Leviathan's health: State capacity and pestilence from the Black Death to Covid

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Abstract: This article examines how state capacity influenced epidemic control from the Black Death to Covid-19. Contrary to conventional theories linking fiscal capacity, centralization, and parliamentary governance to beneficial deployment of state capacity, historical evidence reveals that these features were neither necessary nor sufficient for successful contagion control. Fiscal resources were largely diverted to warfare; centralization often stifled local policy innovation; and parliaments frequently served elite interests. The analysis also reveals the «dark side» of state capacity, showing how governments used their powers to conceal outbreaks, block disease control, and suppress dissent, exacerbating contagion. Effective epidemic control emerged not from Leviathan alone, but from a heterogeneous institutional framework in which the state was supplemented and curbed by non-state institutions – market, community, religion, medical profession, and family.

Keywords: State capacity; epidemics; public health; economic history; institutions.

JEL codes: I18, N13, N33, H11, O43

1. LEVIATHAN AND THE MICROBE

Do powerful states make for healthier citizens? Conventional wisdom in political economy suggests that the rise of the modern state – with its fiscal power, centralized bureaucracy, and parliamentary oversight – was the key to conquering infectious disease. This article challenges that view. For seven centuries, the rise of state capacity was often irrelevant, and sometimes detrimental, to the control of contagion.

This paradox matters because epidemics are a fundamental economic problem, not merely a medical one. For most of history, infectious diseases killed many more people than famine or war, and they still account for a quarter of deaths worldwide. Beyond mortality, survivors suffer life-changing

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I thank Jeremy Edwards and two anonymous referees for detailed suggestions on the text and the audience at the keynote lecture delivered to the Associazione per la Storia Economica in Venice on 4 October 2025 for stimulating discussion.

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sequelae that reduce individual well-being and economic productivity (Ogilvie 2025, pp. 6-11). Consequently, epidemic disease exacerbates the episodes of economic «shrinking» that are increasingly viewed as major determinants of long-term economic growth (Broadberry and Wallis 2025).

Between the Black Death and Covid-19, the burden of epidemics declined dramatically. While modern science eventually played a role, human societies devised effective ways to tackle the externalities of contagion long before the advent of germ theory. Because the capacity of the state expanded significantly across this same period, it is natural to assume a causal link. After all, providing public goods to manage externalities is a core function of the state.

This article investigates the interaction between state and contagion over the past seven centuries. The findings challenge the standard narrative. I demonstrate that the canonical indicators of good state capacity – fiscal strength, governmental centralization, and parliamentary representation – were neither necessary nor sufficient for effective epidemic control. Instead, success depended on specific state expenditures, the principle of governmental subsidiarity, and vigorous interaction with «civil society» – the ecosystem of non-governmental institutions that advance the interests of citizens. Crucially, the data reveal that rising state capacity often possessed a «dark side». The same fiscal and bureaucratic powers used to fight disease were frequently deployed to wage war, suppress information, and enforce authoritarian control, thereby exacerbating contagion. Investigating this tension offers a new perspective on both the epidemiological transition and the historical limitations of the state.

2. The political economy of contagion

Controlling contagion raises classic problems of collective action and misalignment between private and social incentives. When I undertake the costs of social distancing, sanitary measures, or immunization, I generate positive spillovers for society by reducing disease transmission, a public benefit for which I am typically not rewarded. Conversely, when I interact with others while infected, I impose costs on everyone I meet without providing any compensation. Acting purely on private incentives, I undertake fewer beneficial actions and more harmful ones than society desires. How can «society» make me do more good things and fewer bad ones, motivating me to contribute to the public good of collective health?

A major concept in the economic toolkit for addressing this problem is «state capacity» – the ability of the state to implement its aims. An expanding literature argues that historical growth in state capacity – through fiscal, legal, and bureaucratic expansion – improved economic and social outcomes, including better management of epidemic disease (Besley and Persson 2009, 2011; Johnson and Koyama 2017; Besley and Dray 2024). But state capacity raises thorny questions. Fiscal, legal, and bureaucratic capacity give the state the ability to achieve its purposes, yet the forces shaping those purposes remain uncertain. There is no guarantee that state power will benefit society

at large rather than government personnel or entrenched elites, nor is there an obvious check to prevent it from being used for harmful ends (Hoffmann 2015; Ogilvie 2023, 2025). State capacity is a powerful weapon. The fundamental problem is determining how that weapon is aimed.

The state capacity literature argues that this problem was solved by three features that emerged in the transition from medieval rulership to the emerging early modern state: fiscal capacity, centralization, and parliaments. Higher fiscal capacity equipped states with more resources, relaxing constraints on funding socially beneficial public goods. Centralization gave states the ability to implement their policies uniformly across society, transmitting the benefits of government to all citizens. Parliaments checked authoritarian excess and aligned government actions with broader societal interests. Between the late Middle Ages and the twentieth century, these key features created «effective states» that used their capacity to foster economic growth and societal welfare (Besley and Persson 2009, 2011; Johnson and Koyama 2017). An expanding literature has extended these ideas to the study of pandemics, arguing that states possessing higher fiscal capacity, greater centralization, and stronger parliaments improve citizen trust in government and state management of public health crises (e.g., Besley and Dray 2024).

Yet a historical perspective on epidemics reveals a more complex reality. Across the past seven centuries, fiscal capacity, centralization, and parliaments did sometimes improve contagion control, but often they failed to do so or even undermined public health measures. State capacity also had a «dark side», which epidemics brought to the fore. The same powers that could be used to protect public health could also be used to harm it. Historically, states spent most of their fiscal capacity on war, the single greatest driver of epidemics. Even peacetime governments used their bureaucratic and legal capacity to distort public health information or block anti-contagion measures when it served their fiscal or political ends. Many states exploited public health crises to extend authoritarian control of citizens' lives, evoking mistrust and opposition that exacerbated contagion.

The state did not act in an institutional vacuum. Its success in tackling contagion depended critically on its interaction with other components of the institutional framework – markets, local communities, religious organizations, professional associations, familial networks (Ogilvie 2025). Extending our analysis of state capacity to include this interaction yields a better understanding of how societies historically succeeded – or failed – in controlling contagion, and thus in improving economic performance and citizens' welfare.

3. What fiscal capacity did not buy

A key indicator of state capacity is fiscal capacity: the ability of the central state to extract revenues from the population. The logic linking fiscal capacity to epidemic control seems straightforward. Responding to public health crises requires resources. The core tasks of contagion control – tackling externalities and providing public goods – carry costs. Social distancing

Table 1. *Share of state expenditures on military, debt-servicing, and civilian purposes*

Period	% Military	% Debt Servicing	% Civilian	No. obs.
1350-1399	27.3	0.0	72.8	4
1400-1449	27.8	0.0	72.3	8
1450-1499	30.1	9.6	60.3	7
1500-1549	19.9	27.7	55.0	11
1550-1599	28.4	26.7	44.9	17
1600-1649	44.0	14.1	43.5	27
1650-1699	57.3	11.4	32.0	32
1700-1749	52.9	22.2	26.6	39
1750-1799	50.1	23.4	27.2	62
1800-1849	57.6	24.7	17.8	21
Grand total	46.6	19.4	34.9	228
No. missing values	1	12	0	

Notes: Data include observations for Austria, Denmark, England, Germany (Bamberg, Bavaria, the German Empire, Hesse, Prussia, and Württemberg), Italy (Grand Duchy of Florence, Lombardy, Piedmont, Sicily, Venetian Republic), Netherlands/Low Countries, Poland, Portugal, Prussia, Russia, Spain/Castile, Sweden, and the USA. «Civilian» is the standard term used in the literature, but it is in fact a residual, calculated by subtracting «Military» and «Debt Servicing» from the total. In 11 cases, «Debt Servicing» is not given in the source while «Military» is, which means that «Civilian» is a maximum estimate. In 1 case, «Military» and «Debt Servicing» are combined into a single statistic in the source, yielding a missing value for each category but enabling calculation of «Civilian». On the composition of «Civilian» spending, see text. Missing values for separate expenditure components mean not all rows sum precisely to 100%.

Sources: Filipczak-Kocur 1999, p. 448; Mann 1986, I, pp. 485-490; Eloranta 2005; Torres-Sánchez 2007, p. 440; Costa, Henriques and Palma 2024, replication package data for Table 7; Litchfield 2008, par. 351; Alfani and Di Tullio 2019, p. 167 (Table 4.4); Körner 1995, Tables 54-63.

measures, sanitation rules, immunization programmes, and material support to help the poor comply all require substantial financial outlays. Likewise, public goods such as health information, waste removal, water provision, isolation hospitals, quarantine inspections, scientific research, and medical innovation all demand funds. For these reasons, effective anti-contagion measures require fiscal capacity.

But the lens of economic history reveals a neglected dimension: state spending. While some fiscal capacity was clearly necessary, what mattered more was where that capacity was allocated. We must redirect attention from revenues to expenditures. After all, fiscal capacity is a cost; the benefits come from how taxes are spent (Ogilvie 2023, pp. 28, 35-37, 46-47).

For the past seven centuries, governments devoted most spending to purposes unrelated to public health. Until the social and political transformations of the twentieth century, states channelled the bulk of their fiscal capacity into paying for military activities and servicing war debts (Hoffman 2015, p. 315; Ogilvie 2023, pp. 35-37; Alfani and Di Tullio 2019, pp. 165-174). They devoted only a small fraction to civilian purposes.

Table 1 presents statistics on state spending across the five centuries from 1350 to 1850, during which modern fiscal capacity developed. The 228 observations relate to 13 states, some fiscally undeveloped (Poland, Russia, Italy outside Venice, Germany outside Prussia), some fiscally advanced and absolutist (France, Spain, Portugal, Austria, Prussia), some fiscally advanced and constitutional (England, the Netherlands, the Venetian Republic, the

USA). Across all observations, about 47% of spending was military, 19% serviced state borrowing (mostly war debts), and just over a third was allocated to civilian purposes such as public health.

The canonical argument that rising fiscal capacity relaxed constraints on state funding for socially beneficial public goods would predict a positive association between fiscal capacity and civilian state spending. But the data do not support this idea. Table 1 reveals a stark long-term decline in the share of state expenditures dedicated to civilian purposes, which plummeted from over 70% in the late fourteenth century to less than 18% by the first half of the nineteenth. This trend corroborates the established finding that the historical expansion of state fiscal capacity was inextricably linked to military ambitions, as states increasingly prioritized waging war and servicing war-related debt over investing in public goods or economic infrastructure (Hoffman 2015; Ogilvie 2023, pp. 35-40).

This decline in the share of civilian state expenditure was significantly associated with the rise in states' fiscal capacity. For 161 of the 228 observations in Table 1, data are available on a standard measure of fiscal capacity: tax revenues as a share of GDP (Pamuk 2021, slides 15-16; Costa, Henriques and Palma 2024, pp. 458-459). A multiple regression reveals that civilian spending share had a negative, statistically significant association with fiscal capacity.[1] The economic magnitude is non-trivial: with each percentage point rise in tax revenues as a share of GDP, the share of civilian state spending declines by 0.3 percentage points, and the association is statistically significant at the 0.01 level. Controlling for date, therefore, rising fiscal capacity was strongly and significantly associated with a falling share of state spending on civilian purposes.

One might assume that rising fiscal capacity at least resulted in higher absolute or per capita spending on civilian public goods. Detailed data on the value of state expenditures are scarce, but an unusually well-researched comparison between two eighteenth-century European states, Britain and Spain, casts doubt on that assumption (Torres-Sánchez 2007; Ogilvie 2023, pp. 36-38). These two states had a similar population size in 1700 (about 8.7 m inhabitants), though Britain's population was rising fast and reached 21 m by 1820 while Spain's attained only 12 m (Bolt and van Zanden, MPD-2023). In the second half of the eighteenth century, total state expenditures in Britain greatly exceeded those in Spain. But the British state devoted less than 10% of its spending to civilian purposes, compared to 33% in Spain. Consequently, Spain's absolute and per capita spending on civilian purposes was substantially higher than Britain's, even though Spain had lower per capita GDP, lower fiscal capacity, and lower overall state expenditure (Torres-Sánchez 2007; Ogilvie 2023, pp. 36-38). High fiscal capacity was neither necessary nor sufficient to release more state spending to civilian purposes.

[1] Multiple regression model (OLS). The dependent variable is state expenditure on civilian purposes as a percentage of total state expenditure. The independent variables are date and tax revenues as a percentage of GDP. Coefficient (standard error) on date is –0.0833 (–0.0178); on fiscal capacity, –1.244 (–0.476). N = 161. Adj. R-square = 0.283.

State spending on civilian purposes, moreover, involved negligible sums for social expenditures – those on public health, welfare, and education (Lindert 1998, p. 114; Van Bavel and Rijpma 2016; Alfani and Di Tullio 2019, pp. 165-167). In most states before the later nineteenth century, the bulk of non-military government spending went to the ruler's court and household, subsidies for nobles and elites (sometimes to elicit military support), palaces, state display, and official salaries (Körner 1995; Costa, Henriques and Palma 2024, pp. 461-464). The Venetian Republic, for instance, allocated an average of 30.6% of state revenues to civilian purposes between 1582 and 1780, close to the average of 31.8% for the other 145 observations in Table 1 across that period. But on average only 0.5% of Venetian state revenues were allocated to social expenditures (health, welfare, education). Within social expenditures, public health comprised only a small share. In the Venetian Republic in 1679, the health board received 21.1% of «social» expenditures, amounting to 0.02% of total state expenditures that year (Alfani and Di Tullio 2019, p. 167).

If the central state did not provide resources for public health purposes, who did? Historically, a substantial portion of the financial and human resources needed for controlling contagion came from civil society – non-state components of the institutional framework. Local communities, church parishes, lay religious bodies, hospital-poorhouses, medical associations, and kinship networks were the primary providers of monitoring, care, and material support during epidemics (Ogilvie 2025, chs. 4-7). These communal, religious, professional, and familial organizations depended on monetary contributions that people earned in the market – another key non-state institution (Ogilvie 2025, ch. 2). Historically, the state was most effective at controlling contagion not as a sole provider, but as an enabler, establishing the legal and institutional framework to empower, support, or require civil society organizations to deploy their own human and financial resources.

Social distancing provides many notable examples of this collaborative model of public health, in which the state supplied the formal legitimacy but civil society furnished the actual resources. The pioneering and ultimately successful lockdown measures in early modern English plagues, for instance, relied on this multi-layered institutional structure. The national plague statutes, beginning with the landmark 1604 Act, did not establish centralized state funding or bureaucracy for enforcement and relief. Instead, the central state's primary role was to mandate that local parishes, run by the church, the community, and unpaid Justices of the Peace, use their capacity to collect special «plague rates» from local residents. These funds were then used to provide the food, fuel, and other material support that enabled poor households to comply with stay-at-home orders. The on-the-ground tasks of monitoring locked-down households and distributing aid were carried out by parish overseers, who could effectively harness community information, solidarity, and social pressure (Slack 1985). The central state's contributions were to provide legal compulsion and, crucially, to mandate risk-pooling, obliging non-afflicted parishes and sometimes entire counties to assist severely afflicted localities. During the 1604 Nantwich plague, for instance, five-sixths of the funds spent on supporting infected

households came from a plague rate levied on the surrounding county of Cheshire (Slack 1985, p. 279). Medieval and early modern Italian states adopted a similar, civil-society-based model, with local communities, churches, lay religious associations, hospital-poorhouses, professional associations, and merchant philanthropists in cities like Vicenza, Padua, Palermo, and Florence allocating huge quantities of financial and human capital to monitor, record, regulate, incarcerate, and provision citizens during epidemics (Cipolla 1973; Henderson 2019).

In the realm of sanitation, too, fiscal capacity was rarely the main determinant of regulatory success. Public hygiene was monitored and enforced by local communities and religious groups for centuries before the rise of high-capacity fiscal-military states. From the ninth century on, municipalities across the Islamic Mediterranean paid market inspectors (the *muhtasibs*) to monitor public hygiene, a practice soon adopted by cities in adjacent Christian societies (Ogilvie 2025, pp. 90-91). In later periods, by contrast, states with much higher fiscal capacity often failed to make necessary sanitary investments. The sixteenth-century Grand-Duchy of Florence possessed high fiscal capacity by early modern standards, yet its government chose to withdraw from funding sewerage, devolving responsibility to private landlords. This created a classic externality problem, as individual landlords had little incentive to pay for waste disposal whose contagion risks mainly affected others, leading to overflowing cesspits and the spread of disease (Henderson 2019, p. 69). A similar failure occurred in 1910, when the Japanese state used its fiscal and military capacity to conquer Korea but then delegated sanitation in occupied Seoul to monopolistic Japanese companies, disbanding the previous competitive waste-collection system. Since these companies faced no competition they charged excessively high fees, leading to a rise in infectious disease, with contemporary reports describing how «shit piles up like mounds in and around people's houses» (quoted in Ogilvie 2025, p. 94). Where major improvements in gastrointestinal disease mortality did occur, as in England, the USA, and some German states from the mid-nineteenth century onwards, they were driven by rising investments in sewerage and clean water infrastructure, made by *local* governments, not central states (Brown 1988; Aidt, Davenport and Gray 2023).

Economic theory suggests a key role for the state in funding new scientific knowledge, which creates benefits for society in excess of the private profits it brings to those who devise or diffuse it. In principle, the state should be well-positioned to deploy its fiscal capacity to solve the public good problem of inventing and diffusing new scientific ideas, including concepts critical for epidemic control such as sanitation, contagion, vaccination, and germ theory. In practice, however, the state rarely supported medical innovation before the twentieth century, and sometimes not even then. Most fundamental breakthroughs – from the discovery of microbes to immunization – were made by private individuals without government sponsorship. Even when such knowledge was created by other actors, states often failed to support its diffusion or implementation due to the ignorance of state personnel; for instance, while Italian city-states adopted contagion-based quarantines and social distancing shortly after the Black Death, governments

Table 2. *Fiscal capacity and state legalization of variolation*

State	Date variolation was legal or legalized	Tax revenues as per cent of GDP		Per capita tax revenues in terms of days of unskilled wages	
		1700-1749	1750-1799	1700-1749	1750-1799
China	1560	–	–	2.3	1.3
Ottoman Empire	1670	2.3	2.2	2.6	2.0
England	1721	6.9	9.8	8.9	12.6
Sweden	1754	7.2	6.8	–	–
France	1768	7.0	9.0	6.7	11.4
Spain	1774	4.8	7.4	4.6	10.0
Netherlands	1795	14.1	14.0	24.1	22.8

Note: In the Netherlands, the legal status of variolation differed across cities: the procedure was tolerated in Rotterdam, Middelburg, and Groningen, but illegal in many other cities, including prohibitions in The Hague (1765), Roermond (1768), Zwolle (1769), Arnhem (1772), Amsterdam (1773), Leiden (1773), Haarlem (1776), Utrecht (1776), and Zaltbommel (1785). The 1770s saw growing pressure for legalization, but it was not until the Batavian revolution of 1795 that variolation was legalized nationally.

Sources: Legalization of variolation: Rutten 1997, pp. 38, 192-193, 202-203 (Netherlands); Ogilvie 2025, pp. 120-123 (other countries). Fiscal capacity: Pamuk 2021, slides 15-16; Costa *et al.*, 2024, pp. 458-459.

in England and Germany remained oblivious of these techniques for more than a century, and many eighteenth- and nineteenth-century officials were unable to distinguish between effective and ineffective contagion controls (Ogilvie 2025, pp. 136-143). Worse still, many states actively suppressed the implementation of new knowledge due to pressure from entrenched interest groups, such as religious authorities and conservative medical guilds, that wished to protect their monopoly on old knowledge; in a notable instance of this retrograde tendency, the Danish government followed the advice of miasmatists over contagionists and dismantled its quarantine system in 1852, directly unleashing a severe cholera epidemic in Copenhagen the following year.

An even more damaging example is the state's treatment of variolation – pre-Jennerian immunization by inoculating or insufflating patients with attenuated smallpox material. State fiscal capacity played no role in the invention or diffusion of this key medical innovation. Variolation was devised entirely outside the state framework, by private, commercial, and religious providers in early modern China, the Middle East, and North Africa. Nor did any state finance its diffusion. It was communicated to Europe and North America after c. 1700 through mercantile and familial connections and then spread organically through market transactions, local community initiatives, clergy-led campaigns, philanthropic associations, and familial decisions (Bennett 2020; Ogilvie 2025, pp. 63-64, 69-85, 120-123, 152-154).

Table 2 shows observations of states for which data are available on both fiscal capacity and date of legal variolation. Variolation was widespread in fiscally weak China and the Ottoman Empire in the sixteenth and seventeenth centuries, spread legally in fiscally strong England after 1721 and Sweden after 1756, but was not legal and hence not adopted generally in fiscally strong France and Spain until after c. 1770. The Netherlands had the

highest fiscal capacity in eighteenth-century Europe, but did not legalize or adopt variolation generally until 1795.

The main positive contribution of the state to the invention and diffusion of variolation was not to finance it through fiscal capacity, but to refrain from prohibiting individuals from adopting it (Ogilvie 2025, pp. 120-123). Some states allowed their citizens to get immunized – China as early as 1560, the Ottomans and North Africans in the 1670s, Britain and America from the 1720s on. But many other states – Sweden, France, Spain, the Netherlands, and most German territories – prohibited it until the mid to late eighteenth century. States mainly banned variolation under pressure from medical guilds and religious authorities, which complained that immunization violated professional prerogatives and divine intentions. Opponents sometimes also argued that the innovation risked human lives by deliberately transferring live smallpox to uninfected individuals who might transmit it to the wider community. But cost-benefit analyses overwhelmingly favoured the procedure (Table 3). For individuals, variolation carried a mortality rate of 1.6%, compared to 10-20% for natural smallpox, which ultimately infected 95% of the non-immunized. While opponents emphasized the negative externality of variolation – the risk that inoculated patients might transmit infection to bystanders – this danger was mitigated when inoculation was legal and regulated. Under vestry authorization and Poor Law administration, English overseers of the poor contracted with private variolators to inoculate the poor at public expense, often requiring confinement during the infectious period. Justices of the Peace provided legal oversight, while medical and commercial variolators had reputational incentives to comply with isolation requirements, limiting wider transmission. In reality, the high and uncontrolled contagion of natural smallpox generated a far greater negative externality than the low and managed risks of variolation (Sköld 1996, pp. 40-43, 227-346; Bennett 2020, pp. 32-64). The many European and American states that banned legal variolation were obstructing a remedy that was statistically far safer than the disease.

Fiscal capacity also played no role in the invention or diffusion of true vaccination after 1796. While the British Parliament did eventually grant Edward Jenner a financial prize for having invented vaccination, this was a retrospective premium awarded years after the invention and only after intense lobbying from philanthropic and scientific groups; it was not a deliberate investment to stimulate discovery (Bennett 2020, pp. 89-92, 119). The British state at least permitted private persons both to get themselves vaccinated and to experiment with the procedure, which enabled them to improve it, diffuse it, and ultimately save many thousands of lives. Other European states initially banned vaccination, often because of lobbying from religious and medical interests. Information about vaccination was published in the Swedish newspaper *Stockholms posten* on 3 November 1798, just a few months after Jenner published his results in English, and a few Swedish physicians were keen to try it out. But the state refused them permission, prohibited the procedure in 1800, and took another two years to repeal the ban (Sköld 1996, pp. 369-382). Only as evidence of its astonishing success emerged from England did other states legalize the procedure, although

Table 3. *Natural smallpox, variolation, and vaccination compared*

	Natural smallpox	Variolation	Vaccination
Origin	Probably Near East, India, or China. Ancient variola virus may originate in prehistory or antiquity; modern smallpox virus identified in DNA for 1643-1655	Emerged independently in China, Near East, India, North Africa. First documented China c. 1550. Spread in Europe and North America after c. 1720; widely banned in Europe until after c. 1770	Invented by Edward Jenner in England in 1796. Unpublished precursor experiment by Benjamin Jesty 1774
Raw material	Smallpox virus	Smallpox lymph or dust	Cowpox lymph
Procedure	n/a	Scalpel, needle, thread, insufflation	Mainly needle, sometimes scalpel
Protection	Lifelong (if survived)	Lifelong (if survived)	Complete for 3-5 years; partial for c. 20; re-vaccination after 10-20 years recommended
Risk of infection (%)	95	n/a	n/a
Risk of death (%)	10 to 20	1.6	0.0002
Risk to community	High probability of infection spreading to susceptible	Low but non-zero probability of infection spreading to susceptible	Nil
Adverse reaction	High probability of severe fever, pain, abscess, delirium, other serious symptoms	Low but non-zero probability of fever, pain, abscess	Minor soreness around injection point
Risk of complications	High probability of disfiguration, non-trivial probability of blindness or lameness	Low but non-zero probability of complications of natural smallpox (disfiguration, blindness, lameness)	None
Restrictions	Confinement to prevent community spread	Confinement to prevent community spread.	None
Other	n/a	Entire susceptible community should have procedure simultaneously	None

Source: Ogilvie 2025, p. 75.

Table 4. *National vaccination mandates and fiscal capacity in nineteenth-century Europe*

Country	Date	Taxes as:			
		Per cent of GDP, 1800-1849	Per cent of GDP, 1850-1899	Per cent of GDP, 1914	No. days unskilled wages, 1800-1849
Russia	1812	4.6	10.5	16.5	6.2
Sweden	1816	–	7.8	8.3	–
Britain	1853	12.5	7.5	10.3	13.5
Netherlands	1871	10.1	8.5	10.1	–
German Empire	1874	9.9	13.0	20.0	12.3
Italy	1888	6.0	5.6	8.0	–
Austria	1891	8.7	11.2	16.5	10.2
Turkey	1894	5.0	7.8	10.1	5.0
Portugal	1899	5.0	6.0	7.0	12.7
France	1902	9.1	9.9	10.5	14.3
Spain	1903	6.2	8.5	8.0	8.6

Sources: Vaccination mandates: Ogilvie 2025, p. 126. Fiscal capacity: Pamuk 2021, pp. 15-16; Costa, Henriques and Palma 2024, pp. 458-459.

some rulers still issued prohibitions, as in 1804 when a British doctor started vaccinating children brought to him by anxious mothers in Bushehr (in modern Iran), but the sheikh banned it as «a practice emanating from the impure hand of an unbeliever» (Bennett 2020, p. 265).

It took longer for most states actually to encourage citizens to get vaccinated, even though one individual's immunization creates benefits for society which that person does not enjoy – a classic externality. Some European states enacted universal vaccination legislation as early as 1805, while others did not do so until after 1900. But there is no indication that fiscal capacity explains this variation. Table 4 shows all European states for which data are available on both fiscal capacity and date of vaccination mandate. Despite low fiscal capacity, Russia made vaccination compulsory in 1812, while England and the Netherlands, with the highest fiscal capacity in Europe, did not do so until 1853 and 1871 respectively. Many fiscally weak states in the German south enacted vaccination mandates between 1805 and 1818, while fiscally strong Prussia did so only in 1874 as part of the united German Empire.

Enforcing vaccination mandates vividly illustrates the decoupling of epidemic control from fiscal capacity: successful implementation cost almost nothing. In the German state of Baden between 1819 and 1862, the four vaccination institutes underpinning the highly effective national vaccination campaign consumed less than 0.5% of annual government health spending (Mühlhoff 2022, p. 9). In England and Wales in 1902, total poor-rate expenditure on public vaccination amounted to £270,628, less than 0.1% of total UK public spending and well under 1% of total local receipts for «social» purposes (health, poor relief, education, roads, and law and order) (Departmental Committee on Vaccination Expense, 1905, Cd. 2420-2421; Mitchell 1988, pp. 588-590). What mattered for national vaccination mandates was not fiscal capacity but the political will to allocate a tiny share of that capacity to public health rather than other purposes.

Another way fiscal capacity might help contagion control is if the state uses it to provide public health information from which no one can profit by selling on the market. But while information about prevalence and risks helped people avoid and contain many historical epidemics, state fiscal capacity seldom played a central role. The pioneering collection and dissemination of epidemiological data, exemplified by the Barcelona parish counts of plague deaths (1457-1590), the London Bills of Mortality (from 1514), the Copenhagen doctors' lists of epidemic deaths (from the 1540s), the Mexican cocoliztli epidemic investigations (from 1576), and the nineteenth-century physicians' compilations of data on smallpox, influenza, and cholera infections, were collaborative and relatively low-cost enterprises. While sometimes authorized or mandated by rulers, they relied not on fiscal capacity but on the initiative of local authorities, the devotion of church parishes, the unpaid labour and intellectual passion of private citizens, and the commercial infrastructure of the market to sell the printed information (Ogilvie 2025, pp. 131-136).

Conversely, many fiscally powerful states did not devote resources to compiling or disseminating health information. The sixteenth-century Ming state had sufficient fiscal capacity to subsidize an entire Imperial Academy of Medicine but failed to fund effective health information systems (Ogilvie 2025, p. 117). Likewise, the early-twentieth-century US federal government had the fiscal capacity to fund the Banana Wars in Latin America between 1898 and 1930, but allocated few tax dollars to public information about the hookworm (helminthiasis) epidemics that impaired physical and cognitive health across the American South. The successful eradication campaign of 1909-1910, which collected information about infections and disseminated advice about latrine upgrading, was instead financed by the Rockefeller Foundation – i.e. through private philanthropy (Ogilvie 2025, pp. 196, 216).

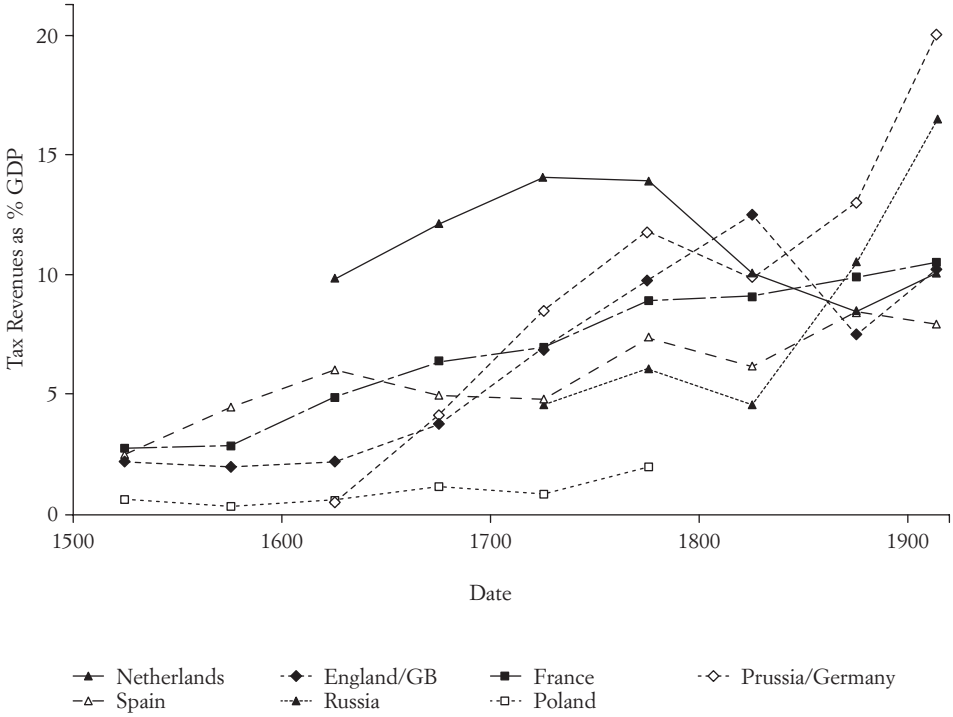
Cross-border externalities – when uncompensated costs spill across political frontiers – are a final challenge that fiscal capacity seems ideally equipped to address. Even a state lacking altruism towards foreigners has reason to fund contagion control abroad to protect its own citizens, since pathogens do not respect frontiers. After 1805, Europeans mounted a number of international expeditions to diffuse vaccination to less developed parts of the world. One might expect such enterprises to be initiated by those states with highest fiscal capacity. Not so. The most far-reaching vaccination diplomacy was organized by Spain, whose 1803 Balmis-Salvani expedition visited multiple continents (shown in Figure 1), vaccinated up to a million people in Latin America, the Philippines, and China, transmitted vaccination knowledge across the world, and established local medical organizations to sustain that knowledge for later generations. Yet in 1800, as Figure 2 shows, Spain had only moderate fiscal capacity by European standards, lower than England, France, Prussia, or the Netherlands.

The second most ambitious vaccine diplomacy was mounted by Russia, which sent expeditions in 1802 and 1806 to the borders of China, vaccinating thousands of people as it progressed. Yet in 1800 Russia had low fiscal capacity by European standards, as Figure 2 shows. By contrast, France, with one of the highest fiscal capacities in Europe, exercised vaccine diplomacy only in

Figure 1. Route of the Spanish royal and philanthropic vaccine expedition, 1803-1812.

Source: Ogilvie 2025, p. 167 (Fig. 3.4).

Figure 2. Tax revenues as percentage of GDP, various states, 1500-1900.



Sources: Pamuk 2021, slides 15-16; Costa, Henriques and Palma 2024, pp. 458-459.

the context of its military occupation of neighbouring countries. Britain, with even higher fiscal capacity, left the funding and organization of a single modest Mediterranean expedition to medical and philanthropic initiatives, providing only permissive support. The Netherlands, with the highest fiscal capacity in Europe during most of the eighteenth century, undertook no vaccination diplomacy at all (Ogilvie 2025, pp. 165-167). In tackling cross-border contagion, the decisive factor was not sheer fiscal capacity, but the political will to channel resources towards that purpose.

Time and again, epidemic history illustrates the critical distinction between the accumulation of fiscal capacity and its allocation (Ogilvie 2023, pp. 35-37). While state resources certainly contributed to the long-term decline in epidemic mortality, the link between fiscal capacity and contagion control was permissive, not inevitable. The decisive factors were the political will and institutional structures that channelled funds towards public health rather than war, debt servicing, or elite consumption. High fiscal capacity was neither necessary nor sufficient for controlling contagion.

4. Central sovereignty and local logic

Centralization is the second feature widely assumed to align state capacity with social welfare. Central states can reap economies of scale in public goods, internalize spillovers across local boundaries, ensure uniform provision, deliver administrative efficiency, improve coordination, and reduce duplication (Besley and Persson 2009, 2011; Johnson and Koyama 2017). A centralized state, according to this argument, should be better placed than provincial or local authorities to enforce quarantines, mandate sanitation, undertake immunization, and diffuse public health information.

But centralization has drawbacks. During epidemics the central state was not always the most effective authority. It lacked the granular local knowledge needed to tailor public health interventions to disease prevalence, economic conditions, and social structure. It could not easily calibrate policy to local preferences, persuade citizens to comply with costly measures, or monitor compliance. A «one-size-fits-all» policy dictated from a distant capital turned out to be inefficient, unacceptable, or unworkable in regions with different geographies, economies, or social arrangements (Ogilvie 2025, pp. 95-97, 117-119, 121-123, 187-188).

Recognizing the drawbacks of centralization suggests a different approach to government – in epidemics as in normal times. This is *subsidiarity*: addressing problems at the most immediate level of governance consistent with their effective resolution (Føllesdal 1998). This principle does not deny a vital role for the central state. On the contrary, the central government's coercive power is often essential for resolving conflicts between localities («banging local heads together»), mandating risk-pooling across a wider territory, and providing financial and legal support to local governments in doing the things at which they are most efficient. But day-to-day implementation of policy measures – whether in public health or other issues – is often best handled by those closest to the problem.

Table 5. *Revenues and expenditures of non-central levels of government as share of total (%)*

Year	Revenues			Expenditures					
	Portugal	GB	USA	Prussia/ Germany	France	GB	USA	Japan	
1400-1449	13.6								b
1450-1499	7.2								b
1500-1549	12.2								b
1550-1599	10.8								b
1600-1649	8.5								b
1650-1699	3.7								b
1700-1749	6.9								b
1750		9.1							c
1750-1799	7.0								b
1760									a
1770									a
1770-1779		13.4							c
1780									a
1790						27.0			a
1800						23.9			a
1800-1819	3.6								b
1810						13.3			a
1820						17.9	30.3		a, f
1830		12.7				17.4	48.6		a, c, f
1840			58.6	12.8		16.6	57.2		a, d, f
1850			53.6	24.6		15.9	49.8		a, d, f
1860			54.0	34.9		20.0	58.2		a, d, f
1870			44.3	41.5	25.9	27.1	46.3		a, d, f
1870-1899		23.1							c
1880			51.1	72.0	24.9	27.2	51.5	30.0	a, d, e, f
1890			57.6	61.2	26.5	26.3	55.6		a, d, f
1900			63.7	62.7	27.9	45.8	64.3		a, d, f
1910				59.1	30.9	39.2	69.8		a, f
1913			68.0						d

Sources: [a] Mann 1986, II, p. 363 (Table 11.1). [b] Costa *et al.*, 2023, p. 37 (Table A3). [c] Mathias 2011, p. 117. [d] Wallis 2000, p. 66 (Table 1). [e] Tanimoto 2019, p. 30. [f] Mann 1986, II, pp. 363-364.

Measuring state centralization is tricky, but one approach is to quantify the fiscal balance between central and local government. Table 5 shows available data from c. 1400 to 1913. Local government's share of total state finance varied across time and space, but was seldom negligible. It might not seem surprising that lower levels of government accounted for a large fiscal share in composite states such as Prussia or federal states such as the USA and the German Empire. But local government revenues and spending were surprisingly important in states such as England and France which are conventionally regarded as highly centralized. In 1790, for instance, 27% of English state expenditures were made at the local level, not far below the 30% observed in the USA in 1820 and above the 13-25% recorded in Prussia in the 1840s and 1850s. Nor did individual countries display an ineluctable decline in the local government share of public revenues and expenditures. In England, for instance, the local share in revenue collection rose from 9% in 1750 to 23% in 1870-1899, while the local share in expenditures described a U-shape, falling from 27% in 1790 to 16% in 1850 but

rising again to 27% in 1870 and 46% in 1900. While the balance between centre and locality varied, many local governments commanded a non-trivial share of state resources.

This was good for contagion control because local governments allocated more resources than central ones to «social» expenditures such as public health and welfare (which helped the poor comply with epidemic controls). In most medieval and early modern states, including England, Portugal, and the Venetian Republic, expenditures on welfare, health, and education were almost wholly entrusted to local levels of government (Mann 1986, I, p. 468, II, p. 485; Costa, Henriques and Palma 2024, pp. 466-468; Alfani and Di Tullio 2019, pp. 166, 169). In Portugal between 1473 and 1835, for instance, the central state controlled about 90% of public spending, which it allocated mainly to war, debt servicing, and subsidizing elite consumption. The 800 local municipalities, by contrast, operated under stricter budget constraints, greater accountability to local inhabitants, and closer alignment with local taxpayers' interests. While they accounted for just one-tenth of total state spending, they provided one-third of spending on non-military public goods (Costa, Henriques and Palma 2024, pp. 464-469).

These spending patterns explain why epidemic controls often emerged from local rather than central government. Foundational physical and social distancing measures were devised mainly by local governments. The first quarantine in history was implemented in 1377 not by a great empire or centralized kingdom, but by the city republic of Ragusa (modern Dubrovnik) (Ogilvie 2025, p. 118). The famous health boards, sanitary cordons, and quarantine systems of the Italian Renaissance were the pioneering innovations of city-states like Venice, Florence, and Milan (Cipolla 1973; Henderson 2019). In early modern England, it was individual town governments that took effective plague measures long before the state legislation of 1604 (Slack 1985). During the 1918 influenza epidemic in the United States, municipal governments in cities such as San Francisco, St. Louis, Milwaukee, and Kansas City implemented early and sustained social-distancing measures, which were associated with reduced transmission and lower cumulative mortality. By contrast, state governments played a limited and uneven coordinating role, and the federal government confined itself largely to guidance and to interventions in military and port settings (Ogilvie 2025, p. 105).

In sanitation, too, local governments often acted centuries before central states began to legislate. In thirteenth-century Bologna, the municipal government created the office of the *fango* – dirt master – to oversee waste disposal and water supply, while medieval Dutch and Flemish towns appointed officials with colourful job titles like «dung king» to manage urban sanitation (Ogilvie 2025, p. 91). In nineteenth-century Britain, America, and Germany, city governments pioneered the water and sewerage investments that dramatically reduced mortality from waterborne diseases like cholera and typhoid, decades before central governments passed comprehensive legislation (Brown 1988; Aidt, Davenport, and Gray 2023).

With immunization, local governments were again far in advance of central states, promoting variolation and vaccination long before national governments got involved. In England and Prussia, local parish and town

councils organized collective variolation campaigns, offered financial inducements to the poor, and used welfare benefits to encourage compliance. In the eighteenth-century Transvaal, tribal headmen personally travelled to collect smallpox pus to variolate their local populations. In nineteenth-century Ethiopia, some regional rulers ordered all their subjects to be variolated. In nineteenth- and twentieth-century China, the leaders of adjacent Hakka villages coordinated each year to hire a commercial variolator and share the expenses (Ogilvie 2025, 122). After 1796, town and village governments all over the world organized local vaccination campaigns, generations before their central governments acted (Bennett 2020, pp. 158, 163, 203, 217; Ogilvie 2025, pp. 124-125).

Highly centralized states were neither necessary nor sufficient for providing the timely data and new ideas needed to fight epidemics. The pioneering systems for collecting and disseminating epidemiological data, such as the health boards of late medieval and early modern Milan and Barcelona, were quintessential local and municipal initiatives, not the creations of central governments. In eighteenth-century England and Sweden, information about variolation was diffused not by the central state but by proactive local governments and a rich ecosystem of civil society actors – doctors, midwives, clergymen, philanthropists (Sköld 1996). In France and Spain, the central state actually banned publications informing citizens about variolation, as in 1754 when the Spanish state forbade the translation of a book on the procedure, which it declared was «prejudicial to the public health» (Bennett 2020, p. 200). In the early twentieth century, American hookworm epidemics were tackled not by the federal government but by local and state health offices, supported by philanthropic and community information campaigns which disseminated advice to citizens, maintained records of latrine upgrades, geolocated them on public maps, carried out laboratory analyses, and notified families (Ogilvie 2025, pp. 196, 216, 430).

State centralization, therefore, was neither necessary nor sufficient to solve contagion externalities; in extreme forms, it often proved counterproductive. To be sure, local autonomy was no panacea; history records ample instances of parochial negligence and obstruction. Yet the differing incentives and capacities of central and local authorities created space for mutual correction. The most successful episodes of contagion control saw the central state support rather than supplant local action, adhering to the principle of subsidiarity. The optimal architecture was not a rigid command hierarchy, but a flexible, multi-level system that harnessed the distinct strengths of centre and locality.

5. Democracy's dilemma

Parliaments are a third feature that is widely believed to have ensured that state capacity developed in a socially beneficial direction. Where parliamentary consent is required for taxation, legislation, and regulation, it acts as a constraint on the executive. This political bargain should make the state more responsive to the interests of society at large (Besley and Persson

2009, 2011; Koyama and Johnson 2017). By providing a mechanism for citizen voice and accountability, parliaments ideally steer state capacity towards socially beneficial ends, such as providing sanitation, quarantines, immunization, and public health information.

Representative bodies did achieve successes during epidemics. The city-states of medieval Italy were not strictly parliamentary, but they did possess more-or-less representative councils, which contributed to the precocious development of social distancing measures in the 150 years after the Black Death. In the Dutch Golden Age, the provincial Estates (*Staten*) and city governments (*vroedschappen*) placed consistent emphasis on public sanitation and hygiene, a priority shaped by the commercial and maritime interests of their urban constituencies (Ogilvie 2025, p. 97). The early modern English Parliament enacted a series of welfare laws and plague ordinances, empowering local parishes to levy taxes to support the poor during lockdowns and creating the foundation for England's successful system of social distancing (Slack 1985).

But not all parliamentary actions benefited epidemic control. When it came to social distancing, parliaments could be a critical point of failure. During the devastating plague epidemic of 1665-1666, the English Parliament, lauded as a model of early representative government, twice failed to pass legislation to organize a national response. This failure stemmed from the narrow self-interest of the House of Lords, whose members were preoccupied with securing exemptions from quarantine regulations for themselves and their estates. Parliamentary paralysis forced local authorities to step into the vacuum and manage the crisis with makeshift measures (Slack 1985, pp. 223-225).

In sanitation, too, representative governments often proved to be a major obstacle. A stark example comes from Leiden around 1600, where the highly representative town council, responding to lobbying by local property owners seeking to keep down their own costs, switched from providing public cesspits to flushing human waste directly into the town's canals, triggering recurrent epidemics (Ogilvie 2025, p. 97). In early-nineteenth-century Britain and America, the wide franchise of representative town councils gave political power to middle-income voters who resisted policies that would increase their tax bills to fund water and sewerage infrastructure whose benefits would accrue mainly to the very poor (who suffered most from waterborne disease) and the very rich (who owned industrial enterprises and large properties). The less democratic German town governments, which concentrated political power in the hands of a rich minority who demanded clean water for their factories and healthier environments for themselves, were able to implement sanitary reform faster and more effectively (Brown 1988). During the 1896 plague epidemic in Mumbai, the municipal council, highly representative by the standards of the time, was dominated by property owners who opposed any sanitary improvements that might increase their taxes or infringe on their property rights, hindering measures to eradicate plague-rats (Harrison 2012, p. 180).

Representative institutions also became focal points for opposition to immunization. Smallpox variolation remained legally prohibited across most of

the Netherlands until 1795 – later than in almost any other European state. The Rotterdam physician Lambertus Bicker attributed this delay to the States General and to city councils that, as highly representative bodies, reflected entrenched religious and medical interests. Although variolation was tolerated in cities such as Rotterdam, Middelburg, and Groningen, it lacked formal support and was actively prohibited elsewhere. Only after the Batavian Revolution of 1795 was variolation legalized, by overriding resistance from provincial Estates and municipal councils (Rutten 1997, pp. 192-193, 202-205).

Parliaments also obstructed vaccination. In 1802, for instance, the Swedish parliament forbade physicians from trying out the new English vaccination procedure, delaying its adoption for several years (Sköld 1996, pp. 369-382). Throughout Europe and Latin America, parliaments often restricted vaccination access by granting monopolies to guilds or associations of medical surgeons and physicians which increased costs, limited supply, and reduced uptake (Ogilvie 2025, pp. 342-346). In Sweden from 1808 to 1898, vaccination rates were consistently much lower in Stockholm, where physicians legally monopolized vaccination, than in the countryside, where a diverse ecosystem of practitioners – including parents, clergymen, midwives, and independent women – was permitted to vaccinate and uptake was consequently far higher (Sköld 1996, pp. 467-478).

Parliaments were also ambivalent about vaccination mandates. The British parliament long delayed enacting a vaccination mandate, only doing so in 1853 after open conflict in parliament, and introducing exemptions in 1898 that effectively nullified it. In Switzerland, too, parliamentary objections delayed enactment of compulsory vaccination until 1886, whereupon the representative bodies in many cantons promptly repealed the mandate (Ogilvie 2025, p. 131). The USA, with its highly democratic political culture, never passed a national vaccination mandate and has a long history of opposition to vaccination laws by state legislatures, leading some scholars to argue that parliamentary governments are actually bad for epidemic control because they are unwilling to compromise individual freedom and corporate interests. But this theory is based mainly on the distinctive federalism of the American parliamentary system, which made it possible for people to sort themselves into small communities of like-minded individuals, and granted such communities massive veto power (Troesken 2015, p. 99; Ogilvie 2025, pp. 125-128).

In an international perspective, parliamentary constitutions neither systematically advanced nor definitively retarded vaccination mandates. Table 6 displays the dates at which compulsory vaccination laws were enacted in 33 European states of differing regime types. To explore the counterfactual scenario, columns 3 and 4 categorize regimes in 1800, since by then any state had the possibility of enacting a vaccination mandate if it so chose. To examine what in fact occurred, column 5 categorizes each regime in the year in which it enacted its vaccination mandate. The descriptive categorization (column 3) is based on the qualitative characterization of that regime in the political literature, in which «democratic» refers to a government subject to meaningful constitutional or parliamentary checks and «authoritarian» to one lacking such checks. This categorization accommodates gradations in

Table 6. *Smallpox vaccination mandates in European states, 1805-1946*

Country	Year of mandate	Regime type in 1800 (descriptive)	Regime type in 1800 (constitutional)	Regime type in year of mandate (constitutional)
Germany Hessen (Grand Duchy)	1805	Authoritarian	Authoritarian	Authoritarian
Italy Piombino & Lucca (principality)	1806	Authoritarian	Authoritarian	Authoritarian
Germany Bavaria	1807	Democratic	Authoritarian	Authoritarian
Germany Erfurt	1807	Authoritarian	Authoritarian	Authoritarian
Denmark	1810	Democratic	Authoritarian	Authoritarian
Germany Schleswig-Holstein	1810	Democratic	Authoritarian	Authoritarian
Germany Waldeck-Pyrmont	1811	Authoritarian	Authoritarian	Authoritarian
Norway	1811	Democratic	Authoritarian	Authoritarian
Russia	1812	Authoritarian	Authoritarian	Authoritarian
Germany Baden	1815	Democratic	Authoritarian	Authoritarian
Germany Hessen (Electoral)	1815	Authoritarian	Authoritarian	Authoritarian
Sweden	1816	Democratic	Authoritarian	Democratic
Germany Nassau	1818	Democratic	Democratic	Democratic
Germany Württemberg	1818	Democratic	Authoritarian	Authoritarian
Germany Oldenburg (Grand Duchy)	1819	Authoritarian	Authoritarian	Authoritarian
Germany Hessen-Homburg	1820	Authoritarian	Authoritarian	Authoritarian
Germany Hannover	1821	Democratic	Democratic	Democratic
Germany Trier	1827	Democratic	Authoritarian	Authoritarian
Britain	1853	Democratic	Democratic	Democratic
Netherlands	1871	Democratic	Democratic	Democratic
Germany Empire	1874	Authoritarian	Authoritarian	Authoritarian
Germany Prussia	1874	Authoritarian	Authoritarian	Authoritarian
Germany Saxony	1874	Democratic	Democratic	Democratic
Switzerland	1886	Democratic	Democratic	Democratic
Hungary	1887	Authoritarian	Authoritarian	Democratic
Italy	1888	Authoritarian	Authoritarian	Democratic
Austria	1891	Authoritarian	Authoritarian	Authoritarian
Romania	1893	Authoritarian	Authoritarian	Democratic
Turkey	1894	Authoritarian	Authoritarian	Authoritarian
Portugal	1899	Authoritarian	Authoritarian	Democratic
France	1902	Democratic	Democratic	Democratic
Spain	1903	Authoritarian	Authoritarian	Democratic
Belgium	1946	Democratic	Democratic	Democratic

Note: Date of vaccination mandate as in Ogilvie 2025, pp. 126-127. Columns 2 and 3 categorize regimes in 1800, since by that date any European regime had the possibility of enacting a vaccination mandate if it so chose. Column 4 categorizes each regime in the year of its vaccination mandate, since that regime chose in practice to enact a mandate in that year. As «Germany» and «Italy» did not exist as unified states in 1800, they are categorized according to the preponderance of their component territorial regimes. «Descriptive» categorization (column 3) is based on the qualitative characterization of that regime in the secondary political literature, in which «democratic» refers to a government subject to meaningful constitutional or parliamentary checks and «authoritarian» to one lacking such checks; this classification accommodates gradations in the implementation of constitutional features and takes account of civil liberties and political culture as well as constitutional mechanics. «Constitutional» categorization (columns 4 and 5) is based on strict constitutional criteria, in which «democratic» refers to a country possessing, in the given year, a constitution and a parliament with legislative or budgetary powers, while «authoritarian» refers to one in which the monarch/ruler held supreme executive power without responsibility to a parliament or in which the constitution was suspended. For detailed discussion, see text.

the implementation of constitutional features and takes account of broader political liberties. By contrast, columns 4 and 5 categorize regimes by strict constitutional criteria, in which «democratic» refers to a country possessing

a constitution and a parliament with legislative or budgetary powers in the given year, while «authoritarian» refers to a state in which the monarch or ruler held supreme executive power without responsibility to a parliament, or in which the constitution was suspended. Each categorization has its distinct strengths and weaknesses: the «constitutional» classification rigorously prioritizes constitutional mechanics, while the «descriptive» categorization also incorporates criteria such as civil liberties and political culture. In Hungary in 1887, for instance, the parliament held absolute veto power and the king could not legislate by decree, so the executive was subject to meaningful checks («democratic»). In Austria in 1891, by contrast, despite broader suffrage and a robust rule of law, Article 14 of the Constitution empowered the Emperor to rule by emergency decree, legally bypassing Parliament («authoritarian»). Thus while Austria was the more *liberal society*, its executive power was less *constitutionally constrained* than in Hungary. The contrast between Austria and Hungary provides a vivid empirical illustration of the following theoretical principle: a state's degree of democracy or authoritarianism depends not merely on having a parliament that can constrain the executive, but on who it represents, whose interests they serve, how society shapes elections, and the strength of civil society in providing independent information, resources, and social pressure that can reinforce or constrain parliamentary incentives (Ogilvie and Carus 2014, pp. 418-428).

Across the 33 countries in Table 6, each regime type displays huge internal variation, with both authoritarian and democratic regimes among both the earliest and the latest states to enact vaccination mandates. Thus the early mandates enacted between 1805 and 1821 included democratic Nassau and Hannover but also many authoritarian regimes, while the late mandates after 1890 included authoritarian Austria and Turkey but also democratic France and Belgium.

Table 7 explores the association between regime type and date of mandate in a regression framework. The descriptive regime characterization for 1800 (equation 1), which takes account of gradations in constitutional implementation and wider political liberties, shows democratic regimes enacting mandates about 10 years earlier than authoritarian ones, but the coefficient is not statistically significant and the regression explains less than 2% of the variance. By contrast, the strictly constitutional regime categorization for 1800 (equation 4) shows democratic regimes enacting mandates about 30 years later than authoritarian ones, though again the coefficient is not significant at conventional levels and the regression explains just 11% of the variance. Only the constitutional classification at the time of the actual mandate is statistically significant, with parliamentary regimes associated with later dates of enactment. Being German, however, played a large and significant role in all specifications (equations 2, 3, 5, and 7), with German states enacting vaccination mandates 26 to 43 years earlier than others. Other factors than regime type influenced date of vaccination mandate, and were particularly important in the «counterfactual» context of the early nineteenth century.

Parliaments were historically neither necessary nor sufficient for effective epidemic controls, therefore, whether these took the form of social distanc-

Table 7. *Regression of date of smallpox vaccination mandate on regime type, Europe, 1805-1946*

Variables	(1) Date	(2) Date	(3) Date	(4) Date	(5) Date	(6) Date	(7) Date
Democratic in 1800 (descr.)	–10.01		–8.761				
	(14.29)		(12.28)				
Democratic in 1800 (const.)				30.90*	25.08*		
				(15.85)	(13.81)		
Democratic in mandate year (const.)						47.82***	35.35***
						(11.76)	(12.58)
German		–42.77***	–42.51***		–40.09***		–26.52**
		(12.18)	(12.28)		(11.84)		(12.44)
Constant	1853***	1869***	1873***	1840***	1861***	1828***	1846***
	(9.948)	(8.480)	(10.32)	(7.803)	(9.135)	(7.659)	(11.18)
Observations	33	33	33	33	33	33	33
R-squared	0.016	0.285	0.297	0.109	0.355	0.348	0.434

Note: «Democratic» is defined according to the three categorizations in Table 6. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

ing, sanitation, or immunization. Why? The structural vulnerability of representative government to special-interest groups played a salient role. In most societies in history, parliamentary bodies were not representative of the whole of society. Rather, they were dominated by politically influential groups that used their representation in parliament to pursue their private purposes. Even in the present day, many parliaments still suffer from these structural weaknesses. Quarantines and market closures threaten influential business interests. Sewerage and water infrastructure imply tax rises for property-owners and high earners. Immunization mandates challenge the spiritual authority of religion and non-evidence-based medical traditions. Public policies that benefit society at large attract economic, political, or moral resistance by powerful groups that are strongly represented in parliament.

This helps explain why parliamentary government exercised ambiguous effects during epidemics. Effective contagion control, like effective economic policy, depended on not just the formal existence of a parliament, but which specific groups were represented in it, what their interests were, and the broader influence of society at large on how representatives were elected (Ogilvie and Carus 2014, pp. 418-428). Successful outcomes were historically more likely when policy was shaped not just by the formal machinations of parliaments, but also by civil society, which provided alternative sources of information, resources, and social pressure to complement or counteract the incentives of parliamentary representatives. The effectiveness of parliament in controlling contagion depended on its interaction with this wider institutional ecosystem (Ogilvie 2025, pp. 97-98, 119, 125-131).

6. The dark side of state capacity

Much literature on state capacity views its growth as an unambiguous progression towards better social outcomes. A state that can tax more, centralize authority, and harness parliamentary representation is assumed to be one that will provide more public goods and improve people's welfare. The history of epidemics, however, reveals a darker side to state capacity. The very powers that enabled a state to control contagion – its fiscal resources, its centralized authority, its legislative apparatus – could be used for purposes that undermined public health, exacerbated epidemics, and spread infection among its own citizens and those of other states.

For most of history, the primary business of government was war. As we have seen, most of the fiscal capacity built up by states from the Middle Ages to the twentieth century was devoted to waging war and servicing military debts. While some literature argues that warfare benefited economic growth, substantial evidence suggests military activity destroyed labour and capital, crowded out private investment, damaged agriculture, and increased prices by blocking trade (see Ogilvie 2023, pp. 37-40). Another way warfare damaged economic performance and human welfare was by spreading disease, as it moved troops, camp followers, refugees, and prisoners of war across previously separate immunological zones under unhygienic conditions, inflicting epidemiological shocks on vulnerable economies. In 1345-1346, for instance, the Black Death came from Mongolia to the Black Sea with a Tartar army, was incubated there during warfare with multicultural trading cities, and moved onwards to the Middle East and Europe in military galleys as well as merchant ships. In fifteenth-century France, epidemics of plague, typhus, and dysentery were carried by armies during the Hundred Years War. The Thirty Years' War (1618-1648) propagated waves of plague that killed an estimated 30-35% of the population in central and northern Italy and 40% in Germany. The eighteenth-century wars between the Russian Empire, Sweden, and the Ottomans unleashed plague and smallpox epidemics which together killed far more soldiers and civilians than combat itself. During the Revolutionary and Napoleonic Wars (1792-1815), mass mobilization, poor sanitation, and global campaigning amplified deadly epidemics of typhus, dysentery, plague, and smallpox, which not only killed many thousands of people but also measurably harmed market integration across the globe (Ogilvie 2023, p. 39). The Franco-Prussian War (1870-1871) sparked the worst smallpox pandemic of the century, causing half a million deaths. The mass troop movements of the First World War created ideal conditions for the global spread of the 1918-1919 influenza pandemic, killing an estimated 50-100 million people worldwide. In 2020, the Syrian civil war saw the world's highest Covid-19 infection rates, particularly among its millions of refugees and captives. Warfare represented the single most destructive application of state capacity, a recurring affliction that has amplified episodes of epidemic contagion and economic shrinking across the centuries (Ogilvie 2025, pp. 1-3, 170-175; Broadberry and Wallis 2025, pp. 511-512, 527-533).

The impact of rising taxation on the poor was a second way state capacity harmed contagion control. The continual increase in per capita taxa-

tion in the context of regressive fiscal systems was a key determinant of the sustained growth of inequality in Europe from the medieval period to the late nineteenth century (Alfani and Di Tullio 2019, pp. 133-180). Rising inequality deprived the poorest members of society of the resources needed to avoid contagion, reinforcing the pattern by which almost every recorded epidemic over the past seven centuries has struck the poor harder than the rich (Ogilvie 2025, pp. 46-65). State spending failed to compensate for fiscally induced deprivation since before the twentieth century the state devoted hardly any expenditures to public health or poor relief (Lindert 1998; Van Bavel and Rijpma 2016; Alfani and Di Tullio 2019, pp. 145-180). Rising fiscal capacity thus exacerbated epidemics by depriving the poorest citizens of resources they could have allocated to protecting themselves – and thus the whole society – against disease.

States also used their legal and bureaucratic capacity to censor and falsify public health information. Governments have powerful incentives to suppress news of an epidemic to avoid trade embargoes, prevent market withdrawal, and maintain political stability. Governments across the world from the Black Death to Covid systematically concealed epidemics to sustain business confidence and maintain public order (Ogilvie 2025, pp. 147-148). In 1598, Duke Carl Emanuel I of Savoy concealed an outbreak of plague in Turin while simultaneously ordering local merchants to attend the great Fair of Asti so as to safeguard his customary revenues (Ogilvie 2025, p. 147). In 1720, in an effort to protect its lucrative Mediterranean trade, Marseille's government concealed a plague outbreak for three crucial months, during which the disease took root and developed into one of the last great plague epidemics of western Europe (Ogilvie 2025, p. 144). During the 1918-1919 influenza pandemic, the governments of all warring nations systematically censored press coverage and ordered health officials to lie to the public so as to maintain military output and civilian morale (Ogilvie 2025, p. 145).

States also blocked public health measures to placate powerful domestic interests. In eighteenth-century France and Spain, governments banned smallpox variolation under pressure from the Catholic Church, which regarded it with theological suspicion, and from monopolistic medical associations, which perceived an effective folk practice as a threat to their professional authority and economic interests (Bennett 2020, pp. 39-43, 151-152; Ogilvie 2025, pp. 260-263, 333-342). In the nineteenth century, the British government concealed evidence of Indian cholera epidemics and obstructed international quarantine measures, concerned to protect Indian exports and the Muslim hajj pilgrimage, propagating the fourth cholera pandemic (Harrison 2012, pp. 139-150). By using legal and bureaucratic capacity to protect powerful interests, states hindered anti-contagion measures that could have saved countless lives.

Historically, public health crises have often provided a pretext for authoritarian overreach, as states used anti-contagion measures to persecute minorities, suppress dissent, and expand surveillance rather than to safeguard public health. During the Black Death, governments across Europe encouraged pogroms against Jewish communities, which were falsely blamed for causing the pandemic (Ogilvie 2025, p. 139, 181). After the Manchu dynasty

took power in 1644, non-infected Chinese families were forcibly evicted on sheer suspicion of harbouring smallpox (Ogilvie 2025, p. 178). In the 1892-1893 Russian cholera epidemic, the Tsarist state exploited the emergency to repress workers and peasants, with *sanitaires* armed with iron hooks seizing the sick from the streets and confining them to «cholera barracks» where they suffered degradation and violence (Ogilvie 2025, p. 178). The South African government used the 1901 Cape Town plague outbreak as a pretext to forcibly remove 6,000 Black Africans to a former sewage station, which it converted in 1902 into one of the first segregated Black townships (Ogilvie 2025, p. 140). During the Covid-19 pandemic, many governments invoked emergency health measures to justify broader authoritarian controls, and according to the *Human Rights Watch World Report 2023*, 16 of 101 governments were still using Covid-19 rules in 2022 as a pretext for repression ranging from bans on assembly and censorship to arbitrary detention, surveillance, and even capital punishment (Ogilvie 2025, p. 180). Time and again, authoritarian excess made epidemics worse as citizens responded by organizing riots, assaulting medical workers, attacking isolation units, and surreptitiously evading the controls, spreading contagion more widely.

A final dark side of state capacity emerged when governments undermined the supranational coordination needed to manage cross-border contagion, instead using their bureaucratic and coercive powers to prioritize narrow national interests, even though, as the Florentine government trenchantly observed in 1630, «by eradicating the disease outside the walls, its eradication within is made easier» (quoted in Cipolla 1973, p. 118). Many states concealed epidemics from other polities, as in 1575 when Venice's ambassadors abroad employed «all possible duplicity» to hide the Venetian plague in order to stave off trade embargos or in 1770 during the Russian-Turkish war when the Tsarist government censored information about plague in the army, exacerbating a pandemic that killed over 100,000 victims across wide tracts of eastern Europe. This pattern continued into the modern era: African governments exacerbated a cholera epidemic in 1978-1987 by concealing cases from the WHO, while the Chinese government refused to share information during the 2002 SARS outbreak and initially concealed Covid-19 cases in late 2019 (Ogilvie 2025, pp. 148-151, 155-157).

While border inspections are vital for containing epidemics, nation-states have often weakened them for military or political gain. In Bremen between 1623 and 1628, the King of Denmark facilitated the spread of plague by suspending grain inspections and keeping trade fairs open for military purposes (Ogilvie 2025, p. 161). In the nineteenth century, states seeking political advantage routinely blocked efforts to systematize international quarantines (Harrison 2012, pp. 73-77, 141-153). This pattern continued in 1906, when the Third International Conference of American States failed to ratify disease controls because several nations favoured narrow domestic interests over the convention (Harrison 2012, pp. 133-135). History shows state capacity often undermining international quarantine agreements, as governments subordinated public health to national rivalry. They did this either by relaxing standards to attract trade or by making false claims about foreign epidemics to block competitors, strategies that encouraged evasion and

eroded the credibility of quarantine accords. In short, the «good» capacity needed for international coordination was often eclipsed by the «bad» capacity of national self-interest.

7. Beyond Leviathan

The history of epidemic control over the past seven centuries challenges the assumption that good social outcomes are the inevitable by-product of a more capacious state. While epidemics create externalities and public good problems that require the coercive and coordinating powers of government, the mere existence of state capacity is no guarantee of its benevolent use. Historical evidence suggests that the «Leviathan» is a dangerous instrument: without the check of civil society and the flexibility of local governance, the state's vast capacity is as likely to be deployed for war and repression as for public health.

The primary lesson of this history is that political will matters more than fiscal might. The bottleneck for epidemic control was rarely a lack of resources, but rather the motivation to allocate them correctly. For centuries, states possessed ample fiscal capacity but prioritized military dominance and debt servicing over civilian well-being. Moreover, the most effective public health interventions – information diffusion, local coordination, and encouragement of voluntary compliance – were often low-cost. High fiscal capacity was neither necessary nor sufficient to trigger them; what mattered was the state's willingness to act as an enabler rather than an extractor of resources.

Second, proximity trumps centralization. The most effective public health measures historically followed the principle of subsidiarity. Local and regional governments, with their granular knowledge of social and economic conditions, consistently outperformed distant central bureaucracies in innovation and implementation. While the central state played a vital role in pooling risk and resolving inter-regional conflicts, top-down «command and control» approaches frequently failed due to rigidity and ignorance. Similarly, parliamentary oversight was no panacea. Representative bodies were structurally vulnerable to capture by special interests – from wealthy ratepayers resisting sanitation taxes to medical guilds hindering immunization – which made them obstruct essential health measures.

Third, state capacity has a dark side. The power to tax, regulate, and surveil is morally neutral; it can be used to protect citizens or to oppress them. The historical record is replete with governments using public health emergencies as pretexts to persecute minorities, suppress dissent, and expand authoritarian control. Furthermore, the state's appetite for war has historically been the single greatest accelerator of pandemics. A realistic theory of the state must account for this structural ambivalence: a state strong enough to control contagion is also strong enough to exacerbate it.

Ultimately, there is no institutional «magic pill» for epidemic control. Neither state, market, community, religion, profession, nor family is sufficient on its own. Markets can fail to internalize externalities; communities can be parochial; religions can block science; professionals can form cartels; fam-

ilies can be clannish. Success has historically come from a diverse institutional ecosystem – a vigorous «civil society» – where these actors interact and curb each other's excesses. By creating interstices where experimentation can flourish, this variegated framework allows innovative solutions to emerge precisely when the state is unable or unwilling to support them. Non-state institutions therefore act as both a laboratory for discovery and a check on state power, providing the resource allocation and moral solidarity that the Leviathan often lacks.

The lesson of seven centuries of pestilence is clear. We cannot rely on the sheer growth of state capacity to secure public health. Future resilience depends not on building a stronger Leviathan, but on cultivating the diverse institutional ecosystem that keeps the Leviathan honest.

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