



# Biological welfare and the commons: A natural experiment in the Alps, 1765–1845



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## ABSTRACT

In the late 18th century hundreds self-governing alpine communities in Northern Italy came under the direct control of centralized states (Austria and France) at different times. We exploit the timing and location of these interventions in a difference-in-differences type design to investigate the effects of removing CPR (common-pool resources) institutions on biological welfare. We find a significant and persistent increase in infant mortality rates and a more modest decrease in birth rates as a result of state centralization. We provide evidence that these demographic changes reflect a critical loss of natural resource income caused by the disruption of communal institutions. Impacts are most severe in communities that have no prior experience with formal institutions.

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## 1. Introduction

Common-pool resources (CPR) such as forests, pastures, and fisheries have a long history of communal ownership throughout the world. It is well-known that such resources are vulnerable to overexploitation, a phenomenon known as the “tragedy of the commons”.<sup>1</sup> The conditions under which communities can effectively address this problem without state intervention has been at the center of a long and contentious debate in both policy and academic circles (Ostrom, 1990, 2005; National Research Council, 2002). On many occasions, the mere potential for a commons problem to arise has induced state authorities to directly intervene in local resource management.<sup>2</sup> The economic effects of

these interventions, however, have been difficult to evaluate and measure objectively.<sup>3</sup> A primary challenge has been in constructing sufficiently large data sets capable of isolating variation in the relevant institutional characteristics. Even when this has been possible, a remaining challenge has been in identifying the appropriate counterfactuals to interventions. Indeed much of the empirical work in this area has struggled to separate the impacts of interventions from the impacts of the factors causing them (Agrawal, 2001; Casey et al., 2012).

The welfare of rural communities has a close relationship to its demographic characteristics. Research by Dasgupta (2003, 2004) explores the existing link between population, the environment, and social well-being in CPR systems in the current developing world. This work shows the importance of institutions in shaping the level of social well-being: institutions provide access to the determinants of well-being (i.e. resources) and create the conditions to develop and sustain its constituents. Dasgupta also documents the environmental downsides of institutional failures

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<sup>1</sup> This situation arises when a CPR user's payoff increases with his or her own exploitation of the resource but decreases with the total exploitation across all users. By taking other resource users' actions as given, an individual chooses to overexploit the resource relative to the efficient amount. Gordon (1954) provides a model of the common-pool fishery that captures these essential tradeoffs. The term itself and its popular usage is credited to Hardin (1968).

<sup>2</sup> See Baland and Platteau (1996, pp. 235–283) for a broad array of examples.

<sup>3</sup> Research findings on this point are largely based on qualitative evidence. Some examples are: Monbiot (1994), Ensminger and Rutten (1991), Ensminger and Knight (1997), Tabachnick (2009), Blackmar (2013).

(i.e. uncertainty in common property rights and political instability) and illustrates the risks of institutional reforms disruptive of traditional systems of access to natural resources: the return of the proverbial 'tragedy'. He demonstrates how the interplay between institutional reforms, population growth, and resource depletion can lead to changes in the structure and evolution of population, an impoverishment of nutrition, and spread of diseases. Fertility rates, survival of children, and infant mortality rates, are some of the indexes commonly used to capture different aspects of the biological distress induced by institutional reforms (Dasgupta, 2003).

During the 18th and 19th centuries the community-based management of CPR declined all over Europe. One of the reasons for this decline was the preeminence accorded by European liberal regimes to centralized bureaucracies and private property over centuries of decentralized common property regimes (Grossi, 1981; Demélas et al., 2003). In this article, we rely on a historical experiment to evaluate the consequences of shifting resource governance from diverse community-level institutions to a centralized state regime. Our analysis investigates 168 resource-dependent communities in the Trentino region of the Italian Alps throughout the late 18th and half 19th centuries.

For centuries, Trentino communities devised both formal institutions (*Carte di Regola*, rural charters) and informal institutions to regulate natural resource use and enforce property rights within the community (Casari, 2007). However in the late 18th century, these communal institutions were upended during separate but similar interventions by Austria and France after which resources were directly regulated by external state authorities and their respective bureaucracies. Critical to our estimation strategy, the Austrian centralization only applied to a subset of Trentino communities known as the *Welsch Confines*, which had come under the Habsburg domain centuries earlier following a treaty with the Republic of Venice. The remainder of the Trentino (which we refer to as Trent) communities were unaffected by the Austrian reforms and maintained their communal institutions. In contrast, the centralization of governance following the French intervention under Napoleon applied to all Trentino communities, but by this time the *Welsch Confines* were already under centralized control.

To isolate the impact of centralization, our main empirical design measures differences in outcomes at five-year intervals from 1765 to 1845 between Trentine and Confinant communities relative to their differences in 1795, the last period before Napoleon's invasion. Therefore prior to 1795 the Difference-in-Differences (DD) estimates the average impact of centralization on Confinant communities using Trentine communities as a control group. After 1795 the DD estimates the average impact of centralization on Trentine communities using Confinant communities as a control group. Pooling the time periods into one empirical design allows us to compare the similarity of the point estimates as well as their trend over time.

Our main outcome of interest is a community's infant mortality rate (IMR), which we argue has a close negative relationship with resource income per capita.<sup>4</sup> We also investigate a number of secondary outcome variables at the community/year level including births per population and the natural growth rate. Our

demographic data are constructed from original archival sources accessed from thousands of parish registers of baptisms and deaths. Importantly, this data is collected by ecclesiastical (rather than political) authorities whose jurisdictions do not change during our study period.

Our main regression estimates indicate that state centralization leads to large, persistent, and statistically significant increases in the IMR for affected communities. DD estimates stabilize around 0.10 in both tails of our study period, indicating a ten percent increase in the IMR (or an additional 100 infant deaths per 1000 births) due to centralization. The magnitude of this impact is greater than 60 percent of the average IMR across the entire study period (0.16). Consistent with our identification strategy, the trends in the estimates follow symmetric patterns pre and post-invasion and reach a minimum immediately prior to Napoleon's invasion. The estimates and their general trajectory over time are robust to various sets of geographic and institutional controls. We find a marginally significant drop in births per population immediately following centralization, but this difference fades over time. However the rate of children surviving past the first year, which accounts for changes in the IMR, is consistently lower after centralization. We also find that the negative impacts from state centralization are significantly smaller, though still large, in communities where formal governance is in place (i.e. a rural charter has been adopted) prior to intervention. Furthermore, the mitigation of the effect is largest when the formal institution in place has governance functions spanning multiple communities.

This article contributes to previous literature on socioeconomic change and infant mortality (Hakobyan et al., 2006; Hakobyan and Yepiskoposyan, 2010; Armenian et al., 1993) with first-hand data in a unique empirical setting. First, we study infant mortality and other demographic indicators from parish records that are uniform throughout the study period (80 years), in a well-delimited area, and for hundreds local communities that are comparable over time. Second, we use a natural experiment to identify and estimate the impact of socioeconomic change – state centralization – on biological indicators. A third distinctive feature of our study is the focus on short and medium-term impacts as opposed to longer-term impacts. For instance, Acemoglu et al. (2011) find generally positive (or at least nonnegative) long-run economic effects of French Revolutionary reforms. They argue the key benefits of the reforms come from uprooting entrenched institutions of the Ancien Régime used to preserve power and wealth of elites at the expense of broader growth. They emphasize abolishing aristocratic privileges, breaking-up of oligarchies, and the imposition of legal equality through a uniform civil code, which were also key aspects of the Josephinian reforms. Compared to Acemoglu et al. (2011), our results provide a considerably more pessimistic appraisal of these reforms. Acemoglu et al. (2011) only find positive effects on growth in the second half of the 19th century, and also note the possibility that the short-term impacts of the French Revolution may indeed be negative, but for reasons attributed to the onerous costs of military conflict and occupation. Instead, our short-term negative results are specific to the institutional reforms. As to the long-term benefits of the Habsburgian bureaucracy, Becker et al. (2016) instead provide evidence that former Habsburg possessions still exhibit lower levels of local corruption and higher levels of trust in local bureaucrats when compared to similar nearby areas that instead have historical ties to the Ottoman, Russian, and Prussian empires. Their study area, however, focuses on the eastern boundary of the former Habsburg Empire and does not specifically include the Trentino region.

The remainder of this article develops as follows. In Section 2 we briefly describe the history of self-governance in Trentino communities and the events surrounding the Austrian and French interventions. Section 3 describes the data and links IMRs to

<sup>4</sup> We provide cross-sectional evidence in support of this relationship in Section 4.2. Baird et al. (2010) provide support for this relationship in a developing country context using panel data. Monteleone (1964) documents suggestive evidence specific to the Trentino region linking higher IMRs to natural resource degradation and food shortages. Hakobyan et al. (2006) report a negative relationship between IMR and per-capita GNP. Cross-country evidence of a negative relationship between IMR and GNP is visually provided by Redmond (2007, 353) using 2005 UNICEF data.

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