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MORE IS WORSE: THE EVOLUTION OF QUALITY OF THE UNESCO WORLD HERITAGE LIST AND ITS DETERMINANTS[1]

ABSTRACT

This paper empirically analyzes the evolution of the quality of the sites included in the UNESCO World Heritage List (WHL) from 1972 till 2016 and verifies how consideration of quality affects the conclusions of the literature about the politics of the WHL. The quality of a site is proxied by the number of criteria set by UNESCO that the site satisfies. The analysis shows that, under a fixed stock of cultural and natural capital, as a country increases the number of sites in the WHL, their marginal quality decreases, because countries propose sites of decreasing quality over time. Contrary to previous studies focusing just on the number of sites included in the list, considering quality shows that the country's lobbying power does not matter for inclusion in the WHL, while the quality of its administration does. These results are robust to tests of the stability of the UNESCO evaluation criteria over time and to changes of econometric estimators.

JEL classification: H87, D72, F53, O19, Z11, L15

Keywords: UNESCO World Heritage List, international organizations, measurement of quality, efficiency of public administration, rent-seeking, cultural capital

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1. *Introduction and literature review*

Probably the best known activity of UNESCO is the recognition of sites that constitute "*… parts of the cultural and natural heritage (that) are of outstanding interest and therefore need to be preserved as a part of the world heritage of mankind as a whole*" (UNESCO, 1972). Recognized sites get included in the World Heritage List (henceforth, WHL) and receive the label of "Heritage of Mankind". As of 2021 a total of 1154 sites, of which 897 cultural, 218 natural and 39 of other types have been included in the list.

The sheer size reached by the WHL, together with the findings of the political economy literature about the rent seeking processes characterizing UNESCO's decision making process, has called into question the average quality and credibility of the list itself (van der Aa, 2005; Rakic, 2007; Frey et al. 2010, Frey and Steiner, 2011; Stainer and Frey, 2011). Three problems in particular come to the fore. First, as the number of sites included in the WHL increases, their average quality might decrease; because the stock of cultural and natural capital is fixed, countries may propose first sites of more outstanding value and then others of lesser renown. Second, since the WHL label increases tourism, the inclusion of a site in the list may be the outcome of rent seeking activities by the proposing countries rather than of an objective assessment of its cultural or naturalistic relevance. Countries that are better represented in the UNESCO committee may thus receive more than their "fair" share of sites, whilst the cultural capital of less influential countries may be underrepresented (Frey et al., 2010; Bertacchini et al. 2015, 2016; Pohle, 2016; Stainer and Frey, 2011; Bertacchini and Saccone, 2012). Third, Western countries, especially European ones, may enjoy a "soft power" in imposing aesthetic and cultural standards that define a Western conception of world heritage (Meskell, 2002; van der Aa, 2005; Stainer and Frey, 2011; Bertacchini et al. 2015, 2016). Such cultural influence allegedly biases the selection of the sites in favor of European ones, especially of the cultural type. This conviction has led UNESCO to approve the "Global Strategy for a Representative, Balanced and Credible World Heritage List" in 1994. This strategy introduces a series of measures aimed at re-balancing the geographic representativeness of WHL, with quotas of sites imposed on European countries.

The literature has not reached a consensus about these alleged biases in the selection of sites for the WHL, for several reasons. One is that the scientific debate employs notions that are either highly subjective, such as the "fair" distribution of sites across the various cultures and geographical areas, or difficult to measure, such as the "quality" of each site in terms of outstanding heritage of mankind. Another is that the empirical studies on rent seeking in the WHL typically resort to a dummy denoting whether a site has been included in the list or not. The shortcoming of this variable is that it dichotomizes the concept of "outstanding interest for mankind" that UNESCO evaluates according to up to ten independent criteria. Such reduction makes it quite difficult to verify whether rent seeking distorts the evaluation of a site's relevance or whether the average quality of the sites in the WHL decreases over time. Without controlling for the quality of the sites, associating the number of a country's sites with its presence in the UNESCO's committee might overstate the importance of rent seeking in the selection process. Italy, for instance, has the largest number of sites in the WHL, but it needs not exert much political pressure to have approved a site like the historic center of Rome, as it is worldwide known and satisfies more than one UNESCO criteria. Yet Italy might use its political weight to have recognized a site such as the "industrial archeology of Ivrea", because it is much less known and satisfies just one criterion of eligibility. Since the literature ignores how the quality of a site affects the need to resort to rent seeking practices, the results of the studies on the WHL might be flawed. Only if one considers the relevance of quality of the sites we can achieve a better understanding of how the WHL is formed and of the possible biases that affect it.

In this paper we define the "quality" of the sites in the UNESCO WHL in a way that is both straightforward and that minimizes the impact of subjective evaluations of quality. We exploit the fact that, to enter the list, each site must satisfy at least one of ten "criteria of outstanding universal value", upon which UNESCO base their evaluation. These criteria capture different dimensions of "quality", i.e., different reasons why a site might deserve to be included in the WHL. We hold that the greater is the number of criteria that each site satisfies when accepted in the WHL, the greater its quality. According to this simple metric, for instance, the center of Rome satisfies 5 criteria out of 6 for cultural sites, while the

industrial city of Ivrea only 1. Among the natural sites the Grand Canyon satisfies 4 criteria out of 4, while the Coastline of Devonshire (UK) only one.

This specific (and by no means unique) definition of quality has several advantages. First, it is based on the original evaluation of the site made by UNESCO itself. The appraisal of quality cannot therefore be attributed to the preferences of the analyst (e.g., the authors of this paper) or of any specific expert involved in the review of the site. The eventual inclusion in the WHL is the outcome of a quite complicated process; such complexity minimizes the importance of each individual's subjective assessment, and of the associated biases. Second, the criteria adopted by the UNESCO have remained rather constant over time. Third, contrary to most alternative evaluation methods, based on the individuals' willingness to pay (e.g., the number of tourists attracted or contingent evaluations) the one we propose is less exposed to endogeneity bias. Quite certainly, counting the number of satisfied criteria does not characterize the idea of "quality" of a site in a perfect way; we maintain, however, that this method marks an improvement with respect to the existing literature, which either ignores the issue, or proxies it via a dichotomous variable, which merely says that sites included in the WHL are considered of higher interest than the excluded ones[2].

With this definition of quality at hand, we aim to provide an answer to two research questions. The first is examining how the average quality of the WHL evolves as the number of sites included expands; specifically, we test the hypothesis that, as a country increases the number of sites in the WHL, their marginal quality decreases, controlling for the stock of natural and cultural capital. The second research aim is analyzing whether and how the UNESCO decision making process, specifically, the rent seeking involved, affects the

[2] A further analytical improvement would be a quantitative assessment of the qualitative evaluations of the sites made by the UNESCO experts. This approach might disentangle "ties" between sites that satisfy the same number of criteria, but are characterized by different levels of quality. In another paper (Dattilo et al. 2020) we attempt to use such evaluations, but they are available for a limited number of sites recently included in the WHL; furthermore, the evaluations made by the experts do not always adopt standardized wordings or formulas, hence it is often difficult to rank them.

recognition of quality of the its size expands over time, a concern that UNESCO expresses in its 1994 strategy.

To anticipate the results, our estimates lend support to the hypothesis that, as the number of UNESCO sites of a country increases, their marginal quality decreases. Since every new site that enters the WHL reduces the stock of the country's cultural capital still available, countries are eventually compelled to propose new sites of lower quality. This is more evident for countries with more than 10 sites in the WHL, which represent 12% of the countries and 51% of the total sites. As for the second research question, we find that it is the efficiency of the country's bureaucracy, rather than its lobbying power, to play an important role in the inclusion of low-quality sites in the WHL. High quality sites, instead, do not need neither an efficient state administration, nor political pressure to be enlisted. This result is at variance with the public choice literature on the UNESCO WHL that, looking at the evaluation of the sites' quality in a dichotomous way (i.e., inclusion in the WHL or not), usually found that lobbying affects the selection of the WHL sites (Stainer and Frey, 2011; Bertacchini and Saccone, 2012).

The rest of the paper is organized as follows. Section 2 reviews the literatures about the "political economy" of the UNESCO WHL and about the evaluation of quality in cultural economics and about. Section 3 illustrates the process through which UNESCO selects the sites to be included in the WHL and the criteria that each site must satisfy to be recognized. Section 4 discusses the empirical strategy, the variables included in the specification of the empirical model and the econometric issues associated with the estimates. In section 5 the estimates' baseline results are presented, while section 6 illustrates the robustness checks. Finally, section 7 summarizes the main conclusions of the analysis.

2. *Literature review*

2.1 Studies about the politics of UNESCO. The procedure through which UNESCO selects the sites to be included in the WHL has been extensively studied in both the cultural economics and the public choice literatures. Many studies of both strands concur that there is a problem of "inequality" in the composition of the WHL, i.e. an alleged over-representation of European sites in the WHL, especially in the case of cultural sites (Frey et al., 2010; Stainer and Frey, 2011; Bertacchini and Saccone, 2012; Bertacchini et al. 2015, 2016). Steiner and Frey (2011) in particular claim that this inequality has increased from 1978 to 2007, reflecting the UNESCO's inability to raise the share of sites from non-European countries, notwithstanding the implementation of their "Global Strategy for a Representative, Balanced and Credible World Heritage List" since 1994.

Several alternative (and dissenting) explanations have been proposed for this alleged lack of success in promoting cultural diversity. One claims that Europe holds a "soft power" in establishing the criteria defining whether a site can be considered a heritage to mankind; the bias in selection of sites would directly stem from the bias in the definition of criteria (Musitelli, 2003; Jokilehto, 2008; Bertacchini and Saccone, 2012). Verifying whether such a claim has any empirical support is problematic, as it is based on immaterial concepts such as cultural diversity, cultural influence and the like. In another paper (Dattilo et al. 2020) we try to overcome these problems by looking at the evaluation of sites in former European colonial countries, where both pre-colonial and post-colonial (i.e., influenced by European culture) monuments are submitted for recognition as mankind's cultural heritage. The analysis fails to detect a pro-European bias in the decisions by the UNESCO, once the independent experts' evaluations of quality are accounted for.

Other studies explain the unequal geographic distribution of sites in the WHL arguing that European countries either care more about the WHL and therefore propose many more sites than non-European ones; or that they enjoy more political power in the UNESCO selection committee. Such influence would subjugate an independent evaluation of the sites' quality to the political logic of rent seeking, thus generating a pro-European bias in selection (Frey et al., 2010; VanBlarcom and Kayahan, 2011; Lee et al., 2017; Bertacchini et al., 2009). Against this conclusion van der Aa (2005) observes that, up to the year 2000, Europe had

46% of the sites included in the WHL, but also 45% of the sites rejected, which is hardly evidence of a bias. He also argues that there any argument in favor of "greater equality" or of rebalancing of the geographic distribution of the WHL sites start from the undemonstrated premise that cultural capital is actually homogeneously distributed around the world; the lack of a benchmark for a "balanced" distribution of sites makes the notion of a pro-European bias unwarranted.

To some extent these debates exist because most papers in the literature fail to properly and explicitly consider the quality of the sites in their analyses. Virtually all empirical studies in this literature use dummy variables that consider whether a site has been included in the WHL or not. So far, a positive correlation between a country's number of sites and its presence in the UNESCO selection committee is usually considered as evidence of rent seeking (Bertacchini et al., 2016). But this conclusion may be spurious without controlling for the quality of the sites approved. As already said, sites of outstanding value do not need any political pressure to be included in the WHL (e.g., Paris), whereas others of lesser renown might do. This information cannot be conveyed by a dichotomous variable. Likewise, any evaluation of how world heritage sites are distributed across the world must consider the assessment of their quality made by the UNESCO itself, not just the end result of the decision making process; it must also somehow control for the distribution of cultural and natural capital stock across the world, to provide some benchmark against which evaluating whether a bias in fact exists.

2.2 Evaluation of quality. One of the reasons why the consideration of quality has been so far neglected in the empirical literature is that, being a subjective and not directly observable concept, it is difficult to characterize and needs being approximated. Yet, at the theoretical level, cultural economics has always stressed its importance in explaining producers and consumers' choices in the domain of the arts and culture (Thorsby, 1990; Frey, 1994; Ginsburg, 2003). The strive for originality in artistic expression makes many works of art and cultural experiences essentially unique; their demand therefore becomes a function of quality, not of quantity as it is the case of standard microeconomic models (Ginsburgh and Weyers, 1999; Waldfogel, 2012).

Two alternative approaches exist for the empirical assessment of the quality of cultural and artistic goods (Ginsburgh, 2003)[3]. The first approach decomposes the evaluation of quality in several dimensions, then establishes criteria to rate each dimension and finally aggregates the scores. Criteria for evaluation, as Throsby (1990) stresses, should be "generally agreed", and provide the foundations for the subsequent application of aesthetic judgements; yet the identification of "generally agreed", i.e., non (excessively) subjective criteria is quite hard. On the one hand, this approach has the important advantage for empirical analysis of expressing the characteristics of cultural and artistic goods along some metric; yet the researcher's value judgments in the identification of the characteristics that determine quality and in their cardinal evaluation make the resulting metric highly subjective and arbitrary.

The second approach envisages the evaluation of quality as a two-step procedure. The first step consists in resorting to experts' evaluations of quality; the second verifies the ability of these evaluations to endure the test of time, in order to minimize the role of fashion and of short-lived opinions in the evaluation of quality; furthermore, the test of time is a way to compare the original experts' opinions with consumers' (or the general public's) preferences. Being less subjective and more amenable to empirical analysis than the first, this approach has been more often used, especially in the domain of music (Ginsburgh and Noury, 2008; Ginsburgh and van Ours, 2003), cinema (Nelson et al., 2001; Deuchert et al., 2005; Reinstein and Snyder, 2005) and literature (Ponzo and Scoppa, 2015), among others.

Our study actually adopts a mix of these two methodologies for the evaluation of quality. On the one hand, it includes experts' opinions, as in the second approach, since, as we shall see, UNESCO resort to committees and panels of experts to evaluate whether a site satisfies the eligibility criteria. On the other hand, these criteria are expressed on a binary scale, reflect a multiplicity of characteristics that the sites must possess and are eventually aggregated; all these are quantitative features typical of the first methodology. Furthermore,

[3] These approaches have ancient historical roots in the philosophy and aesthetics. One of the first expressions of the first approach can be found in de Piles (1708) *Cours de Peinture par Principes*. Hume's *Four Dissertations* (1757) provide a clear description of the second approach.

compared to other settings examined in the literature, in the case of the UNESCO WHL the influence of fashions and/or the reactions to current events has little effect on experts' opinions, since cultural heritage is recognized after a long period of time. In addition, the final ruling by UNESCO is the outcome of a complex decision-making process fragmented between many different veto players, upon which each individual subjective evaluation has little bearing. All these features contribute to minimizing subjectivity in the evaluation o[4]f quality. Finally, when compared with other methods adopted in the literature, our idea of summing the number of criteria presents the advantage of being straightforward and transparent.

3. *The decision-making process behind the UNESCO WHL*

3.1. The UNESCO selection procedure. The UNESCO Convention of 1972 regulates the process through which UNESCO attributes the label "World Heritage" to a site. Two branches within UNESCO are in charge of the WHL: the General Assembly, which includes all member countries of the UNESCO, [5] and the World Heritage Committee, the executive body composed of 21 representatives that remain in charge for six years. Representatives' tenures in the Committee are staggered and rotating; every two years some countries enter into the Committee in place of the existing ones[6]. The distribution of seats is based on geographic location, with the aim of "*ensuring an equitable representation of the different regions and cultures of the world*"[7]. Conversely, to enter into the General Assembly a country must

[4] Sometimes the demand for cultural heritage is evaluated also using stated preferences (Bedate at al., 2004; Alberini and Longo, 2006; Ruijgrok, 2006). This approach, however, presents huge limitations, as it drastically depends on the survey's structure and on the response rate. In addition, marginal changes in cultural goods are difficult to conceive and often evoke opposed responses, depending on the individuals' preferences (Noonan, 2003).

[5] Membership in the UNESCO does not necessarily coincide with membership in the UN; the United States, for instance, quitted the UNESCO once in 1984 and then in 2018, while always remaining a member of the UN.

[6] This number is actually variable, because countries may voluntarily decide to reduce the length of their mandate to maximize turnover.

[7] Seats are allocated as follows: 2 for Western European and North America, 2 for Eastern Europe, 2 for Latin America, 3 for Asia and Pacific, 4 for Africa and 2 for the Arab States.

sign the *Convention concerning the Protection of the World Cultural and Natural Heritage*. This treaty requires the member countries to provide a "compulsory contribution" to the World Heritage Fund, computed as a fixed yearly percentage of its total contributions to the UN, which cannot exceed 1%. A country may however decide to push its contributions beyond such a limit[8] and make "voluntary contributions".

Upon joining the UNESCO, a member country is encouraged to submit a tentative list of natural and cultural sites located within its borders. This list anticipates the sites that the country may propose for inclusion in the WHL in the next five to ten years. Two independent advisory bodies (actually, two NGOs), formally external to UNESCO, evaluate the proposed sites: the International Council on Monuments and Sites (ICOMOS), for the cultural sites; and the International Union for Conservation of Nature (IUCN), for the natural ones. These bodies may provide four alternative recommendations: "inscription", "referral", "deferral" or "not to inscribe". A recommendation of "not to inscribe" implies that the country cannot present that site ever again. The "referral" and "deferral" evaluations encourage the country to provide minor changes (in the case of "referral") or substantial revisions (in the case of "deferral") and resubmit the candidature at a later session. Upon consideration of the recommendations of the advisory bodies, the Committee takes the final decision; a site is inscribed if it obtains a majority of 2/3 of the present members, who cast their vote through a secret ballot. It is especially at this stage that rent-seeking activities take place.

At the times of the promulgation of the Convention, no specific limits were imposed on the number of nominations, neither per country, nor per year. [9] In 1994, however, the UNESCO Committee approved the "Global Strategy for a Representative, Balanced and Credible World Heritage List" and since 2000 they introduced a series of measures aimed at re-balancing the geographic representativeness of WHL. These consisted in an overall limit of 30 nominations examined per year and one nomination proposed per country. In

[8] UNESCO (1972), art. 16 n. 2.

[9] For instance, in 1997 Italy scored a record of ten new sites included in the WHL.

2004, these limits were relaxed to two nominations per country, provided that at least one concerned a natural site, and to 45 nominations examined per year. The limits have remained stable from 2004 to the present day.

3.2. Criteria of Outstanding Universal Value. According to the Convention, in order to be included in the WHL, one of the parties involved in the decision making process (i.e., either the country, the Advisory Board, or the Committee itself) must prove that the site is of "Outstanding Universal Value" from the point of view of history, art, science or nature. As this definition is too generic to drive the evaluation of new proposals, it is further spelled out in ten criteria, six for cultural sites and four for natural ones, which express as many "values" that the UNESCO recognizes (Jokilehto, 2008). Table 1 illustrates these criteria.

[Table 1 about here]

Two points clearly emerge from this table. First, it is reasonable to maintain that not all sites have the same quality, as they do not satisfy the same number of criteria. Second, all criteria are binary, i.e., each of them can be either fulfilled or not, with no possibility of a "partial satisfaction". This greatly simplifies the quantitative evaluation of the quality of the sites. Yet, to be able to compare the quality of sites over time, these criteria must have also remained stable through the sample period. The definitions of the UNESCO criteria have in fact somewhat evolved over time in different stages, as figure 1 illustrates. The issue is to assess to what extent these changes are purely semantic or have in fact produced consequences. On this point the literature leans towards the semantic view. Labadi (2013), for example, judges that the evolution of the criteria was "non-linear, but rather complex and circular, having been at various point the results of contradictory recommendations and decisions" and can therefore be altogether neglected. Stainer and Frey (2011) have not found changes in the distribution of sites following changes in criteria, including the apparently major one of the "Global Strategy" of 1994. Be that as it may, we prefer not to have any *a priori* in our analysis and investigate the issue empirically in section 6.

Figure 2 illustrates the distribution of the mean values of the number of criteria that each site satisfies across the UNESCO geographical areas. Although Europe holds the highest

number of sites, Asia, the Pacific and Arabia reach higher average scores in terms of our measure of quality. This is indeed *prima facie* evidence that the marginal quality of the WHL is decreasing. We can illustrate this negative relationship by means of a scatter plot between the number of sites of each country and the correlation coefficient between quantity and quality of its sites. Figure 3 shows, on the vertical axis, the value of the correlation coefficient between the number of sites already inscribed and the quality of the marginal site; the horizontal axis instead reports the number of sites. Beyond 14 sites (considering Brazil as an outlier), the correlation coefficient becomes negative, i.e. an additional site lowers the average quality of the WHL. The diagram confirms that it is worth analyzing this negative relationship by means of regression analysis in the context of a more complete model, to obtain a more precise assessment of the evolution of the marginal quality of the UNESCO WHL over time as well as of the factors that determine it.

[Figure 1, 2 and 3 about here]

4. *Empirical strategy*

4.1. Dependent variable and estimation issues. The first hypothesis under test is that, as the number of sites that a country has in the WHL increases, the quality of the marginal site decreases. This amounts to estimating the derivative $\frac{\partial Q_{it}}{\partial N_{it}}$, where N_{it} is the total number of sites that country i has in WHL in year t, and Q_{it}, the endogenous variable, is the corresponding average quality of the sites. A decreasing marginal quality implies a negative sign of the derivative. The sample includes 180 countries between 1978 and 2016. To calculate Q_{it}, we exploit the binary nature of the UNESCO criteria for evaluating whether a site can be included in the WHL, assigning a value of 1 if criterion c is satisfied and 0 otherwise. We have first summed the c, thus obtaining a measure of quality for each site; then, since country i may have more than one site approved per year, we have divided the sum of the scores by the number of sites enlisted by each country every year, thus obtaining an average quality of the sites enlisted by the country in that year.

Although this specification has the advantage of simplicity, it creates some econometric issues. Firstly, modelling Q_{it} as yearly averages prevents us from considering it as a count variable, which excludes the possibility of estimating negative binomial and/or zero-inflated models. Secondly, our data have a panel structure where almost 90% of the observations are zeros, because quite often no new sites are recorded for a country/year combination. The frequency of zero values generates problems of estimation and interpretation. First, it makes the probability of observing a strictly positive quality highly related with the probability of having a site enlisted, since in years when one or more sites are included both Q_{it} and N_{it} increase. To solve this problem, we proxy N_{it} by the lagged value of the total number of sites within the WHL that country i has at year t (variable $Sites_{it-1}$). Furthermore, to avoid the concern that the results be driven by a single specification of the main independent variable, we have proxied N_{it} also by the number of years that country i has been a member of the UNESCO at time t (variable $Tenure_{it}$). The idea is that a longer membership should result in a greater number of sites[10]. Second, in any year t the zeroes may reflect either the fact that the country did not propose any site, or that they were rejected. Defining a proper instrument that is able to distinguish these two events and is also independent from the sites' quality is difficult. We have therefore estimated the model including only the strictly positive observations, which yields an unbalanced panel.

4.2 Baseline model and explanatory variables. Although figure 3 shows a negative correlation between the number of sites and their marginal quality, the literature shows that other factors may affect the dependent variable. First and foremost is the country's lobbying power at UNESCO, which, as we have argued before, is likely to be exerted more for sites of relatively low quality. The efficiency of the country's public administration may also affect the number of sites included in the WHL, because the preparation of the proposal and the explanation of how the site satisfies the UNESCO criteria are all bureaucratic tasks.

[10] Some studies in the literature (Bertacchini et al. 2016) use *Tenure* as a proxy for the country's lobbying power. Such interpretation, although it makes intuitive sense, is problematic because countries rotate in the UNESCO Committee. That said, we proxy the country's lobbying power through a battery of other variables, including the number of years a country had a representative in the UNESCO Committee (variable *Committee*). This allows us to use *Tenure* as a proxy just for the number of sites.

Finally, it is important to control for the country's cultural capital, which is not homogeneously distributed across geographical areas, because of the different histories of civilization of each country.

Our baseline model is therefore specified as follows:

$$Q_{it} = \beta_0 + \beta_1 N_{it} + \beta_2 CulturalK_{it} + \beta_3 Lobby_{it} + \beta_4 Bureaucracy_{it} + u_{it} \quad (1)$$

For each variable of equation (1) appropriate proxies must be found. As a measure of cultural capital ($CulturalK$), the literature (e.g., Stainer and Frey, 2011) generally uses the area and population of the country. The idea is that the country's population reflects its potential to produce cultural goods, while in larger countries it should be easier to find a site worth including in the list. Furthermore, both measures are available for a large number of countries. Yet, as cultural heritage is a good originated in the past, historical proxies are more appropriate. We therefore also consider the historical population in the year 1500 and per capita GDP in the year 1820, from Maddison Historical Statistics (2020 release). The motivation is that the larger was the country's population in the past, the greater should be its historical human capital and therefore the cultural capital still available today. Likewise, the higher was GDP per capita in the past, the more resources a country could invest in the production of cultural capital. The drawback of historical proxies is that these variables are not available for all countries.[11] We must therefore distinguish between two types of countries: "high cultural capital countries" (HCK), for which historical data are available and "low cultural capital countries" (LCK), for which they are not. The idea behind this classification is that only more developed civilizations with a high level of human capital have been able to generate information about their historical GDP and population. The remaining countries are assigned a value of 0. To avoid any possibility of misrepresentation of reality, we test three specifications: one with *POP_1500* and *GDP_1820*, which

[11] As a matter of fact, the choice of these two baseline years is the outcome of a compromise between the number of countries that we want to keep in the sample and the distance in time that validates the idea of historical cultural capital. If we go further back in the Maddison historical statistics, too many countries would disappear or would be difficult to related with the currently existing countries. If we move closer in time, we would miss the periods when many countries generated their stock of cultural capital.

encompasses the entire sample and treats the lack of information as a sign of low level of cultural capital, attributing them a 0 value; a second with *POP_1500hk* and *GDP_1820hk*, which includes only high cultural capital countries and considers the missing information as data not available; and a last one, just for the subsample of LCK countries, which includes the current *Population*, since it is the only control variable always available for those countries.

To capture the effects of lobbying, we consider two types of variables: the country's membership in the selection Committee, and the money flows from each country to UNESCO. In particular, *Committee* is a cumulative variable equal to the total number of mandates the country had fulfilled until time *t* when it is a member of the selection Committee and 0 otherwise. This specification allows not only to capture the effects of the inclusion of the country in the Committee, but also those of its permanence in the selection process in terms of experience accumulated and connections established[12]. The other two proxies for lobbying are based on monetary flows: the first, *Expect_contr* is the sum of compulsory and voluntary contributions, i.e., the country's total contributions to UNESCO[13]. As these contributions should have an effect only after they are budgeted, the variable is lagged one period. Second, to capture the entire contributive history of a country, we have computed the variable *Unpaid_contr*. When a member country has paid all compulsory contributions, this variable is 0; otherwise, it is equal to the absolute value of the difference between the contributions due and those actually paid.[14]. Just like *Expect_ contr*, *Unpaid_contr* is lagged one period. The expected signs on these variables reflect the idea that lobbying is exerted only for marginal sites, namely, those of lower quality. Hence,

[12] We have constructed the dataset for *Committee* referring to official data available from the UNESCO website about each Committee Assembly.

[13] Data for *Expect_contr* are drawn from the UNESCO Statements of Compulsory and Voluntary Contribution to World Heritage Fund. They are expressed in US dollars for each country in PPP.

[14] These data come from official documents of UNESCO (Statements of Compulsory and Voluntary Contribution to World Heritage Fund). In the case of countries that provide only voluntary contributions, Unpaid_contr is set equal to 0 (unless they have not contributed at all).

the expected sign on *Committee* and on *Expect_contr* should be negative, whereas that of *Unpaid_contr* (which is a form of "negative lobbying") should be positive.

Finally, we adopt the *Government Effectiveness Index* (variable *Gov_eff* from the Worldwide Governance Indicators of the World Bank) to proxy the efficiency of the country's bureaucracy. *Gov_eff* captures the (perceptions of the) efficiency of the country's public and civil services. These scores are aggregated into a single index, in units of a standard normal distribution, ranging from 0 to 1. As such, *Gov_eff* is the best proxy available of the country's ability to prepare a proposal for inclusion of a site into the WHL. Since our sample includes both developed and undeveloped countries, with very different levels of government efficiency, the discriminating power of this proxy should be adequate.[15]

Table 2 reports the correlation matrix between the variables, table 3 the descriptive statistics and table 4 summarizes the expected signs of the explanatory variables.

[Table 2, 3 and 4 about here]

All panel models are estimated using random effects. Intuitively, we cannot estimate a fixed effect model due to the presence of dummy variables or variables constant over time. In any event, the Lagrange multiplier test for the choice of the econometric model presented in table 10 supports the application of a random effect model.

5. *Estimation of the baseline model*

[15] We expect the effect of *Gov_eff* not to be the same for countries with high and low cultural capital, because the way in which the bureaucracy prepares the nomination might have little effect in low cultural capital countries, where the choice of sites is limited; but it might play a more important role in countries with a large amount of cultural capital of varying degrees of interest, where also low quality sites might be included in the WHL if properly presented. To capture this differential effect of the country's administration, we first estimate *Gov_eff* for high cultural capital countries, i.e. with *POP_1500hk* and *GDP_1820hk*, and secondly on the subsample containing just low cultural capital countries, controlling for area and population, since the historical data for those country are not available.

Tables 5 illustrates the results of our econometric analysis, where the number of sites N_{it} is proxied by $Sites_{it-1}$. Only the observations where the dependent variable has nonzero values are reported; this reduces the sample to 580 observations. Evidently, the most important result is that the coefficient on $Sites_{it-1}$ is negative and statistically significant in all models; in other words, the estimated sign of the derivative $\frac{\partial Q_{it}}{\partial N_{it}}$ is negative for the entire sample (model 1) and the selected subsamples (models from 2 to 4). This lends empirical support to the hypothesis that countries with more sites experience a diminishing marginal quality of newly accepted sites.

As for the effect of lobbying, none of the proxies (*Committee*, *Exp_contr* and *Unpaid_contr*) is statistically significant. Only in model 4 *Committee* is marginally significant. This suggests that when the quality of the sites is considered instead of the simple inclusion in the WHL, lobbying loses its explanatory potential. A possible explanation is that the inclusion of sites that are universally recognized as world heritage does not require resorting to political pressure; if so, lobbying may be relevant only for the marginal sites, i.e., those whose admittance to the WHL thanks only to their quality is uncertain.

Conversely, the efficiency of the country's public administration shows the expected negative sign (model 3), confirming that more efficient bureaucracies are better able to have relatively low quality sites approved into the WHL. When the sample is restricted to countries with a small stock of cultural capital (for which historical population and GDP are not available), the coefficient on the efficiency of the bureaucracy loses significance, but (model 4). A possible explanation is that these countries have very few sites to propose, to the point that there are insufficient observations to detect a negative correlation on *Gov_eff*.

The proxies for the stock of cultural capital based on historical data reveal that, when the entire sample of countries for which such data is available is considered, population in the year 1500 seems to exert a positive impact on the quality of sites (model 1 and 2). When instead the sample is restricted only to high cultural capital countries, GDP per capita plays a more relevant, and still positive, role (model 3). Finally, when the lack of historical data

forces us to use current values of country area and population, as it is usually done in the literature, these variables never turn out statistically significant (model 4).

[Table 5 about here]

6. Robustness checks

The econometric issues discussed above require estimating a series of variants of the baseline model, to minimize the risk of spurious correlations or misspecifications of the model and/or inappropriate estimation techniques.

6.1. Alternative specifications for N_{it}. First, we verify whether the estimated results remain fundamentally the same when the explanatory variable of interest, N_{it}, is proxied by the alternative variable *Tenure*. The idea behind *Tenure* is that a longer membership should result in a greater number of sites. Proxying N_{it} by *Tenure* has the further advantage of avoiding risks of multicollinearity with the other covariates, all of which have a positive effect on the number of sites; *Tenure* instead is positively correlated with the number of sites but not with the other variables, as the correlation matrix of table 2 shows.

Table 6 report the results; they are quite similar to those already obtained in the baseline model. Once more, the estimated coefficients on *Tenure* are always negative and statistically significant in models from 5 to 7. As time goes by, countries that have ratified the UNESCO Convention earlier (and that are therefore likely to have more sites) include sites of lower quality in the list. This effect is stronger when only high cultural capital countries are considered. The estimated coefficients on the variables measuring lobbying, the quality of the public administration and the stock of cultural capital confirm the results already obtained with N_{it} proxied by $Sites_{it-1}$.

[Table 6 about here]

6.2. Disaggrefating countries by the number of sites. Second, we check whether the sign of the derivative $\frac{\partial Q_{it}}{\partial N_{it}}$ remains the same regardless that a country has either a large or a small number of sites in the WHL. The idea is to verify whether the process of diminishing marginal quality is stronger for countries with a large number of sites, controlling for the stock of cultural capital.

To this end we disaggregate the sample by the number of sites that a country has in the WHL. We set the threshold number of sites at 10 in 2016, to obtain a subsample that represents the top 10% of the distribution of sites by country and almost 50% of the sites included in the WHL. Table 7 presents the estimates with N_{it} proxied by $Sites_{it-1}$. They reveal that the negative and statistically significant coefficients found in table 5 and 6 are mainly driven by the countries with more than 10 sites. Models 9 and 11 show that the correlation is always negative and statistically significant when countries have more than 10 sites, while models 10 and 12 instead reveal that this effect disappears for countries below that threshold.[16]

Likewise, greater government efficiency has a negative effect on quality only for countries with more than 10 sites (model 11), confirming that more efficient bureaucracies can have more sites of lower quality approved. The remaining results do not significantly change; *Population* seems to have a positive scale effect on quality (models 9 and 10), and so do the historical proxies for the stock of cultural capital (models 11 and 12). Once more, none of the proxies for lobbying is ever significant.

[Table 7 about here]

6.3. Stability of criteria. The assumption of actual invariance over time of the criteria to include a site in the WHL needs being verified, to ensure that the evolution of the average quality of the WHL is not affected by a change in the methods of evaluation of the quality of the sites. On the basis of the evidence illustrated in figure 2, we select three breakpoints:

[16] We have performed the same estimates using tenure instead of $sites_{t-1}$ as proxy for N_{it}. The pattern of results remains the same. These estimates are available upon request.

the year 1994, when there was a peak in the change of the wording of the definitions of criteria; the years 2001-03, when a new admittance procedure restricted the number of new sites to one per country and 30 in total every year; the year 2005, when it was introduced the possibility of mixed sites (partly natural and cultural) and the number of sites was re-expanded to two per country and 45 in total.[17]

Table 8 presents the results of the control of the stability of criteria over time. We organize the analysis in two steps; in models 13-15 we test whether any of the three beak-points has a direct effect on the quality of the sites; in models 16-18 we verify whether including the proxies for the number of sites modifies this result. In model 13 the dummy for the changes introduced in 1994 turns out negative and significant, which suggests that these changes apparently reduced the quality of the sites subsequently included in the list. Yet, once we control for the number of sites (model 16), the change of criteria of 1994 does not seem to be relevant, since the negative quantity-quality relationship subject of our study holds. In other words, we find evidence that the changes of the definitions of the criteria approved in 1994 did not refrain countries with more sites to have new ones of lower marginal quality being approved into the WHL. Interestingly, we observe an increase in the quality of sites between 2001 and 2003, as a consequence of the restrictions imposed on the number of nominations per country (models 14 and 17). Probably this restriction created an incentive to submit sites of higher quality, to minimize the possibility of receiving a rejection among the proposed sites. In a complementary way, following the relaxation in the UNESCO policy for sites nominations in 2005, we observe a widespread reduction of the average quality after that year, regardless of the number of sites that a country had (models 15 and 18). The negative quantity-quality relationship is thus corroborated, because imposing a limitation on the number of sites that could be nominated seems to increase the quality of sites included in the list and viceversa. In other words, our hypothesis is valid in both directions.

[17] Alternatively, we perform an "unrestricted" test of the stability of the criteria by introducing a set of dummy variables that capture a series of five years intervals. The estimates do not change in a qualitative way. They are available upon request.

[Table 8 about here]

6.4. Specification of the model. As a final robustness check we have estimated a cross-section model to exclude the possibility that our results depend on the model specification. Given the different structure of the dataset, we are obliged to estimate a second equation:

$$Q_i = \beta_0 + \beta_1 N_i + \beta_2 CulturalK_i + \beta_3 Lobby_i + \beta_4 AVquality_i + u_i \quad (2)$$

The dependent variable Q_i is the quality of a single site i whose value, just like in the analysis conducted so far, equals the number of criteria that the site satisfies. Having removed from the sample the sites excluded from the WHL, whose values would have been zero, Q_i is a positive integer with a lower bound equal to 1.

Like in the estimates of equation (1), we proxy the number of sites *N,* by $Sites_{t-1}$ and *Tenure*; yet the cross section specification allows us also to include *Year*, i.e., the year a site is included in the WHL. If the sign of $\frac{\partial Q}{\partial N}$ is negative, sites enlisted in more recent years should be of lower quality; hence the expected sign on *Year* is negative. As measures of cultural capital, we select *Area* and *Population* to keep the number of observations as large as possible; we include the same lobbying variables of the baseline model. Moreover, the focus on single sites of the cross-section specification eliminates the possibility to explain the evolution of the quality of the sites on a country basis. To limit such a drawback, we add the country average quality, in order to evaluate the marginal evolution of the quality of the sites. Making explicit the country average sites' quality in the specification of equation (2) also verifies possible problems of reverse causality that equation (1) might embed; the concern is that, just like the average quality of the sites inscribed in a certain year may depend on the number of sites already inscribed in the list, the number of sites inscribed in the list may also depend on the average quality of the sites a country already has in the WHL.

The cross-sectional specification of equation (2) has several additional advantages. F irst, it allows to keep more than one observation for every year, without the need to compute

country averages of the quality of the sites. Second, it rules out the problem of the missing values. Third, as the sample contains only positive integers, we can test our hypothesis using a count data model. Since *Q* is not over-dispersed and its mean and variance show quite similar values, we assume a Poisson distribution.[18] The descriptive statistics related to the cross-section dataset are shown in table 11.

Table 9 shows that changing the specification of the model from a panel to a cross-section, where single sites rather than country averages are considered, does not qualitatively change the results. In all the estimates $Sites_{t-1}$ is negatively correlated with the quality of the sites and so is *Tenure*. In the cross-sectional model also the proxy *Year* has a negative and statistically significant coefficient. These results are especially important, since we are controlling for the lagged average quality of the sites, and still we find evidence of diminishing marginal quality. The results on the other explanatory variables remain basically unchanged.

[Tables 9, 10, 11 about here]

6. *Conclusions*

Our study uses a simple and straightforward definition of quality of the sites of the UNESCO WHL. The estimates based on this proxy lend empirical support to our main research question: as the number of sites that a country has in the WHL increases, their marginal quality decreases. In other words, since the stock of cultural and natural capital is fixed, new entries into the WHL appear to be of lower quality than earlier ones. This negative quantity-quality relationship is particularly evident for countries with more than 10 sites. Quite importantly, this result seems robust after controlling for the stock of cultural capital, the lobbying power of the UNESCO member countries and the (rather semantic)

[18] We have also estimated the same specification with a linear regression on a normalized version of the dependent variable. The results, available upon request, do not qualitatively change from those reported in table 9.

changes in the criteria for the evaluation of quality that UNESCO has adopted during the 1972-2018 time interval. Finally, this relationship shows up also in the opposite sense, as countries reacted by raising the average quality of their newly proposed sites in years when limitations on the number of sites that could be proposed became more stringent. The results are quite robust to changes in the estimating techniques and in the specification of the data.

This research, however, raises several new questions and scenarios for future research, as it deals with an issue, the assessment of quality that is at the same time important and difficult to handle both in cultural and in mainstream economics. A first topic that will have to be revisited in the literature on the UNESCO WHL in the light of our research is the role that rent seeking plays in the assignment of the new sites. Lobbying seems decisive in sites whose quality is barely sufficient to enter the list, contrary to the current consensus in literature, that countries always resort to rent seeking. Another open question is determining the precise number of sites beyond which the average quality of the whole WHL starts to decrease. A reduction of the average quality of the WHL would call into question the credibility and usefulness of the UNESCO policy to add more sites to the list.

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Figure

Figure 1. Evolution of criteria over time

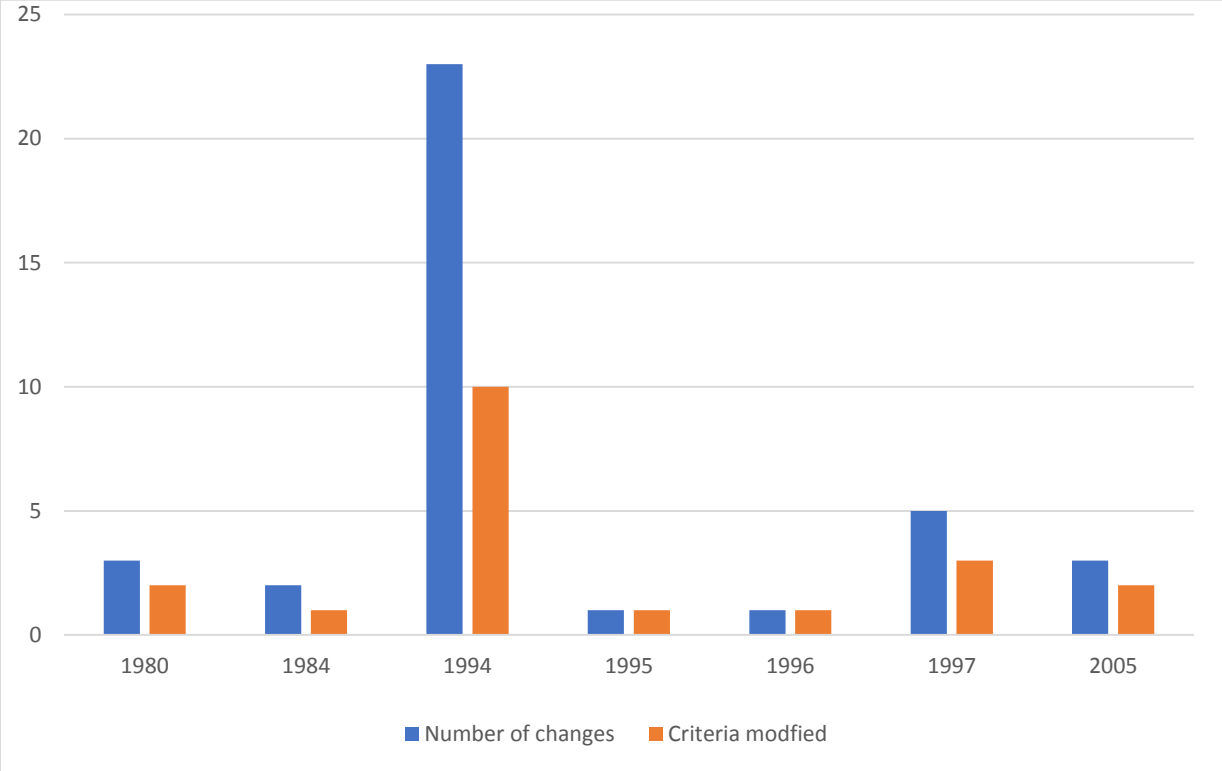


Figure 2. Mean quality of sites by UNESCO geographical area

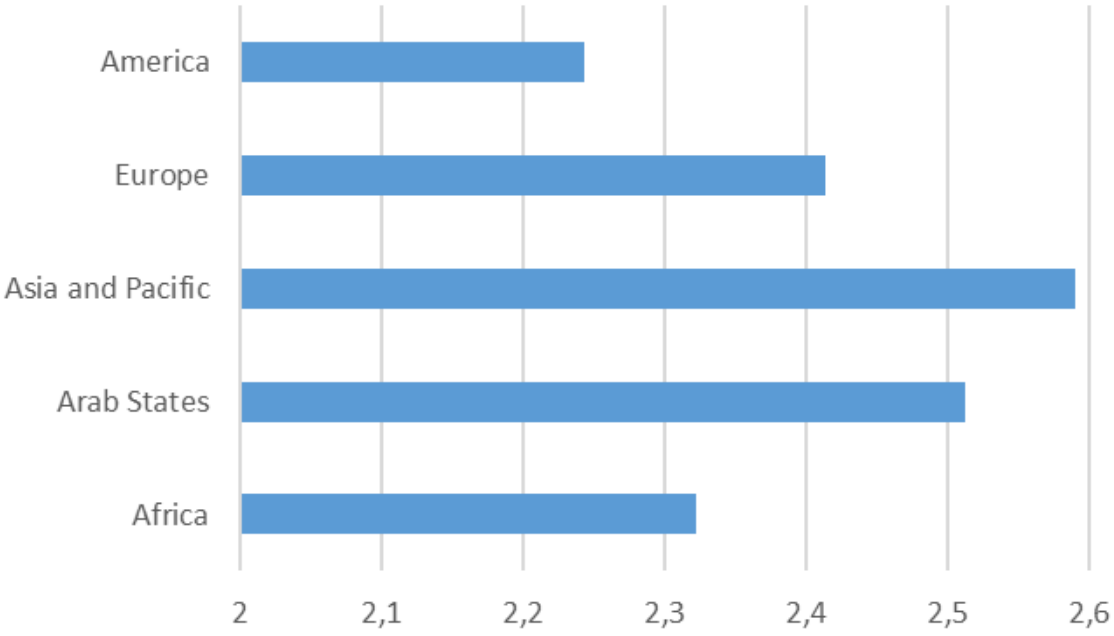
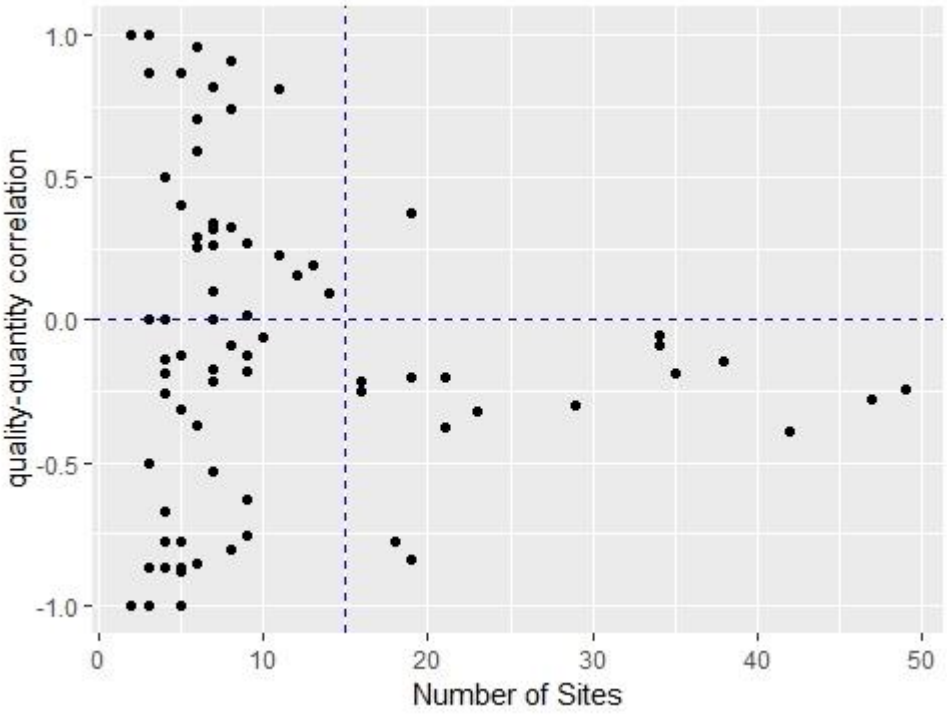


Figure 3. Correlation between quantity and quality of UNESCO sites



Table

Table 1. Criteria for cultural and natural sites in 2018

N.	*Cultural Criteria*	*Value involved*
1	Represents a masterpiece of human creative genius	Aesthetic
2	Exhibits an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design	Aesthetic, Historical, Technical
3	Bears a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living, or which has disappeared	Historical, Representative
4	Is an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history;	Historical, Representative, Technical
5	Is an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change	Historical, Scientific
6	Is directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria);	Representative
N.	*Natural Criteria*	*Value involved*
7	Contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance	Aesthetical
8	Offers outstanding examples representing major stages of Earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features	Historical, Scientific
9	Offers outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals	Representative, Scientific
10	Contains the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of Outstanding Universal Value from the point of view of science or conservation.	Scientific

Table 2. Correlation Matrix

	Change0103	*Tenure*	*Change94*	*Change05*	*Committee*	*Quality*	*Pop*	*POP_1500lk*	*Area*	*Exp_cont*	*Unpaid*	*Gov_Eff*	*Sites*	*GDP_1820lk*
Change01_03	1	-0.21	0.24	-0.58	-0.019	0.0039	-0.01	-0.002	-0.01	-0.023	-0.017	0	-0.05	-0.019
Tenure		1	0.61	0.4	0.17	0.037	0.13	0.085	0.18	0.11	0.047	0	0.32	0.18
Change 94			1	0.56	0.07	0.05	0.04	0	0	0.1	0.03	0	0.26	0
Change 05				1	0.042	-0.05	0.011	-0.002	0.004	0.011	-0.03	-0.01	0.08	0.0022
Committee					1	0.19	0.23	0.22	0.23	0.2	0.034	0.17	0.34	0.25
Quality						1	0.29	0.3	0.2	0.23	0.062	0.12	0.39	0.26
Pop							1	0.96	0.44	0.22	0.11	0	0.52	0.18
POP_1500lk								1	0.31	0.17	0.02	0.05	0.52	0.19
Area									1	0.32	0.32	0.04	0.42	0.14
Exp_cont										1	0.58	0.33	0.5	0.47
Unpaid											1	0.09	0.15	0.17
Gov_Eff												1	0.31	0.55
Sites													1	0.59
GDP_1820lk														1

Table 3. Descriptive statistics

	Mean	*Median*	*St.dev*	*Min*	*Max*	*N of obs*
Quality	2.37	2.00	0.77	1.00	6.00	701
Tenure	11.08	8.00	11.16	0	42.00	7020
$Sites_{t-1}$	2.942	1.000	5.68	0	49.000	7020
Area	7.24	1.18	19.85	0	170.98	6992
Population	321.56	61.97	1212.6	0.12	13786.65	6988
POP_1500hk	7103	1250	20642.80	100	110000	1951
GDP_1820hk	752.41	642.02	341.72	83.33	1837.98	1872
POP_1500lk	1974	0	11336.33	0	110000	7020
GDP_1820lk	200.6	0	376.63	0	1838.0	7020
Committe	0.2248	0	0.67	0	5.0000	7020
Exp_contr	14211	294	63551.60	0	927085	6374
Unpaid	5980	0	57280.13	-104741	1420606	4291
Gov_Eff	0.49	0.45	0.21	0	1	2982

Table 4. Expected signs

Variable	*Expected sign*
Sites $_{t-1}$	Negative
Tenure	Negative
Area	Positive
Population	Positive
POP_1500hk	Positive
GDP_1820hk	Positive
POP_1500	Positive
GDP_1820	Positive
Committe	Negative
Exp_contr	Negative
Unpaid	Positive
Gov_Eff	Negative
Change_94	Not significant
Change01_03	Positive
Change_05	Negative

Table 5. *Regression results. Number of sites proxied by Sites$_{t-1}$.*

	Model 1 *Complete sample*	*Model 2* *HCK countries*	*Model 3* *HCK countries*	*Model 4* *LCK countries*
Sites$_{t-1}$	-0.01793*** (0.005151)	-0.01926*** (0.005883)	-0.007341** (0.00388)	-0.08722** (0.0431)
Committee	0.00756 (0.03897)	-0.006512 (0.04829)	0.02592 (0.05428)	0.1786* (0.1035)
Expect_contr	0.0000007 (0.0000006)	0.0000008 (0.0000007)		0.000003 (0.000008)
Unpaid_contr	-0.0000004 (0.0000004)	-0.0000006 (0.0000008)	-0.0000002 (0.0000007)	-0.000001 (0.0000007)
Gov_Eff			-2.1535*** (0.4974)	-0.2045 (0.5386)
Pop 1500	0.0000088*** (0.000003)			
GDP 1820	0.0001895 (0.000117)			
Pop 1500hk		0.000008** (0.0000034)	0.000004 (0.0000028)	
GDP 1820hk		-0.000009 (0.00026)	0.0006181** (0.000295)	
Area	-0.001938 (0.001724)	-0.001512 (0.00278)	0.0002128 (0.002577)	0.004783 (0.005163)
Population				0.001493 (0.005163)
Intercept	2.3080*** (0.06717)	2.5784*** (0.2512)	3.3499*** (0.2978)	2.3601*** (0.2619)
Adj. R^2	0.072239	0.034685	0.11125	0.14991
F-statistic	6.88437***	1.94965*	3.98641***	4.21297**
N	580	308	168	129

*Note: standard errors in parentheses. Significant levels are: 0.01 '***' 0.05 '**.' 0.1 '* '*

Table 6. Robustness checks. Number of sites proxied by Tenure.

	Model 5 *Complete sample*	*Model 6* *HCK countries*	*Model 7* *HCK countries*	*Model 8* *LCK countries*
Tenure	-0.008144** (0.003632)	-0.01892*** (0.005025)	-0.02446*** (0.007711)	0.00358 (0.01)
Committee	0.003171 (0.03922)	-0.00267 (0.04811)	0.03854 (0.05259)	0.09598 (0.1007)
Expect_ contr	0.0000003 (0.0000005)	0.0000005 (0.0000007)		-0.0000026 (0.000007)
Unpaid_contr	-0.0000003 (0.0000004)	-0.0000004 (0.0000008)	-0.0000003 (0.0000007)	-0.00000035 (0.0000006)
Gov_Eff			-2.5247*** (0.4992)	-0.3293 (0.5373)
Pop 1500	0.000006** (0.000003)			
GDP 1820	0.0001167 (0.000114)			
Pop 1500hk		0.0000054* (0.0000032)	0.0000012 (0.0000025)	
GDP 1820hk		-0.0001259 (0.0002591)	0.0006283** (0.0002714)	
Area	-0.00668 (0.00171)	-0.001261 (0.00281)	0.002122 (0.002589)	-0.000315 (0.004487)
Population				-0.00008158 (0.0004)
Intercept	2.3848*** (0.081)	2.8178*** (0.2663)	4.0507*** (0.3726)	2.3012*** (0.30835)
Adj. R2	0.055078	0.041979	0.15788	0.11389
F-statistic	5.4931***	2.5171**	5.4728***	3.35011***
N	580	308	168	129

*Note: standard errors in parentheses. Significant levels are: 0.01 '***' 0.05 '**.' 0.1 '* '*

Table 7. Robustness checks. Sample divided by number of sites per country

	Model 9	*Model 10*	*Model 11*	*Model 12*
	Country sites>10	*Country sites<10*	*Country sites>10*	*Country sites<10*
$Sites_{t-1}$	-0.01943*** (0.00576)	-0.01784 (0.0264)	-0.01591* (0.0083)	-0.04298 (0.0362)
Committee	0.00483 (0.047)	-0.02551 (0.08044)	0.02026 (0.0515)	0.08092 (0.0974)
Expect_contr	0.00000055 (0.0000006)	-0.0000029 (0.0000052)		
Unpaid_contr	-0.0000005 (0.0000004)	0.0000003 (0.000006)	-0.0000006 (0.0000005)	-0.0000027 (0.0000068)
Gov_Eff			-1.31*** (0.3999)	-0.5024 (0.4058)
POP1500			0.0000059** (0.0000023)	0.0001467** (0.0000562)
GDP1820			0.000835*** (0.000311)	0.0000086 (0.00022)
Area	-0.003 (0.00205)	0.001197 (0.00937)	-0.001342 (0.00184)	0.0115 (0.0114)
Population	0.00007** (0.0000279)	0.0004** (0.000188)		
Intercept	2.6696*** (0.144)	2.2288*** (0.0842)	2.7134*** (0.285)	2.4615*** (0.2098)
Adj. R^2	0.029433	0.046893	0.11572	0.063214
F-statistic	1.9404*	3.3601***	3.65462***	2.54477**
N	273	291	143	162

*Note: standard errors in parentheses. Significant levels are: 0.01 '***' 0.05 '**.' 0.1 '* '*

Table 8. Robustness checks. Stability in the definition of criteria, breakpoints

	Model 13	*Model 14*	*Model 15*	*Model 16*	*Model 17*	*Model 18*
Sites$_{t-1}$				-0.01334**	-0.01821***	-0.01197**
				(0.00564)	(0.00505)	(0.00559)
Committee	0.001039	-0.0021	0.006724	0.01189	0.01482	0.0151
	(0.0388)	(0.0383)	(0.0388)	(0.0389)	(0.0383)	(0.039)
Expect_contr	0.0000005	0.0000003	0.0000004	0.0000009*	0.000001*	0.0000009
	(0.0000005)	(0.0000005)	(0.0000005)	(0.0000005)	(0.0000005)	(0.0000005)
Unpaid_contr	-0.0000003	-0.0000003	-0.0000004	-0.0000004	-0.0000004	-0.0000005
	(0.0000004)	(0.0000004)	(0.0000004)	(0.0000004)	(0.0000004)	(0.0000004)
Area	-0.001708	-0.001373	-0.001595	-0.001423	-0.001233	-0.001432
	(0.00178)	(0.00168)	(0.00181)	(0.00179)	(0.00174)	(0.00181)
Population	0.0000569**	0.0000515*	0.0000583**	0.0000789***	0.000084***	0.0000785***
	(0.0000237)	(0.0000223)	(0.0000244)	(0.0000256)	(0.0000251)	(0.00002615)
Change_94	-0.2**			-0.11		
	(0.0837)			(0.092)		
Change_01_03		0.5418***			0.5824***	
		(0.129)			(0.0128)	
Change_05			-0.2591***			-0.1875**
			(0.0777)			(0.0844)
Intercept	2.4542***	2.2769***	2.4023***	2.4296***	2.3223***	2.4113***
	(0.08)	(0.056)	(0.0626)	(0.081)	(0.0582)	(0.0626)
Adj. R^2	0.052281	0.059478	0.068338	0.066103	0.096811	0.078238
F-statistic	5.7238***	6.47493***	7.5729***	5.94148***	8.88314***	7.24583***
N	580	580	580	580	580	580

*Note: standard errors in parentheses. Significant levels are: 0.01 '***' 0.05 '**.' 0.1 '* '*

Table 9. Robustness checks. Cross-section estimations

	Model 19 *Poisson*	*Model 20* *Poisson*	*Model 21* *Poisson*
$Sites_{t-1}$	-0.0063** (0.0026)		
Tenure		-0.0051** (0.0022)"	
Year			-0.0051** (0.0021)
Committee	0.004 (0.0228)	0.0008 (0.0226)	-0.0048 (0.0225)
Expect_contr	0.0000002 (0.0000002)	0.0000001 (0.0000002)	0.00000004 (0.0000002)
Unpaid_contr	-0.0000001 (0.0000003)	-0.0000001 (0.0000002)	-0.0000001 (0.0000002)
Area	0.0004 (0.0008)	0.0006 (0.0008)	0.0004 (0.0008)
Population	0.000006 (0.000009)	0.000002 (0.000008)	-0.0000006 (0.0000008)
AVquality	0.4255*** (0.0469)	0.4275*** (0.0476)	0.4284*** (0.0478)
Intercept	-0.1281 (0.1184)	-0.0963 (0.1198)	10.0818** (4.1051)
AIC	2505.9	2506.1	2505.6
N	812	812	812

Table 10. Tests for random effect

Lagrange Multiplier Test - Honda	
Model 1 – With zeros	Model 2 – Without zeros
normal = 14.242, p-value < 2.2e-16	normal = 5.1121, p-value = 1.593e-07
alternative hypothesis: significant effects	alternative hypothesis: significant effects
Lagrange Multiplier Test - Breusch-Pagan	
Model 1 – With zeros	Model 2 – Without zeros
chisq = 202.84, df = 1, p-value < 2.2e-16	chisq = 26.134, df = 1, p-value = 3.185e-07
alternative hypothesis: significant effects	alternative hypothesis: significant effects

Table 11. Descriptive statistics cross-section dataset

	Mean	*Median*	*St. dev.*	*Min*	*Max*
Quality	2.424	2.000	1.01197	1.000	7.000
$Site_{t-1}$	8.31	4.00	10.3850	0	47.00
Year	1996	1997	10.6909	1978	2016
Committee	0.7818	0	1.0885	0	5.0000
Exp_contribution	61048	14216	111459.7927	0	804756
Unpaid	14217	0	97222.9591	66769	1420606
Area	21.0748	4.4740	37.1761	0.0006	170.9825
Population	1377.440	384.695	3097.984	0.208	13786.650
AVquality	2.400	2.467	0.4832	1.000	5.000
Tenure	13.14	10.00	10.59	0	41.00