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journal homepage: www.elsevier.com/locate/jeboThreat of taxation, stagnation and social unrest: Evidence from 19th century sicily[☆]Gema Lax-Martinez^a, Dominic Rohner^{b,*}, Alessandro Saia^c^a Department of Economics, Faculty of Business and Economics (HEC Lausanne), University of Lausanne, Switzerland^b Department of Economics, Faculty of Business and Economics (HEC Lausanne), University of Lausanne and CEPR, Switzerland^c Department of Economics, University of Bologna, Italy

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ABSTRACT

Taxation may trigger social unrest, as highlighted by historical examples. At the same time, tax income could boost state capacity which may, in turn, foster political stability. Understanding the a priori ambiguous taxation-turmoil nexus is particularly relevant for low-income countries today – yet causal evidence on the topic is very scarce. Using a regression discontinuity design, we exploit a unique policy experiment in 19th century Sicily to identify the effect of taxation on social unrest. It turns out that it is mostly the threat of taxation that may distort economic investment and ultimately result in greater political turmoil.

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1. Introduction

Taxation and fiscal policy are some of the state's key responsibilities; their design may have wide-ranging implications on political stability. Strikingly enough, not much is known about how tax policies affect civil unrest. Conceptually, the effects of increased taxation are ambiguous. On one hand, taxation perceived as extractive or unfair may trigger revolt, as was the case during the Boston Tea Party of 1773 or the subsequent American Revolution, the Rebecca Riots against tolls in Wales between 1839 and 1843, the so-called “dog tax conflict” in New Zealand in 1898, the Tax Resistance at Bayt Sahur (West Bank) in 1989, the Poll Tax Riots in the United Kingdom in 1990, or more recently during the Yellow Vest

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Movement in France since 2018, among many other examples. On the other hand, greater fiscal revenue could enhance state capacity, making it thereby more difficult for would-be rebels to challenge the state (as argued e.g. by [Collier et al., 2009](#) and [Besley and Persson, 2011](#)). As famously stressed by Max Weber ([Weber, 2013](#)), strong state capacity allows for a “monopoly of power” which is efficient in preventing what Thomas Hobbes called “war of every man against every man” ([Hobbes, 2016](#)).

Fiscal expansion may be linked to greater accountability, as an increased state budget could foster a demand for increased transparency and formalized *bookkeeping* of expenses ([Collier and Rohner, 2008](#)). In essence, a better funded state has more means for building up a powerful regulatory compliance infrastructure. At the same time, a larger state may also be more redistributive, which in turn can help reduce inequality. Overall, both a surge in accountability and a drop in inequality may increase the likelihood of pacification, by addressing popular grievances ([Gurr, 2015](#)).

Finally, increased taxation may also have indirect effects or effects on places and people that have escaped the taxman. For instance, tax systems containing discontinuities and loopholes may enhance tax avoidance. In this regard, the threat of taxation distorts incentives, which can result in slowing economic growth (think e.g. of the stylized fact that informality is associated with lower productivity – [La Porta and Shleifer, 2014](#)). In a faltering economy, the opportunity cost of rebellion is low which in turn increases the probability of civil unrest (see e.g. [Miguel et al., 2004](#); [Dell et al., 2014](#)).

Empirical evidence on these issues is scarce due to the fact that it is very difficult to find exogenous variation in taxation, limiting most possible analyses to pure correlations. In this paper, we aim to address this shortcoming by exploiting a unique policy experiment in 19th century Sicily. In particular, we exploit the implementation of a property tax (*imposta fondiaria*) introduced in Sicily in 1810. Municipalities of over 2,000 inhabitants were subject to the tax, while those under that threshold remained untaxed. This discontinuity allows us to perform a regression discontinuity design (RDD). To the best of our knowledge, the current paper is the first to study the effects of an arguably exogenous variation in taxation on the prevalence of conflict, while investigating potential channels of transmission.

In particular, we examine for municipalities closely below and above the 2,000 inhabitant threshold to what extent a municipality's exogenous exposure to the property tax impacted social unrest in 1860 (when the Kingdom of the Two Sicilies was overthrown and integrated into Italy), and during the revolution of 1848 (as a major robustness check). For this purpose, we have assembled a novel dataset on tax assignment, population and social unrest, drawing on a variety of original sources from historical archives. We detect a strong and robust effect of tax exposure around the threshold lowering the propensity for engaging in political violence. Next, we investigate potential channels of transmission, using a series of proxies for state capacity and public spending, some of which we have freshly collected from archival records. Our results suggest that tax exposure does not measurably affect public spending or state capacity building. These findings are in line with historians' unequivocal assessment of King Ferdinand II's regime being repressive and public spending being dismal and outright ineffective.

We then evaluate an alternative mechanism, namely that places right below the 2,000 inhabitants' threshold may be held back by the desire to avoid costly taxation, while villages already subject to taxation have bigger incentive to welcome new arrivers. We indeed find substantial evidence for this, with the population (and typically also the economy) of municipalities right above the tax threshold thriving much more than their counterparts right below. Importantly, this divergent growth path is only detected for the period of the differential tax treatment, while before and afterwards we do not find any differences in population growth above and below the threshold. Drawing on fine-grained data on housing stocks, we show that significantly more houses remained empty in untaxed villages and that differences in population growth between taxed and untaxed villages were larger for villages close in geographical proximity (i.e. providing an easy outside option).

Taken together, our results are consistent with the notion that it is not taxes, per se, but rather the threat of taxation that stirs up social unrest, since distorted incentives hamper growth and development. In terms of external validity, the current results may extend to past and current contexts where fiscal rules create major distortions in incentives, threatening growth and development. In contrast, we expect fewer –or possibly even no– adverse effects of taxation on violence in settings where the tax collection is designed in a non-distortionary way.

The remainder of the paper is organized as follows. First, [Section 2](#) reviews the most related literature. Next, [Section 3](#) contains a discussion of the historical context, and [Section 4](#) presents the data. [Section 5](#) outlines our identification strategy, and displays our baseline results, as well as a battery of robustness checks. The mechanisms at work are investigated in [Section 6](#), and [Section 7](#) concludes. The Online Appendix contains robustness checks and additional information on the data construction.

2. Literature review

In terms of the existing literature, we are unaware of any other research that explores the effects of exogenous variation in tax rates on conflict. Nonetheless, a series of related literature is relevant for the current analysis. First of all, this paper draws on the general literature of the main drivers of armed conflict (see e.g. the recent literature surveys of [Rohner and Thoenig, 2021](#); [Anderton and Brauer, 2021](#); [Rohner, 2022](#)). This literature highlights the factors that may motivate groups to engage in armed conflict, such as e.g. the availability of natural resource rents that can be appropriated (see [Dube and Vargas, 2013](#); [Caselli et al., 2015](#); [Berman et al., 2017](#)), as well as a multitude of potential weather or commodity price shocks that affect the opportunity cost of fighting compared to working ([Miguel et al., 2004](#); [Bazzi and Blattman, 2014](#); [Harari and Ferrara, 2018](#); [McGuirk and Burke, 2020](#); [Eberle et al., 2020](#)). In addition, ethnic diversity has received much attention as an

important factor affecting war and peace (Montalvo and Reynal-Querol, 2005; Esteban et al., 2012; Amodio and Chiovelli, 2018).

Surprisingly, the links between fiscal policy and conflict have been severely under-studied. While we are unaware of any existing study that exploits exogenous variation in taxation to investigate the impact on conflict, there is nevertheless related literature relevant to investigate the mechanisms at work. A first and obvious effect of taxation is that it triggers resistance against tax collection in some instances, which may lead to riots and unrest.¹ A series of papers have studied e.g. protests linked to the fiscal burden of the welfare state (Burg, 2004; Martin and Gabay, 2012) or to austerity measures (Ponticelli and Voth, 2019; Passarelli and Tabellini, 2017). Moreover, the implementation of fiscal reforms matters: Bansak et al. (2021) have shown that relative support or resistance regarding austerity programs very much depends on the mix of tax rises and spending cuts, while Garfias and Sellars (2021) have found that an increase in centralized tax collection is associated with enhanced social unrest in 17–19th century Mexico.

Second, taxes may contribute to increased state capacity which has been found to reduce conflict. In fact, a substantial amount of literature has shown weak state capacity to be correlated with political instability (Fearon and Laitin, 2003; Collier et al., 2009; Besley and Persson, 2010; Besley and Persson, 2011; Gennaioli and Voth, 2015, and Acemoglu et al., 2020).

Third, taxation could also imply greater accountability, hence better governance. Many researchers have argued that the state's accountability and good governance are major factors for preventing popular discontent and political unrest (see e.g. Collier and Rohner, 2008; Hegre and Nygård, 2015). Fourth, to the extent that tax revenues are partially used for redistribution, lower inequality can then reduce the prevalence of fighting (see Esteban et al., 2012; Gurr, 2015).

Beyond these straightforward direct mechanisms, taxation may also affect those who remain untaxed. The threat of a fiscal burden may distort economic choices, giving way to costly tax avoidance (see e.g. the discussion in Feldstein, 1999). In the context of arbitrary population thresholds for the tax base, as was the case for the income taxation in early 19th century Sicily, villages below the 2,000 citizen threshold had –at least in the short run– strategic incentives to hold back on demographic (and economic) growth to avoid being taxed. This may lead to economic slowdown and lack of growth, which are both powerful drivers of political turmoil (see e.g. Miguel et al., 2004; Dell et al., 2014; König et al., 2017).

Lastly, this paper is also related to the nascent literature that studies the effects of particular public policies on conflict prevention: see e.g. Cilliers et al. (2016) on reconciliation ceremonies, Mousa (2020) on multi-religious sports teams, Fetzer (2020) on workfare programs, Rohner and Saia (2019) on school construction, or Berlanda et al. (2022) on health interventions.

In a nutshell, our research is novel in various dimensions. It is –to the best of our knowledge– the first one to exploit an exogenous variation in fiscal duties to assess the impact of taxation on the risk of conflict. Furthermore, using a newly constructed dataset of civil unrest in 19th century Sicily, we carry out an analysis of the possible channels of transmission linking taxation to political stability.

3. Historical background

Before the Unification of Italy, the southern part of the country, the so-called “Kingdom of the Two Sicilies” was governed by the Bourbon dynasty (1816–1861).² The land was formed after the unification of the Kingdom of Naples and the Kingdom of Sicily and governed by Spanish Kings. This period of Sicilian history has been characterized by popular grievances against the oppressive, unjust and arbitrary domination of outside forces. Initially acclaimed by liberals, King Ferdinand II quickly transformed into an authoritarian monarch. As pointed out by De Lorenzo (2013), the despotism of the regime, widespread corruption, incompetent administration, and –crucially– a difficult economic-financial situation fuelled popular discontent, both among the nobles, the economic bourgeois elite and the population at large. Population discontent and unrest grew stronger from unjust repression, the new kingdom's capital being relocated to Naples, but also from the abolition of the Sicilian Parliament and Constitution. The regime reacted with crackdowns, severely repressing many liberal and national revolts (including the Bandiera brothers' uprising in 1844). While populations' anger built up over several decades (and lower-scale armed contestation was frequent in the first three decades of the Kingdom of the Two Sicilies), civil unrest reached one of its highest peaks during the well-documented “Sicilian Revolution” of 1848. As documented by Venosta (1863) and De Lorenzo (2013), support for revolt stretched over various socio-economic classes of society. Widespread turmoil continued until general Giuseppe Garibaldi and his one thousand volunteers (i.e. in the “Expedition of the Thousand”) conquered “The Kingdom of the Two Sicilies”, incorporating this territory into the newly proclaimed Kingdom of Italy in 1861.

Our study exploits the adoption of a property tax implemented by King Ferdinand's General Parliament in 1810, six years before the unification of the two southern kingdoms.³ The tax was levied in Sicilian municipalities of more than 2,000 inhabitants and consisted of 5 percent of the last cadaster's urban rent.⁴ The population data of 1806 was used as reference

¹ Note that such protests against taxation have sometimes been successful and led to a tax reduction (see e.g. Steele et al., 2017 for Early Modern Japan).

² The discussion in this section draws on a series of historical sources, notably several entries in the Encyclopedia Britannica (www.britannica.com), as well as Horner (1860).

³ See pages 58–65 of the Law of September 28th, 1810, by the General Parliament of the Kingdom of Sicily.

⁴ The property tax that we examine was levied on building owners. The tax base corresponded to the net rents of the funds after deducting the expenses for maintenance (see Dias, 1856 for more details). Rural houses and other rural units intended for land cultivation, pastoralism or warehouses were ex-

to determine which municipalities were tax exempt.⁵ The property tax was widely viewed as extractive, with only a very modest part going into funding public spending and infrastructure. Indeed, as stressed in [Balletta et al. \(2010\)](#), during the first half of the 19th century Sicily suffered from a lack of public investment, and, as deplored by [Carano-Donvito \(1910\)](#), “very little was spent [for the citizens], and this was spent badly” ([Carano-Donvito, 1910, p.73](#)) and there was “negligence in the expenses necessary to promote increases in wealth” ([Carano-Donvito, 1910, p.73](#)). Historical accounts paint a grim picture of galloping corruption, overcrowded prisons, overpaid civil servants recruited based on cronyism and not merit, no elementary education or basic healthcare, almost inexistent media, unsafe roads, lack of street lighting and cemeteries, disenfranchised municipalities and neglected provinces (see e.g. [Conte di Cavour and Nigra, 1926](#) and [Armino, 2015](#)).

Interestingly, while turmoil and violent political protests regularly took place after the 1810 tax reform, regime opposition culminated to its worst about thirty years after. As discussed in more detail below, this is consistent with a key mechanism pinpointed by our analysis, namely that extractive and distortive taxation constrains and slows down the economic development of municipalities, thus increasing distress and discontent over time.

4. Data

We start from the comprehensive list of municipalities provided by “Parlamenti Generali del Regno di Sicilia” which allows us to disentangle the municipalities that did and did not pay the property tax in 1810. We also collect population data for 1748, 1806, 1861, 1871 from a variety of sources. Data from 1806, the most important for our study, was retrieved from [Pagano \(1952\)](#), whereas 1748 data come from [Maggiore-Perni \(1892\)](#), 1861 from [Ministero d’Agricoltura \(1864\)](#) and 1871 from [Ministero d’Agricoltura \(1874\)](#). We observe almost perfect compliance to the treatment (tax obligation) with respect to the 1806 census population, with only very few exceptions.⁶

As discussed above, several rebellions took place on the island of Sicily against the House of Bourbon (a cadet branch of the Spanish royal family) during our period of interest. We measure social unrest using the Medal of Honor recipients for riots in 1848 and 1860, recorded in the National Archives in Palermo. Our data contains very detailed information on these recipients, which crucially includes their municipality of origin. These measures are good indicators of the extent of social unrest in various locations of Sicily, as the awarding of medals was carried out by an external commission (created by two laws in December 1860 and February 1861), reporting directly to the Italian State. This procedure was designed to exhaustively reward all citizens that proved their loyalty to the Italian Kingdom (having displayed great bravery, being injured or killed in combat) by participating in uprisings against the Bourbon’s rule. The process of examining each file was extremely stringent. Our measures unlikely suffer from large measurement errors, as the aim was to exhaustively locate all citizens meeting the criteria, and –if anything– under-reporting of combat involvement would downward bias our estimates. Concerning non-classical measurement errors, there is no reason to believe that the commission would systematically accept more applications from citizens originating from control (or treated) municipalities. Still, we will carry out a series of robustness checks aimed at addressing concerns about these measurement errors.

Using the aforementioned data we code as dependent variable a binary measure of social unrest taking a value of one for municipalities having received at least one Medal of Honor for rebellion against the House of Bourbon in 1860, and zero otherwise.⁷

The standard control variables include a dummy variable indicating whether the municipality had access to a postal road that connected the largest towns of Sicily at the beginning of the 1800s ([Cary, 1799](#)), as well as a battery of controls taken from [Buonanno et al. \(2015\)](#): The distance of each municipality to the nearest non-seasonal river and commercial port, average terrain ruggedness in the municipality, a dummy for water scarcity, a dummy variable that indicates whether the municipality is within 10 km from one of Sicily’s five largest cities, land suitability for cereals, citrus fruits and olives. A further control variable used is the type of municipality, i.e. *demaniale* (royal, cities that are part of the State property) and *baronale* (baronial, subordinated to a feudatory) from [Pagano \(1952\)](#), p. 124–136. For additional (placebo) analyses, we also draw on data on the number of sulfur mines in the municipality in 1886 (from [Buonanno et al., 2015](#)).

In Appendix Table A1 we display descriptive summary statistics. We see that in the 1860 episode of social unrest (our main variable), exactly half of the municipalities had citizens involved in the fighting, while in the social unrest period of 1848 (used in a robustness check) only 14 percent of municipalities had at least one citizen participating. As far as the tax is concerned, it was levied in 58 percent of municipalities. The table also contains summary statistics about the more than a dozen controls and additional variables.

empted. Tax evasion was punished harshly: when detected, an offender would pay three times the tax on the hidden rent. The collected money would be equally distributed to the Council of the Kingdom and the accuser. Thus, citizens had incentives to inculcate their compatriots in case of evasion. Note that there also existed already a tax on feudal and allodial land of 5 percent of the land rents, which did not contain any exemption and which is not exploited in our study.

⁵ See pages 61–65 from the Law of September 28th, 1810 by the General Parliament of The Kingdom of Sicily.

⁶ Within our data-driven bandwidth, the only municipalities (population of 1806 in brackets) with more than 2,000 inhabitants that should be paying the tax but are exempted are Saponara (2183), Savoca (2196), Santo Stefano di Camastra (2218) and Cianciana (2614). We shall in the whole baseline analysis remove these four exceptions and perform a sharp RDD. However, in Appendix B.7 we show that our results are virtually unchanged if we include them.

⁷ We follow the approach in the conflict literature that often uses as main dependent variable a dummy of conflict incidence (see e.g. [Fearon and Laitin, 2003](#); [Collier et al., 2009](#); [Berman et al., 2017](#); [Harari and Ferrara, 2018](#)). Further, moving beyond a municipality-level dummy would have been extremely complicated, due to the poor condition of the archival records for individuals.

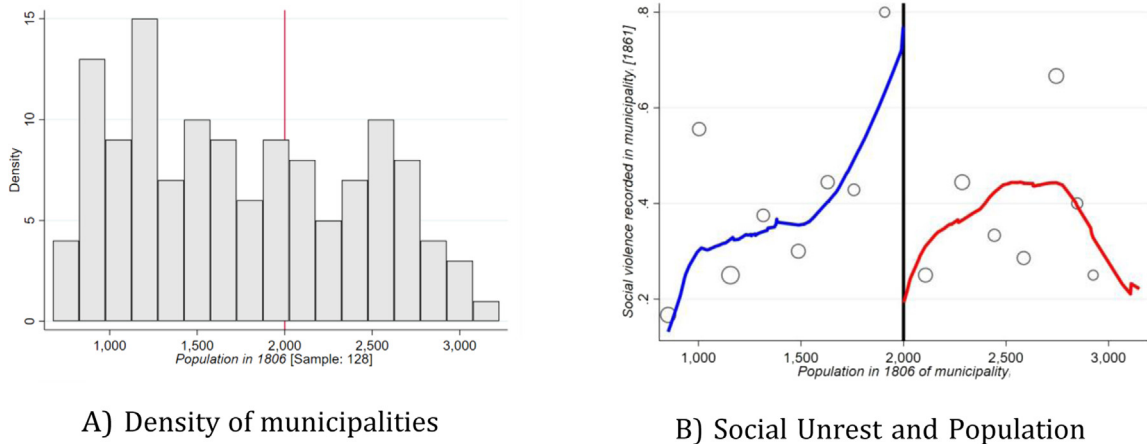


Fig. 1. Density plot and relation between social unrest and population. A) Density of municipalities. B) Social Unrest and Population. Panel A displays the density in numbers of Sicilian municipalities in 1806 with population around the cut-off of 2,000 inhabitants. Panel B shows the lowest (Locally Weighted Scatterplot Smoothing) smoothed relationship between Medals of Honor and population in municipalities below and above 2,000 inhabitants in 1806, represented by the blue (below) and red (above) lines. The scatter-plot averages over intervals of 150 inhabitants and the bin size (represented by the size of the circles) is a function of the number of municipalities in the corresponding interval. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

5. Empirical analysis

5.1. Identification strategy

As previously mentioned, in 1810, a property tax consisting of 5% of urban rents was introduced and levied exclusively in municipalities of more than 2,000 inhabitants. We exploit this discontinuity in treatment to investigate whether the introduction of the property tax affected the likelihood of observing social unrest in the municipality, performing a Regression Discontinuity Design (RDD). Our sample consists of 338 Sicilian municipalities with population numbers ranging from 108 to 155,740. Out of these settlements, 196 (i.e. 58%) are subject to the tax.

The identification assumption required to hold for the validity of an RDD is that there is no sorting around the threshold, i.e. that there is a “smooth” distribution of municipalities in the neighborhood of the known threshold (2,000) of the forcing variable population. Figure 1, Panel A illustrates (using bins of 150 inhabitants) that the density in numbers of municipalities of a given size is “smooth” in the neighborhood of the threshold.⁸ This is confirmed by a formal test, following Cattaneo et al. (2019).⁹

We perform a sharp RDD analysis to estimate the casual impact of taxation around the threshold of 2,000 inhabitants. The treatment effect, identified at the threshold of 2,000 inhabitants, is given by

$$E[y_{i1} - y_{i0} | X_i = 2,000] = \lim_{X_i \rightarrow 2,000^-} E[y_i | X_i = x] - \lim_{X_i \rightarrow 2,000^+} E[y_i | X_i = x] \tag{1}$$

where the outcome variable y_i is social unrest in municipality i defined in Section 4. It can take two potential values: y_{i1} for municipality i subject to the treatment, and y_{i0} otherwise. X_i is the forcing variable, i.e. the number of inhabitants in municipality i .

We estimate non-parametrically the regression function $E[y_i | X_i = x]$ at each side of the threshold, separately for control and treated municipalities.¹⁰ In practice it is like estimating by OLS the following regression equation including only observations ranging from $2,000 - h$ to $2,000 + h$ inhabitants, where $h > 0$ is a data-driven bandwidth, as suggested by Cattaneo et al. (2017)¹¹:

$$y_i = \beta_0 + \beta_1 \mathbb{1}\{X_i \geq 2,000\} + \beta_2 (X_i - 2,000) + \beta_3 \mathbb{1}\{X_i \geq 2,000\} \cdot (X_i - 2,000) + \beta_3 Q_i + \epsilon_i \tag{2}$$

⁸ The sample of municipalities displayed in Fig. 1 corresponds to the sample selected by the data-driven bandwidth of our unconstrained baseline estimates. For the sake of completeness, we report the analogous figure with the density of all Sicilian municipalities in the Online Appendix A.2.

⁹ According to their test, which does not require pre-binning the data, we cannot reject the null hypothesis of no difference of the population data in 1806 around the 2000 inhabitants’ cutoff (the t -stat is 0.86 for the sample of our baseline Table 1).

¹⁰ Our baseline estimations use a second-order polynomial. The use of a quadratic regression follows Gelman and Imbens (2019). The Online Appendix B.4 displays the results for a local linear regression, leading to very similar findings.

¹¹ This approach selects the bandwidth, taking into consideration the bias-variance trade-off, so that the mean square error of the point estimator is minimized. Section B.5 in the Online Appendix presents the results for different manually-chosen bandwidths of 500, 750, 1000 and 1500 inhabitants.

where $\mathbb{1}\{X_i \geq 2,000\}$ is the threshold indicator function, $(X_i - 2,000)$ is the continuous, normalized population measure and Q_i represents the quadratic version of the former, i.e. $Q_i = (X_i - 2,000)^2 + \mathbb{1}\{X_i \geq 2,000\} \cdot (X_i - 2,000)^2$. The coefficient of $\mathbb{1}\{X_i \geq 2,000\}$ is the treatment effect at the cutoff.¹²

5.2. Main results

In the current subsection we shall report the main baseline results of the RDD analysis. Figure 1, Panel B depicts graphically the main finding. On the horizontal axis, all Sicilian municipalities are ordered by size around the tax threshold, where the ones above 2,000 inhabitants have to pay the tax, while the others are exempted. On the vertical axis we display the incidence of social unrest in a given municipality (as measured by our variable on Medals of Honor from the National Archives in Palermo). In particular, it displays the lowess (Locally Weighted Scatterplot Smoothing) smoothed relationship between Medals of Honor and population around the 2,000 inhabitants' threshold. The blue and red lines display the incidence of social unrest observed in municipalities below and above 2,000 inhabitants in 1806, respectively. The bins indicate the average level of social unrest of municipalities in the corresponding population intervals (for better readability, we considered municipalities over intervals of 150 inhabitants) and the bin size (represented by the size of the circles) is a function of the number of municipalities in the corresponding interval. We find that political violence is much more prevalent in municipalities exempt from taxation compared to the more peaceful group of treated municipalities.

In what follows, we investigate in further detail this relationship, starting with baseline Table 1. We perform sharp RDD estimations with a data-driven bandwidth (following Cattaneo et al., 2017, as discussed above), and display the coefficient of the impact of the property tax exemption (according to 1806 population data) on social unrest in 1860, measured using a dummy variable indicating whether someone from the municipality has received a Medal of Honor in that year. This captures whether there has been at least one incident of anti-government unrest in a given municipality in the year 1860.

Column 1 displays the results of the unconstrained regression. It confirms the negative, statistically significant effect of being subject to taxation on unrest previously found above in Fig. 1, Panel B. Quantitatively, municipalities just below the threshold of 2,000 inhabitants tend to have on average four times more episodes of social unrest compared to the municipalities just above the threshold.

Column 2 includes a battery of controls, namely a dummy variable indicating whether the municipality had access to a postal road that connected the largest towns of Sicily at the beginning of the 1800s, the distance of each municipality to the nearest non-seasonal river and commercial port, average terrain ruggedness in the municipality, a dummy for water scarcity, a dummy variable that indicates whether the municipality is within 10 km from one of Sicily's five largest cities, land suitability for cereals, citrus fruits and olives and the type of municipality, i.e. *demaniale* (royal, cities that are part of the State property) and *baronale* (baronial, subordinated to a feudatory).

In the third column we add fixed effects for historical provinces (from 1806, called *valli*, there are 3), while, similarly, in column four we include fixed effects for more recent province boundaries (from 1861, there are 7). Column five includes at the same time controls and *valli* fixed effects, while the sixth column includes both controls and province fixed effects. In all columns we find a negative, significant effect of tax exposure on social unrest. Reassuringly, the coefficient of interest is extremely stable across specifications.

5.3. Robustness checks

The first robustness check that we present is a placebo analysis of our main baseline results. In particular, we report in Fig. 2 the coefficient of our baseline estimate (in red) together with a placebo exercise (in black) where we rely on the same explanatory variables as in the baseline Table 1 but include a proxy of social unrest for other years, i.e. the presence of a political opponent to the government (anarchists, republicans, socialists, etc.). Every point estimate represented in the figure corresponds to a period of equal length. We see that –as expected– social unrest was only impacted during the period when the differential tax policy was in place.¹³ Overall, the results displayed in Fig. 2 provide support to the idea that the choice of the tax threshold was not driven by the notion that municipalities below 2,000 inhabitants were intrinsically more prone to violence. In the Online Appendix B.1, we provide additional variants of this placebo analysis, and we find, as above, only an effect for the period when this differentially applied tax was active, but not for any other time period.¹⁴

¹² The baseline regression is weighted by a triangular kernel function $K\left(\frac{x_i - 2,000}{h}\right)$. The triangular kernel function $K(x) = (1 - |x|)1(|x| \leq 1)$ assigns a positive weight to the municipalities inside the interval $(2,000 - h, 2,000 + h)$ that declines, as their distance from the cutoff increases. Section B.6 in the Online Appendix depicts the results for the unweighted regression (rectangular kernel), which are consistent with our baseline estimates.

¹³ Note that we have also studied whether Peasant Fasci at the end of the 19th century and mafia presence during the 20th century were affected by our unequal tax treatment in the early 19th century. In line with the results of Fig. 2, we find no effect on these later phenomena. This is consistent with the notion that the differential tax policy's impact was limited to the period when it was in place, and that it did not generate persistent effects carrying over until today.

¹⁴ Note that we have also collected additional data on military presence for the period before the introduction of the tax. We have replicated the baseline estimates, but using on the left hand side data on infantry and cavalry soldiers observed in the municipality in 1714 (results available upon request). We do not observe any discontinuity in military presence around the 2,000 inhabitants threshold, which is in line with the notion that municipalities below the threshold were not intrinsically more conflict-prone (and hence that the Bourbon Kingdom is unlikely to have strategically selected the 2,000 inhabitants threshold to minimize dissent).

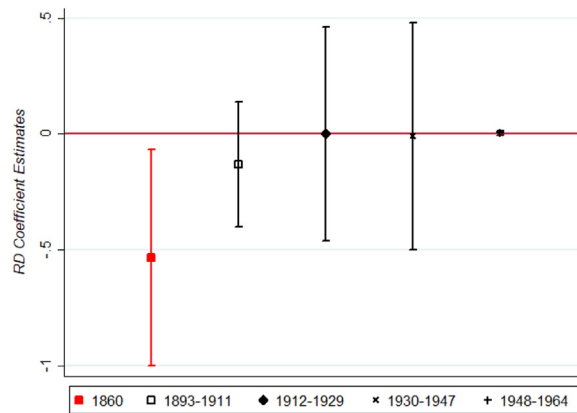


Fig. 2. Placebo - Effect of taxation on social unrest after 1860 - Different time-windows. *Notes:*The figure shows the coefficient estimates (and the 95% confidence intervals) from a set of unconstrained RD regressions of the impact of the property tax exemption (given by population data in 1806) on social unrest in 1860 (in red), and the presence of “subversive individuals” for different periods of equal length (in black). The coefficient estimate shown in red corresponds to that in Column 1 in Table 1. Social unrest data from 1860 comes from the National Archives in Palermo (Sicily), population data on 1806 comes from Pagano (1952) and data on “subversive individuals” from 1893 onwards is retrieved from the National Archives (*Archivio Centrale dello Stato*). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Table 1

Baseline results of the effect of taxation on social unrest.

Dep. Variable: Social Unrest _{<i>t</i>}	(1)	(2)	(3)	(4)	(5)	(6)
Tax in 1810 _{<i>t</i>}	-0.534** (0.239)	-0.656*** (0.207)	-0.546** (0.239)	-0.563*** (0.214)	-0.633*** (0.206)	-0.684*** (0.198)
Observations	128	145	137	129	153	149
Bandwidth	[846-3,154]	[685-3,315]	[774-3,226]	[839-3,161]	[622-3,378]	[657-3,343]
Controls	No	Yes	No	No	Yes	Yes
Valli FEs	No	No	Yes	No	Yes	No
Province FEs	No	No	No	Yes	No	Yes
Sample Mean	0.375	0.373	0.370	0.369	0.370	0.369

Notes: Sharp RD Estimates of the impact of the property tax exemption (given by population data in 1806) on social unrest in 1860, measured with a dummy variable indicating whether someone from the municipality has received a Medal of Honor in that year. A data-driven bandwidth is implemented. Column 1 is the unconstrained regression. Column 2 adds the following controls: a dummy variable indicating whether the municipality had access to a postal road that connected the largest towns of Sicily at the beginning of the 1800s, the distance of each municipality to the nearest non-seasonal river and commercial port, average terrain ruggedness in the municipality, a dummy for water scarcity, a dummy variable that indicates whether the municipality is within 10 km from one of Sicily's five largest cities (urban), land suitability for cereals, citrus fruits and olives and the type of municipality, i.e. *demaniale* or *baronale*. The third column adds province (from 1806, called *valli*, there are 3) fixed effects. The fourth column adds province FE (from 1861, there are 7). Robust standard errors are reported in parenthesis. Statistical significance is represented by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

A variety of further robustness checks are relegated to the Online Appendix. We shall briefly describe here the tests performed and results found. In particular, we implement a series of sensitivity tests linked to alternative ways of computing RDD coefficients and standard errors (Section B.2) and alternative definitions of the dependent variable (Section B.3), and we allow for other functional forms of the RD function (Section B.4) and manual bandwidths (Section B.5). In Section B.6 we use an uniform kernel, and in Section B.7 a fuzzy RDD is applied. Finally, in Section B.8 we include the battery of control variables used in Acemoglu et al. (2020), while in Section B.9 we perform sensitivity tests with respect to the geographical controls included. Our results remain statistically significant and of similar magnitude in all these sensitivity specifications.

6. Channels

Below we study through which channels of transmission the Sicilian property tax may have affected social unrest. We first explore different proxies for state capacity such as whether the municipality has its own municipal administration, district judge and the presence of police stations. Second, we investigate different measures of population growth as a proxy for economic progress.

6.1. State capacity

An obvious potential mechanism explaining why being above the tax threshold diminishes conflict could be that tax collection is associated with building up state capacity (see Tilly, 2017 and Besley and Persson, 2011) which in turn helps

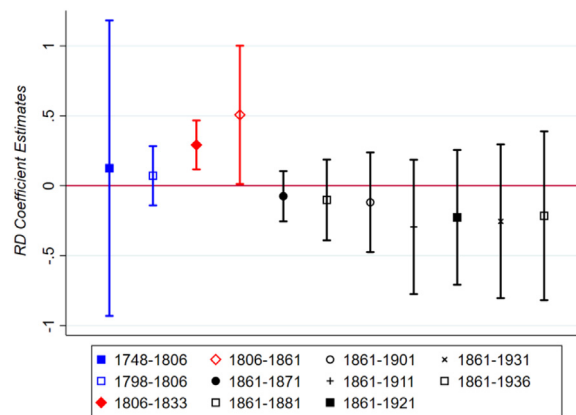


Fig. 3. Placebo - Effect of taxation on population growth after 1860 - Different time-windows. *Notes:* The figure shows the coefficient estimates (and the 95% confidence intervals) from a set of unconstrained RD regressions of the effect of the property tax exemption (given by population data in 1806) on population growth over different periods. Estimated coefficients shown in red (for 1806-1833 and 1806-1861) correspond to those presented in columns 1 and 3 in Table 2. Sources are Pagano (1952), Maggiore-Perni (1892), Ministero d'Agricoltura (1864), Ministero d'Agricoltura (1874) and Italian National Institute of Statistics (ISTAT). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

prevent social unrest (Fearon and Laitin, 2003; Collier et al., 2009; Besley and Persson, 2010; Besley and Persson, 2011; Gennaioli and Voth, 2015, and Acemoglu et al., 2020). While this nexus has been uncovered in several contexts, it does not seem very plausible for the Kingdom of the Two Sicilies in the early and mid 19th century, given Ferdinand II's infamously poor and wasteful public spending policies (as discussed above in Section 3).

In the additional material, Appendix Table A14 performs an RDD analysis of the impact of being above the tax threshold on a series of indicators and proxies of state capacity. Columns 1–2 focus on a municipality having an own administration, Col. 3–4 on the (log) value of public buildings, Col. 5–6 on the existence of municipal level judiciary, Col. 7–8 on the municipality being mentioned in legal texts, and, finally Col. 9–10 on a principal component analysis of the aforementioned indicators.¹⁵ While the coefficients found have in general a positive sign, they are in almost all cases very far from statistical significance, with the exception of the legal mention where the coefficient of tax assignment is positive and significant at the 10 percent level. Overall, this table does not provide strong support for the notion that taxation reduces social unrest through enhanced state capacity, as was hypothesized. However, as always, the absence of evidence of an effect is not to be mistaken for evidence of absence of an effect. We cannot rule out that these non-results are partly due to noisy measures of state capacity leading to attenuation bias.

6.2. Population growth

An alternative mechanism explaining why occurrences of social unrest are more common in non-taxed municipalities is that these places have hampered their development (by staying below the 2000 inhabitant threshold) to escape taxation. Economic growth indicators for 19th century Sicily are sparse at the municipal level. However, this missing data on economic and demographic development can reasonably be proxied by population growth rates. In the case of stagnant municipalities – held back by the treat of taxation – population should remain approximately the same. Hence, in this subsection we investigate how the discontinuous tax duties have affected population growth in the municipalities subject to the tax with respect to the ones exempted from this fiscal levy.

Table 2 provides the main estimates with as dependent variable population growth between 1806 and 1833 (and 1806 and 1861). The same control variables are included as in the baseline Table 1. In all four specifications we find a strong and statistically significant positive effect of taxation on population growth. Differently put, we find that –in the neighborhood of the population threshold– tax exempt municipalities have experienced much smaller demographic development than their taxed counterparts.

A major robustness check for the aforementioned results is performed in Fig. 3 where we present placebo estimation results using population growth before the introduction of the tax and after 1861 (when they removed exemption because the Kingdom of the Two Sicilies was absorbed by Italy). Again, as expected, no effect is found for these “before” and “after” periods where our differential fiscal treatment does not apply. Note that in Online Appendix C.2 we carry out a further

¹⁵ Information on which municipalities have an own administration is retrieved from a chorographic dictionary with detailed information on any Sicilian municipality (De Luca, 1852); value of public buildings comes from Mortillaro (1854), that quantifies the value of buildings such as mills, industries like foundries, silk, cotton or wool manufactures for every municipality. Records on the so-called *district judges* are taken from Serristori (1842) (apart from the magistrates listed in this source, every district counted as having a single investigating judge). Using automatic text extraction algorithms, we retrieve the number of times a municipality is mentioned in over 12,000 pages of legal texts related to the period 1806–1860. The full list of legal texts used in this exercise is available in Appendix Section D.

Table 2
Channel - Effect of taxation on population growth.

	(1)	(2)	(3)	(4)
Dep. Variable:	Pop. Growth 1806–1833 _i		Pop. Growth 1806–1861 _i	
Tax in 1810 _i	0.292*** (0.0893)	0.259*** (0.0680)	0.507** (0.252)	0.394** (0.193)
Observations	142	138	136	136
Bandwidth	[730–3,270]	[717–3,283]	[781–3,219]	[726–3,274]
Controls	No	Yes	No	Yes
Province FEs	No	Yes	No	Yes
Sample Mean	0.255	0.262	0.591	0.585

Notes: Sharp RD Estimates of the impact of the property tax exemption (given by population data in 1806) on population growth 1806–1833 and 1806–1861. A data-driven bandwidth is implemented. Columns 1 and 3 show results from the unconstrained regression. Columns 2 and 4 adds province FE (from 1861, there are 7) and the following controls: a dummy variable indicating whether the municipality had access to a postal road that connected the largest towns of Sicily at the beginning of the 1800s, the distance of each municipality to the nearest non-seasonal river and commercial port, average terrain ruggedness in the municipality, a dummy for water scarcity, a dummy variable that indicates whether the municipality is within 10 km from one of Sicily's five largest cities (urban), land suitability for cereals, citrus fruits and olives and the type of municipality, i.e. *demaniale* or *baronale*. Robust standard errors are reported in parenthesis. Statistical significance is represented by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

placebo analysis, finding again only an effect for the period when this differentially used tax was active, but not for any other time period. In Online Appendix Section C.3 we also show that the results of Table A17 are robust for using predicted instead of actual population growth.

Finally, we explore the extent to which these differential growth rates could be explained by internal migration patterns. It is important to keep in mind that the economic structure of Sicily in the 19th Century was overwhelmingly skewed toward the agricultural sector where the (de facto) abolition of feudalism in 1812 helped “to further strengthen the dominance of *latifundia*” (Lucchini and Fiore, 1902, p.37). In such a context, the owners of vast land holdings could influence the internal movements of inhabitants and prevent the arrival of new peasants to avoid reaching the population threshold for taxation. Given that people are more likely to migrate to municipalities where they could find work, new arrivals were more likely in cities already above the threshold. There, landowners had incentive to employ more labor to boost production (among others, to compensate for the existence of the tax), while the opposite was true for municipalities below the threshold.

To provide evidence of internal migration / depopulation, we implement two separate empirical exercises. First, we draw on fine-grained data retrieved from the 1861 Census on the presence of uninhabited houses (*case vuote*) in given municipalities. The results presented in the Appendix C4 show a negative effect of being taxed on the number (and incidence) of uninhabited houses, meaning that taxed municipalities have in general a lower amount of uninhabited houses.¹⁶ Second, we link the distance between municipalities subject versus not subject to taxation to differences in their population growth rates. A shorter distance implies that an easy outside option is available, which may increase incentive and ease to channel migration flows away from municipalities below the taxation threshold. The results are presented in Appendix C5. We document a negative effect of distance on growth rate differentials: more precisely, the smaller the distance between paying and non-tax paying municipalities, the larger is the differential in population growth observed after the introduction of the tax. Overall, both empirical exercises suggest that the tax treatment may impact internal migration patterns and, ultimately, economic growth.¹⁷

7. Conclusion

In this paper we have exploited the 1810 Sicilian municipality property tax (*imposta fondiaria*) to provide novel evidence about the impact of taxation on social unrest. To do so we collected novel historical data on population and Medal of Honor recipients for riots in 1848 and 1860, among others.

We find that taxation has a statistically significant, quantitatively sizeable impact on reducing the prevalence of social unrest (as paying the tax reduces the baseline social unrest risk by more than half). In terms of channels of transmission, we fail to detect an impact of taxation on increasing state capacity and fostering public investments but discover that

¹⁶ This finding is consistent with the notion that landowners from taxed municipalities may be keen to increase production in order to compensate for the fiscal duties on their own houses. For this purpose, they may want to hire more workers, which may trigger migration from exempted municipalities to non-exempted ones. In contrast, the incentives differ for landowners from exempted municipalities, who may want to contain population numbers for the sake of escaping additional tax duties. These internal migration incentives may be part of the explanation of why more houses remained empty in the exempted municipalities, compared to the taxed ones.

¹⁷ A further potential channel that could explain differential patterns of population growth could be related to fertility patterns. The tax treatment may also have had an impact on household fertility decisions. Unfortunately, we were not able to find precise fertility data for villages in Sicily in the early 19th century. We have computed, however, two proxies for fertility behaviour in a given municipality: (i) average family size (calculated as the ratio of the overall population divided by the number of families in 1861) and (ii) the ratio of unmarried men over the population of 1861. Overall, we fail to detect conclusive evidence in support of the hypothesis that the introduction of the tax treatment had an effect on household fertility decisions (see Appendix Table A22).

municipalities right below the threshold experience much reduced demographic (and typically economic) growth compared to municipalities right above the tax threshold. These findings are consistent with the notion that it is not fiscal levies, per se, but rather the threat of taxation that leads to distorted incentives slowing down growth and development – which in turn can fuel unrest.

While the current study is arguably the first one to exploit an exogenous variation in tax exposure to investigate drivers of social violence, the generalizability of results is limited to contexts of ill-designed, distortionary taxation. Hence, various fruitful avenues for future research remain under-explored. First of all, it would be very worthwhile to set up a formal contest model that incorporates several countervailing forces, such as the benefits of fostered state capacity and accountability on the one hand, versus a potentially greater scope for tax-related grievances and unrest on the other hand. The relative magnitude of these forces typically depends on the exact design of the tax system and scope for incentive distortions. A natural, related research question to explore empirically is the causal impact of taxation on unrest in a setting of a well-crafted fiscal system where tax revenues are used for building up infrastructure and state capacity. This may be able to highlight a potentially multifaceted picture of the impact of levying higher taxes. Further, it would be useful to investigate the relative importance of communicating effectively how taxes are used. If the population is exposed to a credible signal that tax incomes are well-spent and not wasted, the scope for unrest is attenuated. Putting in place randomized control trials related to tax communication and accountability appear particularly promising. Last but not least, another very relevant avenue for future work is the study of the trade-offs between different means of opposing taxation, such as e.g. revolting versus tax evasion.

Declaration of Competing Interest

We have no relevant interests to declare.

Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.jebo.2022.08.007](https://doi.org/10.1016/j.jebo.2022.08.007).

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