played a pivotal role in the Prussian education reform led by von Stein and von Humboldt. As Jeismann (1987, p. 5) points out with regard to the 1806-1813 period of Napoleonic reign in Prussia,

> "The 'period of the French' was the incubation period of the German education system of the 19th century."

Indeed, military defeat might have induced a shift in education policy in Prussia:

> "only after the humiliating defeat by Napoleon at Jena in 1806 did Frederick William III commit to educational reforms, and up to his death in 1840 he remained ambivalent on whether mass schooling helped or hurt national security" (Gray, 1986, p. 119)

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This shift came quite suddenly. As late as 1803, Frederick William III

> "rejected the introduction of the relatively progressive Pestalozzi method into primary schools because it would give young minds ideas not fitting their inherited social situation" and stated "the children of this hardworking Volksklasse should not become lecturers, not chancellery officials, not mathematicians, not religion professors. They should learn to read their catechism, Bible, and hymnal, to write and calculate in accordance to their limited circumstances, to love and fear God and behave accordingly" (Lindert, 2004).

However, after the Battle of Jena, which came as a surprise for the Hohenzollern Monarchy, public opinion evolved quickly. Frederick William III tried to implement an ambitious program of reforms in order to strengthen the country. As explained by Gray,

> "In 1806 Napoleon's imperial army inflected a crushing blow on the Hohenzollern monarchy. [. . .] King Frederick William III summoned Baron Karl von Stein to head a ministry dedicated to making Prussia as vital and as strong as France. Only months previously Frederick William had dismissed because of the minister's resolute advocacy of reform. But in defeat even the cautious monarch adopted the view that innovation was necessary." (Gray, 1986, p. 1).

2.1.2 The reform debate

Stein did not originally pay much attention to education. His primary focus was on the organization and administration of the Prussian state. But he understood the importance of promoting patriotism among the population – he first tried to do so through a city governance reform in the hope that this would create a civic sense through the participation of the community in its own affairs. Stein realized that his major reforms, namely the end of villeinage, the reform of this army, and the self-administration of the towns, could be unsuccessful due to the insufficient level of education. He thought that Wilhelm von Humboldt would be capable of bringing about a complete reform of the Prussian education system and called him to Berlin. Thus, on February 28, 1809, Wilhelm von Humboldt became head of the culture

and education section at the Ministry of the Interior, although Stein had left office by then. Napoleon had called for his dismissal and the King of Prussia had acceded to that request.

> "From the beginning of the crisis, even prior to the startling defeats of Jena and Auerstadt, two views were competing in government circles about the future direction of Prussia" (Gray, 1986, p. 47)

A "peace party" was organized around von Haugwitz and Lombard, while the "patriots" followed Stein and von Hardenberg. von Humboldt endorsed the ideals defended by Stein, who had said that

> "the chief idea was to arouse a moral, religious and patriotic spirit in the nation, to instill into it again courage, confidence, readiness for every sacrifice in behalf of independence from foreigners and for the national honor, and to seize the first favorable opportunity to begin the bloody and hazardous struggle" (Ford, 1965, p. 122).

Humboldt sensed that his reforms could play a key role in the survival of Prussia. He had developed his ideas in his July 1809 treatise Über Die Mit Dem Königsberger Schulwesen Vorzunehmende Reformen (On reforms to execute with the teaching in Königsberg) and was able to initiate fundamental reforms of curricula, teaching methods, teacher education, and auditing in the school system.

As this brief discussion shows, military concerns was one of the major arguments in the debate leading up to the educational reforms in early 19th century Prussia.

2.1.3   The reforms

Humboldt's reforms delegated the powers to administer and fund schools to local communities in order to circumvent the surveillance of the French. They also helped found Berlin University. However

> "the desire to be reunited with his family and the realization that he would never be able to gain acceptance for his school plan or for his ideas of effective educational administration under the government of the day led to his resignation in the spring of 1810 that the King accepted on 25 May."

After the defeat of Napoleon in 1815 by a coalition of European powers, the external threat to Prussia was removed and the Prussian government stopped endorsing the ideal of reform. Yet, "once the reformed Prussian educational framework was in place, it could not be dislodged by the subsequent waves of conservatism"(Lindert) because von Humboldt had set up a decentralized education system. "In 1876, funds from the Prussian state accounted for only 8.9 percent of the budgets of public primary schools, endowments for 3.2 percent, fees for 15.1 percent, and the remaining 72.8 percent came from local taxes" (Lindert, 2004, .p. 120). Throughout the 19th century, the provision of local education in German communities kept increasing, and Prussia eventually became the leader in primary enrollment. In this respect, von Humboldt's reforms had lasting consequences. It is also interesting to note that Stein encouraged democratization of towns to gain the support of the population. This may suggest that the probability of successful reform is higher in democracies.

2.1.4 Outcomes

The educational reforms in Prussia had a substantial impact in the longer run. Of the cohorts born in Prussia before 1801, 16.8% of males were completely illiterate, as against 2.9% for males born between 1837 and 1841. The literacy rate inched up towards 85% in 1850 and Prussia became the European leader with regard to primary enrollment until the 1880s. The primary school enrollment per 10,000 inhabitants (the School002 variable from the CNTS data archive)[4] rose from 1131 in 1815 to 1592 in 1850. Finally, the country took its military revanche on France in 1870.

2.2 Jules Ferry's France

2.2.1 Military and educational background

The well-known French educational reform in the 1880s, led by Jules Ferry, is linked to events in the 1870s – the defeat in the Battle of Sedan in the France-Prussia war and the political regime transition from the Second Empire to the Third Republic.

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[4]In the long run, primary school enrollment per capita, and therefore also the School002 measure, depend not only on the primary school enrollment rate of new generations, but also on the demographic structure of the country.

The defeat against Prussia provoked a national trauma. When Napoleon III mobilized and declared war on July 19th, 1870, a Prussian victory seemed unimaginable. Yet, on September 2, Napoleon III was made prisoner at Sedan and the French army was vanquished. The news reached Paris on September 4 and – in a revolutionary atmosphere – the Republicans (the French left at the time) seized this opportunity to put an end to the Second Empire and organize a "government of National Defense." A few months later, the Prussian army had reached Paris. During the Siege of Paris, on January 18, 1871, King Wilhelm I was proclaimed German Emperor at the Palace of Versailles, a symbolic act that also marked the unification of Germany. When the armistice was signed on February 26, Wilhelm and Bismarck imposed a heavy tribute on the French including the takeover control of two French provinces, Alsace and Lorraine.[5]

In 1870, French expenditures on education were lagging behind those in Prussia and other European countries. The French education system was little supported by public spending and mainly run privately, revolving around churches and religious congregations (Lindert, 2004). This system was far from perfect:

> "many who were registered hardly ever attended class." (Lindert, 2004, p. 308).

Equally problematic, and a further sign of a disintegrated system, was the fact that many people relied on their local dialects to communicate and did not have a good command of the French language:

> "In 1863 by official tally, some 7.5 million people, a fifth of the population, did not know the language. [. . .] The actual number was probably much larger, particularly if one includes those whose notions of the language were extremely vague." (Lindert, 2004, p. 313).

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[5]Once Prussia had invaded France, a sharp divide appeared within the government of National Defense, between those who wanted the war to come to an end as soon as possible – moderate politicians such as Jules Simon, Jules Favre, Ernest Picard or even Adolphe Thiers – and those who wanted to fight to the bitter end – the Republicans, led by Gambetta. Worse, after the departure of the Prussians, Paris was wrecked by a civil war: the infamous "Commune of Paris," a new trauma for the French people.

2.2.2 The reform debate

Even prior to the Prussian war, French elites were aware of the fact that the French education system had failed to promote national unity. Victory Duruy, appointed Minister of Education in 1863 by Napoleon III, explained that his goal was

> "the expansion and improvement of educational facilities; the institution of a genuine educational program for girls that would weaken the religious communities, 'who owed the allegiance not to Paris but to Rome and who were not attuned to modern needs'; and the development of technical education" (Moody, 1978, p. 72).

His plans were in many ways similar to those Jules Ferry would defend some 20 years later. [6] Duruy tried to gather political support and convince the Emperor that it was in his own interest to implement such a reform. But he did not succeed, partly due to a lack of support from a rural population influenced by the Church.[7]

As explained by Lindert (2004)

> "The resounding defeat by Prussia tipped the scales in favor of the education reformers. Enrollments and expenditures accelerated across the 1870s, with local taxation leading the way. The real victory of universal tax-based education came with Jules Ferry's Laic Laws of the 1880s, especially the 1881 law abolishing all fees and tuition charges in public elementary schools [...].While the national politics could not deliver a centralized victory for universal schooling before the military defeat of 1870, [...] after 1881 centralization performed the mopping up role."

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[6] "Duruy's major objective was to make primary education compulsory and tuition free so that each citizen could fulfill his duties under universal suffrage and contribute to the burgeoning economy" (Moody, 1978, p. 72).

[7] "In a letter to the Emperor on 6 February 1866, (Duruy) maintained that his plan would embarrass the Orleanists, the clericals and the republicans, and win millions of families to the Empire, particularly the parents of the million and a half pupils who were now accepted free, but under the stigma of charity" (Moody, page 72). In fact, Duruy never managed to reduce the hostility of the rural masses, who looked on farm labor as a natural apprenticeship, and consequently Napoleon decided to let the project of his minister be defeated by the legislature.

More generally, although many groups and political parties diverged regarding the causes of the defeat, they all agreed that education in Prussia had played in key role in the rise of this new power, and that education in France had to be reformed, to

> "teach Frenchmen to be confident of their nation's superiority in law, civilization and republican institutions. It should be consistent with reigning social values, and thereby eliminate disruptive conflicts and promote the unity of the classes. Since France no longer enjoyed religious unity, it must forge a new moral unity from a unified education that would teach civic morality based on the principles of natural reason" (Moody, 1978, p. 88).

Only the Church wanted the status quo to be preserved.[8]

This discussion suggests that military rivalry was a major factor behind the forthcoming French reforms.

2.2.3 The reforms

Jules Ferry was appointed Minister of Education in February 1879. In 1881, he abolished all fees and tuition charges in public elementary schools. In 1882, he designed a law whereby enrollment in a public or private school became compulsory from age six to thirteen and religious education was forbidden in public schools. In 1883, every village with more than 20 children at

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[8] "Unexpected defeat, occupation, and sanguinary civil war fixed 1870-71 in the French consciousness as 'the terrible year.' Several national myths were deposed, end of the vision of national glory built during the Second Empire. [. . .] Frenchmen who had lived through the experience were aware that defeat had exacerbated the social and political divisions of the nation – the Commune provided brutal evidence. But intellectual disagreements were also sharpened as Frenchmen sought for a cause of the disasters that had befallen them. [. . .] There was a debate about the source of the defeat: the prime culprit was the Empire and all its works. The right viewed Sedan as deserved punishment for infidelity to the traditions of France. Toward the Church there was an initial ambivalence. Most people thought that 'France had neglected intellectual formation, particularly in the sciences [. . .].' There was nearly universal belief among the French elite that Prussia had triumphed because of the superiority of its celebrated universities: a popular aphorism was that the University of Berlin was the revenge for the defeat at Iena. French praise for German education extended to all levels of the system. Journalists repeated the dicta that the Prussian elementary school teacher was the architect of Sedan and that the modern secondary education of the Realschulen had provided the scientific base for Prussian military efficiency." (Moody, page 87).

school age was required to host a public elementary school. In 1885, subsidies were devoted to the building and maintenance of schools and to paying teachers. In 1886, an elementary teaching program was established, together with monitoring provisions. These are the so-called "laicity" provisions, which characterize the French educational system still today.

At the same time, a whole infrastructure program – the Freycinet plan – was initiated to facilitate children's access to schools. Millions of francs were spent on building roads to match the large amounts spent on schools: 17,320 new schools had to be built, 5,428 schools were enlarged, 8,381 schools were repaired. As a result, enrollment as well as attendance in primary education steadily increased.

Equally important as these investments were the changes in the content of elementary education that ensued from the Ferry laws.

> "At the very start of school, children were taught that their first duty was to defend their country as soldiers. [...] The whole school program went on expanding the theme. Gymnastics were meant 'to develop in the child the idea of discipline, and prepare him... to be a good soldier and a good Frenchman."

Geography and history were two particularly powerful tools of indoctrination, as well as dictations. Dictations were useful to teach people the French language but, beyond that

> "the exercise was a sort of catechism designed to teach the child that it was his duty to defend the fatherland, to shed his blood or die for the commonwealth, to obey the government, to perform military service, to work, learn, pay taxes and so on" (Lindert, 2004, p. 333).

2.2.4 The outcomes

As pointed out by Moody "Regarding enrollment rates, statistics attest that there was an appreciable increase in attendance in the decade after 1882. [...] The proportion of the population that could not read or write continued to decline slowly, reaching about 4 percent by 1900." Most authors agree with this characterization of the trend in illiteracy in France: for instance, Morrisson and Murtin (2011) note that literacy rates rose from 80% in 1870 to 96% in 1912. The reforms also appear to have increased the sense of

patriotism and national unity. Thanks to the Ferry laws, "in Ain, Ardennes, Vendee, all children became familiar with references or identities that could thereafter be used by the authorities, the press, and the politicians to appeal to them as a single body" (Lindert, 2004, p. 337), and in that respect Ferry's efforts would pay off during the mobilization in 1914. Primary School enrollment per 10,000 inhabitants (again, measured by the School002 variable from the CNTS data archive) rose from 1176 in 1870 to 1430 in 1912.

2.3   Japan in the Meiji era

2.3.1   Military background

The experience of Japan at the end of the 19th century provides a clear example of how external military *threats*, rather than military rivalry, can also bring about reforms promoting mass education. As put by Duke:

> "...in 1872, government leaders were haunted by a crisis of international proportions. Powerful western nations were expanding trading posts throughout the world. European colonial empires had spread into the Far East, threatening the very existence of Japan as a sovereign state. During the years of self-imposed isolation by the Tokugawa regime from the early 1600s, the country had fallen dangerously behind the West as the industrial revolution got under way. The rise of western capitalism and international colonialism posed a pervasive threat to Japan, as perceived by the new leaders. They were determined to use any means necessary to transform their country into a modern state in order to preserve the political order and the national sovereignty. Education on the Western model was envisioned as an instrument to achieve that goal." (Duke, 2009, p. 1).

To understand why military threats posed by Western powers resulted in a shift in Japan's education policy, one must recall the historical context. The so-called Meiji Restoration, named after the Emperor installed in 1868, were to put an end to centuries of rule by the military lords (or shogun) of the Tokugawa family who, since the 17th century, had been virtually equivalent of the Emperor. The Tokugawa lords dominated the Japanese feudal system, a domination grounded in religious symbols and ideals. The system they

had set up suffered from structural problems, however, including a conflict between merit and heredity:

> "hereditary rank and family income continued to be the most important influence on a samurai's career path in practice." (Gordon, 2000, p. 41).

The threats posed to Japan by Western powers in the second half of the 19th century acted as a catalyst for educational reforms. The Tokugawa implemented various reforms at the beginning of the 1860s but did not go far enough to satisfy the Samurais. As a result, Japan fell into civil war. In early January 1868, the insurgents prompted the Emperor Meiji, who had just taken the throne, to announce an "imperial restoration," which in fact was nothing more than a coup d'Etat.

2.3.2 The reform debate

The leaders of the new Meiji movement were concerned by the foreign threat, aware of the military and economic weaknesses, and cognizant that the existing hierarchical system did not promote talent. Thus they decided to initiate a process of political unification, administrative centralization, modernization of the army, and educational reforms. Many of those who initiated educational reform were also involved in army reform – notably Kido Koin, Omura Masujiro and Yamagata Aritomo. Mori Arinori, who became Minister of Education in 1885, is usually regarded as the founder of Japan's modern education system. The Mori reforms would eventually prove successful but were very controversial at first – so much that he was assassinated by a religious fanatic in 1889 (Duke, 2009, p. 345).

As pointed out by Duke, "the movement for educational modernization that followed the 1868 Meiji Restoration did not begin in an education vacuum" (Duke, 2009, p. 11). Under the Tokugawa, education was essentially the privilege of the Samurais and revolved around tradition:

> "education was primarily provided by the study of Chinese writings, especially the Confucian classics; its purpose was chiefly to develop moral character, both as an absolute human duty and also to better fulfill the samurai's function in society" (Duke, 2009, p. 12).

With the fall of the Tokugawa, a debate emerged regarding the nature of education under the new regime. There was a clear division between those who wanted to preserve the focus on Confucian classics with a primary concern of maintaining interpersonal hierarchical relationships, and those who wanted to introduce secular Western science and mathematical and rationalistic thought. The debate

> "had become inevitable ever since the overthrow of the Tokugawa government over a decade earlier. Those forces seeking to modernize Japan society through western science and technology were locked in a struggle with their opponents who believed that Japanese culture could only survive on the basis of traditional customs and beliefs." (Duke, 2009, p. 262).

The western-oriented progressives eventually prevailed over the eastern-oriented traditionalists. Indeed,

> "observation of European and American societies convinced leaders such as Kido Koin that mass schooling, like mass conscription, was a fundamental source of the economic and military power of the West. Their initial models were primarily American and French" (Gordon, 2000, p. 67).

The newly founded Ministry of Education sent delegates in the West to learn about their education system, for instance with the Iwakura mission of 1872-1873 (see Duke, 2009, p. 77).

2.3.3   The reforms

The leaders of the Meiji era decided to undertake a deep reform of the education system and in particular to turn to mass education in order to rise up to the challenges posed by the West. As explained by Burnett and Wada (2007),

> "for the first time in Japanese history education was interpreted as a tool in the push to modernize the nation, a point confirmed by the then Minister of Education Mori Arinori; 'Our country must move from its third class position to second class, and from second class to first: ultimately to the leading position among all countries of the world. The best way of doing this is [by laying] the foundations of elementary education'."

The desire to unify the people after years of civil war and the sense of urgency derived from perceived domestic and foreign threats explains the radical steps taken by the Meiji leaders. They approached education as an instrument to serve the State and were eager to follow what they called the "Prussian notion of education" (see Duke, 2009, p. 314).

The new education system was instituted by the Meiji government with remarkable speed. In 1872, it declared four years of elementary education to be compulsory education for all children, boys as well as girls (Gordon, 2000, page 67). As explained by Burnett and Wada (2007),

> "in just a one-year period following the Gakusei of 1872, 12,500 primary schools were established. Within the next five years the number of schools doubled to a figure not surpassed until the 1960s."

This move to mass education was complemented by the establishment of a national training system for teachers. The first teacher's college was created in Tokyo in July 1872, based on American principles of elementary-school instruction.

2.3.4 The outcomes

Initially, reactions to the educational reform were mixed.

> "Not everyone was so happy at the obligation to attend school and the opportunity to graduate. There elementary schools were to be financed by a 10 percent local surcharge to the national property tax. In the 1870s, angry taxpayers reacted to compulsory schooling as they had to the draft: they rioted. Crowds of people destroyed at least two thousand schools, usually be setting them afire. This represented close to one-tenth of the total number of schools. The passive resistance of simply not going to school was even more widespread. Rates of attendance for school-age boys and girls stood at 25 to 50 percent of the eligible population for the first decade of the new system" (Gordon, 2000, p. 68).

One may perhaps argue that popular resistance to the educational reforms was due to the lack of democracy in the Japanese system – the peasants did not identify with the emperor, nor with the new ruling class, and therefore

disapproved of the nationalistic education that was now compulsory. Similarly, people tried to resist the military reform at first.

Yet, over time, the Japanese educational reforms appeared more and more as a resounding success. First, Japan overtook most European powers with regard to primary enrollment, which rose from 28.1% in 1873 to 98.1% in 1910. From 1865 to 1910, the literacy rate increased from 35% to 75% for men and from 8% to 68% for women. The primary-school enrollment per 10,000 inhabitants (School002 variable from the CNTS data archive) rose with blistering speed, from 65 in 1876 to 1122 in 1905.

By the mid-1890s,

> "Japan's military was strong enough to move from the task of keeping order at home to that of imposing its will overseas" (Gordon, 2000, p. 67).

The success of the education reform certainly played a role in the unexpected military victories by Japan at the turn of the 20th century, in the 1895 war against China and the 1905 war against Russia.

Overall, Japan's educational reforms during the Meiji era further illustrate the idea that education reform occurs as a result of military concerns. The Japanese example is probably even clearer than the French case, in that the military considerations clearly took precedence over humanist ones. The popular resistance to the reforms may indicate that a lack of democracy reduces the effectiveness of the educational reform.

2.4   Overview

Figure 2 summarizes our historical overview of educational reforms in Prussia, France and Japan. In all three cases, military defeats and/or perceived military threats appear to have prompted an otherwise reluctant ruling class to invest in mass primary education.

Figure 2 about here

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3 Data and Specifications

3.1 Sources and variable definitions

To investigate the determinants of mass education reforms, empirically we use cross-country panel data for up to 137 countries over the period 1830-2001. Our dependent variable, *enrollment*, is measured by primary enrollment per capita, defined according to the UNESCO criteria and expressed per 10,000 inhabitants. The underlying data are drawn from the CNTS Data Archive. In a first set of regressions, we use primary enrollment as a continuous dependent variable. We then analyze the effect of military rivalry on the probability of conducting education reforms, where the reform variable is constructed in two alternative ways. For the complete sample of countries over the period 1830-2001, a binary (0,1) *imputed reform* variable is set equal to one in a given year if primary enrollment grew by more than 10% over the previous 5-year period.

For a reduced sample of 14 European countries over the period 1830-1975, a binary (0,1) *known reform* variable is set equal to one in years in a year of a new education reform. The latter entails any new law which extends compulsory education, lowers the cost of education (abolish school fees, provide for free primary education), or increases the number of schools (e.g. by making it compulsory for each municipality to set up at least one primary school). The source for this variable is Flora (1983). When we perform the analysis of know reforms for this restricted sample, we aggregate the data into five-year periods.

We measure war risk and vulnerability to military threats in two alternative ways. Recent experience of external war is likely to raise the perceived likelihood of a new conflict and the importance of military concerns in policy decisions. Hence, our first variable *war risk* is a binary indicator set equal to one if the country was engaged in an interstate war in the previous 10 years, according to the Correlates of War database. This database also provides us with information on the outcome (victory of defeat) of past wars and a (crude) measure of the number of casualties.

A caveat is that this first measure of war risk is completely backward looking. Our second measure, *military rivalry*, is less subject to this concern. Here, we define a dummy variable for whether a country has a strategic rival in a given year according to Thompson (2001). Thompson's measure captures the risk of armed conflict with a country of significant relative military

strength, based on contemporary perceptions by political decision-makers, gathered through the investigation of historical sources on foreign policy and diplomacy. Specifically, military rivalries are identified by three criteria: whether two countries regard each other as (a) competitors[9]; (b) a source of actual or latent threats that increase militarization incentives; (c) a hostile country (see Appendix for details). We also create a measure of the relative strength of rivals, assessing the probability of winning or losing a potential military conflict, by gauging the ratio of their respective army sizes

The political regime is constructed from the autocracy and democracy scores in the Polity IV database, which are themselves combinations of indexes, that capture constraints on the executive, and the openness and competitiveness of executive recruitment. The combined score *polity*2 ranges from -10 to +10, where a higher score means that the country is more democratic. We define a binary indicator, *democracy,* which is set equal to one for countries with a strictly positive *polity*2 score.

Fiscal capacity is proxied by a dummy variable equal to one whenever the country has a (permanent) income-tax system in a particular year. Information on the date of introduction of an income tax is available for 76 countries comes from Besley and Persson (2011). Finally, we use data for GDP per capita, converted to US dollars, drawn from Penn World Tables 7.0 and CNTS, as well as measures of government expenditures per capita from the WDI and CNTS databases.

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[9] "Most states are not viewed as competitors—that is, capable of "playing" in the same league. Relatively weak states are usually capable of interacting competitively only with states in their immediate neighborhood, thereby winnowing the playing field dramatically. Stronger actors may move into the neighborhood in threatening ways but without necessarily being perceived, or without perceiving themselves, as genuine competitors. If an opponent is too strong to be opposed unilaterally, assistance may be sought from a rival of the opponent. Other opponents may be regarded more as nuisances or, more neutrally, as policy problems than as full-fledged competitors or rivals. (...) Threatening enemies who are also adjudged to be competitors in some sense, as opposed to irritants or simply problems, are branded as rivals. This categorization is very much a social-psychological process. Actors interpret the intentions of others based on earlier behavior and forecasts about the future behavior of these other actors. The interpretation of these intentions leads to expectations about the likelihood of conflicts escalating to physical attacks. Strategic rivals anticipate some positive probability of an attack from their competitors over issues in contention." (Thompson, 2001)

3.2 Specifications

Our baseline regression equation is expressed as:

$$enrollment_{i,t} = \alpha_0 + \alpha_1 war\ risk_{i,t} + \alpha_2 democracy_{i,t} + \tag{1}$$
$$\alpha_3 war\ risk_{i,t} \cdot democracy_{i,t} + \alpha_4 gdppc_{i,t} + \nu_i + \delta_t + u_{i,t}$$

where $enrollment_{i,t}$ refers to the primary enrollment rate in country i and year t. Our main coefficient of interest is α_1, which captures the effect of the war risk faced by country i in year t. As explained above, this military threat is measured either by having had a war some time in the past 10 years (i.e., between years $t - 10$ and $t - 1$) or by having at least one strategic rival in year t. as defined above. We also include $democracy_{i,t}$, the indicator for democracy in country i at time t, and an interaction term between war risk and democracy. Importantly, the specification includes country fixed effects ν_i, and a year fixed effects δ_t. Thus any effect that we estimate is identified from the variation over time within countries of the right-hand side variables relative to their world average levels. Other independent variables include $gdppc_{i,t}$, the level of per capita GDP in country i in year t, as well as past enrollment (not shown in the regression) to account for possible convergence effect.

We also estimate the probability of a discrete education reform according to the following Probit specification:

$$\Pr(reform_{i,t}) = \beta_0 + \beta_1 war\ risk_{i,t} + \beta_2 democracy_{i,t} + \tag{2}$$
$$\beta_3 war\ risk_{i,t} \cdot democracy_{i,t} + \beta_4 gdppc_{i,t} + \eta_i + \mu_t + v_{i,t},$$

where the $reform$ variable is either *imputed reforms* (for the entire sample of countries) or *known reforms* (for the historical European sample).

Our main prediction is that the coefficients which capture the effect of war risk on education policy should be positive. We exclude countries at war from the sample, as an ongoing war (as opposed to a latent rivalry) may severely increase the opportunity cost of public funds and – more importantly – as data in times of war may be unreliable. The expected coefficient on democracy is not clear a priori. On the one hand, the median voter in a democracy may be poorer than in autocracy and thus more favorable to mass education. On the other hand, a rent-seeking policymaker in an autocracy may be more likely to appropriate the future benefits of higher income due to education investments and therefore more inclined to incur the cost of the reform than a democratic government.

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3.3 Descriptive statistics

Descriptive statistics for the annual data underlying the specifications with primary enrollment (as in (1)) or imputed reforms (as in (2)) as the left-hand side variables are shown i Table 1a. The descriptive statistics for the five-year data underlying the specifications with know reforms (as in (2)) as left-hand side variable are shown in Table 1b. In particular, 12% of our sample are countries that have experienced a war in the previous 10 years, around 41% are engaged in one or more strategic rivalries, and 4% are at war with another state. Of the countries in the sample about 45% are democracies, the mean *polity*2 score being -0.75. We see that there is a large variance in the severity of past wars, given by the number of casualties suffered, as well as in the threat posed by strategic rivals, given the size of the military in the largest rival or the sum of rivals relative to the country's own army.

Tables 1a and 1 b about here

4 Empirical results

4.1 Primary enrollment

Table 2 shows the results from our baseline estimation of (1) on the yearly panel, with the primary enrollment rate as the dependent variable and war risk measured by the presence of an ongoing military rivalry. Column 1 shows that the simple correlation between rivalry and primary enrollment is positive and significant. In column 2 we add the democracy indicator. Interestingly, when faced with the same level of military threats, autocracies invest more in education than democracies. This finding runs counter to the median voter view of mass education reforms. Also, the coefficient on military rivalry remains stable when we control for the political regime, which appears inconsistent with the view that democratization *per se* is a main underlying force behind increases in primary enrollment across countries. We discuss our democracy results somewhat further at the end of this section.

In column 3, we add an interaction terms to check if the impact of rivalries on educational investments differs by political regime. We find that primary enrollment responds more positively to military threats in democracies than in autocracies. In columns 4 and 5, we include the relative strength of rivals, defined as the military size of the largest rival (column 4) or of the sum of

the rivals (column 5), in both cases divided by the size of the country's own military. We find that countries with stronger rivals (i.e., with a higher risk of losing a potential war) have higher enrollment rates, magnifying the effect of war threats for countries that would stand to lose war if a war were to occur. Finally, in columns 6 and 7, we control for total government expenditures per capita (column 6), or for GDP per capita and the existence of an income tax as a proxy for fiscal capacity (column 7). This last regression must be performed on a reduced sample as our GDP per capita series begin in 1936 and the income tax data is only available for a subsample of countries. Yet, our main results are unchanged, namely the presence of a strategic rival is associated with higher enrollment in primary education, democracies have less primary education, while the interaction between the democracy indicator and military rivalry is positive.

<div align="center">**Table 2 about here**</div>

Table 3 presents the same set of regressions, except that we are measuring war risk by the occurrence of a war in the past 10 years, distinguishing also between wars that are won and lost. Our main finding is that primary enrollment responds positively and significantly to the country having experienced a war in the past 10 years. Systematically, this effect appears to be stronger if the war was won than if it was lost. This finding goes against the view that past wars might favor future education investments because they weaken incumbent elites that might oppose mass education. A higher number of casualties, which indicates the intensity of the recent war, tends to magnify the impact of recent wars on education, but the coefficient is only significant for lost wars in column 9, where we also control for per capita GDP and for the existence of an income tax system. Consistent with our previous set of results, we find that all else equal, autocracies invest more in education than democracies. However, the interactions between democracy and past wars now appears to be negative in the case of lost wars.

<div align="center">**Table 3 about here**</div>

4.2   Education reforms

Next, we consider the effect of war risk on the occurrence of an educational reform, based on the probit regression in (2). Table 4 looks at the effects of

military risk or rivalry on the probability of an imputed reform, i.e., a 10% or higher increase in primary enrollment over a five-year period. Consistent with our predictions, we find that a strategic rivalry raises the probability of a large increase in primary enrollment. However, we find no significant impact of the military strength of rivals on primary enrollment. The democracy indicator still enters negatively, and its interaction with rivalry weakly positive, consistent with the previous tables. Finally, neither total government expenditure, nor GDP per capita, nor the existence of an income tax system, show significant coefficients.

Table 4 about here

In Table 5, we study the effect of military threats on known reforms, restricting attention to the subsample of 14 European countries for which these data are available since 1830. For this specification, due to the already reduced sample size, we include an indicator variable for countries at war (instead of removing them form the sample) and do not consider the specifications with GDP per capita, for which the data series is shorter. The results are weaker than before, which is not surprising with such a small number of countries. But our main results still hold: a significant positive effect of rivalry (or rival's strength) on the probability of observing a reform in primary or secondary education, once we control for democracy.

Table 5 about here

4.3   The political regime

Our estimates are striking in that they imply that democratic countries invest less in primary education and pursue less education reforms than autocratic countries, absent rivalries or war threats. The gap between democracies and autocracies narrows, however, when the risk of war is high.

The nature of the political system may affect education policy along several channels. As mentioned already in the introduction, extending the franchise might foster policies in the interest of the poor, which might include publicly funded primary schooling. We find no evidence supporting this hypothesis[10]. A prospective mechanism leading in the opposite direction is that

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[10]As mentioned earlier, Bursztyn (2011) questions the impact of democratization on education spending based on the Brazilian example.

democratically elected leaders have higher turnover – and therefore supposedly shorter time horizons – than autocrats, which might make the former less willing than the latter to invest in mass education policies with mainly long-term benefits. A third channel could conceivably run through the effect of rivalries and wars on regime change: wars might affect education spending mainly because they promote regime change, which in turn affects education policy. However, our findings do not support this idea, since the direct estimates of military rivalry on education remains unchanged when we hold constant the political regime. Instead, our results suggest that war threats or past wars tilt the preferences of the elite towards mass education, even in autocratic regimes where more schooling might imply a higher risk of the leader being ousted.

While the finding of a positive interaction effect is an intriguing finding still to be understood, our results suggest that military competition between states has played a more important role for the emergence of mass education than has democratization.

But maybe the concept of democracy is too broad to help us understand the mechanisms at work. To make further progress, we try to disentangle the effects of two main components of the democracy score: constraints on the executive and the openness of executive recruitment. In Table 6, we thus run our main specifications, letting each of these two aspects of democracy enter separately on the right hand side. Specifically, we define one indicator variable for *high constraints on the executive* (*xconst* greater than or equal to 4 in the Polity IV database) and another for *openness of executive recruitment* (*xropen* greater than or equal to 3 in the same database).

Panel A looks at the effect on imputed educational reforms with military rivalry as the measure of war risk. The estimates in Columns 1 and 3 show that both measures of democracy are negatively correlated with the probability of an imputed educational reform. Columns 2 and 4 introduce the interaction terms between rivalry and one particular aspect of democracy. While the point estimates are positive, only the interaction between rivalry and the high constraints on the executive comes out statistically significant. In Columns 5 and 6, we perform a horse race between the two measures of democracy, with or with our interaction terms. The estimates show that the direct influence of each component of democracy remains negative and significant, albeit with a larger estimate for the constraints on the executive.

Panel B repeats the same exercise, but with war in the previous 10 years replacing rivalry. The results are similar to those in Panel A, except that

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the interaction between war risk and openness of executive recruitment now turns negative though not significantly so.

Panel C considers the same specifications as Panel A, but with primary enrollment replacing imputed reforms as the dependent variable. As in Panel A, both the constraints on executives and openness of recruitment variables are negatively and significantly correlated with education. When looking at interactions between rivalry and these two measures of democracy in columns 2 and 4, both interactions come out positive and significant. Finally, both the direct and the interaction effects are of larger magnitude for the executive constraint variable than for the openness variable.

Finally Panel D repeats the same exercise as Panel B, but with enrollment as the left-hand side variable, and the results are similar to those in Panel B, although with higher estimates for the coefficient on the executive constraint variable.

Overall, both measures of democracy appear to have a negative and significant direct effect, however we measure mass education. The results for the interaction effects are somewhat less clear, although the interaction between military threat and high executive constraints is always positive and significant. Taken together, the disaggregated results do not seem to shed all that much light on the underlying mechanism through which political regimes influence mass education.

Table 6 about here

4.4   Robustness

To check the robustness of our results, we first compare our baseline results with those obtained with an alternative measure of primary schooling, namely education attainment from the Barro-Lee (2010) data set, available at five-year intervals for the postwar period only. We run the specifications of (1) with the amount of primary education achieved by adults 15-19 at year $t+5$ as the dependent variable, starting in 1950. Table 7 presents the results. We find similar results to those in Table 2: a positive effect of rivalry or recent wars, a negative effect of democracy, and a (weakly) positive interaction term.

Table 7 about here

Next, we check the sensitivity of our results on imputed reforms to the threshold chosen to define such reforms. Table 8 shows regression results with

thresholds of 5% and 15% instead of 10%. The signs of the coefficients on rivalry and on the democracy score are similar to our baseline specification, although the interaction term is no longer significant.

Table 8 about here

Finally, we take into account the possibility that in the presence of a military threat, defense spending may crowd out the education budget, which would potentially affect our estimated coefficients. Table 9 adds as controls the size of the army (number of military personnel per 10,000 inhabitants) and the share of defense spending in total government expenditure. In the regression where enrollment is the dependent variable, we find some evidence of crowding out: higher defense spending is associated with lower primary enrollment. A natural interpretation is that if fiscal capacity is limited, such that more effort towards building an army restricts the ability of the government to invest in mass education. However, this does not affect our coefficients on rivalry and the democracy variable. On the other hand, a larger army size does not seem to have the same effect, and is even associated with higher enrollment rates. If we speculate, maybe a higher number of soldiers is the sign of a period of pressing military threats, in which governments are concerned with educating a population to alleviate a future scarcity of educated soldiers.

Table 9 about here

Summary of empirical findings   Taken together, our empirical results are quite robust. In the wake of a strategic rival or past wars countries invest more in mass education and undertake more educational reforms. Everything else equal, democracies invest less in primary education than do autocracies. But the interaction between democracy indicators and military rivalry appears to be positive, at least when democracy is captured by constraints on the executive.

5   A simple theory and its implications

How can we understand the empirical results summarized at the end of the previous section. This is certainly not obvious, but in this section we propose a simple theoretical model that may rationalize our findings. In line with the

historical discussion and the focus of our empirical work, the model focuses on the role of education in affecting the quality of the military.

5.1 Formal analysis

The formal model we develop borrow from the state-capacity framework of Besley and Persson (2009, 2011). Consider a society, where the population is normalized to unity and divided into two equally large and homogenous groups (with regard to education) of risk-neutral individuals, $J = A, B$. There are two time periods. Suppose further that total output per capita in period s, equal to total resources and the tax base, is exogenous and constant over time and denoted by $\frac{1}{2}y$. It would be straightforward to extend the model and let output depend on the level of education. All consumption takes place at the end of the second period.

One of the groups serves as the incumbent in both periods (thus there is no political turnover). Constraints on the executive are modeled as an amount t which the incumbent group, I, must grant to the opposition group, O – thus a higher value of t captures more democratic institutions. A war can occur in period 2 with exogenous probability p. For simplicity all (accumulated) income is lost to the country as a whole – i.e., to both groups – if a war is lost. The probability of winning a war in turn is increasing in the educational level e in period 2, and increasing, separable, and concave in a non-monetary quality input incurred by members of both groups. These inputs can readily interpret as educational effort in a broad sense by group members. More specifically, we assume that a war in period 2 is won with probability Ωe, where

$$\Omega = \omega_I^\alpha + \omega_O^\alpha$$

with $\alpha \leq \frac{1}{2}$, and ω_I and ω_O are the (non-monetary efforts) incurred by the incumbent group and the opponent group at a linear cost. Finally, the incumbent group can augment the initial education level, normalized at zero, by investment e in future education at cost $C(e)$, which is increasing and convex.

Timing The timing of the model is as follows

1. In period 1, the incumbent makes investment e in future education

2. At the beginning of period 2, members of each group simultaneously chooses their effort levels ω_I and ω_O.

3. A war with a foreign power erupts with probability p.

4. If a war takes place it is won with probability Ωe.

5. If no war has been fought or a war has been won, the incumbent group consumes $y - t$, while the opposition group consumes t.

    To analyze the model, we proceed by backward induction, starting from the second period, and we assume no time discounting for simplicity.

Equilibrium   At the beginning of the second period, the second period the opponent group's effort solves

$$\max_{\omega_O} \left\{ (1 - p)t + p \left(\omega_I^\alpha + \omega_O^\alpha \right) et - \omega_O \right\} ,$$

taking ω_I as given. Simple algebra gives us

$$\omega_O = (\alpha p e t)^{\frac{1}{1-\alpha}} .$$

Similarly, the incumbent group's effort solves

$$\max_{\omega_I} \left\{ (1 - p)(y - t) + p \left(\omega_I^\alpha + \omega_O^\alpha \right) e(y - t) - \omega_I \right\} ,$$

which gives

$$\omega_I = (\alpha p e \, (y - t))^{\frac{1}{1-\alpha}} .$$

In equilibrium, it follows that Ω is equal to:

$$\Omega(e) = (\alpha p e)^{\frac{\alpha}{1-\alpha}} \left[t^{\frac{\alpha}{1-\alpha}} + (y - t)^{\frac{\alpha}{1-\alpha}} \right] .$$

Moving back to the first period, the incumbent group chooses education investment e to:

$$\max_{e} \{ [(1 - p) + p e \Omega(e)](y - t) - C(e) \},$$

The first-order condition becomes

$$C'(e) = (y - t)[p\Omega(e) + p\frac{\partial(\Omega)}{\partial e_2}] . \tag{3}$$

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Comparative statics It is straightforward, albeit a little bit messy, to perform comparative statics on the first-order condition (3). In the appendix we derive the following result.

Proposition 1 *If t and α are small enough, the equilibrium investments in education e, are increasing in the risk of war, p, decreasing in the extent of democracy t, but with a positive interaction effect between the two.*

Intuitively, these results of our model capture a relatively simple idea. Society's income is (partly) expropriated if a war is lost to a foreign power. The probability of winning a war depends both, upon the educational level, and upon the educational effort by members of the incumbent and opposition groups. In these circumstances, the incumbent group has stronger motives to invest in education if a war is becomes more likely. Absent democracy in the form of some checks and balances, however, opposition-group members do not benefit too much from the economy's resources. Therefore, they have weaker incentives to exert effort than members of the incumbent group. If the efforts by the incumbent and opponent groups are sufficiently complementary, this incentive gap may lower the prospects of winning a war to such an extent that investments in education respond less to a higher war threat in autocracies than in democracies.

5.2   Some supporting evidence

To reiterate, our model predicts that educational investment may well, all else equal, be lower in democracies than in autocracies. But the opposite holds for private educational effort, where the effort of both groups enters in a concave way in the aggregate effort function Ω. Hence, a more democratic country, in which the gap between the two groups' efforts ω_I and ω_O is lower, generates a higher quality of education for a given public investments.

Can we find any empirical evidence for this auxiliary prediction of the model? In recent years, scores on Programme for International Student Assessment (PISA) tests, constructed by the OECD, provide us with a measure of the educational quality across education systems. These tests assess the achievements of 15-year olds in the domains of reading, mathematical and scientific literacy every 3 years since 2000. Taking our model seriously, it would imply that more democratic countries should have a better quality of education per dollar of public education spending.

To maximize the sample size, we use the cross section of 2009 PISA scores, from Hanushek et al. (2011), as our dependent variable. We use public spending in education in % of GDP from the World Development Indicators as our measure of educational investments. Data on both these variables, as well as Polity IV democracy scores, are available for 53 countries. The two panels of Table 10 presents results for reading and math and scores. In Column 1 of each panel, we measure democracy by the *polity*2 score. In column 2, we distinguish clear democracies (*polity*2 $\geq$ 4) versus autocracies or intermediate regimes, while Column 3 makes a further distinction between the most democratic countries (*polity*2 $\geq$ 9) and other democracies.

In every case, we find a positive and significant interaction term between public education spending and the quality of democracy. For given expenditure on education, a more democratic regime is associated with a higher quality of education, i.e., public education investments result in better student achievements. Clearly, this evidence is suggestive at best, but it is certainly consistent with our predictions.

Table 10 about here

6   Conclusion

We have showed that military rivalry and war risks are important factors behind countries' decisions to invest in mass primary education. Democratization seem to play a lesser role, although primary enrollment seems responds more to war threats in democracies than in autocracies. Moreover, a higher number of casualties (intensity of the war) tends to magnify the impact of recent wars on education.

This research could be extended in several directions. One would be to investigate whether economic rivalry has a similar effect on primary enrollment as military rivalry. Economic rivalry could conceivably be measure by competition in international trade. Another would be to endogenize fiscal capacity and in particular look at how much current or past military rivalry affects future fiscal capacity as well as education. One might then expect to find complementarities between the two, analog to the findings on legal and fiscal capacity in Besley and Persson (2009, 2011). A third extension would be to look not only at the size of primary enrollment, but also at the *governance* of primary (and secondary) schools. Recent work by Algan, Cahuc

and Shleifer (2011) distinguishes between vertical and horizontal school pedagogy, where the former relies heavily upon taking notes from the teacher whereas the latter involves more horizontal (group) interactions among pupils in a class. One conjecture might be that primary education reforms driven by military rivalry would be more likely to foster vertical systems. These extensions are left for future research.

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7 Appendix

7.1 Data on military rivalry

Thompson (2001) used the following coding rules to define strategic rivalries:

1. Strategic rivals must be independent states.

2. Beginning and ending dates are keyed as much as possible to the timing of evidence about the onset of explicit threat, competitor, and enemy perceptions on the part of decision-makers. Historical analyses, for instance, often specify that decision-makers were unconcerned about a competitor prior to some year just as they also provide reasonably specific information about the timing of rapprochements and whether they were meaningful ones or simply tactical maneuvers. (...)

3. No minimal duration is stipulated in advance (...)

4. Various constituencies within states may have different views about who their state's main rivals are or should be. Unless they control the government, constituency views are not considered the same as those of the principal decisionmakers. If the principal decision-makers disagree about the identity of rivals, the operational problem then becomes one of assessing where foreign policy-making is most concentrated. (...)

5. If two states were not considered rivals prior to the outbreak of war, they do not become rivals during the war unless their rivalry extends beyond the period of war combat. This rule is designed to avoid complications in assessing the linkages between rivalry and intensive forms of conflict. (...)

6. One needs to be especially skeptical about dating rivalry terminations. Some rivalries experience short-lived and highly publicized rapprochements that turn out to be less meaningful than one might have thought from reading the relevant press accounts at the time. Some rivalries enter long periods of hibernation only to erupt suddenly as if nothing

had changed. All of these situations may share the outward appearance of rivalry termination. What needs to be manifested is evidence of some explicit kind of a significant de-escalation in threat perceptions and hostility. (...)

7. The most valuable sources for information pertinent to identifying strategic rivalry are political histories of individual state's foreign policy activities.

7.2 Proof of Proposition 1

First rewrite (3) as follows

$$C'(e) = (y - t) \left[\frac{1}{1 - \alpha} p^{\frac{1}{1-\alpha}} (\alpha e)^{\frac{\alpha}{1-\alpha}} \left(t^{\frac{\alpha}{1-\alpha}} + (y - t)^{\frac{\alpha}{1-\alpha}} \right) \right] .$$

Using this rewritten condition, we can proceed to analyze the comparative static properties of education investment e with respect to military rivalry p, democracy t), and the interaction between the two. In particular we want to show that (for a non-empty set of parameter values) we can simultaneously have:

$$\frac{\partial e}{\partial p} > 0; \frac{\partial e}{\partial t} < 0; \frac{\partial^2 e}{\partial p \partial t} > 0$$

in line with the empirical results. .

As for the first partial derivative, we have:

$$\frac{\partial e}{\partial p} \propto \left(\frac{1}{1 - \alpha} \right)^2 (\alpha p e)^{\frac{\alpha}{1-\alpha}} \left(t^{\frac{\alpha}{1-\alpha}} + (y - t)^{\frac{\alpha}{1-\alpha}} \right)$$

This expression is always positive.

As for the second partial, we have:

$$\frac{\partial e}{\partial t} \propto -\frac{1}{1 - \alpha} p^{\frac{1}{1-\alpha}} (\alpha e)^{\frac{\alpha}{1-\alpha}} \left[\frac{1}{1 - \alpha} (y - t)^{\frac{\alpha}{1-\alpha}} + t^{\frac{\alpha}{1-\alpha}} \left(1 - \frac{\alpha}{1 - \alpha} \left(\frac{y - t}{t} \right) \right) \right] .$$

Now, if α is sufficiently small, i.e., if the incumbent and opponent groups' non-monetary efforts are sufficiently complementary, we have:

$$\frac{\partial e}{\partial t} < 0 .$$

Finally, let us sign the cross-partial $\frac{\partial^2 e}{\partial p \partial t}$. Using:

$$\frac{\partial e}{\partial p} = \frac{\left(\frac{1}{1-\alpha}\right)^2 (\alpha p e)^{\frac{\alpha}{1-\alpha}} \left(t^{\frac{\alpha}{1-\alpha}} + (y-t)^{\frac{\alpha}{1-\alpha}}\right)}{C''(e_2) - \left(\frac{1}{1-\alpha}\right)^2 (\alpha p)^{\frac{1}{1-\alpha}} e^{-\frac{1-2\alpha}{1-\alpha}} (y-t) \left(t^{\frac{\alpha}{1-\alpha}} + (y-t)^{\frac{\alpha}{1-\alpha}}\right)},$$

we get that $\frac{\partial^2 e}{\partial p \partial t}$ is positive whenever

$$\frac{\partial e}{\partial p} < \frac{\alpha e}{p} \frac{t^{-\frac{1-2\alpha}{1-\alpha}} - (y-t)^{-\frac{1-2\alpha}{1-\alpha}}}{\left(1 - \frac{\alpha}{1-\alpha}\frac{2y-T}{T}\right) t^{\frac{\alpha}{1-\alpha}} + \frac{1}{1-\alpha}(y-t)^{\frac{\alpha}{1-\alpha}}}.$$

This in turn holds if t is sufficiently small. This completes the proof.

7.3 Tables

Table 1a: Summary statistics (yearly sample)

Variable	Obs	Mean	Std. Dev.	Min	Max
Enrollment	7492	1071.168	551.729	1	4943
Rivalry	16442	0.409	0.492	0	1
War in previous 10 years	16442	0.123	0.329	0	1
Rel. army largest rival	7138	1.373	3.621	0	69
Rel. army total rivals	7138	2.003	5.009	0	69
Lost war casualties	15825	0.051	1.030	0	39.841
Won war casualties	15825	0.020	0.193	0	3.922
Polity2	13687	-0.751	7.066	-10	10
Govt expenditure p.c.	11245	452.624	1244.307	0.07	15305.420
Income tax	8186	0.628	0.483	0	1
GDP p.c.	8756	4155.559	9871.112	18	183150.600

Table 1b: Summary statistics (5-year period sample)

Variable	Obs	Mean	Std. Dev.	Min	Max
Enrollment	1833	0.440	0.496	0	1
Rivalry	3343	0.416	0.487	0	1
War in previous 10 years	3343	0.119	0.298	0	1
Rel. army largest rival	1542	1.438	3.757	0	65.2
Rel. army total rivals	1542	2.089	5.097	0	65.2
Lost war casualties	3343	0.051	1.001	0	39.841
Won war casualties	3343	0.020	0.181	0	3.922
Polity2	2893	-0.670	6.939	-10	10
Govt expenditure p.c.	2493	490.854	1356.977	0.07	14228.080
Income tax	1704	0.637	0.477	0	1
GDP p.c.	1894	4364.165	10403.790	22	152794.100

Table 2

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Rate of primary enrollment			
Rivalry	62.877***	66.585***	112.019***	102.075***	99.080***	70.268***	64.899**
	[14.535]	[14.530]	[14.567]	[16.397]	[16.282]	[14.300]	[26.015]
Polity2		-9.397***	-20.844***	-22.841***	-22.914***	-17.331***	-10.044***
		[0.993]	[1.226]	[1.237]	[1.235]	[1.182]	[1.775]
Rivalry*Polity2			24.569***	28.785***	28.822***	21.107***	4.818**
			[1.594]	[1.707]	[1.706]	[1.534]	[2.271]
Rel. army largest rival				2.033			
				[2.067]			
Rel. army total rivals					2.683**		
					[1.287]		
Govt expenditure p.c.						-0.321***	
						[0.009]	
GDP p.c.							-0.037***
							[0.002]
Income tax							25.605
							[48.227]
Country FE	yes	yes	yes	yes	yes	yes	yes
Time FE	yes	yes	yes	yes	yes	yes	yes
Observations	7199	6675	6675	6139	6139	6130	2074
R-squared	0.689	0.666	0.678	0.695	0.695	0.731	0.732

Standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 3

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Rate of primary enrollment				
War in	54.030***	67.270***		71.407***			57.917***	116.508***
previous 10 years	[13.412]	[13.563]		[13.718]			[13.399]	[19.841]
Won war in			121.265***		114.752***	105.550***		
previous 10 years			[17.514]		[17.967]	[19.331]		
Lost war in			10.837		21.847	17.944		
previous 10 years			[17.000]		[17.267]	[18.806]		
Polity2		-9.517***	-9.419***	-9.071***	-8.978***	-9.424***	-7.102***	-7.199***
		[0.994]	[0.993]	[1.018]	[1.016]	[0.992]	[0.972]	[1.367]
War in 10 years				-3.580**			-3.933**	0.218
*Polity2				[1.794]			[1.783]	[2.335]
Won war*Polity2					2.051			
					[2.343]			
Lost war*Polity2					-7.495***			
					[2.181]			
Won war casualties						42.457*		
						[22.529]		
Lost war casualties						-23.329		
						[18.076]		
Govt. exp. p.c.							-0.335***	
							[0.009]	
GDP p.c.								-0.036***
								[0.002]
Income tax								10.940
								[47.925]
Country FE	yes	yes	yes	yes	yes	yes	yes	yes
Time FE	yes	yes	yes	yes	yes	yes	yes	yes
Observations	7199	6675	6675	6675	6675	6675	6130	2074
R-squared	0.689	0.666	0.667	0.666	0.668	0.667	0.723	0.736

Standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Table 4

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Probit for "imputed reforms"				
Rivalry	0.357***	0.224**	0.244**	0.391***	0.422***	0.229**	0.536***
	[0.112]	[0.104]	[0.102]	[0.125]	[0.124]	[0.101]	[0.166]
Polity2		-0.054***	-0.060***	-0.063***	-0.062***	-0.060***	-0.052***
		[0.007]	[0.009]	[0.009]	[0.009]	[0.009]	[0.014]
Rivalry*Polity2			0.015	0.019	0.020	0.017	0.011
			[0.013]	[0.015]	[0.015]	[0.013]	[0.019]
Rel. army largest rival				0.013			
				[0.023]			
Rel. army total rivals					-0.000		
					[0.015]		
Govt expenditure p.c.						-0.000	
						[0.000]	
GDP p.c.							0.000*
							[0.000]
Income tax							-0.522
							[0.343]
SE clustered by country	yes	yes	yes	yes	yes	yes	yes
Time FE	yes	yes	yes	yes	yes	yes	yes
Observations	1660	1519	1519	1366	1366	1426	529

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 5

| | Probit for "known reforms" | | | | | |
	(1)	(2)	(3)	(4)	(5)	(6)
Rivalry	0.120	0.130	0.176**	0.057	-0.082	-0.132
	[0.077]	[0.088]	[0.086]	[0.146]	[0.203]	[0.194]
Polity2		0.010	0.003	0.005	0.006	0.007
		[0.012]	[0.010]	[0.014]	[0.015]	[0.015]
Govt expenditure p.c.			0.000			
			[0.000]			
Rivalry*Polity2				0.018	0.033	0.037*
				[0.023]	[0.021]	[0.021]
Rel. army largest rival					0.087***	
					[0.022]	
Rel. army total rivals						0.060***
						[0.013]
At war	0.249	0.119	-0.193	0.110	0.105	0.108
	[0.264]	[0.269]	[0.540]	[0.270]	[0.273]	[0.273]
SE clustered by country	yes	yes	yes	yes	yes	yes
Time FE	yes	yes	yes	yes	yes	yes
Observations	1466	1410	1095	1410	1365	1365

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Constraints on the executive and openness of executive recruitment

Panel A

	Probability of "imputed reforms"					
	(1)	(2)	(3)	(4)	(5)	(6)
Rivalry	0.189*	0.008	0.351***	0.254	0.255**	0.184
	[0.103]	[0.129]	[0.117]	[0.296]	[0.107]	[0.285]
Exec. constraints	-0.725***	-0.959***			-0.656***	-0.846***
	[0.097]	[0.136]			[0.097]	[0.141]
Exec. openness			-0.488***	-0.556**	-0.276*	-0.210
			[0.155]	[0.236]	[0.150]	[0.230]
Exec. const.*Rivalry		0.500**				0.391*
		[0.200]				[0.200]
Exec.open*Rivalry				0.120		-0.105
				[0.296]		[0.277]
At war	-0.178	-0.202	-0.389	-0.381	-0.237	-0.256
	[0.237]	[0.230]	[0.241]	[0.237]	[0.238]	[0.230]
Observations	1683	1683	1564	1564	1564	1564

All specifications include time and country FE.

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

	Panel B					
	Probability of "imputed reforms"					
	(1)	(2)	(3)	(4)	(5)	(6)
War in previous 10 years	-0.107	-0.259	-0.126	0.011	-0.078	-0.065
	[0.126]	[0.162]	[0.131]	[0.316]	[0.129]	[0.304]
Exec. constraints	-0.756***	-0.814***			-0.696***	-0.740***
	[0.100]	[0.114]			[0.102]	[0.118]
Exec. openness			-0.512***	-0.481***	-0.280*	-0.248
			[0.155]	[0.175]	[0.152]	[0.171]
Exec. const.*War in 10 years		0.357*				0.275
		[0.214]				[0.223]
Exec. open.*War in 10 years				-0.179		-0.178
				[0.336]		[0.322]
At war	-0.001	0.011	-0.123	-0.136	-0.049	-0.050
	[0.239]	[0.235]	[0.236]	[0.238]	[0.242]	[0.238]
Observations	1683	1683	1564	1564	1564	1564

All specifications include time and country FE.

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)
			Primary enrollment rate			
Rivalry	68.787***	12.620	66.873***	48.516*	66.900***	87.435***
	[14.270]	[15.713]	[14.264]	[25.806]	[14.264]	[25.852]
Exec. constraints	5.133	-130.661***			12.939	-114.990***
	[12.917]	[17.174]			[13.057]	[17.567]
Exec. const.*Rivalry		256.399***				237.423***
		[21.635]				[22.010]
Exec. openness			-56.304***	-128.412***	-58.558***	-89.983***
			[14.753]	[19.943]	[14.928]	[20.276]
Exec. open.*Rivalry				142.901***		98.509***
				[26.657]		[26.764]
At war	-2.361	0.760	-5.623	-2.420	-5.465	0.607
	[20.963]	[20.762]	[20.956]	[20.924]	[20.956]	[20.758]
Observations	7492	7492	7492	7492	7492	7492
R-squared	0.686	0.692	0.687	0.688	0.687	0.693

All specifications include year and country FE. Standard errors in brackets. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Panel D

	(1)	(2)	(3)	(4)	(5)	(6)
			Primary enrollment rate			
War in previous 10 years	43.754***	75.558***	43.703***	6.438	43.775***	26.729
	[12.673]	[17.603]	[12.658]	[26.569]	[12.659]	[27.281]
Exec. constraints	4.943	14.671			13.079	23.819*
	[12.927]	[13.452]			[13.066]	[13.586]
Exec. const.*War in 10 years		-61.212***				-76.285***
		[23.524]				[24.384]
Exec. openness			-58.661***	-67.118***	-60.941***	-73.460***
			[14.755]	[15.677]	[14.930]	[15.864]
Exec. open.*War in 10 years				46.517		70.745**
				[29.161]		[30.280]
At war	-4.535	-7.286	-8.129	-5.210	-7.983	-6.983
	[21.106]	[21.124]	[21.100]	[21.177]	[21.100]	[21.172]
Observations	7492	7492	7492	7492	7492	7492
R-squared	0.685	0.686	0.686	0.686	0.686	0.687

All specifications include year and country FE. Standard errors in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 7: Barro-Lee education attainment

| | Percentage of primary schooling attained 5 years later by adults 15-19 years old | | | | | | | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rivalry	5.804**	4.018**	10.190**	9.810**				
	[2.929]	[1.794]	[4.390]	[4.222]				
Polity2	-0.778***	-0.430***	-0.424**	-0.422**	-0.562***	-0.226*	-0.566***	-0.233*
	[0.192]	[0.144]	[0.197]	[0.197]	[0.157]	[0.121]	[0.157]	[0.121]
Rivalry*Polity2	0.450*	0.508**						
	[0.271]	[0.198]						
Rel. army largest rival			0.140					
			[0.700]					
Rel. army total rivals				0.262				
				[0.516]				
War in previous 10 years					7.673***	6.134***		
					[2.542]	[1.836]		
Won war in previous 10 years							8.663***	7.786***
							[2.767]	[2.249]
Lost war in previous 10 years							6.517**	4.269*
							[3.216]	[2.365]
War in 10 years*Polity2					-0.433	-0.192	-0.450	-0.216
					[0.290]	[0.222]	[0.301]	[0.224]
GDP p.c.	-0.303		-11.221***	-11.053***	-0.081		-0.001	
	[1.172]		[3.598]	[3.611]	[1.169]		[1.168]	
Income tax	1.650		2.991	3.088	2.273		2.472	
	[5.512]		[5.557]	[5.547]	[5.523]		[5.530]	
Govt expenditure p.c.		-1.821**				-1.683**		-1.623**
		[0.717]				[0.721]		[0.721]
Country FE	yes	yes	yes	yes	yes	yes	yes	yes
Time FE	yes	yes	yes	yes	yes	yes	yes	yes
Observations	673	1207	375	375	673	1207	673	1207
R-squared	0.230	0.123	0.248	0.248	0.231	0.124	0.235	0.126

Standard errors in brackets. *** $p<0.01$, ** $p<0.05$, * $p<0.1$ Govt exp. and GDP are normalized values.

Table 8: 5% and 15% enrollement threshold for education reforms

| | 5% threshold | | | 15% threshold | | |
	(1)	(2)	(3)	(4)	(5)	(6)
Rivalry	0.199**	0.291**	0.321***	0.320***	0.430***	0.457***
	[0.096]	[0.120]	[0.120]	[0.104]	[0.124]	[0.122]
Polity2	-0.045***	-0.048***	-0.048***	-0.063***	-0.065***	-0.065***
	[0.008]	[0.008]	[0.008]	[0.011]	[0.011]	[0.011]
Rivalry*polity2	0.008	0.008	0.008	0.012	0.017	0.017
	[0.013]	[0.016]	[0.016]	[0.015]	[0.017]	[0.016]
Rel. army largest rival		0.010			0.014	
		[0.023]			[0.024]	
Rel. army total rivals			-0.002			0.002
			[0.014]			[0.016]
Country FE	yes	yes	yes	yes	yes	yes
Time FE	yes	yes	yes	yes	yes	yes
Observations	1517	1364	1364	1514	1361	1361

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

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Table 9

</div>

	Primary enrollment rate			Probability of "imputed reforms"		
	(1)	(2)	(3)	(4)	(5)	(6)
Rivalry	110.857***	76.848***	85.535***	0.439***	0.347***	0.511***
	[15.417]	[18.641]	[19.440]	[0.121]	[0.109]	[0.132]
Polity2	-21.688***	-23.667***	-25.280***	-0.062***	-0.060***	-0.062***
	[1.328]	[1.501]	[1.565]	[0.011]	[0.009]	[0.011]
Rivalry*Polity2	26.429***	30.823***	31.572***	0.010	0.010	0.011
	[1.667]	[1.892]	[1.951]	[0.016]	[0.013]	[0.016]
Size of military/Population	0.812***		0.619***	-0.004***		-0.004***
	[0.085]		[0.095]	[0.001]		[0.001]
Defense/Govt expenditure		-0.229***	-0.365***		0.000	0.000
		[0.062]	[0.063]		[0.001]	[0.001]
Country FE	yes	yes	yes	yes	yes	yes
Time FE	yes	yes	yes	yes	yes	yes
Observations	5604	4772	4290	1073	1220	892
R-squared	0.712	0.637	0.665			

<div align="center">

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

</div>

Table 10a: Quality of education and democracy (reading)

	PISA reading score (2009)		
	(1)	(2)	(3)
Education spending/GDP, 2000-08	1.442	-5.743	-5.743
	[6.607]	[10.602]	[10.825]
Polity2	-1.549		
	[2.586]		
Education spending*Polity2	1.657**		
	[0.660]		
Polity2 ≥ 4		-43.151	
		[59.194]	
Education spending*Polity2 ≥ 4		26.276**	
		[11.526]	
4 ≤ Polity2 ≤ 8			-35.093
			[72.607]
9 ≤ Polity2 ≤ 10			-35.303
			[63.277]
Education spending*4 ≤ Polity2 ≤ 8			21.857
			[15.021]
Education spending*9 ≤ Polity2 ≤ 10			25.446**
			[12.237]
Observations	53	53	53
R-squared	0.414	0.411	0.426

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 10b: Quality of education and democracy (math)

	PISA math score (2009)		
	(1)	(2)	(3)
Education spending/GDP, 2000-08	-3.944	-17.117	-17.117
	[6.456]	[11.007]	[11.239]
Polity2	-5.662		
	[3.498]		
Education spending*Polity2	2.507***		
	[0.697]		
Polity2 ≥ 4		-119.692*	
		[68.816]	
Education spending*Polity2 ≥ 4		40.926***	
		[12.177]	
4 ≤ Polity2 ≤ 8			-138.913
			[85.776]
9 ≤ Polity2 ≤ 10			-102.610
			[72.681]
Education spending*4 ≤ Polity2 ≤ 8			41.839**
			[16.509]
Education spending*9 ≤ Polity2 ≤ 10			38.530***
			[12.867]
Observations	53	53	53
R-squared	0.414	0.411	0.426

Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1

1881

1867
law

National
government

1833
law

#

*

*

#

Parents

Communes

1820   1840   1860   1880   1900

* = département governments
# = other public administrations
Sources: Carry (1999), Toutain (1987).
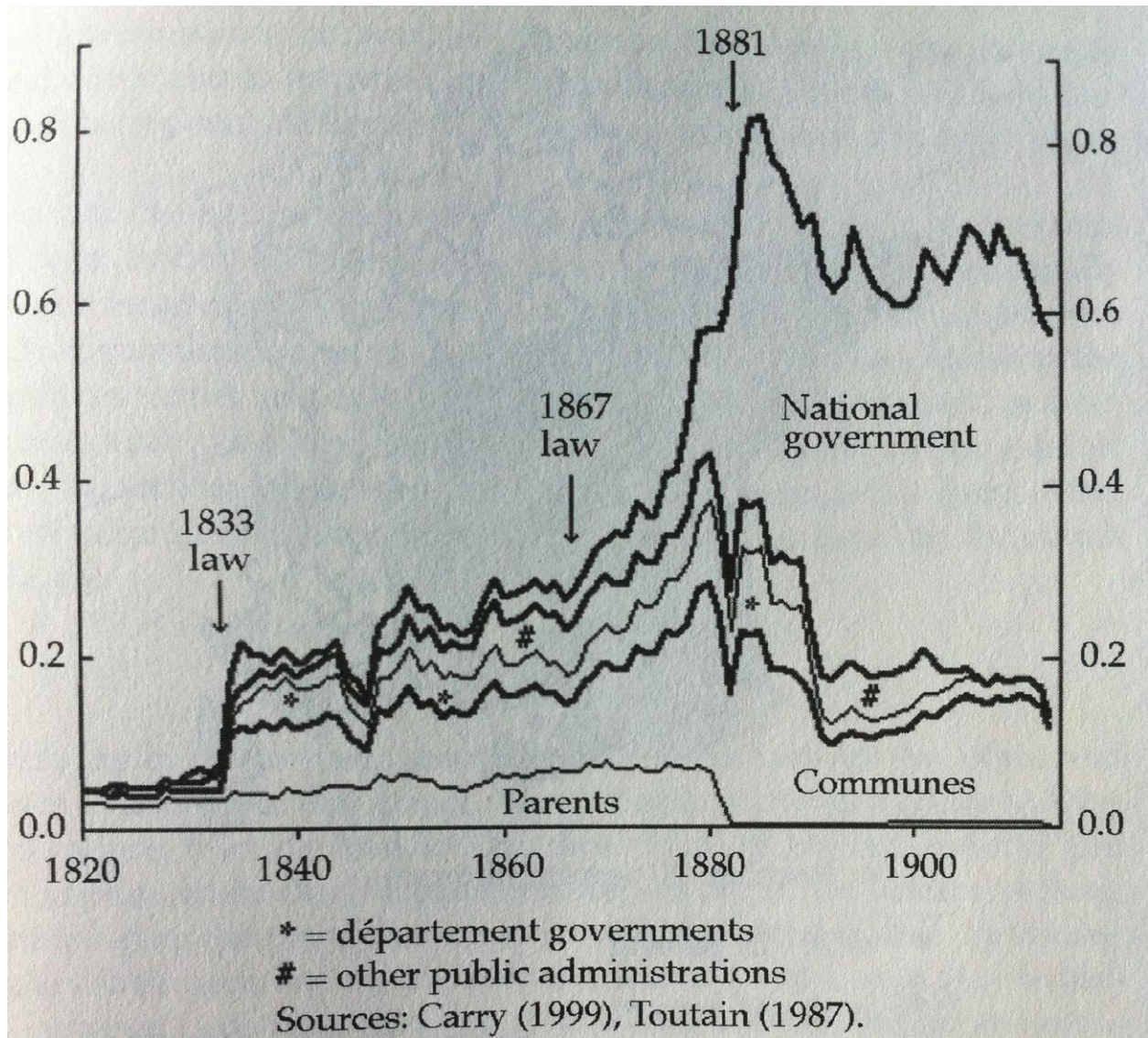
FIGURE 1

Country	Period	External Threat	New Policies	Key Figures	Outcome
Prussia	1810s	Defeat of Iena in 1806	1. Reforms of curricula, teaching methods and teacher education 2. Delegating power to local communities regarding administration and funding of schools 3. Foundation of Berlin University	Wilhelm von Humboldt Baron vom Stein	1. Failure in the short run due to the opposition of the French 2. Substantial impact in the long run: - 16.8% of males born in Prussia before 1801 were completely illiterate, as against 2.9% for males born between 1837 and 1841 [9] - starting in the 1810s, literacy rates gradually increased and reached 85% in 1850 [3] - Prussia became the leader for primary enrollment until the 1880s [4] - schools remained funded primarily by local taxes throughout the XIXth century [4] 3. Primary school enrollment per 10,000 people: 1131 in 1815 vs. 1592 in 1850 [5] **
France	1880s	Franco-Prussian War of 1870	1. Abolition of all fees and tuition charges in public elementary schools 2. Education is made compulsory until age 13 3. Religious education in public school is forbidden 4. 17,320 new schools are built, 5,428 enlarged, 8,381 repaired [1] 5. The new curriculum promotes patriotism	Jules Ferry	1. France overtook Prussia as the leader for primary enrollment in the 1880s [4] 2. Literacy rates quickly increased from 80% in 1870 to 96% in 1912 [6] 3. Increased sense of patriotism and unity [1] 4. Primary school enrollment per 10,000 people: 1176 in 1870 vs. 1430 in 1912 [5] **
Japan	1870s	Risk of colonization by Western powers	1. Introduction of modern science in the curriculum 2. Elementary education is made compulsory 3. 25,000 new schools are built [2]	Mori Arinori Yamagata Aritomo	1. Strong popular resistance in early stages 2. Resounding success in a few decades: - Japan overtook most European powers in terms of primary enrollment, which rose from 28.1% in 1873 to 98.1% in 1910 [7] - from 1865 to 1910, the literacy rate increased from 35% to 75% for men and from 8% to 68% for women [7] - traditionalists and progressives agreed on the curriculum planned by the 1890 Imperial Rescript [8] 3. Primary school enrollment per 10,000 people: 65 in 1876 vs. 1122 in 1905 [5] **

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** Note that, in the long run, primary school enrollment per capita depends on the primary school enrollment rate of new generations but also on the evolution of the demographic structure of the country.

FIGURE 2