Online Appendices (For Web Publication Only)

1 Data Appendix

A Source for Country-Level Sumptuary Laws

England/Scotland The main source for English sumptuary laws is Baldwin (1926). We also consult Hooper (1915). There is a distinction between legislation by Parliament and proclamations made by the king. Proclamations were legislative orders that the king could issue at his discretion and which were enforced in the Star Chamber (and not by common law courts). In addition to legislation, our dataset includes royal proclamations such as those issued by Elizabeth in 1559 and twice in1562. Elizabeth also issued proclamations in 1574, 1577,1580, 1588 and 1597 (Benhamou, 1989).

France The main source is Moyer (1996) who covers the period 1229–1806. For the period before 1229 we rely on other sources such as Hunt (1996). We also consult Harte (1976).

Low Countries We obtain information from Sturtewagen and Blonder (2019).

Italy A comprehensive list of sumptuary laws in Italian city-states is provided by Killerby (2002). We supplement this with information from Brundage (1987) and Hunt (1996). Sumptuary legislation in Florence is detailed by Rainey (1985). We also consulted Muzzarelli (2002) for laws in Emilia Romagna.

Spain For Spain the main source for sumptuary laws is Guarinos (1788). We also consulted Wunder (2019).

Portugal We use Bethencourt (2019).

Sweden Our source of information is Andersson (2019).

Holy Roman Empire For obtaining and translating sources in Germany we are indebted to Josh Bedi. General information on sumptuary laws across the Holy Roman Empire is provided by Bulst (1988). A large amount of information for various German cities is listed in Eisenbart (1962). Mueller (1914) provides a history of sumptuary legislation in Isny. Information on the history of sumptuary legislation from Ravensburg is from Mueller (1924). Ulm is covered by Mollwo (1905). Keller-Drescher (2003) provides information on sumptuary laws in Wüttemberg, as does Schmidt-Funke (2018). Detailed information on sumptuary laws in Leonberg is provided by Landwehr (2000) who also includes information on sumptuary laws in Rostock and Stuttgart. Weber (2002) provides details on the major police ordinances at the Reich level in 1530, 1548, and 1577. We also consulted Zander-Seidel (1990), Kraß (2006), and Frieling (2013).

Switzerland We use the numbers provided by Hunt (1996) which we verified and checked with other sources.

Russia We use information in Riello and Rublack (2019).

Japan The main source of data for sumptuary laws in Tokugawa Japan is Yunoki, Egashira, and Horie (1929). We are indebted to Noboru Koyama for obtaining and coding these data for us.

2 Historical Appendix

In this appendix we provide additional discussion of different types of sumptuary legislation (Section A); sumptuary laws in Republican Rome, the Ottoman empire and Japan (section C). In Section A.4 we provide additional evidence for the link between outbreaks of the bubonic plague, population, and real wages.

We provide an example of an Elizabethan sumptuary law in Figure A.1.

The Problem of Evasion

This suggests that enforcement was costly and that these costs depended on the extent to which the laws were being violated. In our model both the extent to which sumptuary laws are violated and the resources devoted to enforcing these laws depend on disposable income. It is the interaction of these two effects generated by income growth that can thus account for both the rise and fall of sumptuary legislation. This analysis is influenced by accounts that emphasize how enforcement became more costly as the economy became more complex and consumption opportunities more diverse.[36]

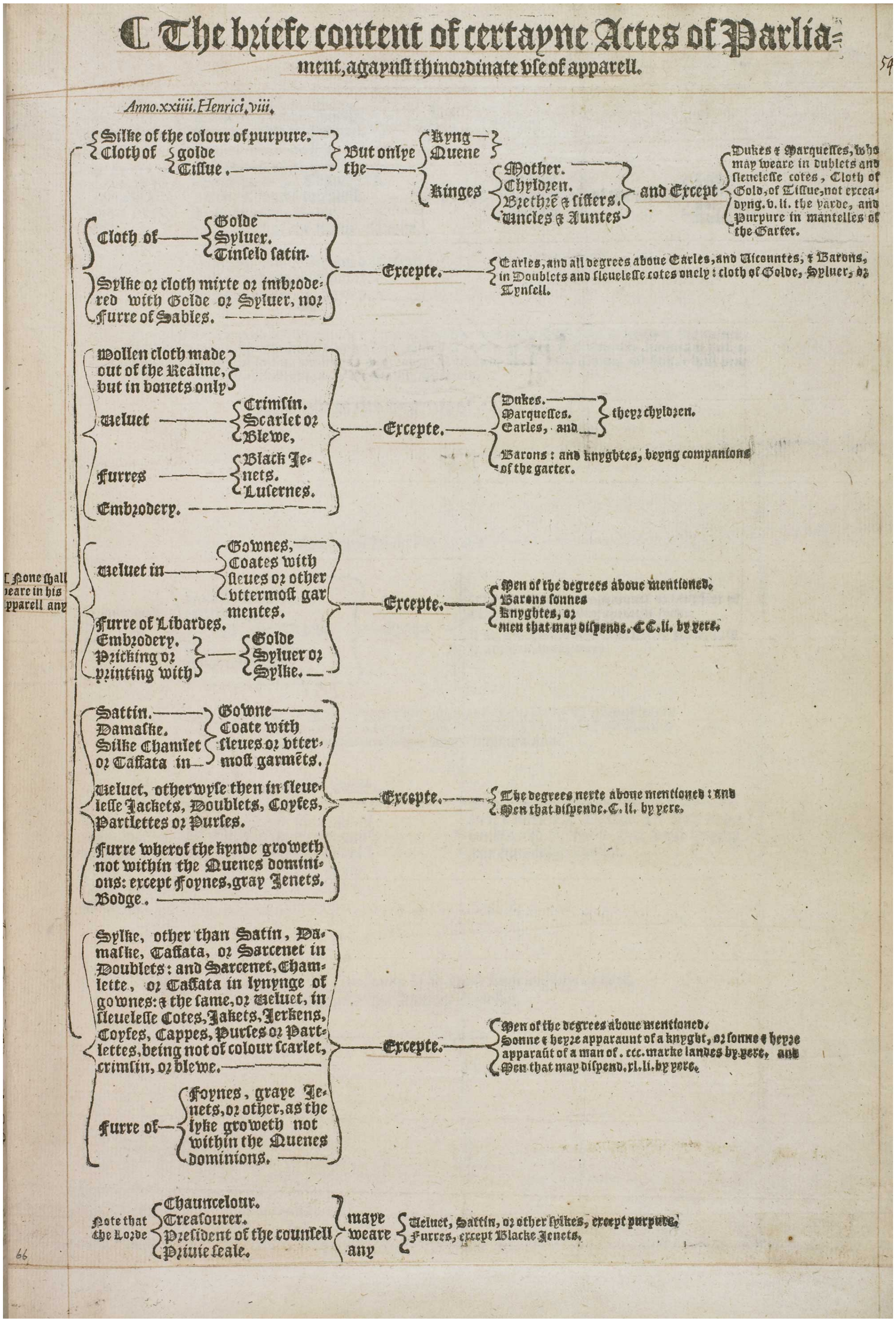
While generalist accounts often give the impression that sumptuary laws were ineffective and widely flouted, more recent and better sourced studies suggest that the extent of evasion varied greatly. For example, sumptuary laws were complied with in medieval and Tudor England (Doda, 2014, 183–184).[37] However, by the late sixteenth century, concern with widespread evasion appears to have become more widespread, at least in the minds of legislators. Specifically, there was concern that economic developments were making luxury consumption more available to the lower orders and that this was a source of social disorder. Enforcement costs were also a concern; it was possible to enforce sumptuary laws in London but more difficult to do so in the rest of the country (Hooper, 1915, 447).

The consumer revolution of the seventeenth to eighteenth centuries made sumptuary laws increasingly difficult to enforce. Opportunities for luxury consumption could not easily be restricted to the elite (McKendrick, Brewer, and Plumb, 1982; Brewer and Porter, 1993; Vries, 2008; Koyama, 2012). Consumer aspirations diffused among the middle and lower classes (see Styles, 2007). New opportunities for fashionable clothing rose with the emergence of retail shops, where individuals could purchase ready-made clothes, as opposed to purchasing whole cloth (Mui and Mui, 1989). The real cost of clothing also fell (Shammas, 1990). By the eighteenth century Lemire (1991, 97) observes that even servants could save up the "eight shillings for a ready-made gown," creating "a potentially vast market among working-women, for whom these prices meant perhaps one week's wages or less". All of this made it more costly to limit the expenditures of non-elites.

Finally, at the end of our period of analysis, the rise of ready-to-wear clothes made it easier for non-elites to emulate the clothing of elites. As a consequence, in the nineteeth century, luxurious clothing ceased to be as important a signifier of social status as it had been previously. "Thanks to ready-to-wear clothing and inexpensive fabrics," Perrot

[36] Frick (2002, 188–189) reports how with economic growth in late Renaissance Florence, new goods emerged with vague names designed to evade sumptuary legislation: "The term *lattizi* translates as 'milky,' but pelts of what creature it is unclear. This 'mystery fur' of Renaissance documents may have started out as a female strategy to evade . . . sumptuary laws, with the name in time becoming a commonly used designation for a pricey fur of indeterminate origin" (Frick, 2002, 189).

[37] For instance, "There were no overt violations of the sumptuary laws among the wills left by late medieval nobility . . . The early Tudor period wills and inventories reveal much of the same, and the solitary violation which Hayward notes appears to have been in error and not a violation at all" (Doda, 2014, 183).



The briefe content of certayne Actes of Parliament, agaynst thinordinate vse of apparell.

54

Anno.xxiiii.Henrici.viii.

None shall weare in his apparell any

Silke of the colour of purpure.
Cloth of golde
Tissue.
But onlye the
Kyng
Quene
Kinges
Mother.
Chyldren.
Brethrē & sisters.
Uncles & Auntes
and Except
Dukes & Marquesses, who may weare in dublets and sleuelesse cotes, Cloth of Gold, of Tissue, not exceadyng. v. li. the yarde, and Purpure in mantelles of the Garter.

Cloth of
Golde
Syluer.
Tinseld satin.
Sylke or cloth mixte or imbrodered with Golde or Syluer, nor Furre of Sables.
Excepte.
Earles, and all degrees aboue Earles, and Uicountes, & Barons, in Doublets and sleuelesse cotes onely: cloth of Golde, Syluer, or Tynsell.

Wollen cloth made out of the Realme, but in bonets only
Ueluet
Crimsin.
Scarlet or
Blewe,
Furres
Black Jenets.
Lusernes.
Embrodery.
Excepte.
Dukes.
Marquesses.
Earles, and
theyr chyldren.
Barons: and knyghtes, beyng companions of the garter.

Ueluet in
Gownes,
Coates with sleues or other vttermost garmentes.
Furre of Libardes.
Embrodery.
Pricking or printing with
Golde
Syluer or
Sylke.
Excepte.
Men of the degrees aboue mentioned.
Barons sonnes
Knyghtes, or
men that may dispende. CC.li. by yere.

Sattin.
Damaske.
Silke Chamlet
or Taffata in
Gowne
Coate with sleues or vttermost garmēts.
Ueluet, otherwyse then in sleuelesse Jackets, Doublets, Coyfes, Partlettes or Purses.
Furre wherof the kynde groweth not within the Quenes dominions: except Foynes, gray Jenets, Bodge.
Excepte.
The degrees nexte aboue mentioned: and
Men that dispende. C. li. by yere.

Sylke, other than Satin, Damaske, Taffata, or Sarcenet in Doublets: and Sarcenet, Chamlette, or Taffata in lynynge of gownes: & the same, or Ueluet, in sleuelesse Cotes, Jakets, Jerkens, Coyfes, Cappes, Purses or Partlettes, being not of colour scarlet, crimsin, or blewe.
Furre of
Foynes, graye Jenets, or other, as the lyke groweth not within the Quenes dominions.
Excepte.
Men of the degrees aboue mentioned.
Sonne & heyre apparaunt of a knyght, or sonne & heyre apparaūt of a man of. ccc. marke landes by yere, and
Men that may dispend. xl. li. by yere.

Note that the Lorde
Chauncelour.
Treasourer.
President of the counsell
Priuie seale.
maye weare any
Uelnet, Sattin, or other sylkes, except purpure.
Furres, except Blacke Jenets.

66

Figure A.1: The text of Elizabeth I's 1577 proclamation against excess.

notes that "the intermediate classes—the small, relatively independent businessmen, the low-level bureaucrats who fetched and carried for their superiors, the auxiliaries of the liberal professions, and the white-collar employees of industry and business, as well as the comfortable artisans and laborers—could now assume varying degrees of sophistication and entire wardrobes formerly reserved for their betters and protected by wealth" (Perrot, 1994, 71). It is important to note, however, that the demise of sumptuary laws largely occurred *before* the arrival of modern egalitarian fashions in the nineteenth century. That is, they declined when clothes were still important status-producing goods.

A Different Types of Sumptuary Legislation

In our main analysis we do not distinguish between different types of sumptuary legislation. The historical literature does note that the types of goods and the nature of sumptuary laws changed over time and varied from place to place.

Sumptuary laws in Italy and Germany were particularly focused on women's dress. Medieval English sumptuary laws, however, did not specifically refer to women's clothing. Sumptuary legislation in Renaissance Italy was also especially concerned with the extravagance of weddings and funerals.

Some sumptuary legislation was explicitly about maintaining existing status hierarchies The 1483 Act in England stated that "no man below the estate of lord shall wear plain cloth of gold". In 1510 this was expanded so that only those of baronial status of higher could wear "eny clothe of golde or clothe of Sylver or tynsen Satten [woven with fine metallic threads in the weft] ne no other Sylke or Clothe myxte or brodered with Golde or Sylver" (quoted in Doda, 2014).

B Mercantilist Regulations and Luxury Taxes?

Sumptuary laws were distinct from mercantilist laws prohibiting or taxing certain imports. They were also distinct from luxury taxes though we discuss their commonalities in the context of our model and in Appendix (F.1).

Mercantilist justifications were sometimes provided for sumptuary ordinances. But sumptuary laws did not discriminate between foreign and domestically produced goods. Their concern was with regulating consumption rather than directly favoring domestic producers, though there were discussions of guilds favoring certain sumptuary laws in order to benefit themselves. In general, mercantilistic policies emerged in the seventeenth-century at the same time as sumptuary legislation receded.

By the late seventeenth-century, France under Louis XIV tried to support the silk industry by banning printed cottons. The growth of these mercantilistic regulations amply documented by Heckscher (1955a, 1955b) did not, however, mean an end to sumptuary legislation, as discussed by Moyer (1996).

In England, major acts of sumptuary legislation at the national level ceased after 1603. Local ordinances were issued in the first half of the seventeenth-century but these petered out. Rather than sumptuary laws, the English state became preoccupied with laws aimed at supporting the English textile industry at the expense of foreign competitors. This tendency is exemplified by the Calico Acts.

In the Habsburg empire, the luxury patent of 1732 was the first to mention the explicitly mercantilistic goal of protecting the domestic luxury industry from foreign competition. In the assessment of Axtmann (1992, 55), the transformation from traditional sumptuary laws that aimed at maintaining existing status hierarchies to mercantilism reflected the "realization that economic and social developments had transformed society to such a degree that the traditional status order could not possibly be re-established by passing traditional sumptuary laws."

Sumptuary laws also differed from luxury taxes. Sumptuary laws sought to limit or prohibit consumption, and as discussed above, punishment for sumptuary violations often involved confiscation of the goods in question. Nonetheless, as recent scholarship of sumptuary legislation in fifteenth century Italy has stressed, where sumptuary violations were punishable by a simple fine, this could result in the laws having similar properties to luxury taxes (see Bridgeman, 2000). Muzzarelli (2019), in particular, emphasizes the "usefulness" of sumptuary laws as "instruments of rule" and as sources of revenue. She notes the case of sumptuary laws in fifteenth century Savoy where the "fines ended up by being perceived as a sort of useful tax on luxury used to meet all kinds of public financial needs" (Muzzarelli, 2019, 179). This motivates the extension to our model where the fines from enforcing sumptuary laws augment other revenues which can then be used to offset the costs of enforcement.

Outside Italy, only at the end of the period that we are considering, did sumptuary ordinances evolve into a form of luxury tax. For example, in Bavaria a system of licensing for luxury goods was introduced in the eighteenth century: "Those who were caught with overly sumptuous clothes for which they had not bought a licence on paper were to be fined, while those offending more than twice could be publicly punished. This marks the beginning of a new regime of luxury fines, from which the nobility at court with their families as well as livery-wearing employees were exempt" (Rublack, 2019, 59).

C External Validity

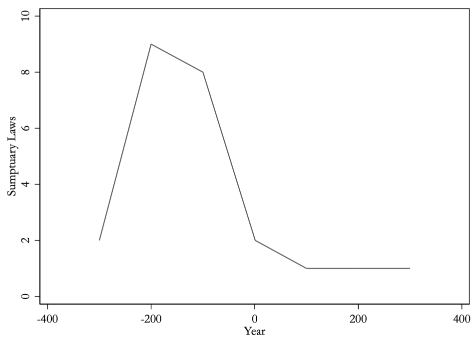
Our main focus has been on sumptuary laws in medieval and early modern Europe. However, as we noted in the introduction, many other societies have implemented sumptuary laws. In this section, for the purposes of external validity we consider whether our framework can also explain the pattern of sumptuary legislation we observe in these societies. Specifically, we discuss sumptuary legislation in ancient Rome, Tokugawa Japan and Qing China.

Republican Rome Sumptuary legislation first appeared in Rome in the Twelve Tables (conventionally dated to the 5th century BCE). But it was not until Rome acquired an empire and became the centre of Mediterranean trade and commerce in the 2nd century BCE that luxury and sumptuary legislation became prominent (Zanda, 2011).

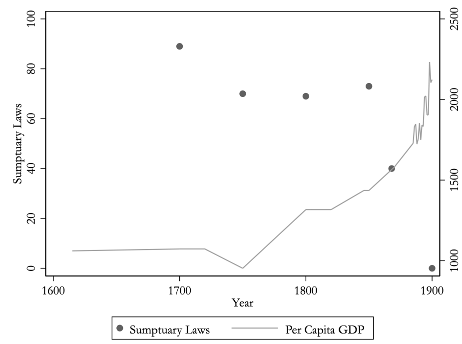
Following the defeat of Rome's major regional rivals, luxury came to be seen as a major threat to the social order. Historians view Roman sumptuary legislation as a means of regulating competition between elites. As Zanda (2011, 53) describes it:

> "...the senatorial class needed to put a brake on the expenditure and display of wealth and power. The lavish spending of one senator could have pushed the other members of the ruling class to do the same, putting their economic power at serious risk".

The Roman experience is consistent with the model we propose. Sumptuary legislation was sporadic and unimportant when the level of commercial and economic activity was low. Once commercialization and economic growth took place, however, elites came into competition with those below them on the social scale. One weapon at their disposal was to regulate the consumption of luxury. At a certain point, however, as growth continued the costs of enforcing these laws increased and the elites were forced to liberalize luxury consumption (see Figure A.2a). This occurred during the imperial period when per capita income also likely peaked (Temin, 2006; Harper, 2017).



(a) Sumptuary Legislation in Rome 300 BCE–300 CE. Source: Hunt (1996).



(b) Sumptuary Legislation in Japan 1600-1900 CE

Figure A.2: Sumptuary laws in ancient Rome and Tokugawa Japan

Tokugawa Japan Like medieval and early modern Europe, premodern Japan was a hierarchical and status bound society. From 1600 onwards, Japan was ruled by the Tokugawa shogunate which ended more than a century of civil war and institutionalized a rigid class system that distinguished samurai from farmers, artisans, and merchants (Shively, 1964).

Following the establishment of peace, Japan experienced Smithian economic growth (Crawcour, 1974). As Shively (1964, 124) documents, greater "affluence enabled the more fortunate merchants to enjoy a luxurious life which in the past had been reserved for their social superiors". This provoked a response in the forms of sumptuary laws.

Tokugawa sumptuary laws increased in the late seventeenth century as a new culture of consumption took off. In the reign of Shogun Tsunayoshi (r. 1680–1709) the number of laws accelerated. Seven laws were passed in 1683 alone. Tokugawa sumptuary laws targeted the expense of weddings by daimyo (limited to ten horses and twenty standard bearers), the number of courses that could be served at banquets, the material that could be used in clothing (satin was banned for the samurai in the service of the Shogunate), and the amount of money that could be spent on religious observance. These "proclamations should not be regarded merely as oddities. They were an integral part of the laws of the times, made with the serious intention of helping to preserve the social order upon which the political system was dependent" (Shively, 1964, 155–156).

The laws were widely enforced and people could be jailed for violations, but as in Europe enforcement was costly and may have declined in effectiveness over time. These laws were maintained until the end of the Tokugawa period and the Meiji Restoration.

Data from Yunoki, Egashira, and Horie (1929) indicates that the number of sumptuary laws increased during the seventeenth and eighteenth centuries and in the early and mid-nineteeth century, which is consistent with our framework. Following the Meiji Restoration all sumptuary legislation ceased. A high proportion of the laws were aimed at regulating the spending of samurai. There were also laws that aimed at controlling spending by merchants and farmers. In Japan we do not observe the gradual decline of sumptuary legislation. Rather, these laws were abolished in one go as a result of the Meiji Restoration.

The Ottoman Empire Sumptuary laws were widespread in the Ottoman Empire. These laws both distinguished between the dress permitted to different religious minorities and that allowed for members of different social classes. Laws restricting the dress of non-Muslims date to the time of the original Arab conquests.

Christians and Jews, who had *dhimmi* status were only allowed clothes of certain colors—specifically black or blue, nor could they bear arms, ride hoses, or wear silk or satin. Only

Muslims could wear green or yellow (Dunn, 2011, 91). Muslims avoided blue so as not to be mistaken for Christians. Members of military and civil hierarchy were permitted specific forms of dress and headgear.

Relatively few sumptuary laws were passed until the eighteenth century when they began to proliferate rapidly (Quataert, 1997). Whereas sumptuary laws declined and more or less disappeared in Europe during the eighteenth century, in the Ottoman Empire they continued in full force (Zifli, 2019). The number of sumptuary laws and the severity of their enforcement increased during the reigns of Osman III (r. 1754-57), Mustafa III (1757-1774) and Selim III (r. 1789-1807). Quataert (1997, 410) comments that

> "The brief reign of Sultan Osman III, who ascended the throne when was nearly 56, was noteworthy for little else than his extraordinary concern about the sartorial displays of his subjects. In his few years on the throne, this sultan vigilantly prowled the streets of Istanbul in disguise, haranguing men and women for their clothing improprieties".

Individuals were on occasion executed in the Ottoman empire for violating sumptuary laws including a Christian beggar wearing yellow slippers that he had been given by a charitable Muslim.

Traditional Ottoman sumptuary laws were abolished in 1829 as part of widespread reforms that followed from the destruction of the janissary corp and which saw major fiscal and administrative centralization (Quataert, 1997). The headgear previously reserved for Ottoman empire were abolished in the favor of the fez. This can be seen as an attempt by the state to limit status competition by various groups in society. Non-Muslims benefited as they were able to escape discrimination. Nevertheless, historians argue that these reforms largely failed. The population were able to innovate and adopt more decorative variants of the plain fez in order to demonstrate their social status.

Other Dress Codes Other dress codes can be subsumed within our analysis with relatively minor modifications. For example, during the Middle Ages a separate set of sumptuary laws applied to Jews. The motivation given for these laws is in keeping with our model: status concerns. The laws were explicit in wishing to signify that Jews were social inferior.[38]

One difference between these sumptuary laws and those that applied to the rest of society is Jewish communities were frequently keen to comply with these sumptuary laws. The reason for this was that within each Jewish community there was a strong incentive to limit luxurious displays. If one individual wore fine and expensive clothing or jewelry this risk incurring the envy or greed of the local ruler or Christian neighbors who could then raise taxes on the Jewish community. For this reason, historians describe the "internal" restrictions of the kinds of clothes Jews could wear as a form of "foreign policy"' (Hundert, 2004, 87). For this reason, Jews in Eastern Europe came to adopt a very simple form of clothing. This only changed following Jewish emancipation in Western Europe when Jews were freed from these discriminatory laws (see Carvalho and Koyama, 2016).

[38]There was a slightly different motivation to laws obliging Jews to wear certain distinguishing items of clothing like a yellow star or pointed hats. These laws ensured that Jews could not pass for Christians and were intended to make their identity and status as outsiders and religious "others" as salient as possible.

3 Theory Appendix

In this appendix we provide (i) a more formal description of the game; (ii) formal proofs of all of the propositions; (iv) several extensions to the model.

A Formal Rendition of the Model

We analyze the following game S.

1. Nature decides whether income $Y \in \mathbb{R}_{\geq 0}$ reaches some threshold $\bar{Y}$. With probability p, $Y \geq \bar{Y}$. In turn, Y determines the disposable income y_i of player $i \in \{E, B\}$, where E denotes the ruling elite and B the ordinary citizens, the number of each is normalized to 1.
2. The elites E choose whether to enact a sumptuary law ($\eta = 1$) or not ($\eta = 0$).
3. If $\eta = 0$, then, simultaneously, each player i chooses how to allocate her disposable income y_i over bundle (x_i, l_i), where $x_i \in \mathbb{R}_{\geq 0}$ denotes ordinary goods and $l_i \in \mathbb{R}_{\geq 0}$ status goods that i consumes. Let l_i be priced at ρ, while x_i is the numeraire.

   If $\eta = 1$, B chooses whether to obey the law ($\omega = 1$) or not ($\omega = 0$). If $\omega = 0$, E incurs fixed cost C_F and variable cost C for enforcing the law. If $\omega = 1$, E incurs only fixed cost C_F. Let $\bar{l}_B \in [0, L\ ]$, $L \in \mathbb{R}_{\geq 0}$, denote the maximum amount of status goods that E permits B to consume. Then C_F and C are decreasing in $\bar{l}_B$ — the more lenient the sumptuary law, the lower the costs of enforcement. Variable cost C is also increasing in B's status good consumption l_B, as the more status goods citizens consume, the more goods to inspect for infractions of the law.

   Specifically, $C_F : [0, L] \to \mathbb{R}_{\geq 0}$ is a function of $\bar{l}_B$, where:

   $$C_F(L) = 0 \quad ; \frac{\partial C_F}{\partial \bar{l}_B} < 0 \quad \text{for} \quad \bar{l}_B \in [0, L) \ ,$$

   while $C : [0, L] \times \mathbb{R}_{\geq 0} \to \mathbb{R}_{\geq 0}$ is a function of $\bar{l}_B$ and B's consumption of the status good, l_B, where:

   $$C(L, 0) = C(L, l_B) = C(\bar{l}_B, 0) = 0 \ \ ; \frac{\partial C}{\partial \bar{l}_B} < 0, \frac{\partial C}{\partial l_B} > 0 \quad \text{for} \quad \bar{l}_B \in [0, L) \text{ and } l_B > 0 \ .$$

   In addition, if $\omega = 0$, B is caught violating the law with probability χ, and incurs fine F if caught. Denoting the odds-ratio of being caught as $\theta = \frac{\chi}{1-\chi}$, B thus incurs expected cost of evasion θF, which decreases with the leniency $\bar{l}_B$ of the sumptuary law, and increases with B's status good consumption l_B

   Specifically, the probability of being caught $\chi : [0, L] \times \mathbb{R}_{\geq 0} \to [0, 1]$ is a function of $\bar{l}_B$ and l_B, where:

   $$\chi(L, 0) = \chi(L, l_B) = \chi(\bar{l}_B, 0) = 0 \ \ , \frac{\partial \chi}{\partial \bar{l}_B} < 0 \ \ \frac{\partial \chi}{\partial l^B} > 0 \quad \text{for} \ \ \bar{l}_B \in [0, L) \text{ and } l_B > 0 \ .$$

The odds-ratio of being caught is $\theta = \frac{\chi}{1-\chi}$, where:

$$\theta(L,0) = \theta(L,l_B) = \theta(\bar{l}_B,0) = 0\ ,\ \frac{\partial\theta}{\partial\bar{l}_B} < 0 \quad \frac{\partial\theta}{\partial l_B} > 0 \quad \text{for } \bar{l}_B \in [0,L) \text{ and } l_B > 0\ .$$

The fine $F : [0,L] \times \mathbb{R}_{\geq 0} \longrightarrow \mathbb{R}_{\geq 0}$ is also a function of $\bar{l}_B$ and l_B, where

$$F(L,0) = F(L,l_B) = F(\bar{l}_B,0) = 0\ ,\ \frac{\partial F}{\partial\bar{l}_B} < 0, \quad \frac{\partial F}{\partial l_B} > 0 \quad \text{for } \bar{l}_B \in [0,L) \text{ and } l_B > 0\ .$$

4. Simultaneously, B chooses bundle (x_B, l_B), while E chooses $(x_E, l_E, \bar{l}_B)$.

B Proposition 1

Proposition 2 *Game S has a unique equilibrium* $(\sigma^{E*}, \sigma^{B*} = (\{\eta^*(x^*_E, l^*_E, \bar{l}^*_B)\}, \{\omega^*(x^*_B, l^*_B)\})$ *where:*

$$\eta^* = \begin{cases} 1 & \textit{if } U_{E,f} \geq U_{E,b} \\ & \textit{or } U_{E,f} < U_{E,b} \textit{ and } U_{B,d} \geq U_{B,f} \\ 0 & \textit{if } U_{E,f} < U_{E,b} \textit{ and } U_{B,d} < U_{B,f} \end{cases} \tag{6}$$

$$\omega^* = \begin{cases} 1 & \textit{if } U_{B,d} \geq U_{B,f} \\ 0 & \textit{otherwise} \end{cases} \tag{7}$$

$$(x^*_E, l^*_E, \bar{l}^*_B) = \begin{cases} (x_{E,f}, l_{E,f}, \bar{l}_{B,f}) & \textit{if } U_{E,f} \geq U_{E,b} \\ (x_{E,b}, l_{E,b}, \bar{l}_{B,b}) & \textit{otherwise} \end{cases} \tag{8}$$

$$(x^*_B, l^*_B) = \begin{cases} (x_{B,d}, l_{B,d}) & \textit{if } U_{B,d} \geq U_{B,f} \\ (x_{B,f}, l_{B,f}) & \textit{otherwise} \end{cases} \tag{9}$$

Proof We use the following optimal values of (x_i, l_i) chosen by player $i \in \{E, B\}$, the optimal value of $\bar{l}_B$ chosen by E, and the indirect utility function U_i obtained by i, under cases a, b, c, d, e, f:

$$\begin{aligned} U_{B,a} &= u(x_{B,a}, l_{B,a}) \\ U_{B,b} &= u(x_{B,b}, l_{B,b}) \\ U_{B,c} &= u(x_{B,c}, l_{B,c}) \\ U_{B,d} &= u(x_{B,d}, l_{B,d}) \\ U_{B,e} &= u(x_{B,e}, l_{B,e}) \\ U_{B,f} &= u(x_{B,f}, l_{B,f}) \end{aligned}$$

$$\begin{aligned} U_{E,a} &= u(x_{E,a}, (l_{E,a} - l_{B,a})) \\ U_{E,b} &= u(x_{E,b}, (l_{E,b} - l_{B,b})) \\ U_{E,c} &= u(x_{E,c}, (l_{E,c} - l_{B,c})) \\ U_{E,d} &= u(x_{E,d}, (l_{E,d} - l_{B,d})) \\ U_{E,e} &= u(x_{E,e}, (l_{E,e} - l_{B,e})) \\ U_{E,f} &= u(x_{E,f}, (l_{E,f} - l_{B,f})) \end{aligned}$$

where

$$
\begin{aligned}
(x_{B,a}, l_{B,a}) &= (x_{B,a}, 0) \\
x_{B,a} &= \arg\max_{x_B} u(x_B) \\
&\quad \text{s.t.} (1-\tau)Y^L = x_B \\
(x_{B,b}, l_{B,b}) &= \arg\max_{x_B, l_B} u(x_B, l_B) \\
&\quad \text{s.t.} (1-\tau)Y^H = x_B + \rho l_B \ ; \\
(x_{B,c}, l_{B,c}) &= (x_{B,c}, 0) \\
x_{B,c} &= \arg\max_{x_B} u(x_B) \\
&\quad \text{s.t.} (1-\tau)Y^L = x_B \\
(x_{B,d}, l_{B,d}) &= \arg\max_{x_B, l_B} u(x_B, l_B) \\
&\quad \text{s.t.} (1-\tau)Y^H = x_B + \rho l_B \ ; \\
&\quad l_B \leq \bar{l}_B \\
(x_{B,e}, l_{B,e}) &= (x_{B,e}, 0) \\
x_{B,e} &= \arg\max_{x_B} u(x_B) \\
&\quad \text{s.t.} (1-\tau)Y^L = x_B \\
(x_{B,f}, l_{B,f}) &= \arg\max_{x_B, l_B} u(x_B, l_B) \\
&\quad \text{s.t.} (1-\tau)Y^H = x_B + \rho l_B + \theta(\cdot)F(\cdot) \ ; \\
&\quad l_B > \bar{l}_B
\end{aligned}
$$

$$\begin{aligned}
(x_{E,a}, l_{E,a}) &= (x_{E,a}, 0) \\
x_{E,a} &= \arg\max_{x_E} u(x_E) \\
&\quad \text{s.t. } \tau Y^L = x_E \\
(x_{E,b}, l_{E,b}) &= \arg\max_{x_E, l_E} u(x_E, (l_E - l_B)) \\
&\quad \text{s.t. } \tau Y^H = x_E + \rho l_E \\
(x_{E,c}, l_{E,c}, \bar{l}_{B,c}) &= (x_{E,c}, 0, L) \\
x_{E,c} &= \arg\max_{x_E} u(x_E) \\
&\quad \text{s.t. } \tau Y^L = x_E + \rho l_E + C_F(\cdot) \\
(x_{E,d}, l_{E,d}, \bar{l}_{B,d}) &= \arg\max_{x_E, l_E, \bar{l}_B} u(x_E, (l_E - l_B)) \\
&\quad \text{s.t. } \tau Y^H = x_E + \rho l_E + C_F(\cdot) \\
(x_{E,e}, l_{E,e}, \bar{l}_{B,e}) &= (x_{E,e}, 0, L) \\
x_{E,e} &= \arg\max_{x_E} u(x_E) \\
&\quad \text{s.t. } \tau Y^L = x_E + \rho l_E + C_F(\cdot) + C(\cdot) \\
(x_{E,f}, l_{E,f}, \bar{l}_{B,f}) &= \arg\max_{x_E, l_E, \bar{l}_B} u(x_E, (l_E - l_B)) \\
&\quad \text{s.t. } \tau Y^H = x_E + \rho l_E + C_F(\cdot) + C(\cdot)
\end{aligned}$$

We first prove 7, then 6, then 8 and 9.

To prove 7, we show that the equilibrium value of ω depends on $U_{B,d}$ $U_{B,f}$. Given $\eta = 1$, B chooses $\omega = 1$ over $\omega = 0$ if the expected payoffs from the former is at least as large as that from the latter. That is,

$$pU_{B,d} + (1-p)U_{B,c} \geq pU_{B,f} + (1-p)U_{B,e} \ .$$

or

$$(1-p)(U_{B,c} - U_{B,e}) \geq p(U_{B,f} - U_{B,d}).$$

Since $U_{B,c} = U_{B,e}$, the condition reduces to $U_{B,d} \geq U_{B,f}$.

To prove 6, we move backwards in the game. If $\omega = 0$, E chooses $\eta = 1$ over $\eta = 0$ if

$$pU_{E,f} + (1-p)U_{E,e} \geq pU_{E,b} + (1-p)U_{E,a}$$

or

$$(1-p)(U_{E,e} - U_{E,a}) \geq p(U_{E,b} - U_{E,f})$$

Since $l_{B,e} = 0$ and $\bar{l}_{B,e} = L$, then $C_F(\cdot) = 0$ and $C(\cdot) = 0$. Thus, $U_{E,a} = U_{E,e}$, and the condition reduces to $U_{E,f} \geq U_{E,b}$.

Now if $\omega = 1$, E chooses $\eta = 1$ over $\eta = 0$ if

$$pU_{E,d} + (1-p)U_{E,c} \geq pU_{E,b} + (1-p)U_{E,a}$$

or

$$(1-p)(U_{E,c} - U_{E,a}) \geq p(U_{E,b} - U_{E,d})$$

Since $l_{B,c} = 0$ and $\bar{l}_{B,c} = L$, then $C_F(\cdot) = 0$. Thus, $U_{E,c} = U_{E,a}$, and the condition reduces to $U_{E,d} \geq U_{E,b}$.

To summarize, if $\omega = 0$, then E would choose:

$$\eta = \begin{cases} 1 & \text{if } U_{E,f} \geq U_{E,b} \\ 0 & \text{if } U_{E,f} < U_{E,b} \end{cases}$$

If $\omega = 1$, then E would choose:

$$\eta = \begin{cases} 1 & \text{if } U_{E,d} \geq U_{E,b} \\ 0 & \text{if } U_{E,d} < U_{E,b} \end{cases}$$

Now, by Conjecture 1 (below), $U_{E,f} \leq U_{E,d}$. This implies three cases: (a) $U_{E,f} \leq U_{E,d} < U_{E,b} \rightarrow \eta = 0$; (b) $U_{E,b} \leq U_{E,f} \leq U_{E,d} \rightarrow \eta = 1$; (c) $U_{E,f} < U_{E,b} \leq U_{E,d} \rightarrow \eta = 1$ if $\omega = 1$ (which in turn requires $U_{B,d} \geq U_{B,f}$) and $\eta = 0$ if $\omega = 0$ (which requires $U_{B,d} < U_{B,f}$) or, summarizing:

$$\eta = \begin{cases} 1 & \text{if } U_{E,b} \leq U_{E,f} < U_{E,d} \\ & \text{or } U_{E,f} < U_{E,b} \leq U_{E,d} \text{ and } U_{B,d} \geq U_{B,f} \\ 0 & \text{if } U_{E,f} < U_{E,d} < U_{E,b} \\ & \text{or } U_{E,f} < U_{E,b} \leq U_{E,d} \text{ and } U_{B,d} < U_{B,f} \end{cases}$$

This can be reduced to:

$$\eta^* = \begin{cases} 1 & \text{if } U_{E,f} \geq U_{E,b} \\ & \text{or } U_{E,f} < U_{E,b} \text{ and } U_{B,d} \geq U_{B,f} \\ 0 & \text{if } U_{E,f} < U_{E,b} \text{ and } U_{B,d} < U_{B,f} \end{cases}$$

Finally, to prove 8 and 9, note that (x_B^*, l_B^*) is the bundle that maximizes B's utility. Since by 7, B can only obtain either $U_{B,d}$ or $U_{B,f}$ in equilibrium, then $(x_B^*, l_B^*) = (x_{B,d}, l_{B,d})$ if $U_{B,d} \geq U_{B,f}$ and $(x_B^*, l_B^*) = (x_{B,f}, l_{B,f})$ otherwise. An analogous reasoning proves the equilibrium values of $(x_E^*, l_E^*, \bar{l}_B^*)$.

C Conjecture 1

$$U_{E,f} \leq U_{E,d}$$

Conjecture 1 formally states that the utility that ruling elites would obtain in a period in which sumptuary laws are obeyed (case d) would be no less than the utility they would obtain if such laws were disobeyed (case f).

D Inverted-U Relationship between Sumptuary Legislation and Income

Recall that when $Y < \bar{Y}$, neither citizens nor elites derive utility over status good consumption. Thus, no sumptuary law is passed. However, for incomes at and above the threshold, we obtain the following result.

Proposition 3 *Consider income levels $Y \geq \bar{Y} \in [Y_0, +\infty)$, with Y_0 denoting the smallest value Y can take at and above the threshold $\bar{Y}$. Assume that: (a) at Y_0, $\frac{\partial v}{\partial Y_0} / \frac{\partial w}{\partial Y_0} > -\frac{1-v}{1-w}$; and that (b) $\frac{\partial[\frac{\partial v}{\partial Y}/\frac{\partial w}{\partial Y}]}{\partial Y} < \frac{\partial(-\frac{1-v}{1-w})}{\partial Y}$ for all $Y > Y_0$. Then there exists a threshold level of income Y, i.e. Y^*, such that:*

1. $Y_0 \leq Y < Y^* \longrightarrow \frac{\partial Pr(\eta=1)}{\partial Y} > 0$
2. $Y_0 \leq Y^* < Y \longrightarrow \frac{\partial Pr(\eta=1)}{\partial Y} < 0$

Proof Differentiating equation (3) with respect to Y gives $\frac{\partial v}{\partial Y}(1-w) + \frac{\partial w}{\partial Y}(1-v)$ which, when greater (less) than zero implies that $\frac{\partial Pr(\eta=1)}{\partial Y}$ is greater (less) than zero. Equivalently:

$$\frac{\partial Pr(\eta = 1)}{\partial Y} \gtreqless 0 \Longleftrightarrow \frac{\partial v}{\partial Y} / \frac{\partial w}{\partial Y} \gtreqless -\frac{1-v}{1-w}.$$

Assuming that (a) the minimum value Y_0 that Y can take at and above threshold $\bar{Y}$ is such that $\frac{\partial v}{\partial Y_0} / \frac{\partial w}{\partial Y_0} > -\frac{1-v}{1-w}$, then as Y increases, the $\frac{\partial v}{\partial Y} / \frac{\partial w}{\partial Y}$ curve will eventually cross the $\frac{1-v}{1-w}$ curve if the rate at which the former increases with Y is lower than the rate at which the latter increases with Y. That is, if (assumption (b))

$$\frac{\partial[\frac{\partial v}{\partial Y}/\frac{\partial w}{\partial Y}]}{\partial Y} < \frac{\partial[-\frac{1-v}{1-w}]}{\partial Y},$$

then there is a value $Y^* > Y_0$ such that as Y increases, when $Y_0 \leq Y < Y^*$, then $\frac{\partial v}{\partial Y} / \frac{\partial w}{\partial Y} > -\frac{1-v}{1-w}$, which implies $\frac{\partial Pr(\eta=1)}{\partial Y} > 0$, and when $Y_0 \leq Y^* < Y$, then $\frac{\partial v}{\partial Y} / \frac{\partial w}{\partial Y} < -\frac{1-v}{1-w}$, which implies $\frac{\partial Pr(\eta=1)}{\partial Y} < 0$.

It is useful to prove that there are values of Y for which $\frac{\partial v}{\partial Y}, \frac{\partial w}{\partial Y} \neq 0$, and $\frac{\partial[\frac{\partial v}{\partial Y}/\frac{\partial w}{\partial Y}]}{\partial Y} \neq 0$, in order to show that assumptions (a) and(b) are possible.

We derive $\frac{\partial v}{\partial Y}$ and $\frac{\partial w}{\partial Y}$. First note that $\frac{\partial v}{\partial Y} = G'(\frac{\partial U_{E,f}}{\partial Y} - \frac{\partial U_{E,b}}{\partial Y})$, and $\frac{\partial w}{\partial Y} = G'(\frac{\partial U_{B,d}}{\partial Y} - \frac{\partial U_{B,f}}{\partial Y})$, where G' is a probability density function. Thus, $\frac{\partial v}{\partial Y} \neq 0 \leftrightarrow (\frac{\partial U_{E,f}}{\partial Y} - \frac{\partial U_{E,b}}{\partial Y}) \neq 0$ and $\frac{\partial w}{\partial Y} \neq 0 \leftrightarrow (\frac{\partial U_{B,d}}{\partial Y} - \frac{\partial U_{B,f}}{\partial Y}) \neq 0$.

To get an expression for $\frac{\partial U_{E,f}}{\partial Y}$, we use the ruling elites' budget constraint under case f to get $x_{E,f} = \tau Y - \rho l_{E,f} - C_{F,f} - C_f$ which, when plugged into the indirect utility function gives $U_{E,f} = u((\tau Y - \rho l_{E,f} - C_{F,f} - C_f), (l_{E,f} - l_{B,f}))$. Differentiating this with respect to Y gives

$$\begin{aligned}\frac{\partial U_{E,f}}{\partial Y} &= \frac{\partial u}{\partial(\tau Y - \rho l_{E,f} - C_{F,f} - C_f)} \cdot (\tau - \rho\frac{\partial l_{E,f}}{\partial Y} - \frac{\partial C_{F,f}}{\partial Y} - \frac{\partial C_f}{\partial Y}) \\ &+ \frac{\partial u}{\partial(l_{E,f} - l_{B,f})} \cdot (\frac{\partial l_{E,f}}{\partial Y} - \frac{\partial l_{B,f}}{\partial Y}).\end{aligned}$$

Analogously, we get the following under case (b)

$$\begin{aligned}\frac{\partial U_{E,b}}{\partial Y} &= \frac{\partial u}{\partial(\tau Y - \rho l_{E,b})} \cdot (\tau - \rho\frac{\partial l_{E,b}}{\partial Y}) \\ &+ \frac{\partial u}{\partial(l_{E,b} - l_{B,b})} \cdot (\frac{\partial l_{E,b}}{\partial Y} - \frac{\partial l_{B,b}}{\partial Y}).\end{aligned}$$

Thus, to the extent that $\frac{\partial U_{E,f}}{\partial Y} \neq \frac{\partial U_{E,b}}{\partial Y}$, then $\frac{\partial v}{\partial Y} \neq 0$.

To show that $\frac{\partial w}{\partial Y} \neq 0$, we derive $\frac{\partial U_{B,d}}{\partial Y}$ and $\frac{\partial U_{B,f}}{\partial Y}$ in the same manner:

$$\begin{aligned}
\frac{\partial U_{B,d}}{\partial Y} &= \frac{\partial u}{\partial((1-\tau)Y - \rho l_{B,d})} \cdot ((1-\tau) - \rho \frac{\partial l_{B,d}}{\partial Y}) \\
&+ \frac{\partial u}{\partial(l_{B,d})} \cdot (\frac{\partial l_{B,d}}{\partial Y}). \\
\frac{\partial U_{B,f}}{\partial Y} &= \frac{\partial u}{\partial((1-\tau)Y - \rho l_{B,f} - \theta F)} \cdot ((1-\tau) - \rho \frac{\partial l_{B,f}}{\partial Y} - \theta \frac{\partial F}{\partial Y} - \frac{\partial \theta}{\partial Y} F) \\
&+ \frac{\partial u}{\partial(l_{B,f})} \cdot (\frac{\partial l_{B,f}}{\partial Y}).
\end{aligned}$$

To the extent that $\frac{\partial U_{B,d}}{\partial Y} \neq \frac{\partial U_{B,f}}{\partial Y}$, then $\frac{\partial w}{\partial Y} \neq 0$.

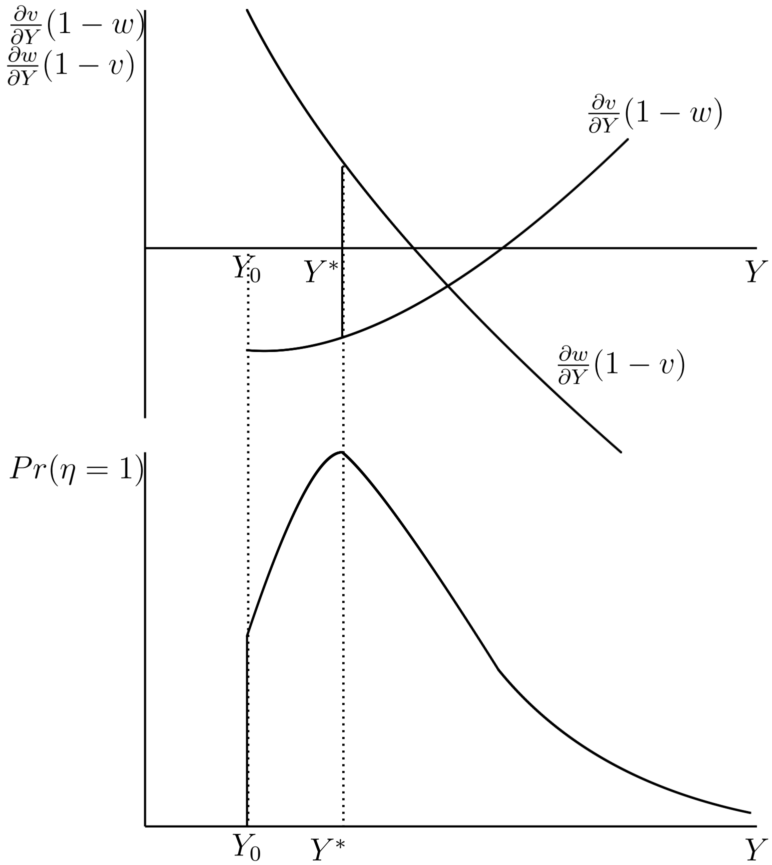
Lastly, we prove that $\frac{\partial[\frac{\partial v}{\partial Y}/\frac{\partial w}{\partial Y}]}{\partial Y} \neq 0$ by showing that $\frac{\partial \frac{\partial v}{\partial Y}}{\partial Y}, \frac{\partial \frac{\partial v}{\partial Y}}{\partial Y} \neq 0$.[39] Note that $\frac{\partial\left(\frac{\partial v}{\partial Y}\right)}{\partial Y} = G' \frac{\partial\left[\frac{\partial U_{E,f}}{\partial Y} - \frac{\partial U_{E,b}}{\partial Y}\right]}{\partial Y} \neq 0$, since $\frac{\partial U_{E,f}}{\partial Y} \neq \frac{\partial U_{E,b}}{\partial Y}$ and, for non-homothetic preferences over x_E and $(l_E - l_B)$, $\frac{\partial \frac{\partial U_{E,f}}{\partial Y}}{\partial Y}, \frac{\partial \frac{\partial U_{E,b}}{\partial Y}}{\partial Y} \neq 0$. For the same reasons, $\frac{\partial\left(\frac{\partial w}{\partial Y}\right)}{\partial Y} \neq 0$.

REMARKS: Note that Proposition 2 establishes the existence of *a* cutoff point Y^*. There may be other cutoff points at income levels larger than Y^* at and beyond which the effect of Y switches again to being positive if $\frac{\partial[\frac{\partial v}{\partial Y}/\frac{\partial w}{\partial Y}]}{\partial Y} > \frac{\partial(-\frac{1-v}{1-w})}{\partial Y}$ at $Y > Y^*$. Our data suggest, however, that for the case of pre-industrial Europe, there is only one cutoff point Y^* since sumptuary laws did not resurge after declining in the seventeenth and eighteenth centuries.

Figure A.3 illustrates the non-monotonic effect of income on the probability that elites enact a sumptuary law.

[39] These, along with $\frac{\partial v}{\partial Y}, \frac{\partial w}{\partial Y} \neq 0$, imply that $\frac{\partial[\frac{\partial v}{\partial Y}/\frac{\partial w}{\partial Y}]}{\partial Y} \neq 0$.

Figure A.3: Illustrating the Non-Monotonic Effects of Income on the Probability of a Sumptuary Law



This figure provides an example in which $\frac{\partial v}{\partial Y^0} < 0$ and $\frac{\partial w}{\partial Y^0} > 0$, and $\frac{\partial w}{\partial Y^0}(1-v) > |\frac{\partial v}{\partial Y^0}|(1-w)$ such that assumption (a) is satisfied. Note, then, that $\frac{\partial Pr(\eta=1)}{\partial Y} > 0$ from Y^0 to Y^*, the latter at which the distance $\frac{\partial w}{\partial Y^*}(1-v)-0$ is exactly equal to the distance $|\frac{\partial v}{\partial Y^*}(1-w)-0|$. Beyond Y^*, $\frac{\partial Pr(\eta=1)}{\partial Y|Y>Y^*} = \frac{\partial v}{\partial Y}(1-w) + \frac{\partial w}{\partial Y}(1-v) < 0$.

E The Effect of Rent-Seeking

Proposition 4 below establishes that the non-monotonic relationship between income and sumptuary legislation is more likely if ruling elites are *less* rent-seeking, that is, if τ is low.

Proposition 4 *Consider the following special case, in which τ intensifies the effect of Y on θF, C_F, C, $l_{B,f}$, and $l_{B,d}$, and dampens the effect of Y on $l_{B,b}$.*

1. $\frac{\partial(\frac{\partial \theta F}{\partial Y})}{\partial \tau} > 0$ *if* $\frac{\partial \theta F}{\partial Y} > 0$, *and* ≤ 0 *otherwise;*

2. $\frac{\partial(\frac{\partial C_{F,f}}{\partial Y})}{\partial \tau}, \frac{\partial(\frac{\partial C_f}{\partial Y})}{\partial \tau} > 0$ *if* $\frac{\partial C_{F,f}}{\partial Y}, \frac{\partial C_f}{\partial Y} > 0$, *and* ≤ 0 *otherwise;*

3. $\frac{\partial(\frac{\partial l_{B,f}}{\partial Y})}{\partial \tau} > 0$ *if* $\frac{\partial l_{B,f}}{\partial Y} > 0$, *and* ≤ 0 *otherwise;*

4. $\frac{\partial(\frac{\partial l_{B,d}}{\partial Y})}{\partial \tau} > 0$ *if* $\frac{\partial l_{B,d}}{\partial Y} > 0$, *and* ≤ 0 *otherwise;*

5. $\frac{\partial(\frac{\partial l_{B,b}}{\partial Y})}{\partial \tau} < 0$ *if* $\frac{\partial l_{B,b}}{\partial Y} > 0$, *and* ≥ 0 *otherwise;*

Then, under assumption (b), the non-monotonic effect of Y on $Pr(\eta = 1)$ established in Proposition 2 is more likely to occur when τ is low.

Proof Under assumption (b), the non-monotonicity is obtained when assumption (a) is met. In turn, the latter is more likely to be met if $|\frac{\partial v}{\partial Y}|$ is large and $|\frac{\partial w}{\partial Y}|$ is small, which are more likely under (1) to (4) if τ is low.

Assumption (a) in Proposition 2 implies that the initial rise in $Pr(\eta = 1)$ is more likely when $|\frac{\partial v}{\partial Y}|$ is large and $|\frac{\partial w}{\partial Y}|$ is small. For ease of notation, let $\alpha \equiv \frac{\partial v}{\partial Y}$ and $\gamma \equiv \frac{\partial w}{\partial Y}$. Then, for the initial rise in $Pr(\eta = 1)$ to be more likely with **lower** τ, it must be that $\frac{\partial \alpha}{\partial \tau} < 0$ and $\frac{\partial \gamma}{\partial \tau} > 0$. In the following, we thus show conditions under which these hold (which correspond to conditions (1) to (5) of Proposition 3).

First, from the expressions derived in the proof of Proposition 2, note that $\frac{\partial \alpha}{\partial \tau} = G'[\frac{\partial(\frac{\partial U_{E,f}}{\partial Y})}{\partial \tau} - \frac{\partial(\frac{\partial U_{E,b}}{\partial Y})}{\partial \tau}]$ is more likely to be negative if the following hold.

1. The effect of τ on the change in E's status distance from B (with respect to income) under case f is negative. That is,

$$\frac{\partial[\frac{\partial(l_{E,f} - l_{B,f})}{\partial Y}]}{\partial \tau} = \frac{\partial(\frac{\partial l_{E,f}}{\partial Y})}{\partial \tau} - \frac{\partial(\frac{\partial l_{B,f}}{\partial Y})}{\partial \tau} < 0$$

   if $\frac{\partial l_{E,f}}{\partial Y} - \frac{\partial l_{B,f}}{\partial Y} > 0$, and $\geq$ otherwise.

2. The effect of τ on the change in E's status distance from B (with respect to income) under case b is positive. That is,

$$\frac{\partial[\frac{\partial(l_{E,b} - l_{B,b})}{\partial Y}]}{\partial \tau} = \frac{\partial(\frac{\partial l_{E,b}}{\partial Y})}{\partial \tau} - \frac{\partial(\frac{\partial l_{B,b}}{\partial Y})}{\partial \tau} > 0$$

if $\frac{\partial l_{E,b}}{\partial Y} - \frac{\partial l_{B,b}}{\partial Y} > 0$, and $\leq$ otherwise.

In turn, (1) and (2) are more likely if

(condition 3)

$$\frac{\partial(\frac{\partial l_{B,f}}{\partial Y})}{\partial \tau} > 0$$

if $\frac{\partial l_{B,f}}{\partial Y} > 0$, and $\leq$ otherwise and

(condition 5)

$$\frac{\partial(\frac{\partial l_{B,b}}{\partial Y})}{\partial \tau} < 0$$

if $\frac{\partial l_{B,b}}{\partial Y} > 0$, and $\geq$ otherwise.

That is, τ increases the rate at which the status threat from citizens increases when laws are disobeyed (case f), but decreases it when there are no laws (case b).

3. τ decreases the rate at which enforcement increases (under case f). That is,

   (condition 2)

$$\frac{\partial(\frac{\partial C_{F,f}}{\partial Y})}{\partial \tau}, \frac{\partial(\frac{\partial C_{f}}{\partial Y})}{\partial \tau} < 0$$

   if $\frac{\partial C_{F,f}}{\partial Y}, \frac{\partial C_f}{\partial Y} < 0$, and $\geq$ otherwise.

Similarly, $\frac{\partial \gamma}{\partial \tau} = G'[\frac{\partial(\frac{\partial U_{B,d}}{\partial Y})}{\partial \tau} - \frac{\partial(\frac{\partial U_{B,f}}{\partial Y})}{\partial \tau}]$ is more likely to be positive if the following hold.

4. τ increases the rate at which citizens' ability to evade the law increases. That is,

   (condition 1)

$$\frac{\partial(\frac{\partial(\theta F)}{\partial Y})}{\partial \tau} > 0$$

   if $\frac{\partial(\theta F)}{\partial Y} < 0$, and $\leq$ otherwise.

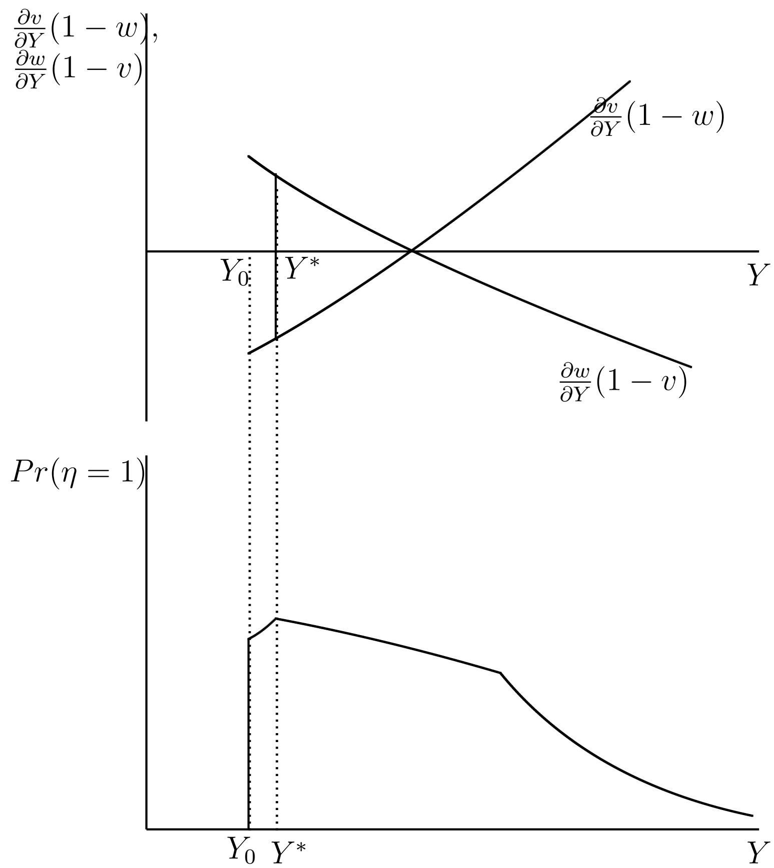
5. τ increases the rate at which the status threat from citizens increases when laws obeyed (case d). That is,

   (condition 4)

$$\frac{\partial(\frac{\partial l_{B,d}}{\partial Y})}{\partial \tau} > 0$$

   if $\frac{\partial l_{B,d}}{\partial Y} > 0$, and $\leq$ otherwise.

Figure A.4: Illustrating the Effect of τ on Non-Monotonic Relationship Between Income and the Probability of a Sumptuary Law



REMARKS

Figure A.4 provides an illustration: when τ is large, the non-monotonic pattern is hardly apparent — for most values of $Y > Y^0$, the probability of enacting a sumptuary law falls sooner as income increases.

Conditions (1) to (5) of Proposition 4 imply that the manner by which elites' rent-seeking modifies the non-monotonic effect of income on sumptuary legislation depends on how the rents affect three factors: the citizens' ability to evade the law, the elites' capacity to enforce it, and the status threat from citizens. These are specifically defined below.

Definition. The citizens' **ability to evade** the law is the extent to which income lowers the expected cost of evasion. It is increasing if $\frac{\partial \theta F}{\partial Y} < 0$, and non-increasing otherwise.

Definition. The ruling elites' **enforcement capacity** is the extent to which incomes lowers the costs of enforcement. It is increasing if $\frac{\partial C_F}{\partial Y}, \frac{\partial C}{\partial Y} < 0$, and non-increasing otherwise.

Definition. The **status threat** from citizens is the extent to which income increases the status good consumption of citizens. It is increasing if $\frac{\partial l_B}{\partial Y} > 0$, and non-increasing otherwise.

Proposition 3 implies that the initial rise in sumptuary legislation is more likely in jurisdictions in which ruling elites are less rent-seeking, if the rents increase the rate at which citizens' ability to evade the law increases (condition (1)) and decrease the rate at which elites' enforcement capacity improves (condition (2)). In addition, it must be that rents decrease the rate at which the status threat from citizens rise when there are no sumptuary laws (condition (5)), but increase it when there are laws to be enforced (conditions (3) and (4)).

A second implication of Proposition 4 is that while cities with less rent-seeking will be more likely to impose sumptuary laws, these sumptuary laws will impose less onerous restrictions on the luxury spending of non-elites. A plausible scenario is as follows. Suppose that as income increases, status good consumption of citizens rise (i.e. $\frac{\partial l_{B,f}}{\partial Y}, \frac{\partial l_{B,b}}{\partial Y}, \frac{\partial l_{B,d}}{\partial Y} > 0$). Then for enforcement capacity to be increasing as well, i.e. for $\frac{\partial C_{F,f}}{\partial Y}, \frac{\partial C_f}{\partial Y} < 0$, it must be that the maximum status good consumption permissible for citizens, i.e. $\bar{l}_B$, is higher. This also lowers the cost of evasion, i.e. $\frac{\partial(\theta F)}{\partial Y} < 0$. With falling enforcement costs, ruling elites are able to consume more, including of status goods.

In other words, both elites and citizens increase status good consumption as income increases, but the way in which elites limit such status competition is to enact a sumptuary law but enforce it with leniency (i.e. higher $\bar{l}_B$.) Proposition 3 implies that this scenario is more likely in jurisdictions in which the ruling elites are less rent-seeking.

This is evident in the history of Florentine sumptuary laws. For example, the law of 1355 limited the permissible expenditure on women's ornaments to ten gold florins. It permitted women to wear fur but only to keep warm and not to show off—a highly ambiguous provision. It focused on ensuring that these provisions could be enforced: the male head of household was made responsible for violations by members of his family (Rainey, 1985, 139–140). In contrast, Milan was a despotic state and "the Milanese laws of 1396 and, more especially, 1498, were designed to reserve privileges, not just for members of the ruling family of the city, but for all the noble and eminent citizens of the city as well" (Killerby, 2002, 87).

F Extensions

F.1 Revenue from Fines

We first consider an extension in which the fines collected from violators of sumptuary laws are a source of revenues for the elites that can offset the costs of enforcing the laws.

This changes the budget constraint of the elites, increasing their disposable income by the amount of fines $F(\cdot)$ whenever citizens violate sumptuary laws. Thus, in the proof of Proposition 1, the optimal values $(x_{E,e}, l_{E,e}, \bar{l}_{B,e})$ and $(x_{E,f}, l_{E,f}, \bar{l}_{B,f})$ and corresponding indirect utility functions $U_{E,e}$ and $U_{E,f}$ change to:

$$\begin{aligned}
(x_{E,e}, l_{E,e}, \bar{l}_{B,e})^F &= (x^F_{E,e}, 0, L) \\
x^F_{E,e} &= \arg\max_{x_E} u(x_E) \\
&\quad \text{s.t. } \tau Y^L + F(\cdot) = x_E + \rho l_E + C_F(\cdot) + C(\cdot) \\
(x_{E,f}, l_{E,f}, \bar{l}_{B,f})^F &= \arg\max_{x_E, l_E, \bar{l}_B} u(x_E, (l_E - l_B)) \\
&\quad \text{s.t. } \tau Y^H + F(\cdot) = x_E + \rho l_E + C_F(\cdot) + C(\cdot)
\end{aligned}$$

$$U^F_{E,e} = u(x^F_{E,e}, (l_{E,e} - l_{B,e})^F)$$
$$U^F_{E,f} = u(x^F_{E,f}, (l_{E,f} - l_{B,f})^F),$$

where superscript F denotes the version when fines are added as revenues to elites. The proof of Proposition 1 proceeds exactly as before and remains valid. Thus, Proposition 1 is essentially the same, with the exception that $U_{E,f}$ in (3) and (5) is replaced by $U^F_{E,e}$, and $(x_{E,f}, l_{E,f}, \bar{l}_{B,f})$ in (5) by $(x_{E,f}, l_{E,f}, \bar{l}_{B,f})^F$.

What is more interesting is the implication on the relationship between sumptuary laws and income. In the benchmark model, enforcement costs keep increasing as more violations are made by increasingly wealthy citizens, that at some point, it becomes optimal for elites to cease enforcing such laws. Hence, one eventually sees a decline in sumptuary legislation as income grows further.

However, when fines are an additional source of income for elites, enforcement costs can be offset. This could enable elites to keep enforcing sumptuary laws, and prevent or slow down the decline in sumptuary laws. That is, the inverted-U relationship between sumptuary legislation and income may weaken or not even happen at all.

This is generally the case, provided that the rate at which fines grow with income is sufficiently high. (Note that enforcement costs also grow with income, and that the fixed, rather than the variable, component of such costs may be large. Thus, fines may not always offset all of enforcement costs.)

The proof is straightforward. Recall from the proof of Proposition 2, that

$$\frac{\partial Pr(\eta = 1)}{\partial Y} \gtrless 0 \Longleftrightarrow \frac{\partial v}{\partial Y} / \frac{\partial w}{\partial Y} \gtrless -\frac{1-v}{1-w}.$$

Thus, the decline in the probability of enacting sumptuary laws does not happen for as long as $\frac{\partial v}{\partial Y}/\frac{\partial w}{\partial Y}$ is greater than $-\frac{1-v}{1-w}$. It turn, this is more likely to hold when $\frac{\partial v}{\partial Y}$ is large and $\frac{\partial w}{\partial Y}$ small.

Recall from the benchmark model that $\frac{\partial v}{\partial Y} = G'(\frac{\partial U_{E,f}}{\partial Y} - \frac{\partial U_{E,b}}{\partial Y})$, and $\frac{\partial w}{\partial Y} = G'(\frac{\partial U_{B,d}}{\partial Y} - \frac{\partial U_{B,f}}{\partial Y})$, where G' is a probability density function. Now in this alternative version of the model, only $U_{E,f}$ changes (to $U^F_{E,e}$), and therefore it suffices to show that $\frac{\partial U^F_{E,f}}{\partial Y}$ is larger than $\frac{\partial U_{E,f}}{\partial Y}$ (from the benchmark model) to establish that $\frac{\partial v}{\partial Y}$ is larger in the alternative model and, thus, that $\frac{\partial v}{\partial Y}/\frac{\partial w}{\partial Y}$ is greater than $-\frac{1-v}{1-w}$ for longer, thereby delaying or preventing the decline in the probability of enacting sumptuary laws. We thus compare $\frac{\partial U^F_{E,f}}{\partial Y}$ with $\frac{\partial U_{E,f}}{\partial Y}$:

$$\frac{\partial U_{E,f}^F}{\partial Y} = \frac{\partial u}{\partial(\tau Y + F(\cdot) - \rho l_{E,f}^F - C_{F,f} - C_f)} \cdot (\tau + \frac{\partial F}{\partial Y} - \rho \frac{\partial l_{E,f}^F}{\partial Y} - \frac{\partial C_{F,f}}{\partial Y} - \frac{\partial C_f}{\partial Y}) + \frac{\partial u}{\partial(l_{E,f}^F - l_{B,f})} \cdot (\frac{\partial l_{E,f}^F}{\partial Y} - \frac{\partial l_{B,f}}{\partial Y}).$$

$$\frac{\partial U_{E,f}}{\partial Y} = \frac{\partial u}{\partial(\tau Y - \rho l_{E,f} - C_{F,f} - C_f)} \cdot (\tau - \rho \frac{\partial l_{E,f}}{\partial Y} - \frac{\partial C_{F,f}}{\partial Y} - \frac{\partial C_f}{\partial Y}) + \frac{\partial u}{\partial(l_{E,f} - l_{B,f})} \cdot (\frac{\partial l_{E,f}}{\partial Y} - \frac{\partial l_{B,f}}{\partial Y}).$$

Note that with larger disposable income for elites under the alternative model, $l_{E,f}^F$ would be larger than $l_{E,f}$, which implies $\frac{\partial l_{E,f}^F}{\partial Y} < \frac{\partial l_{E,f}}{\partial Y}$. (In addition, $x_{E,f}^F$ is no smaller than $x_{E,f}$. Without loss of generality, we restrict attention to the region of income at which additional incomes are spent mostly or entirely on status goods – recall that this is possible because of non-homothetic preferences. In this region, $x_{E,f}^F \approx x_{E,f}$ and, thus, $\frac{\partial u}{\partial(\tau Y + F(\cdot) - \rho l_{E,f}^F - C_{F,f} - C_f)} \approx \frac{\partial u}{\partial(\tau Y - \rho l_{E,f} - C_{F,f} - C_f)}$.) This means that $\frac{\partial u}{\partial(l_{E,f}^F - l_{B,f})} \cdot (\frac{\partial l_{E,f}^F}{\partial Y} - \frac{\partial l_{B,f}}{\partial Y})$ may be smaller than $\frac{\partial u}{\partial(l_{E,f} - l_{B,f})} \cdot (\frac{\partial l_{E,f}}{\partial Y} - \frac{\partial l_{B,f}}{\partial Y})$. Thus, even with the addition of $\frac{\partial F}{\partial Y}$ in $\frac{\partial U_{E,f}^F}{\partial Y}$ and the fact that $\frac{\partial l_{E,f}^F}{\partial Y} < \frac{\partial l_{E,f}}{\partial Y}$, $\frac{\partial U_{E,f}^F}{\partial Y}$ is not necessarily larger than $\frac{\partial U_{E,f}}{\partial Y}$. However, for sufficiently large $\frac{\partial F}{\partial Y}$, it is indeed the case that $\frac{\partial U_{E,f}^F}{\partial Y} > \frac{\partial U_{E,f}}{\partial Y}$.

The above implies that the benchmark model is a good approximation when fines are not a significant source of elites' income, i.e. when $\frac{\partial F}{\partial Y}$ is small. Otherwise, the alternative model can be used to predict the non-decline of sumptuary legislation.

F.2 A Commercial Elite

Total income is (still) Y, but we now specify the following distribution among citizens. Let $Y = (1-\kappa)Y + \kappa Y$, where κ is the share of some prominent merchants. Now suppose these merchants come to power, whether by joining, or replacing, the old elites. Then only a portion of $(1-\kappa)Y$ can be appropriated as rents by this new set of elites (since κY is now 'produced' by them). As before, let τ capture the extent of rent appropriation. Then elites' disposable income includes rents and the merchant-elites' income: $y_E = \kappa Y + (1-\kappa)\tau Y = (\kappa + (1-\kappa)\tau)Y$. Meanwhile, citizens' disposable income is now $y_B = (1-\kappa)(1-\tau)Y$.

Generally, the distribution of income across classes is now more unequal, with elites obtaining a larger share than before. To see this, denote τ_0 as the rate of appropriation in the benchmark model (in which the old elites do not include merchants), and τ_1 the rate in this alternative version. Then $\tau_0 < \kappa + (1-\kappa)\tau_1$ when $\tau_0 - \tau_1 < (1-\tau_1)\kappa$, which is always true when $\tau_0 \leq \tau_1$, that is, when new elites can appropriate citizens' income to an extent that is no smaller than what the old elites could do.

Even if the rent-seeking of the new set of elites were less than that of the old elites, i.e. $\tau_0 > \tau_1$, the former will still have a larger share of total income than the latter for as long as κ is large enough, that is, when the merchant-elites are sufficiently rich.

The results from the benchmark model readily carry over in this alternative version. The probability of enacting sumptuary laws tends to rise with income, then eventually falls. However, this non-monotonic relationship is more likely to happen the smaller the share of income of the new elites.

In turn, this share is smaller when either the new elites cannot extract much rents from citizens, i.e. τ_1 is low, or the merchant-elites are not very economically powerful, i.e. κ is low, or both.

The intuition is straightforward. When elites' disposable income is not much greater than those of citizens', the difference in status good consumption is also not very large. As total income increases, status competition becomes more intense as citizens are better able to violate sumptuary laws and elites become increasingly burdened by enforcement costs. At some point, it is no longer optimal for elites to restrict citizens' status good consumption.

The reverse follows. If the new set of elites have a much larger share of income, then status competition is not so intense, as elites can easily outspend citizens. An important application is the rise of economically powerful merchants, e.g. in Italy, for which κ is large. When these merchants become elites, status competition with citizens becomes much less intense, and there is therefore less need to repeal or refrain from enacting sumptuary laws. Even if citizens violate them, citizens still will not be able to come very close to the status good consumption of the new elites.

The above implies that one would be less likely see a sharp decline, if any, in the probability of enacting sumptuary laws when the rise of total income coincides with the rise to power of rich merchants.

(For a formal proof, simply replace τ in the benchmark model with $\kappa + (1 - \kappa)\tau$. Then all the proofs underlying the benchmark results are still generated, albeit with $\kappa + (1 - \kappa)\tau$ replacing τ everywhere.)

4 Empirical Appendix

A Country-Level Analysis

In the main paper we reported the bivariate relationship between income and sumptuary legislation (Figures 3a and 3b) and include our baseline cross-country estimates. In this appendix, we explore these findings in more detail.

Investments in state capacity made it more feasible for early modern states to enforce sumptuary laws. This would have enabled ruling elites to legislate more and stricter sumptuary laws. Thus, had rulers simply wanted to decrease the status good consumption of non-elites in order to, e.g. preserve social order, or discourage extravagance, they would have enforced even more sumptuary legislation as incomes continued to rise.

To explore this possibility, in Table A.2 we use data on state history from Borcan, Olsson, and Putterman (2018). This measure captures the degree to which a country has a long history as a centralized state. The data was originally introduced by Bockstette, Chanda, and Putterman (Dec. 2002) and has been widely used in economics. For every fifty year period they assess: (1) was there a government in place above tribal level within the borders of the modern-day country; (2) was the government locally based, foreign based, or in between; and (3) what proportion of the country's modern-day territory was ruled by the historical polity. They create an index number based on these scores for each fifty year period.[40] Of course, this is not a perfect measure of state capacity but other proxies for state capacity such as taxes per capita are only available for a subset of countries and typically only for the period after 1500. In general, the coefficient on state history is positively correlated with sumptuary laws (though imprecisely estimated). GDP per capita and GDP per capita squared retain their signs (though they lose precision) (Table A.2).

Another possible explanation is cultural or religious change. High quality proxies for these variables at the country level do not exist. One possibility we can explore is the role of the Reformation as many scholars see this as a critical juncture in the eventual divergence between northwestern and southern Europe (Rubin, 2017). We do not expect there to be a large difference in sumptuary law regimes between Protestant and Catholic polities. Calvinist Geneva, for example, had a strict sumptuary regime. Indeed when we include controls for whether a country became Protestant after 1600, we find it has no impact on the non-monotonic relationship between income and sumptuary laws (Table A.1).

Next we consider factors that shaped the ability of elites to enforce sumptuary legislation. Specifically, we investigate the role guilds played in enforcing sumptuary legislation (see Sponsler, 1992; Hunt, 1996). As we discussed in the main text, numerous examples illustrate the importance of guilds in regulating many aspects of the medieval or early modern economy, including sumptuary laws.

We therefore expect that in regions where guild control was weaker it became harder to punish merchants or venders who violated sumptuary legislation. Specifically, with economic growth evasion became easier and enforcement more difficult. It became increasingly challenging to differentiate between those who were permitted to wear particular items of clothing from those who were not.[41] As guilds' hold on the economy weakened, it was harder to punish merchants or venders who violated sumptuary legislation. The gradual move from

[40] We interpolate the value of the index for the years in between each 50 year observation and then extract these modern-day country-level variables at the city-level. We end up with a state antiquity measure that goes from 0 (highest antiquity) to 50 (lowest antiquity).

[41] Moyer notes that it became "difficult for officials to determine with any degree of certainty precisely who was legally entitled to wear illegal items" (Moyer, 1996, 257).

Table A.1: Sumptuary Laws and GDP: The Reformation

	Sumptuary Laws					
	(1)	(2)	(3)	(4)	(5)	(6)
GDP pc	18.964***	20.025***	12.624	19.694***	21.229***	14.135
	(4.924)	(5.303)	(13.443)	(5.147)	(5.454)	(15.843)
GDP pc Sq	-0.002***	-0.002***	-0.002	-0.002***	-0.002***	-0.002
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Interpolated		No			Yes	
Protestantism × Century FE	✓	✓	✓	✓	✓	✓
Century FE	✓	✓	✓	✓	✓	✓
Region FE		✓			✓	
County FE			✓			✓
Observations	50	50	50	50	50	50

All coefficients are multiplied by 1000 for readability. Standard errors clustered at the modern country level are reported in parentheses * $p < 0.10$, * $p < 0.05$, *** $p < 0.01$

Table A.2: Sumptuary Laws and GDP: State History

	Sumptuary Laws					
	(1)	(2)	(3)	(4)	(5)	(6)
GDP pc	31.231	30.826*	9.000	31.831	33.072*	10.481
	(17.933)	(16.317)	(7.777)	(18.453)	(16.977)	(8.811)
GDP pc Sq	-0.004	-0.003	-0.001	-0.004	-0.004	-0.002
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)
State History	597.885	864.942	1735.897	594.713	912.785	1724.510
	(584.676)	(558.176)	(941.337)	(610.350)	(585.959)	(935.115)
Interpolated		No			Yes	
Century FE	✓	✓	✓	✓	✓	✓
Region FE		✓			✓	
Country FE.			✓			✓
Observations	50	50	50	50	50	50

All coefficients are multiplied by 1000 for readability. Standard errors clustered at the modern country level are reported in parentheses * $p < 0.10$, * $p < 0.05$, *** $p < 0.01$

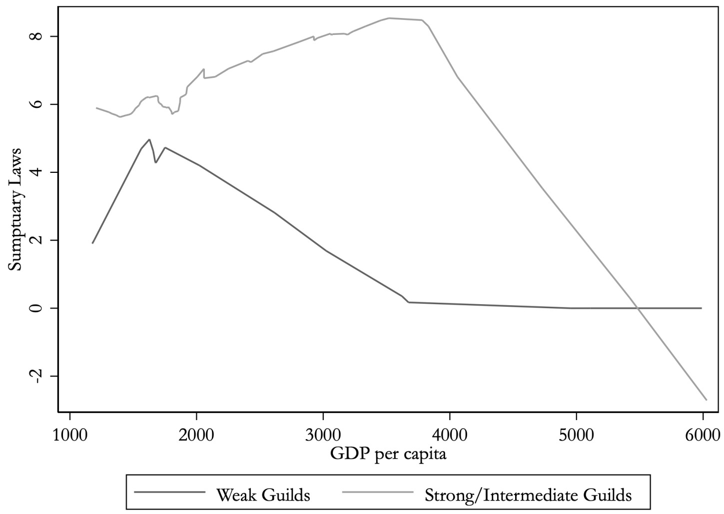
identity rules to more general rules in the early modern period discussed by Johnson and Koyama (2019) similarly made it more difficult and costly to enforce sumptuary legislation.

To test this empirically in Figure A.5 we distinguish between countries that are coded as having relatively weak guilds from those that are coded as having guilds that were either strong or of intermediate strength. From Figure A.5, it is evident that there is non-monotonic relationship between per capita GDP and sumptuary legislation for both countries with weak and strong guilds. However, this relationship peaks earlier for regions with weak guilds. This suggests that regions with weaker guild control found it more costly to enforce sumptuary legislation as incomes rose. This result provides further empirical support for our framework and for the role played by enforcement costs.

B Rising Real Wages and Distributional Changes Following the Black Death

Our main city-level empirical exercise exploits plague shocks following the Black Death. In this section we present additional discussion of how episodes of the plague affected labor

Figure A.5: The Relationship Between GDP per capita and Sumptuary Laws by Guild Strength



The relationship between per capita GDP and sumptuary laws for countries with weak guilds versus those with strong or intermediate guilds as coded by Ogilvie (2019). Lowess smoother using 50-year data and the default bandwidth of 0.8.

markets and incomes in late medieval Europe.

Prior to the outbreak of the Black Death in 1348, bubonic plague had been absent in Europe for centuries. The Black Death itself had a dramatic impact on population: estimates of the death toll range from 1/3 to over 1/2 of the total population. These losses were particularly high in Italy, parts of France, and England and somewhat lower in central and eastern Europe (Benedictow, 2005). As the medieval economy was broadly Malthusian, the fall in population led to a rise in per capita incomes and real wages (Ashraf and Galor, Aug. 2011). There was considerable variation in the intensity of the plague shock at the city-level

Table A.3: Summary Statistics for City-Level Decade-Level Panel

Variable	Mean	S.D.	Min	Max
N. Plagues in Prior Two Decades	1.35	1.28	0	7
Latitude	43.386	2.305	37.317	46.33
Longitude	11.716	2.332	7.82	18.5
Number of Sumptuary Laws	0.285	0.54	0	6
University	0.184	0.387	0	1
River	0.469	0.499	0	1
Sea	0.224	0.417	0	1
Republican	0.178	0.383	0	1
Ever Self-Governing	0.126	0.32	0	1
Commune	0.673	0.469	0	1
Capital	0.102	0.303	0	1
Archbishop	0.143	0.35	0	1
Bishop	0.776	0.417	0	1
Despotism	0.175	0.38	0	1

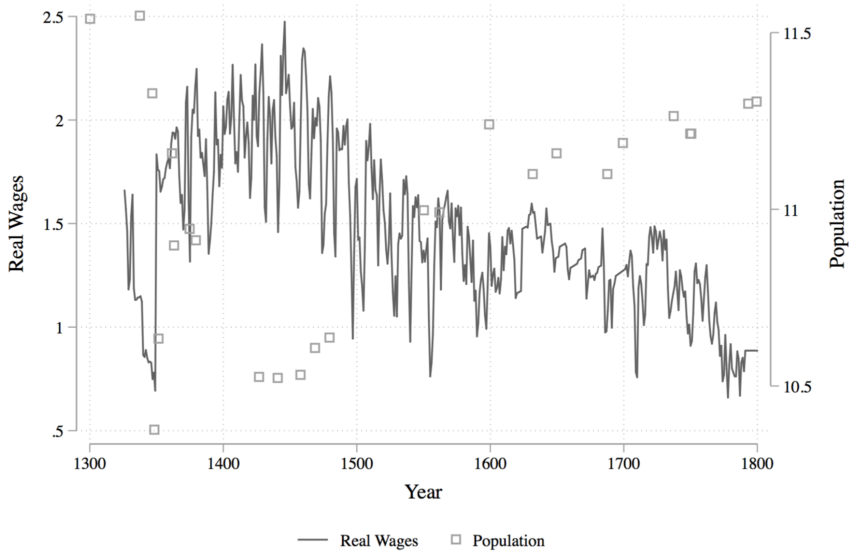


Figure A.6: Real Wages and Population in Florence

(Jedwab, Johnson, and Koyama, Feb. 2019).

Following the initial outbreak of the Black Death, bubonic plague returned periodically (Biraben, 1975; Alfani and Murphy, 2017). Unlike the initial outbreak which spread across Europe like a wave, late episodes of plague were localized (with the partial exception of the seventeenth century plague outbreak in Italy, which is outside of our period of analysis). Infections often sprung from local plague spores. The timing of plague outbreaks appears to have been random and uncorrelated with observable city characteristics (see Dittmar and Meisenzahl, 2020). We can therefore use plague shocks as exogenous proxies for upwards pressure on wages and per capita income.

Real wage data for the late medieval period remains scarce. In Figure A.6 we depict real wage data against population data from Allen (2001) and Fochesato (2018) for Florence. There is a clear inverse relationship: as population pressure eased, real wages rose. This enables us to use plague shocks as a proxy for shocks to per capita income in a Malthusian world. Of course, once European state began to transition out of the Malthusian equilibrium, as discussed by Galor (2005, 2011), we cannot use plague shocks for this purpose.

Qualitative evidence provided by historians also supports the contention that the plague had a major impact on the incomes of non-elites. Pamuk (2007, 292) observes that:

> "Even a cursory look at real wage series makes clear that modern economic growth and the Black Death are the two events that led to the most significant changes in wages and incomes during the last millennium".

Describing England, Dyer observes that the conditions of relative labor scarcity benefited workers including both craftsmen and rural workers (Dyer, 2005, 130). He concludes that:

> "The total number of consumers had halved during the fourteenth century, from 5–6 million to 2.5 million, but as each household could afford to buy more goods, global consumption fell by much less than a half, and in cases such as meat or cloth the total may well have increased. A reduced number of traders and artisans were kept busy supplying the demand, and their increased workload brought them higher incomes" (Dyer, 2005, 132).

Table A.4: The Effect of Plague on Real Wages in Florence (annual data)

	Real Wages						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Plague	0.0355	0.0478	0.0486	0.0696	0.0824	0.0713	
	(0.0738)	(0.0739)	(0.0771)	(0.0769)	(0.0771)	(0.0762)	
Lag Plague_1	0.136**	0.118**	0.135**	0.132**	0.149**	0.148**	
	(0.0595)	(0.0597)	(0.0595)	(0.0601)	(0.0607)	(0.0606)	
Lag Plague_2		0.116*	0.0881	0.107*	0.106*	0.133**	
		(0.0623)	(0.0603)	(0.0613)	(0.0610)	(0.0597)	
Lag Plague_3			0.170***	0.141**	0.157**	0.198***	
			(0.0626)	(0.0642)	(0.0664)	(0.0642)	
Lag Plague_4				0.163***	0.140**	0.204***	
				(0.0622)	(0.0663)	(0.0632)	
Lag Plague_5					0.143**	0.161**	
					(0.0662)	(0.0736)	
Lag Plague_6						0.212***	
						(0.0786)	
Lag Plague_7						0.166***	
						(0.0608)	
Lag Plague_8						0.145**	
						(0.0637)	
Lag Plague_9						0.151**	
						(0.0609)	
Lag Plague_10						0.209***	
						(0.0625)	
Plague MA							1.360***
							(0.227)
Constant	1.745***	1.729***	1.706***	1.681***	1.658***	1.517***	1.523***
	(0.0336)	(0.0365)	(0.0391)	(0.0418)	(0.0450)	(0.0570)	(0.0548)
Observations	175	175	175	175	175	175	175
Adjusted R^2	0.008	0.014	0.033	0.051	0.062	0.182	0.211

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

More formally, we can show that plague shocks are positively associated with wage in subsequent years and estimate a variety of ARDL models that confirm the positive relationship between real wages and past plague shocks.

In order to estimate the relationship between time series variables, we first establish that they are stationary using Dickey Fuller tests. Having confirmed this, we can estimate the model in levels using linear regression. As a first test of the data, we estimate regressions of the following form:

$$wages_t = \alpha + \beta_1 \text{lag plague}_t \cdots + \beta_{10} \text{lag plague}_t + \epsilon_t$$

As evident in Table A.4, the incidence of plague is positively associated with real wages, as expected.

Alternatively, approach using an ARDL model broadly confirms these findings. We use the stata command ARDL to estimate the optimal number of lags. The results of the model selected are presented in Table A.5.

All in all, these empirical findings are consistent with the assumptions that underline our main analysis. Plague shocks generated temporary labor scarcity that raised wages in urban areas

C City-Level Analysis

Turning to the city-level analysis, Table A.6 reports the summary statistics for our city-level panel analysis. To better visualize the variation in our data, we use the panelview package from Liu, Wang, and Xu, 2022 to display the treatment status of the cities in our dataset (Figure A.7).

Table A.7 reports our main results using plague in the prior decade only. Table **??** reports our main results using yearly data.

Table A.5: Plague Shocks and Real Wages in Florence, ARDL Model

	Real Wages
	(1)
Lag 1 of Real Wages	0.944***
	(0.0775)
Lag 2 of Real Wages	-0.281***
	(0.105)
Lag 3 of Real Wages	0.145*
	(0.0774)
Plague	-0.00132
	(0.0454)
Lag 1 of plague	0.0862*
	(0.0453)
Constant	0.335***
	(0.0889)
Observations	165
Adjusted R^2	0.674

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In Tables A.8 and A.9, we report our main results when we correct our standard errors to allow for spatial autocorrelation. We first vary the radius of our Conley standard errors from 100 to 500km. Then we increase the number of spatial lags to 5. In general, the adjusted standard errors do not change greatly.

Tables A.10 and A.11 report our results when we exclude the Black Death shock. In Table A.12 we focus exclusively on the post-Black Death era.

In Table A.13 we report the results using our yearly data when we vary the sample in a number of ways. First we exclude the largest cities in our sample. Next we sequentially exclude cities in Sicily, Northern Italy, Southern Italy, cities on the coast, on rivers, above mean elevation, on Roman road intersections, and cities with universities. Finally we exclude both large and small cities. In general the size of the effect of the plague on sumptuary legislation remains robust even as the sample changes.

Finally, Table A.14 reports our results by city-level institutions using our yearly data.

Table A.6: Summary Statistics for City-Level Decade-Level Panel

Variable	Mean	S.D.	Min	Max
N. Plagues in Prior Two Decades	1.35	1.28	0	7
Latitude	43.386	2.305	37.317	46.33
Longitude	11.716	2.332	7.823	18.5
Number of Sumptuary Laws	0.285	0.54	0	6
University	0.184	0.387	0	1
River	0.469	0.499	0	1
Sea	0.224	0.417	0	1
Republican	0.178	0.383	0	1
Ever Self-Governing	0.126	0.323	0	1
Commune	0.673	0.469	0	1
Capital	0.102	0.303	0	1
Archbishop	0.143	0.35	0	1
Bishop	0.776	0.417	0	1
Despotism	0.175	0.38	0	1

Figure A.7: Visualizing the variation in treatment status.

(a) Yearly variation in treatment status . (b) Decade-level variation in treatment status

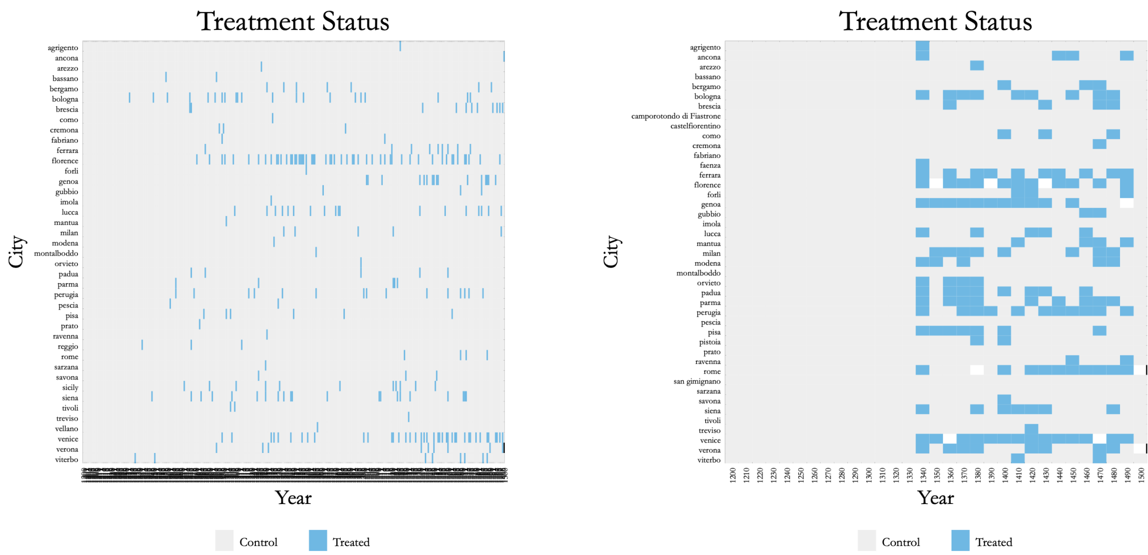


Table A.7: The Effect of Plague Shocks on the Number of Sumptuary Laws: City-Level Panel Analysis, Decade Level Using One Decade Lag

	Number of Laws					
	OLS			Negative Binomial		
	(1)	(2)	(3)	(4)	(5)	(6)
Plague	0.215***	0.201***	0.191***	0.335***	0.252***	0.245***
	(0.0718)	(0.0666)	(0.0626)	(0.0647)	(0.0741)	(0.0782)
				[1.4]	[1.3]	[1.3]
City FE	✓	✓	✓	✓	✓	✓
Decade FE	✓	✓	✓	✓	✓	✓
Geographic Controls*Decade FE		✓	✓		✓	✓
Institutional Controls*Decade FE			✓			✓
Observations	2758	1783	1783	2758	1783	1783
Adjusted/Pseudo R^2	0.422	0.341	0.343	0.381	0.3402	0.342

Table Notes: This table reports difference-in-differences estimates of the impact of the plague using plagues in the prior decade as our explanatory variable. Columns (1)-(3) report OLS results. Columns (4)-(6) report results obtained from a negative binomial specification. The unit of observation is a city-decade. All specifications include city and decade fixed effects. Geographical controls include longitude, latitude, elevation, whether a city is on a river or the sea, and soil quality. Institutional controls include the presence of universities, bishoprics, and communes. We report incidence ratios in square brackets. Robust standard errors clustered at the city level are reported in brackets.

Table A.8: The Effect of Plague Shocks on the Number of Sumptuary Laws: City-Level Panel Analysis: Spatial Autocorrelation, Decade Level Data

	Number of Laws					
	(1)	(2)	(3)	(4)	(5)	(6)
Plague	0.138***	0.138***	0.138***	0.138***	0.138***	0.138***
	(0.0317)	(0.0391)	(0.0410)	(0.0317)	(0.0391)	(0.0410)
Radius	100	250	500	100	250	500
N. of Lags	1	1	1	5	5	5
City FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Observations	1761	1761	1761	1761	1761	1761
R^2	0.583	0.583	0.583	0.583	0.583	0.583

Table Notes: This table reports difference-in-differences poisson estimates of the impact of the plague using Conley standard errors to correct for possible spatial autocorrelation. In Columns (1)-(3) we vary the radius of our Conley standard errors from 100 to 500km. In columns (4)-(6) we increase the number of spatial lags to 5.

Table A.9: The Effect of Plague Shocks on the Number of Sumptuary Laws: City-Level Panel Analysis: Spatial Autocorrelation, Yearly Data

	Number of Laws					
	(1)	(2)	(3)	(4)	(5)	(6)
Plague (moving average)	0.417***	0.417***	0.417***	0.417***	0.417***	0.417***
	(0.0833)	(0.0871)	(0.0844)	(0.0833)	(0.0871)	(0.0844)
Radius	100	250	500	100	250	500
N. of Lags	1	1	1	5	5	5
City FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
Observations	13070	13070	13070	13070	13070	13070
R^2	0.0875	0.0875	0.0875	0.0875	0.0875	0.0875

Table Notes: This table reports difference-in-differences poisson estimates of the impact of the plague using Conley standard errors to correct for possible spatial autocorrelation. In Columns (1)-(3) we vary the radius of our Conley standard errors from 100 to 500km. In columns (4)-(6) we increase the number of spatial lags to 5. The adjusted standard errors we obtain change very little.

Table A.10: The Effect of Plague Shocks on the Number of Sumptuary Laws: City-Level Panel Analysis, Excluding the Black Death, Decade Level

	Number of Laws					
	Excl. 1347-1360		Excl. 1347-1400		Excl. Cities > 50% Pop Loss	
	(1)	(2)	(3)	(4)	(5)	(6)
Plague	0.145***	0.141***	0.165***	0.160***	0.0739***	0.0635***
	(0.0385)	(0.0329)	(0.0453)	(0.0396)	(0.0169)	(0.0164)
City FE	✓	✓	✓	✓	✓	✓
Decade FE	✓	✓	✓	✓	✓	✓
Geographic Controls*Decade FE		✓		✓		✓
Institutional Controls*Decade FE		✓		✓		✓
Observations	2452	1590	2096	1362	2446	1479
Adjusted/Pseudo R^2	0.419	0.347	0.402	0.337	0.551	0.461

Table Notes: This table reports difference-in-differences estimates of the impact of plague reoccurrences on sumptuary laws at the decade level. Columns (1)-(2) exclude the decades between 1340-1360. Columns (3)-(4) exclude the decades between 1300-1400. Columns (5)-(6) exclude cities with greater than 50% plague mortality. The unit of observation is a city-decade. All specifications include city and decade fixed effects. Geographical controls include longitude, latitude, elevation, whether a city is on a river or the sea, and soil quality. Institutional controls include the presence of universities, bishoprics, and communes. Robust standard errors clustered at the city level are reported in brackets.

Table A.11: The Effect of Plague Shocks on the Number of Sumptuary Laws: City-Level Panel Analysis, Excluding the Black Death, Yearly Level

	Number of Laws					
	Excl. 1347-1360		Excl. 1347-1400		Excl. Cities > 50% Pop Loss	
	(1)	(2)	(3)	(4)	(5)	(6)
Plague	0.442***	0.401***	0.577***	0.521***	0.193***	0.157***
	(0.121)	(0.108)	(0.123)	(0.104)	(0.0519)	(0.0539)
City FE	✓	✓	✓	✓	✓	✓
Decade FE	✓	✓	✓	✓	✓	✓
Geographic Controls*Decade FE		✓		✓		✓
Institutional Controls*Decade FE		✓		✓		✓
Observations	12468	9608	10739	8279	11653	8953
Adjusted/Pseudo R^2	0.0245	0.0298	0.0323	0.0378	0.00657	0.00972

Table Notes: This table reports difference-in-differences estimates of the impact of plague reoccurrences on sumptuary laws at the year level. Columns (1)-(2) exclude the decades between 1340-1360. Columns (3)-(4) exclude the decades between 1300-1400. Columns (5)-(6) exclude cities with greater than 50% plague mortality. The unit of observation is a city-year. All specifications include city and decade fixed effects. Geographical controls include longitude, latitude, elevation, whether a city is on a river or the sea, and soil quality. Institutional controls include the presence of universities, bishoprics, and communes. Robust standard errors clustered at the city level are reported in brackets.

Table A.12: The Effect of Plague Shocks on the Number of Sumptuary Laws: City-Level Panel Analysis, Post-1350, Decade Level

	Number of Laws		
	(1)	(2)	(3)
Plague	0.0774**	0.0801**	0.0781**
	(0.0388)	(0.0349)	(0.0339)
Observations	1335	855	855
City FE	✓	✓	✓
Decade FE	✓	✓	✓
Geographic Controls*Decade FE		✓	✓
Institutional Controls*Decade FE			✓
Adjusted R^2	0.265	0.199	0.196

Table Notes: This table reports difference-in-differences estimates of the impact of plague reoccurrences on sumptuary laws at the decade level for the post-Black Death period. The unit of observation is a city-decade. All specifications include city and decade fixed effects. Geographical controls include longitude, latitude, elevation, whether a city is on a river or the sea, and soil quality. Institutional controls include the presence of universities, bishoprics, and communes. Robust standard errors clustered at the city level are reported in brackets.

Table A.13: The Effect of Plague Shocks on the Number of Sumptuary Laws: City-Level Panel Robustness, Yearly-Level

	Number of Laws					
Excluding		L. Cities	Sicily	N. Cities	S.Cities	Coastal Cities
	(1)	(2)	(3)	(4)	(5)	(6)
Plague	0.373***	0.154***	0.376***	0.837	0.391***	0.240***
	(0.107)	(0.0494)	(0.108)	(0.510)	(0.113)	(0.0801)
City FE	✓	✓	✓	✓	✓	✓
Decade FE	✓	✓	✓	✓	✓	✓
Geographic Controls*Decade FE	✓	✓	✓	✓	✓	✓
Institutional Controls*Decade FE	✓	✓	✓	✓	✓	✓
Observations	10070	9545	9770	883	9187	8641
Excluding	Riverine Cities	Elevation >mean	Roman Road Hubs	University Cities	Pop 1300 > 50k	Pop 1300 < 50k
	(7)	(8)	(9)	(10)	(11)	(12)
Plague	0.435***	0.373***	0.421***	0.414***	0.303**	0.0875
	(0.133)	(0.122)	(0.108)	(0.117)	(0.136)	(0.0753)
City FE	✓	✓	✓	✓	✓	✓
Decade FE	✓	✓	✓	✓	✓	✓
Geographic Controls*Decade FE	✓	✓	✓	✓	✓	✓
Institutional Controls*Decade FE	✓	✓	✓	✓	✓	✓
Observations	5029	7670	7399	8595	5978	3939

Table Notes: This table reports our main robustness checks for our city-level analysis. The unit of observation is a city-year. All specifications include city and decade fixed effects. Geographical controls include longitude, latitude, elevation, whether a city is on a river or the sea, and soil quality. Institutional controls include the presence of universities, bishoprics, and communes. Column (1) reports our baseline estimates. The largest cities excluded in column (2) are Venice, Florence, and Milan. In column (3), northern cities are those above 41.9028 (the latitude of Rome). In column (8) we exclude cities with elevation greater than 183 meters. Robust standard errors clustered at the city level are reported in brackets.

Table A.14: The Effect of Plague Shocks on the Number of Sumptuary Laws: City-Level Panel Analysis by City Institutions, Yearly Data

	Number of Laws					
	Non-Despotic/Despotic		Commune/Non-Commune		Republican/Non-Republican	
	(1)	(2)	(3)	(4)	(5)	(6)
Plague	0.283**	0.0688	0.247***	0.0690	0.219***	0.0406
	(0.107)	(0.0941)	(0.0738)	(0.185)	(0.0606)	(0.0723)
City FE	✓	✓	✓	✓	✓	✓
Decade FE	✓	✓	✓	✓	✓	✓
Geo. Controls*Decade FE	✓	✓	✓	✓	✓	✓
Instit. Controls*Decade FE	✓	✓	✓	✓	✓	✓
Observations	5883	3887	8270	1800	3837	5933
Adjusted R^2	0.0550	0.0143	0.0387	0.000154	0.0618	0.0193

Table Notes: This table reports difference-in-differences˜ estimates of the impact of the plague on the number of sumptuary laws by state type using yearly data. The unit of observation is a city-year. All specifications include city and decade fixed effects. Geographical controls include longitude, latitude, elevation, whether a city is on a river or the sea, and soil quality. Institutional controls include the presence of universities and bishoprics. Robust standard errors clustered at the city level are reported in brackets.

Table A.15: No Effect of Plague Shocks on Institutional Change

	Adopting Republican Institutions			
	(1)	(2)	(3)	(4)
Plague Outbreaks Past 20 Years	0.00260	-0.00308		
	(0.00567)	(0.00564)		
Plague Outbreaks Past 10 Years			-0.00554	-0.00533
			(0.0124)	(0.0125)
City FE	✓	✓	✓	✓
Decade FE	✓	✓	✓	✓
Geographic Controls*Decade FE	✓	✓	✓	✓
Institutional Controls*Decade FE	✓	✓	✓	✓
Observations	2719	1761	5104	4176
Adjusted R^2	0.00766	0.122	0.00452	0.0516

Table Notes: This table explores the relationship between plague shocks and the adoption of Republican institutions. Robust standard errors clustered at the city level are reported in brackets.

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