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www.est.unito.it

Dipartimento
Economia e Statistica
Cognetti de Martiis

Working Paper Series

4/23

LORD, HOW I WANT TO BE IN THAT NUMBER! ON THE BLESSING OF UNESCO WORLD HERITAGE LISTING

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UNIVERSITÀ DEGLI STUDI DI TORINO

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Lord, how I want to be in that number! On the blessing of UNESCO World Heritage listing

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Abstract

This paper studies the impact of UNESCO World Heritage List (WHL) inscription on income and property values in the Italian municipalities that had their sites inscribed during the past two decades. To address the selection bias and identify the causal impact of inscription, we focus on sites included in the national 'tentative list' (i.e., list of candidates for subsequent nomination) and exploit the plausibly exogenous timing of inscription conditional upon entering the list. The evidence from an event study analysis suggests that WHL listing has a significant impact on the level and distribution of income. Possible underlying mechanisms are discussed.

Keywords— UNESCO World Heritage List; economic impact; real estate market; tourism

JEL codes— H24; H71; H73

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1 Introduction

Heritage designation is a policy intervention commonly recognized to bear considerable consequences on the economies of cities and regions where heritage sites are located and on the welfare of local communities (Van Balen and Vandesande, 2016). Heritage designations influence the real estate market through legal constraints on the development and use of buildings and the demand for amenity value households place on the historic built environment and its conservation (Ahlfeldt et al., 2017, Waights, 2019). At the same time, by signalling the historical and cultural significance of a location, the listing of sites, monuments, and historic districts contributes to an array of positive externalities and spillovers arising from the cultural heritage, ranging from a boost to tourism flows (Rizzo and Throsby, 2006) to a more general capacity of attracting high human-capital individuals, with direct and induced effects on regional growth (Cerisola, 2019). Of the different types of heritage listing, the UNESCO World Heritage designation is central to the debate about the economic impact of cultural heritage. Even though the original goals of the UNESCO World Heritage List (WHL) are primarily related to the preservation and protection of heritage sites with outstanding value, the process of UNESCO designation is increasingly regarded as a tool for territorial marketing and as a place-making catalyst in recent years (Di Giovine, 2018, Ryan and Silvanto, 2009, Adie, 2017). Being on the List attracts the attention of the media, the general public, decision-makers at various levels, potential donors, and for-profit firms, allowing countries and regions to use the WHL designation for marketing their sites as tourist destinations (Bertacchini and Saccone, 2012, Frey et al., 2013). As a result, the expectation of a positive economic impact from the World Heritage designation justifies the considerable efforts required to apply for and eventually achieve UNESCO recognition (Meskell, 2012). The existing empirical evidence in this regard has yielded mixed results, though, generally failing to properly address the inherent selection bias and to correctly

identify the causal impact of WHL inscription on local economies (Cellini, 2011). We aim to add to the existing empirical evidence on this issue by exploiting for the first time the two phases of the selection of sites into the UNESCO WHL - the preliminary step of entering sites in the national 'tentative list' and the subsequent step of formal nomination and selection into the WHL - and studying the impact of the UNESCO designation on two key economic outcomes in Italian municipalities: taxable personal income and real estate values. Moreover, to cope with the potential bias in the estimation of the average treatment effect of a binary, staggered, and absorbing treatment (as the WHL designation) in panel data two-way fixed effects (TWFE) approaches, we employ the estimator for staggered difference-in-differences (DiD) designs proposed by Callaway and Sant'Anna (2021). This estimation approach aggregates observations into cohorts based on the timing of the first treatment (WHL designation) and develops a cohort-specific DiD estimator by comparing the cohort-based evolution of the outcome of interest (property values, income) with the evolution of the same variables in never-treated or not-yet-treated groups (admissible comparisons).

Italy constitutes an ideal environment for analysing the impact of UNESCO designations because of the considerable number of World Heritage Sites and its decentralized structure of government, where regional and local governments play an active role in the process of application for heritage site recognition (Bertacchini and Revelli, 2021). As a result, it is a question of substantial policy relevance whether those efforts are worth their cost. We employ a rich dataset on taxable income and distribution along with values of various real estate properties at the municipal level and combine it with information on the nomination and selection process of World Heritage sites through the past two decades. This paper aims to contribute to the existing literature on the economic impact of heritage designation policy in three main ways.

First, we employ data on personal income and real estate markets, thus addressing for

the first time the impact of WHL designation on two key economic outcomes representing the major tax bases for local governments.

Second, unlike previous studies that use data at the relatively large regional or provincial levels covering extremely diverse territories and internally heterogeneous economic structures, we use data at the municipal level, thus offering more accurate estimates of the local impact of the WHL on far more homogeneous territories.

Finally, to address the fundamental endogeneity issue arising from the fact that the trajectories of income and property values in treated municipalities might differ significantly from those in the other municipalities even before the official UNESCO designation, we focus our analysis on the sample of localities having their sites included in the national Tentative List (TL) during the period of observation. Since the national TL is a procedural requirement necessary for a government to propose heritage sites for eventual designation into the UNESCO WHL, the timing of WHL designation conditional on entering the TL can be taken as plausibly random. In doing so, we follow a similar strategy as Li (2022), who addresses the selection bias that developers are more likely to build new high-rises in fast-appreciating areas by restricting the sample to residential properties near approved new high-rises and exploit the plausibly exogenous timing of completion conditional upon the timing of approval.

The event study analysis provides only weak evidence of an impact of WHL designation on the prices of residential properties, in line with the existing theoretical and empirical contributions highlighting two potentially contrasting effects of conservation and designation policies on property prices - the enhancement of existing historical or cultural characteristics of an area that raise its amenity value on the one hand, and the lower housing productivity due to rising maintenance costs and more stringent use limitations and regulations on the other hand (Coulson and Leichenko, 2001, Coulson and Lahr, 2005, Waights, 2019). The evidence points instead to a significant positive impact of WHL designation on income per

capita. We discuss two possible transmission channels in this respect. First, to capture the tourism-led local income growth channel, a hypothesis frequently made in the literature (Faber and Gaubert, 2019), we use proxies for both supply and demand of tourism services (number and size of tourism accommodation facilities, official touristic flows, and production of urban solid waste) and find that all of them exhibit some positive response to WHL inscription that is compatible with the hypothesis of increased touristic visibility of a locality after WHL designation. Next, we test the sorting hypothesis based on the idea that the increased amenity value of sites after WHL inscription attracts rich individuals with a high marginal valuation of those amenities to the area (Brueckner et al., 1999, Lanzara et al., 2019). In this case, we use several income and demographic dynamics proxies to account for this potential sorting effect, finding an increase in the number of high-income taxpayers and various indicators of income inequality as well as an overall increase in the number of residents in the years after the World Heritage designation.

This paper relates to three strands of scholarly research. The first concerns the tourism-enhancing effects of World Heritage sites. While a voluminous literature has analyzed the impact of UNESCO designation, mainly focusing on tourism flows in developed and developing countries (Arezki et al., 2009, Yang et al., 2010, Caust and Vecco, 2017, Panzera et al., 2021), the empirical evidence has yielded mixed results, as shown by the recent review and meta-analysis by Yang et al. (2019). More importantly, though, those contributions do not rely on causal inference models to properly address the inherent endogeneity issue of WHL designation. As far as Italy's UNESCO WHL sites are concerned, Patuelli et al. (2013) find the number of WHL sites in a region to stimulate the inflow of visitors from other Italian regions and the number of WHL sites in surrounding regions to reduce it, compatibly with the hypothesis of spatial substitution within a competitive destinations' framework. Canale et al. (2019) and De Simone et al. (2019) analyze the impact of WHL designations on tourism at the level of the Italian provinces, confirming a tourism-enhancing

role for the UNESCO WHL inscription. Conversely, using tourism flow data from 16 Italian cities whose heritage sites obtained UNESCO recognition, Ribaudo and Figini (2017) find no evidence of higher growth of touristic flows after the inscription relative to the pre-inscription period. Using Data Envelopment Analysis, Cuccia et al. (2016, 2017) focus instead on the impact of UNESCO WHL on tourism destinations' performance, finding that the presence of UNESCO sites reduces the efficiency of the regional tourism industry, as local tourism operators tend to overestimate the effects of the WHL inscription and to oversupply the accommodation capacity and other hospitality services. We complement this literature by adopting a causal inference approach for testing the tourism-enhancing effect of UNESCO designations on the local economy.

Our findings also relate to papers addressing the capitalization of cultural heritage values in real estate markets. This strand of literature is based theoretically on a hedonic approach and empirically on micro data on real estate transactions and prices and explores the extent to which the housing market responds to the listing of historic buildings and the designation of cultural sites and conservation areas (Shultz and King, 2001, Coulson and Leichenko, 2001, Coulson and Lahr, 2005, Lazrak et al., 2014, Waights, 2019). Research in this field uses spatial models to estimate the extent of spillovers on neighbourhoods surrounding designated historic properties, typically finding significant positive externalities from these urban development and rehabilitation policies (Koster et al., 2016). While using a different empirical approach, we add to this debate by providing first-time evidence on how the heritage value signalled by the process of UNESCO listing affects property values at the municipal level.

Finally, the estimation of the economic effects of mega events such as the Olympic Games is at the centre of a lively academic debate that exhibits remarkable conceptual and methodological similarities with the investigation of UNESCO WHL designations in terms of choice of meaningful outcome variables, spatial level of study, impact duration

from a short time to long-run consequences, and proper control group and counterfactual scenarios (Rose and Spiegel, 2011, Bruckner and Pappa, 2015, Firgo, 2021). Concerning the latter point, to account for self-selection in the bidding process, recent works use candidate cities that were not elected to host the event as the control group to accurately estimate the event's impact. The evidence generally points towards a positive effect of hosting those mega events in terms of export (Rose and Spiegel, 2011), investment, consumption (Bruckner and Pappa, 2015), and regional GDP per capita (Firgo, 2021).

The rest of the paper is structured as follows. Section 2 describes the UNESCO WHL selection process, Section 3 presents the data and the econometric approach, Section 4 summarises the main estimation results, and Section 5 investigates and discusses the underlying mechanisms. Section 6 concludes.

2 The UNESCO World Heritage List

The WHL is the primary implementing mechanism of the 1972 UNESCO World Heritage Convention. This international agreement seeks to encourage the identification, protection, and preservation of humanity's cultural and natural heritage (UNESCO, 2007). The List consists of cultural, natural, and mixed properties of "outstanding universal value" (OUV), which operational guidelines of the World Heritage Convention define according to ten criteria detailing cultural and natural significance the proposed heritage sites must meet for inclusion on the List (UNESCO, 2021). The composition of the WHL is the outcome of two different phases, nomination and selection, and of the input of three distinct actors: state parties, advisory bodies, and the World Heritage Committee (Strasser, 2002). The nomination process starts with the state parties' initiative, which submits nomination proposals for their sites to be included on the List. Experts from two advisory bodies, the International Council on Monuments and Sites (ICOMOS) for cultural properties and the International

Union for Conservation of Nature (IUCN) for natural properties, evaluate the nomination dossiers according to the OUV claims, the measure proposed to protect the integrity and manage the heritage site. Once the technical evaluation is concluded, the advisory body communicates its recommendation to the World Heritage Committee, the final decision-making body of representatives from 21 member states. The selection of new sites occurs every year at the World Heritage Committee's annual sessions in June. A site is inscribed if it meets at least one of the ten criteria and the conditions of uniqueness, authenticity and integrity. As of 2022, 1,154 cultural and natural sites have been included in the List. Having national heritage sites with World Heritage recognition does not guarantee safer protection or additional financial resources from UNESCO to the listed properties. The protection of World Heritage properties still rests on national conservation programs. Yet, being on the WHL is increasingly regarded as generating positive effects at the local level. By signalling a heritage site's exceptional quality and authenticity, the UNESCO designation helps attract the attention of media, donors, visitors and decision-makers (Frey and Steiner, 2011), thus allowing cities and regions to promote their place as a tourist destination and an amenity-rich area. In general, developing a World Heritage nomination requires resources, time and the commitment and mobilisation of different national and local stakeholders. Preparing a nomination usually involves at least two years of work, but sometimes it might also take many years. For example, a well-documented and protected cultural monument or site can require a much less complicated and time-consuming nomination process. On the other hand, a large multi-use natural property, a historic town, a cultural landscape or a cultural route requires new protection measures and management plans to be implemented and documented. In the latter cases, as the nominated property stretches over wider areas and several administrative units, the growing number of stakeholders results in a more complicated management system or plan (UNESCO, 2011). A procedural aspect of the World Heritage listing relevant to our analysis is that nominations must first be part of inventories

of national heritage sites that State Parties compose and submit to the World Heritage Committee. These inventories, called "TL," reflect the cultural and natural heritage in a State party's territory that it considers to be of potential outstanding universal value and suitable for inscription in the WHL. Although this provision is present in the text of the 1972 World Heritage Convention (Article 11.1), it is only since the 1990s that the process of composing TLs by member states has become more systematic, primarily to facilitate advisory bodies' evaluation of nomination dossiers in comparison with other potential candidate sites (Van der Aa, 2005). As of 2022, 185 out of 194 States Parties to the Convention have submitted a TL. The Operational Guidelines of the UNESCO World Heritage Convention do not prescribe a specific process or methodology to be followed when selecting sites for inclusion on the TL. State parties can update their TL at any time. A single department at the national government level or various working groups and advisory councils can compose this List based on technical evidence that supports the potential OUV of candidate sites. Public or private stakeholders, such as local governments or heritage experts, can propose sites for the TL, which are then evaluated by government agencies responsible for managing the application process (Fulton et al., 2020). In the case of Italy, the first TL was submitted in 1996 and was followed by a second comprehensive update in 2006. After that year, a few new sites were added, and some of the proposed ones have been revised. Figure 1 summarises the main steps of the nomination and selection procedure.

[Figure 1 around here]

While entering the TL is essential to have a site proposed for inclusion in the WHL, the timing between the two steps tends to vary considerably. Since the mid-2000s, changes occurred in the selection process of the UNESCO WHL (UNESCO, 2007), allowing a state party to submit only one or (in exceptional cases) two complete nominations per year. This implies that a national government can pick only one heritage property from those available in the TL. Table A1 in the Appendix summarises the properties included in the Italian TL

and those that obtained the World Heritage designation in the 2006-2019 period. For the sites inscribed into the WHL, the average time between the inclusion in the TL and the final UNESCO recognition is 7.4 years, but with large variability. For example, the property of Mantua and Sabbioneta was inscribed two years after inclusion in the TL. In contrast, for some other sites (i.e. Ivrea, an industrial city of the 20th century or Le Colline del Prosecco di Conegliano e Valdobbiadene), it took more than ten years after inclusion in the TL to officially enter the WHL.

3 Data and Methodology

3.1 Data

We collect data on Italian municipalities from 2006 to 2019. The data source for the World Heritage Sites – access to the national TL and formal inscription in the WHL – is the UNESCO World Heritage Center (https://whc.unesco.org). We attribute the selected sites to their respective administrative (municipal) boundaries based on the name and geographic coordinates from the official evaluation documents. If the World Heritage properties (i.e., cultural landscapes and serial sites) cross multiple municipalities, we consider all administrative units that fall within the boundaries of the wide UNESCO site. Out of more than 8,000 municipalities, as explained below in the empirical specification, our dataset comprises information on 391 municipalities with a heritage site included in the national tentative list and 132 municipalities treated by the World Heritage designation during the reference period.

The main objective of the empirical analysis is to ascertain whether entering the UNESCO WHL impacts two sets of indicators of local economic performance: real estate prices and personal income level and distribution. As for the former, we use the average value of properties of various categories (central apartments, detached houses, com-

mercial properties) in a municipality. Information on real estate values comes from the database of real estate prices provided by the Italian internal revenue authority (https://www.agenziaentrate.gov.it/). For each municipality, a minimum-maximum range of market values is provided every six months by a unit of surface (square meter), type of property, and state of maintenance and conservation. We focus on the average values of properties in a good state of care and conservation. As for income, we use average yearly taxable income per taxpayer[1], total taxable income above €55,000 (€120,000), the share of taxable income above €55,000 (€120,000) over total taxable income, the number of taxpayers with income above €55,000 (€120,000), and an inequality index measured as total taxable income above €120,000 over total taxable income below €10,000. Income data for tax purposes at the municipal level come from the Department of Finance of the Italian Treasury (http://www1.finanze.gov.it). Throughout the analysis, we also use municipal-level data on population, tourist flows and accommodation from the Italian Statistical Office (https://www.istat.it). Because tourist flows at the municipal level are only available for the period 2014-2019, we also use as a proxy of tourism demand urban solid waste collection from the Italian Institute for Environmental Protection and Research (https://www.isprambiente.gov.it/it). Summary statistics for all the variables used in the analysis are reported in Table A2 in the Appendix.

3.2 Empirical specification

To identify the dynamic impact of WHL designation on local economic outcomes, we adopt a flexible difference-in-differences event study approach - equation (1) - that relies on comparisons of outcome changes in WHL-treated municipalities to outcome changes in 'control municipalities':

[1]We use net income after tax deductions.

$$y_{m,t} = f_m + h_t + \sum_{\substack{k \neq 0 \\ -T \leq k \leq T}} 1[WHL_{m,t} = k]\beta_k + u_{m,t} \tag{1}$$

where $y_{m,t}$ is one of the local economic outcomes of interest, f_m and h_t are, respectively, municipality and year fixed effects, WHL is a dummy equal to 1 for time k relative to treatment and $u_{m,t}$ is the error term.

Identification of the causal effect of WHL in this framework is contingent on no-anticipation and parallel trends assumptions, two conditions from which our policy context could admittedly depart. For instance, the procedural aspects of the WHL nomination may induce changes in investment and other strategic decisions in expectation of the official designation. As a result, real estate markets and income levels and distribution may move to different growth trajectories well before the timing of the official UNESCO designation. Similarly, using municipalities never having sites included in the WHL as the control group may overlook potential sources of unobserved heterogeneity in municipalities' characteristics and outcomes related to the heritage designation process that may violate the parallel trends assumption.

Moreover, recent scholarship has highlighted how standard panel data TWFE event study approaches to the estimation of the average treatment effect on the treated (ATT) of binary, staggered, and absorbing treatment - as is the case with the WHL designation - may lead to serious bias when treatment effects are heterogeneous across time or units. The bias fundamentally arises from the fact that 'variational hungry' OLS TWFE estimation compares 'switching' units (localities acquiring the WHL recognition in our case) both to groups that remain untreated at different dates and to groups that are already treated at both dates - the latter constituting 'forbidden comparisons' in the presence of time-heterogenous treatment effects and making the OLS estimate of ATT a non-convex combination of treatment effects (negative weighting). An array of heterogeneity-robust estimators have been recently proposed (see the reviews by De Chaisemartin and D'Haultfoeuille (2022), Roth

et al. (2022)).

To cope with these concerns, we proceed as follows. As for the selection of the control group, we exploit information on the earlier registration of candidate sites in the national TL. Using such information has several advantages. Knowing the timing of earlier inclusion of candidate sites in the TL allows us to better disentangle the causal impact of official UNESCO inscription from potential anticipation effects on the outcomes of interest. Further, focusing on municipalities with heritage sites in the TL promises to produce a more sensible 'matching' between treated and control observations in most circumstances. The fundamental assumption underlying this strategy is that candidates to the WHL that managed to enter the national TL share similar underlying characteristics and are likely to behave in roughly the same way in their heritage promotion and enhancement activities, irrespective of whether and when their efforts will eventually turn out to be successful, thus displaying more similar trends in the variables of interest than municipalities that are not included in the TL. Once included in the TL, whether and when the official UNESCO recognition will come can plausibly be considered a random event.

As a result, our empirical strategy restricts the analysis to the sample of municipalities with a site included in the national TL for at least one year during the observation period. The sample size shrinks to less than 10,000 observations relative to the original dataset. Still, we increase the robustness and accuracy of our estimate of the World Heritage effect by conditioning on a sample of municipalities that approximates an ideal control group for the observations that achieve the WHL status.

In addition, to cope with the heterogeneous treatment effects discussed above, we employ the estimator for staggered DiD designs proposed by Callaway and Sant'Anna (2021). This estimation approach aggregates observations into cohorts based on the timing of the first treatment (WHL designation). It develops a cohort-specific DiD estimator by comparing the cohort-based evolution of the outcome of interest (property values, income) with the

evolution of the same variables in never-treated or not-yet-treated groups (admissible comparisons). In addition, a more aggregated ATT estimate can be obtained by appropriately weighting the DiD estimates across all cohorts.

Finally, it might still be argued that even when restricting the analysis to the sample of municipalities having their heritage sites included in the TL, the unconditional parallel trends assumption is unlikely to hold. To further address potential concerns of parallel trend violation between treated and untreated municipalities in our sample of TL candidates, we exploit the doubly robust (DR) estimator from Sant'Anna and Zhao (2020), which combines regression adjustment and inverse probability weighting (IPW) methods to allow for parallel trends conditional on covariates. In particular, we control for pre-treatment characteristics, population and per capita income at the municipal level in 2006, representing the two key dimensions that capture most local economic dynamics.

4 Main results

4.1 Effects on Income and Real Estate values

Figure 2 through Figure 9 plot summary event-study estimates, ATT(e), of the effect of the UNESCO World Heritage Designation on the different local economic outcomes. At the same time, Table 1 presents yearly average ATT(e) estimates over the pre-designation and post-designation periods (6 years before and after treatment). As shown in Figure 2, our estimates display a substantial and statistically significant effect of WHL designation on per capita income during the six years following the treatment. Remarkably, five years after the UNESCO designation, per capita income in the treated municipalities reached a peak growth of 500 euros or about 2.5% over the baseline mean of almost 20,000 in the pre-treatment year. Table 1 confirms this trend reporting an average positive yearly change over the post-designation period (0-6 years) of 268 euros, a substantial impact compared to

the nearly zero effect (-1.5 euros) in the pre-designation period.

[Figure 2 and Table 1 around here]

As far as the real estate market is concerned, the event study plot in Figure 3 points to a generally increasing trend in residential properties and retail space values in the six years following the World Heritage designation, though the event study coefficients are less precisely estimated. As shown in Table 1, the UNESCO designation bears, at 10% of significance, a 48 euros yearly increase in residential property values in the six years after treatment, corresponding to a 3.2% over the baseline mean in the pre-treatment year. A similar effect is found for retail space values, even if not statistically significant. Consistently with our identifying assumption, we do not find significant evidence of any differential pre-trend before treatment for income and real estate values.

[Figure 3 around here]

The fact that the effect of WHL designation on real estate prices is statistically weaker than that on taxable income might be due to two distinct phenomena. First, the market value of the UNESCO WHL recognition might have already been capitalized into property prices when the site entered the national TL, based on real estate market operators' expectation that this preliminary yet necessary step will be eventually followed by formal designation in the WHL. The fact that most of the sites were already included in the national TL back in 2006, the first year of observation in our dataset, though, prevents us from exploiting the timing of access to the TL to formally test this hypothesis. Second, as mentioned above, a weak or ambiguous sign of the impact of WHL designation on property prices might be the result of the operation of two contrasting effects on property prices that have been highlighted in the literature on the economic consequences of conservation and designation policies (Coulson and Leichenko, 2001, Coulson and Lahr, 2005, Waights,

2019). On the one hand, designation policies tend to push up property values by preserving existing historical or cultural characteristics that enhance the amenity value of an area or site. On the other hand, those policies might lower the productivity of the housing stock by forcing owners to sustain higher maintenance costs and face more stringent limitations and regulations on the use of their properties.

5 Mechanisms

In this section, we investigate the mechanisms that could be responsible for the effects of inscription in the WHL on local economic performance. A common tenet in the literature is that the positive economic impact of UNESCO listing is due to the enhancement of tourism. Indeed, tourism is a complex and varied phenomenon in terms of length (from long holidays to short excursions), reason (culture, religion, nature), and type of accommodation (formal or informal), implying that it is typically hard to properly capture its size in a single variable. As a result, we use several variables meant to proxy the size of the tourism market in a locality. First, we use the number of establishments and beds in extra-hotel accommodation structures (b&b, guest houses, homestays) as a proxy of the segment of the local touristic supply that should react most rapidly and flexibly to the enhanced visibility of a place as a result of WHL inscription. Second, we account for the flows of tourist arrivals and the number of overnight stays spent in a locality to proxy the dimension of touristic demand. Moreover, because the latter variables are only available for a shorter period (2014-2019), we also consider the production of solid waste as a further and broader proxy of touristic demand[2], based on the idea that all flows of tourists are bound to affect the production of urban solid waste (particularly the undifferentiated one), including those informal touristic flows (i.e., short excursions, one-day trip visits, or stays in informal ac-

[2]Data for urban solid waste production is avaiable from 2010 to 2019.

commodation structures) that hardly appear in official tourist inbound statistics. Figure 4, Figure 5 and Figure 6 plot the event-study estimates for this set of variables. The UNESCO WHL designation appears to significantly affect the opening of new extra-hotel accommodation facilities six years after the treatment. As shown in Figure 4, panel (a), and with the average yearly effect reported in Table 1, the magnitude is about one new establishment per thousand inhabitants. As for the number of beds, the estimated effect shown in Figure 4, panel (b), is positive but not statistically significant at conventional levels.

As shown in Figure 5, panels (a) and (b), the event study evidence from the shorter period 2014-2019 also suggests that both arrivals and overnight stays significantly increased in the four years after the WHL designation. In terms of the impact size, WHL designation is estimated to attract up to 2% more tourists in treated municipalities than in localities with only TL candidate sites. Figure 6 shows the trajectory of the amount of urban solid waste per capita produced in a municipality across the time where the WHL recognition is attributed. The event study plot points to some slight increase in the production of undifferentiated waste per capita, and other indicators of urban waste production (not reported) show a similar tendency as that in Figure 6 of an increase in waste production in the years immediately following WHL inscription. Along with the direct indicators of touristic activity discussed above, the trajectory of waste seems compatible, too, with a hypothesis of an increase in the presence of the non-resident population in municipalities hosting WHL sites.

[Figure 4 and Figure 5 and Figure 6 around here]

Besides the forces exerted by the touristic channel, the increase in income and, to some extent, in property values that we observe in localities hosting WHL sites might be driven by the sorting of high-income households that are attracted by the inflated amenity value of the UNESCO heritage. Indeed, by providing the composition of the population of taxpayers in terms of the tax brackets their income falls into, our data allow a further investigation

of the source of the rise in local per capita income. As shown in Figure 7, the local income growth after the UNESCO designations we have observed above seems to be driven mainly by the dynamics of higher-income individuals. The share of total taxable income derived by taxpayers with higher income levels (higher than €55,000 and €120,000, panels (a) and (c)) significantly increases after the World Heritage designation in the treated municipalities. For illustrative purposes, the magnitude over the six years post-designation period is a 1% increase per year of the share of income from taxpayers with more than €55,000 (see Table 1). The rise in the share of income from high-income individuals is also accompanied by a small but statistically significant increase in the number of affluent taxpayers (Figure 7, panels (b) and (d)), with an average yearly change in the post-designation period of two additional taxpayers per 1,000 declaring more than €55,000. This corresponds to almost a 7% increase over the baseline mean of affluent taxpayers in the treated municipalities. Further, consistent with the previous evidence, Figure 8 indicates that the ratio of top to bottom incomes tends to increase after the designation, confirming the shift in the relative shares of different income classes.

[Figure 7 and Figure 8 around here]

Finally, if the sorting mechanism was in operation, we should observe a net influx of affluent individuals who have strong preferences for a cultural heritage of outstanding quality. Unfortunately, available data do not allow a thorough investigation in this direction. We have no information on the level of income, education, or profession of those who migrate to a municipality but only observe the municipal-level yearly variation in the number of residents, the level of total and per capita income, and the distribution of taxpayers and gross income across the income brackets of the Italian tax system. In this respect, the event study plot in Figure 9 shows an increase in the number of residents in the years following the World Heritage designation, with a magnitude of the effect of about 2% after six years. While this result, coupled with the significant changes in the level and distribution of income

observed above, is compatible with the hypothesis of localities hosting WHL sites becoming a magnet for affluent households, the aggregate data we work with here do not allow a definite answer in this regard.

[Figure 9 around here]

6 Conclusions

This paper has investigated the impact of two decades of inscriptions of heritage sites in the UNESCO WHL on two dimensions of local economic performance (taxable income and real estate values) in a country (Italy) that has a highly decentralized structure of government, and that is rich in cultural resources and UNESCO World Heritage sites. We offer a novel contribution to the existing empirical research in this area in three main ways. First, the municipal-level data that we employ return more accurate estimates of the local impact of WHL inscription than previous analyses averaging the effects across larger and internally more heterogeneous (regional) jurisdictions. Second, we address the fundamental endogeneity issue arising from the fact that the trajectories of income and property values in municipalities having their sites included in the WHL might differ significantly from those in the other municipalities even before the official UNESCO designation by focusing on the municipalities having their sites included in the national TL during the period of observation. Since the national TL is a procedural requirement that is necessary for a government to propose heritage sites for eventual designation into the UNESCO WHL, the timing of WHL designation conditional on entering the TL (our key treatment) can be taken as plausibly random. Finally, since standard panel data TWFE event study approaches to the estimation of the average treatment effect on the treated (ATT) of binary, staggered, and absorbing treatment - as is the case with the WHL designation - may deliver biased estimates when treatment effects are heterogeneous across time or units, we employ the staggered

difference-in-differences (DiD) cohort-based estimator of Callaway and Sant'Anna (2021). The event study analysis provides only weak evidence of an impact of WHL designation on the prices of residential properties, probably as a result of the conflicting forces that policies of conservation and designation, such as the UNESCO listing, tend to generate on the built environment. On the other hand, WHL inscription is estimated to have a positive and significant impact on the level of per capita income in treated localities. Investigation of the mechanisms that could explain this effect suggests that the enhanced touristic role of municipalities hosting listed sites (reflected in increased supply of touristic facilities, touristic flows, and generation of urban solid waste) and the sorting of affluent individuals having intense preferences for the heritage of outstanding quality (signalled by an increase in the total number of taxpayers, the number and total income share of high-income residents, and various indicators of income inequality) seem likely to play a role in the aftermath of the enlisting of a site in the UNESCO WHL.

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Tables

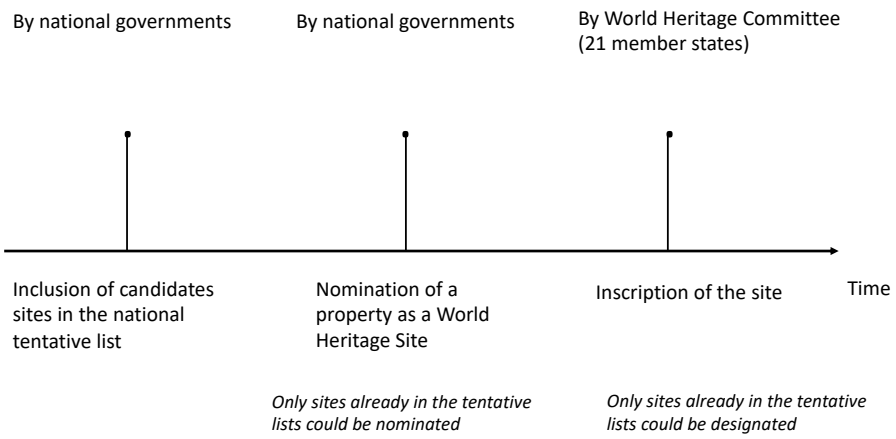
Table 1: Average ATT(e) estimates - Yearly change

Variables	**Pre-UNESCO designation Years -6 to -1**	**Post-UNESCO designation Years 0 to 6**
Total Income per capita	-1.577	268.437***
	(33.346)	(98.689)
Central apartments (price for sale)	-2.389	48.902*
	(10.948)	(28.350)
Detached houses (price for sale)	-5.376	17.504
	(8.496)	(33.544)
Commercial properties (price for sale)	13.878	49.589
	(9.421)	(41.039)
Extra-hotel facilities (per '000 inhabitants)	0.114*	0.854*
	(0.066)	(0.518)
Extra-hotel beds (per '000 inhabitants)	-0.100	7.821
	(1.603)	(7.884)
Tourist arrivals (log)	0.021	0.067**
	(0.016)	(0.035)
Tourist overnight stays (log)	0.032**	0.091***
	(0.014)	(0.018)
Undifferentiated waste (per capita)	0.002	0.003
	(0.005)	(0.009)
Share of income $\geq$ 120,000	0.0002	0.007***
	(0.0006)	(0.002)
Share taxpayers with income $\geq$ 120,000	0.00008**	0.0008***
	(0.00004)	(0.0002)
Share of income $\geq$ 55,000	0.0003	0.010***
	(0.0007)	(0.003)
Share taxpayers with income $\geq$ 55,000	0.0001	0.002***
	(0.0001)	(0.0006)
Inequality	0.009	0.166***
	(0.010)	0.064)
Population (log)	0.001	0.009**
	(0.001)	(0.004)

Notes: Standard errors, clustered by province, are in parentheses. * p <0.10, ** p <0.05, *** p <0.01. For tourist arrivals and overnight stays data are available for 2014-2019. For urban solid waste collection data are available for 2010-2019.

Figures

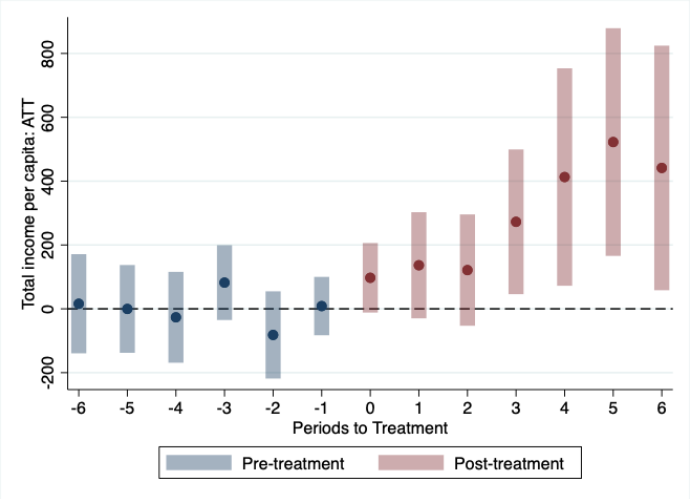
Figure 1: Unesco shortlisting process



Note: Authors' elaboration.

Figure 2: UNESCO designation (year=0) and income

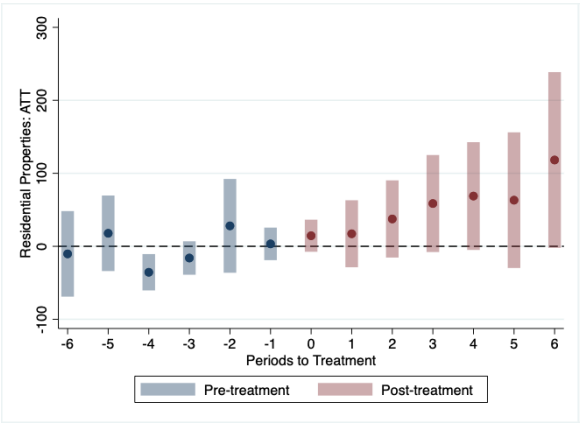
(a) Total income per capita



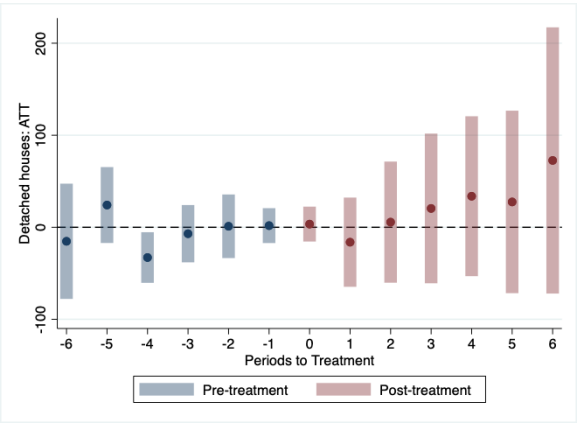
Note: The figure plots estimates at 95% confidence interval of the average treatment effect on the treated using the doubly-robust estimator in Callaway and Sant'Anna (2021), with population and per capita income in 2006 as covariates. Varying base displayed for estimates in pre-treatment periods. Standard errors are clustered at province level. (a) contains 6600 observations.

Figure 3: UNESCO designation (year=0) and property values

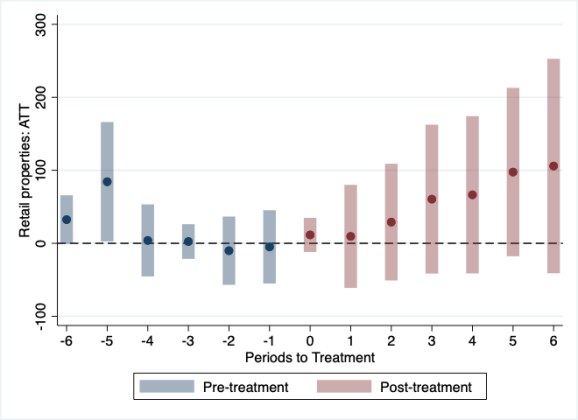
(a) Central apartments



(b) Detached houses



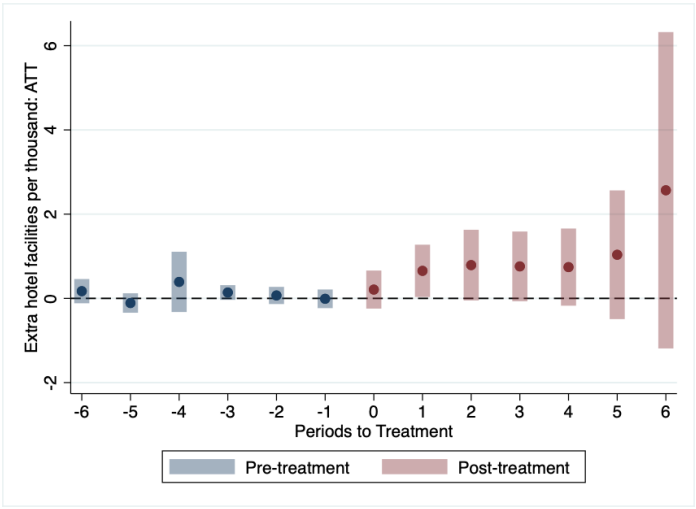
(c) Commercial properties



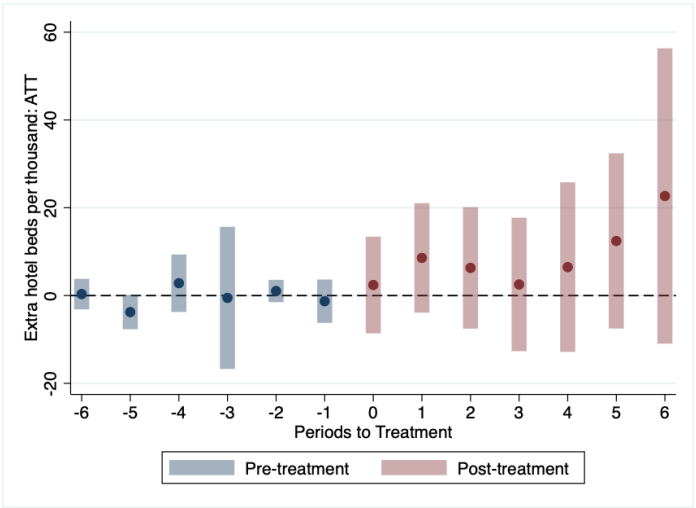
Note: The figures plot estimates at 95% confidence interval of the average treatment effect on the treated using the doubly-robust estimator in Callaway and Sant'Anna (2021), with population and per capita income in 2006 as covariates. Varying base displayed for estimates in pre-treatment periods. Standard errors are clustered at province level. (a) contains 6437 observations, (b) is based on 5950, and (c) 6407 observations.

Figure 4: UNESCO designation (year=0) and touristic supply

(a) Extra hotel facilities (per '000 inhabitants)



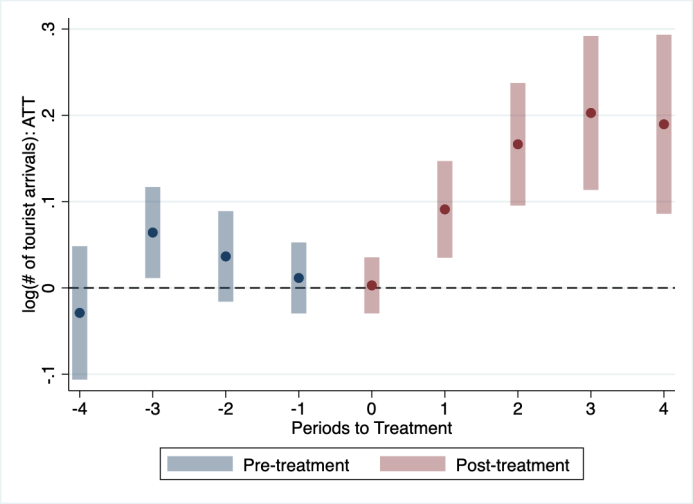
(b) Extra hotel beds (per '000 inhabitants)



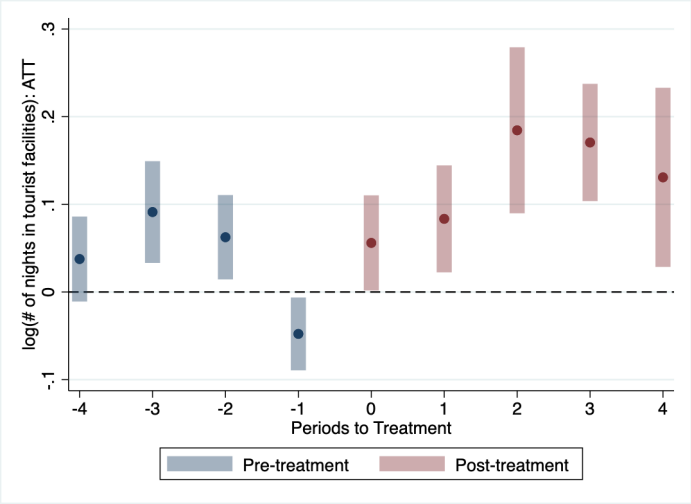
Note: The figures plot estimates at 95% confidence interval of the average treatment effect on the treated using the doubly-robust estimator in Callaway and Sant'Anna (2021), with population and per capita income in 2006 as covariates. Varying base displayed for estimates in pre-treatment periods. Standard errors are clustered at province level. (a) and (b) contain 6568 observations.

Figure 5: UNESCO designation (year=0) and touristic demand

(a) Tourist arrivals (log)



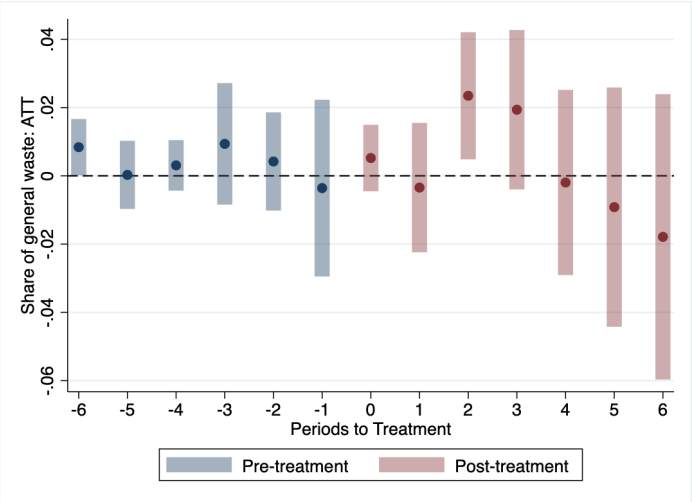
(b) Nights in touristic facilities (log)



Note: The figures plot estimates at 95% confidence interval of the average treatment effect on the treated using the doubly-robust estimator in Callaway and Sant'Anna (2021), with population and per capita income in 2006 as covariates. Varying base displayed for estimates in pre-treatment periods. Standard errors are clustered at province level. Data are available for the years 2014–2019. (a) and (b) contain 1509 observations.

Figure 6: UNESCO designation (year=0) and urban waste production

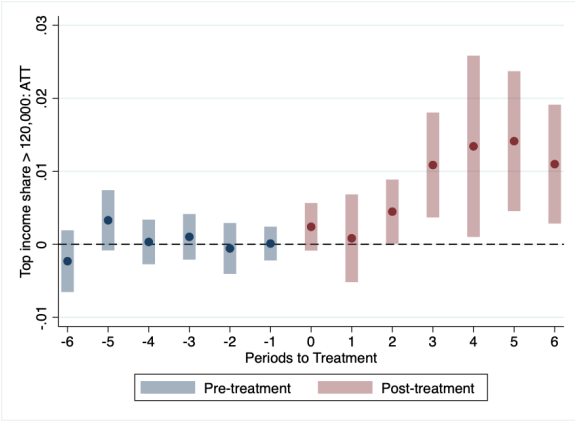
(a) Undifferentiated waste per capita



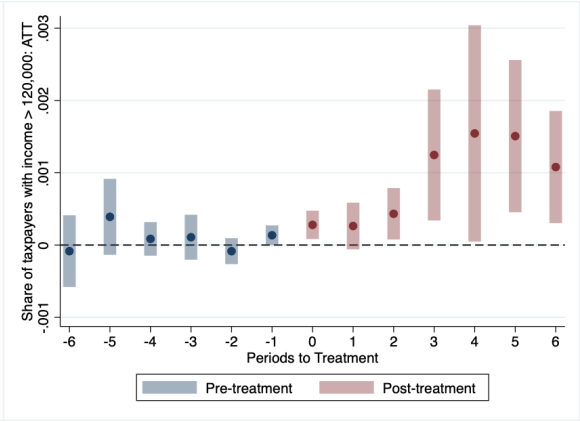
Note: The figure plots estimates at 95% confidence interval of the average treatment effect on the treated using the doubly-robust estimator in Callaway and Sant'Anna (2021), with population and per capita income in 2006 as covariates. Varying base displayed for estimates in pre-treatment periods. Standard errors are clustered at province level. Data are available for the years 2010–2019. (a) contains 4631 observations.

Figure 7: UNESCO designation (year=0), share of top income and top income taxpayers

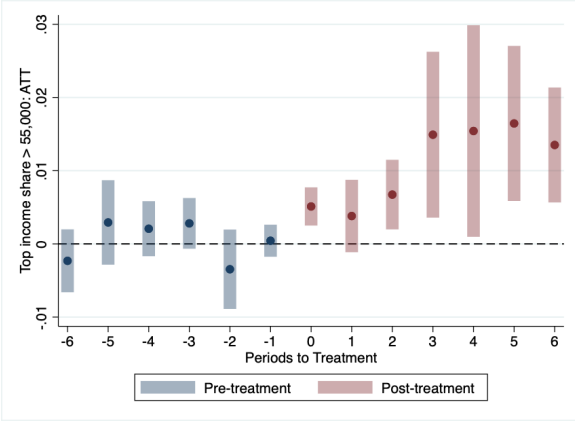
(a) Share of income ≥ 120,000



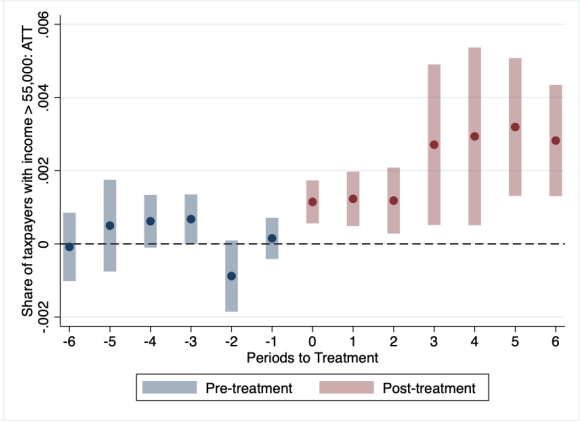
(b) Share of taxpayers with income ≥ 120,000



(c) Share of income ≥ 55,000



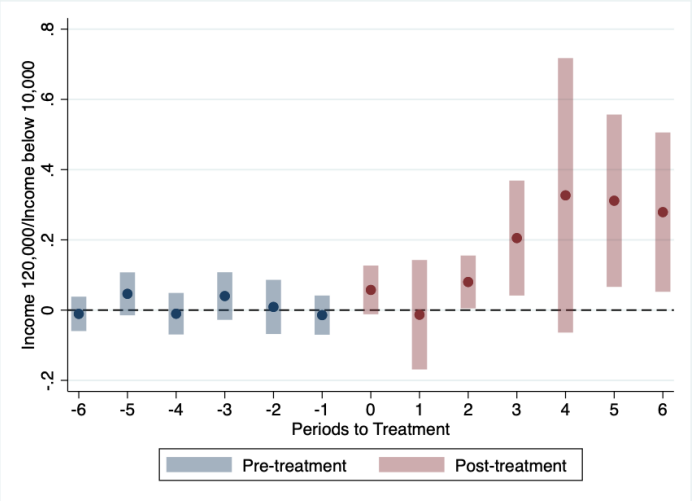
(d) Share of taxpayers with income ≥ 55,000



Note: The figures plot estimates at 95% confidence interval of the average treatment effect on the treated using the doubly-robust estimator in Callaway and Sant'Anna (2021), with population and per capita income in 2006 as covariates. Varying base displayed for estimates in pre-treatment periods. Standard errors are clustered at province level. (a), (b), (c) and (d) contain 6600 observations.

Figure 8: UNESCO designation (year=0) and inequality

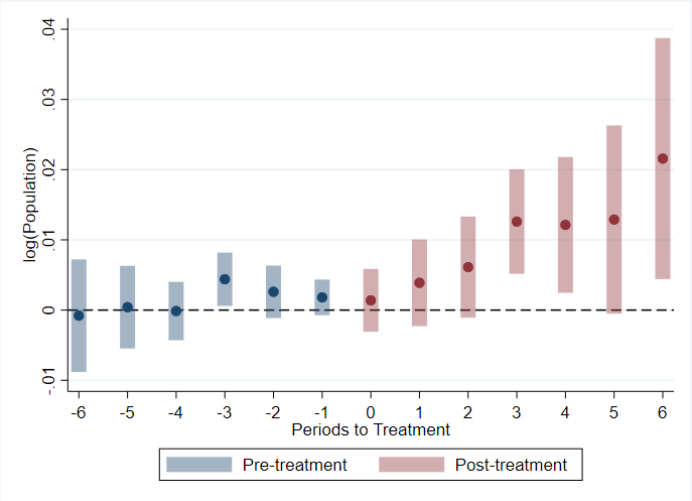
(a) Share of income $\geq$ 120,000 over Share of income $\leq$ 10,000



Note: The figures plot estimates at 95% confidence interval of the average treatment effect on the treated using the doubly-robust estimator in Callaway and Sant'Anna (2021), with population and per capita income in 2006 as covariates. Varying base displayed for estimates in pre-treatment periods. Standard errors are clustered at province level. (a) contains 6600 observations.

Figure 9: UNESCO designation (year=0) and population dynamics

(a) Population (log)



Note: The figure plot estimates at 95% confidence interval of the average treatment effect on the treated using the doubly-robust estimator in Callaway and Sant'Anna (2021), with population and per capita income in 2006 as covariates. Varying base displayed for estimates in pre-treatment periods. Standard errors are clustered at province level. (a) contains 6603 observations.

Appendix

Table A1: Unesco sites

Site	Year of inclusion in TL	Year of WH designation	Region	N. of municipalities
Mantua and Sabbioneta	2006	2008	Lombardia	2
The Dolomites	2006	2009	Friuli-Venezia Giulia, Veneto, Trentino-Alto Adige	5
Longobards in Italy. Places of the Power (568-774 A.D.)	2006	2011	Puglia, Campania, Umbria, Toscana, Friuli-Venezia Gulia, Lombardia	8
Prehistoric Pile Dwellings around the Alps	2006	2011	Piemonte, Friuli-Venezia Giulia, Veneto, Trentino-Alto Adige, Lombardia	25
Mount Etna	2006	2013	Sicilia	20
Medici Villas and Gardens in Tuscany	2006	2013	Toscana	10
Vineyard Landscape of Piedmont: Langhe-Roero and Monferrato	2006	2014	Piemonte	29
Arab-Norman Palermo and the Cathedral Churches of Cefalú and Monreale	2006	2015	Sicilia	3
Venetian Works of Defence between the 16th and 17th Centuries: Stato da Terra – Western Stato da Mar	2006	2017	Lombardia, Veneto, Friuli-Venezia Giulia	3
Ivrea, industrial city of the 20th century	2006	2018	Piemonte	1
Le Colline del Prosecco di Conegliano e Valdobbiadene	2006	2019	Veneto	26
Lake Maggiore and Lake D'Orta lakeland	2006	//	Piemonte, Lombardia	35
Citadel of Alessandria	2006	//	Piemonte	1
Hanbury botanical gardens	2006	//	Liguria	1
Karstic caves in prehistoric Apulia	2006	//	Puglia	3
Historic centre of Pavia and Chartreuse	2006	//	Lombardia	1
Historic Centre of Parma	2006	//	Emilia Romagna	1
The Porticoes of Bologna	2006	//	Emilia Romagna	1
The Marble Basin of Carrara	2006	//	Toscana	1
Historic Centre of Lucca	2006	//	Toscana	1
Volterra: Historical City and Cultural Landscape	2006	//	Toscana	1
Cascata delle Marmore and Valnerina: Monastic sites and ancient hydrogeological reclamation works	2006	//	Umbria	14

Authors' elaboration.

Table A1 (cont'): Unesco sites

Site	Year of inclusion in TL	Year of WH designation	Region	N. of municipalities
Orvieto	2006	//	Umbria	1
The Aniene valley and Villa Gregoriana in Tivoli	2006	//	Lazio	18
Villas of the Papal Nobility	2006	//	Lazio	6
Via Appia "Regina Viarum"	2006	//	Lazio, Campania, Puglia	12
Bradyseism in the Flegrea Area	2006	//	Campania	9
Romanesque Cathedrals in Puglia	2006	//	Puglia	11
The Murge of Altamura	2006	//	Puglia	11
Salento and the "Barocco Leccese"	2006	//	Puglia	15
The Lower Palaeolithic Palaeosurfaces at Isernia-La Pineta and Notarchirico	2006	//	Basilicata, Molise	2
Cattolica Monastery in Stilo and Basilian-Byzantine complexes	2006	//	Calabria	5
Mothia Island and Lilibeo: The Phoenician-Punic Civilization in Italy	2006	//	Sicilia	1
Taormina and Isola Bella	2006	//	Sicilia	1
Island of Asinara	2006	//	Sardegna	1
Sulcis Iglesiente	2006	//	Sardegna	25
Ponds in the Bay of Oristano and the Sinis Peninsula island of Mal di Ventre	2006	//	Sardegna	7
Parco Nazionale della Sila – Sila, gran bosco d'Italia	2012	//	Calabria	21
Great Spas of Europe	2014	//	Toscana	1
The cultural landscape of the Benedictine settlements in medieval Italy	2016	//	Piemonte, Marche, Lazio, Molise Lombardia	8
The Cultural Landscape of Civita di Bagnoregio	2017	//	Lazio	1
Evaporite karst and caves of Emilia Romagna Region	2018	//	Emilia Romagna, Toscana	43

Authors' elaboration.

Table A2: Descriptive statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Tentative list sample					UNESCO list sample					
VARIABLES	N	mean	sd	min	max	N	mean	sd	min	max	mean (pre-treatment)
Total income per capita	6,600	19,215	3,669	8,411	34,866	1,802	20,028	3,682	9,450	33,008	19,968
Central apartments (value)	6,443	1,431	833.0	426.7	7,994	1,784	1,484	876.3	508	6,164	1,496
Detached houses (value)	5,962	1,494	720.8	399.7	5,831	1,769	1,439	726.5	624.8	5,313	1,433
Commercial properties (value)	6,414	1,420	757.7	378.5	8,759	1,792	1,492	856.0	531.9	8,759	1,509
Extra hotel facilities (per '000 inhabitants)	6,574	3.155	5.522	0	117.1	1,795	4.256	8.074	0	117.10	3.874
Extra hotel beds (per '000 inhabitants)	6,574	93.91	301.2	0	4,637	1,795	117.20	422.3	0	4,637	112.9
Tourist arrivals (log)	1,949	9.164	1.849	4.419	16.120	588	9.244	2.023	4.970	15.520	9.055
Nights in touristic facilities (log)	1,948	10.17	1.888	5.485	17.250	587	10.210	2.044	6.353	16.38	9.910
Undifferentiated waste (per capita)	4,702	0.239	0.147	0.026	1.141	1,287	0.194	0.148	0.026	0.741	0.223
Share of income 120,000	6,600	0.044	0.044	0	0.435	1,802	0.060	0.052	0	0.435	0.058
Share of taxpayers with income 120,000	6,600	0.004	0.004	0	0.056	1,802	0.006	0.005	0	0.056	0.006
Share of income 55,000	6,600	0.141	0.084	0	0.507	1,802	0.172	0.088	0	0.507	0.171
Share of taxpayers with income 55,000	6,600	0.029	0.020	0	0.129	1,802	0.036	0.021	0	0.129	0.036
Inequality	6,600	0.719	0.977	0	12.920	1,802	1.003	1.161	0	12.920	0.960
Population (log)	6,603	8.586	1.465	4.564	14.870	1,803	8.653	1.494	4.727	13.430	8.654

Authors' elaboration.