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# More is worse: the evolution of quality of the UNESCO World Heritage List and its determinants

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MORE IS WORSE: THE EVOLUTION OF QUALITY OF THE UNESCO WORLD  
HERITAGE LIST AND ITS DETERMINANTS<sup>1</sup>

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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<sup>1</sup> Paper presented at Genova Summer School in Political Economics, Genova, June 2019 and at the Scientific Meeting of the SIEP (Italian Society of Public Economics) Torino, September 2019. The authors thank James Snyder, Enrico Bertacchini, Giovanna Segre and two anonymous referees for useful comments on previous versions of the paper. The usual *caveat* applies.

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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.

1 The literature has not reached a consensus about these alleged biases in the selection of  
2 sites for the WHL, for several reasons. One is that the scientific debate employs notions that  
3 are either highly subjective, such as the “fair” distribution of sites across the various cultures  
4 and geographical areas, or difficult to measure, such as the “quality” of each site in terms of  
5 outstanding heritage of mankind. Another is that the empirical studies on rent seeking in  
6 the WHL typically resort to a dummy denoting whether a site has been included in the list  
7 or not. The shortcoming of this variable is that it dichotomizes the concept of “outstanding  
8 interest for mankind” that UNESCO evaluates according to up to ten independent criteria.  
9 Such reduction makes it quite difficult to verify whether rent seeking distorts the evaluation  
10 of a site’s relevance or whether the average quality of the sites in the WHL decreases over  
11 time. Without controlling for the quality of the sites, associating the number of a country’s  
12 sites with its presence in the UNESCO’s committee might overstate the importance of rent  
13 seeking in the selection process. Italy, for instance, has the largest number of sites in the  
14 WHL, but it needs not exert much political pressure to have approved a site like the historic  
15 center of Rome, as it is worldwide known and satisfies more than one UNESCO criteria. Yet  
16 Italy might use its political weight to have recognized a site such as the “industrial  
17 archeology of Ivrea”, because it is much less known and satisfies just one criterion of  
18 eligibility. Since the literature ignores how the quality of a site affects the need to resort to  
19 rent seeking practices, the results of the studies on the WHL might be flawed. Only if one  
20 considers the relevance of quality of the sites we can achieve a better understanding of how  
21 the WHL is formed and of the possible biases that affect it.  
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46 In this paper we define the “quality” of the sites in the UNESCO WHL in a way that is  
47 both straightforward and that minimizes the impact of subjective evaluations of quality. We  
48 exploit the fact that, to enter the list, each site must satisfy at least one of ten “criteria of  
49 outstanding universal value”, upon which UNESCO base their evaluation. These criteria  
50 capture different dimensions of “quality”, i.e., different reasons why a site might deserve to  
51 be included in the WHL. We hold that the greater is the number of criteria that each site  
52 satisfies when accepted in the WHL, the greater its quality. According to this simple metric,  
53 for instance, the center of Rome satisfies 5 criteria out of 6 for cultural sites, while the  
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1 industrial city of Ivrea only 1. Among the natural sites the Grand Canyon satisfies 4 criteria  
2 out of 4, while the Coastline of Devonshire (UK) only one.  
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5 This specific (and by no means unique) definition of quality has several advantages.  
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7 First, it is based on the original evaluation of the site made by UNESCO itself. The appraisal  
8 of quality cannot therefore be attributed to the preferences of the analyst (e.g., the authors  
9 of this paper) or of any specific expert involved in the review of the site. The eventual  
10 inclusion in the WHL is the outcome of a quite complicated process; such complexity  
11 minimizes the importance of each individual's subjective assessment, and of the associated  
12 biases. Second, the criteria adopted by the UNESCO have remained rather constant over  
13 time. Third, contrary to most alternative evaluation methods, based on the individuals'  
14 willingness to pay (e.g., the number of tourists attracted or contingent evaluations) the one  
15 we propose is less exposed to endogeneity bias. Quite certainly, counting the number of  
16 satisfied criteria does not characterize the idea of "quality" of a site in a perfect way; we  
17 maintain, however, that this method marks an improvement with respect to the existing  
18 literature, which either ignores the issue, or proxies it via a dichotomous variable, which  
19 merely says that sites included in the WHL are considered of higher interest than the  
20 excluded ones<sup>2</sup>.  
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38 With this definition of quality at hand, we aim to provide an answer to two research  
39 questions. The first is examining how the average quality of the WHL evolves as the number  
40 of sites included expands; specifically, we test the hypothesis that, as a country increases  
41 the number of sites in the WHL, their marginal quality decreases, controlling for the stock  
42 of natural and cultural capital. The second research aim is analyzing whether and how the  
43 UNESCO decision making process, specifically, the rent seeking involved, affects the  
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55 <sup>2</sup> A further analytical improvement would be a quantitative assessment of the qualitative evaluations  
56 of the sites made by the UNESCO experts. This approach might disentangle "ties" between sites that satisfy  
57 the same number of criteria, but are characterized by different levels of quality. In another paper (Dattilo et  
58 al. 2020) we attempt to use such evaluations, but they are available for a limited number of sites recently  
59 included in the WHL; furthermore, the evaluations made by the experts do not always adopt standardized  
60 wordings or formulas, hence it is often difficult to rank them.  
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1 recognition of quality of the its size expands over time, a concern that UNESCO expresses  
2 in its 1994 strategy.  
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5 To anticipate the results, our estimates lend support to the hypothesis that, as the  
6 number of UNESCO sites of a country increases, their marginal quality decreases. Since  
7 every new site that enters the WHL reduces the stock of the country's cultural capital still  
8 available, countries are eventually compelled to propose new sites of lower quality. This is  
9 more evident for countries with more than 10 sites in the WHL, which represent 12% of the  
10 countries and 51% of the total sites. As for the second research question, we find that it is  
11 the efficiency of the country's bureaucracy, rather than its lobbying power, to play an  
12 important role in the inclusion of low-quality sites in the WHL. High quality sites, instead,  
13 do not need neither an efficient state administration, nor political pressure to be enlisted.  
14 This result is at variance with the public choice literature on the UNESCO WHL that,  
15 looking at the evaluation of the sites' quality in a dichotomous way (i.e., inclusion in the  
16 WHL or not), usually found that lobbying affects the selection of the WHL sites (Stainer and  
17 Frey, 2011; Bertacchini and Saccone, 2012).  
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34 The rest of the paper is organized as follows. Section 2 reviews the literatures about the  
35 "political economy" of the UNESCO WHL and about the evaluation of quality in cultural  
36 economics and about. Section 3 illustrates the process through which UNESCO selects the  
37 sites to be included in the WHL and the criteria that each site must satisfy to be recognized.  
38 Section 4 discusses the empirical strategy, the variables included in the specification of the  
39 empirical model and the econometric issues associated with the estimates. In section 5 the  
40 estimates' baseline results are presented, while section 6 illustrates the robustness checks.  
41 Finally, section 7 summarizes the main conclusions of the analysis.  
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## 57 2. *Literature review* 58 59 60 61 62 63 64 65

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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.

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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.

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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



1 46% of the sites included in the WHL, but also 45% of the sites rejected, which is hardly  
2 evidence of a bias. He also argues that there any argument in favor of “greater equality” or  
3 of rebalancing of the geographic distribution of the WHL sites start from the  
4 undemonstrated premise that cultural capital is actually homogeneously distributed  
5 around the world; the lack of a benchmark for a “balanced” distribution of sites makes the  
6 notion of a pro-European bias unwarranted.  
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12 To some extent these debates exist because most papers in the literature fail to properly  
13 and explicitly consider the quality of the sites in their analyses. Virtually all empirical  
14 studies in this literature use dummy variables that consider whether a site has been included  
15 in the WHL or not. So far, a positive correlation between a country’s number of sites and its  
16 presence in the UNESCO selection committee is usually considered as evidence of rent  
17 seeking (Bertacchini et al., 2016). But this conclusion may be spurious without controlling  
18 for the quality of the sites approved. As already said, sites of outstanding value do not need  
19 any political pressure to be included in the WHL (e.g., Paris), whereas others of lesser  
20 renown might do. This information cannot be conveyed by a dichotomous variable.  
21 Likewise, any evaluation of how world heritage sites are distributed across the world must  
22 consider the assessment of their quality made by the UNESCO itself, not just the end result  
23 of the decision making process; it must also somehow control for the distribution of cultural  
24 and natural capital stock across the world, to provide some benchmark against which  
25 evaluating whether a bias in fact exists.  
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44 2.2 Evaluation of quality. One of the reasons why the consideration of quality has been  
45 so far neglected in the empirical literature is that, being a subjective and not directly  
46 observable concept, it is difficult to characterize and needs being approximated. Yet, at the  
47 theoretical level, cultural economics has always stressed its importance in explaining  
48 producers and consumers’ choices in the domain of the arts and culture (Thorsby, 1990;  
49 Frey, 1994; Ginsburg, 2003). The strive for originality in artistic expression makes many  
50 works of art and cultural experiences essentially unique; their demand therefore becomes a  
51 function of quality, not of quantity as it is the case of standard microeconomic models  
52 (Ginsburgh and Weyers, 1999; Waldfogel, 2012).  
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Two alternative approaches exist for the empirical assessment of the quality of cultural and artistic goods (Ginsburgh, 2003)<sup>3</sup>. 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.

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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.

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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,

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<sup>3</sup> 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.

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

### 10 11 12 13 14 15 16 17 18 19 20 21 22 3. *The decision-making process behind the UNESCO WHL*

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25 3.1. The UNESCO selection procedure. The UNESCO Convention of 1972 regulates the  
26 process through which UNESCO attributes the label "World Heritage" to a site. Two  
27 branches within UNESCO are in charge of the WHL: the General Assembly, which includes  
28 all member countries of the UNESCO,<sup>5</sup> and the World Heritage Committee, the executive  
29 body composed of 21 representatives that remain in charge for six years. Representatives'  
30 tenures in the Committee are staggered and rotating; every two years some countries enter  
31 into the Committee in place of the existing ones<sup>6</sup>. The distribution of seats is based on  
32 geographic location, with the aim of "*ensuring an equitable representation of the different regions*  
33 *and cultures of the world*"<sup>7</sup>. Conversely, to enter into the General Assembly a country must

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

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53 <sup>5</sup> Membership in the UNESCO does not necessarily coincide with membership in the UN; the United  
54 States, for instance, quitted the UNESCO once in 1984 and then in 2018, while always remaining a member  
55 of the UN.

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57 <sup>6</sup> This number is actually variable, because countries may voluntarily decide to reduce the length of  
58 their mandate to maximize turnover.

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60 <sup>7</sup> Seats are allocated as follows: 2 for Western European and North America, 2 for Eastern Europe, 2  
61 for Latin America, 3 for Asia and Pacific, 4 for Africa and 2 for the Arab States.

1 sign the *Convention concerning the Protection of the World Cultural and Natural Heritage*. This  
2 treaty requires the member countries to provide a “compulsory contribution” to the World  
3 Heritage Fund, computed as a fixed yearly percentage of its total contributions to the UN,  
4 which cannot exceed 1%. A country may however decide to push its contributions beyond  
5 such a limit<sup>8</sup> and make “voluntary contributions”.

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

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

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<sup>8</sup> UNESCO (1972), art. 16 n. 2.

<sup>9</sup> For instance, in 1997 Italy scored a record of ten new sites included in the WHL.

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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

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

25 [Figure 1, 2 and 3 about here]

#### 31 4. Empirical strategy

32 4.1. Dependent variable and estimation issues. The first hypothesis under test is that, as  
33 the number of sites that a country has in the WHL increases, the quality of the marginal site  
34 decreases. This amounts to estimating the derivative  $\frac{\partial Q_{it}}{\partial N_{it}}$ , where  $N_{it}$  is the total number of  
35 sites that country  $i$  has in WHL in year  $t$ , and  $Q_{it}$ , the endogenous variable, is the  
36 corresponding average quality of the sites. A decreasing marginal quality implies a negative  
37 sign of the derivative. The sample includes 180 countries between 1978 and 2016. To  
38 calculate  $Q_{it}$ , we exploit the binary nature of the UNESCO criteria for evaluating whether a  
39 site can be included in the WHL, assigning a value of 1 if criterion  $c$  is satisfied and 0  
40 otherwise. We have first summed the  $c$ , thus obtaining a measure of quality for each site;  
41 then, since country  $i$  may have more than one site approved per year, we have divided the  
42 sum of the scores by the number of sites enlisted by each country every year, thus obtaining  
43 an average quality of the sites enlisted by the country in that year.

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

19 4.2 Baseline model and explanatory variables. Although figure 3 shows a negative  
20 correlation between the number of sites and their marginal quality, the literature shows that  
21 other factors may affect the dependent variable. First and foremost is the country's lobbying  
22 power at UNESCO, which, as we have argued before, is likely to be exerted more for sites  
23 of relatively low quality. The efficiency of the country's public administration may also  
24 affect the number of sites included in the WHL, because the preparation of the proposal and  
25 the explanation of how the site satisfies the UNESCO criteria are all bureaucratic tasks.

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

1 Finally, it is important to control for the country's cultural capital, which is not  
2 homogeneously distributed across geographical areas, because of the different histories of  
3 civilization of each country.  
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7 Our baseline model is therefore specified as follows:  
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$$9 \quad Q_{it} = \beta_0 + \beta_1 N_{it} + \beta_2 CulturalK_{it} + \beta_3 Lobby_{it} + \beta_4 Bureaucracy_{it} + u_{it} \quad (1)$$

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12 For each variable of equation (1) appropriate proxies must be found. As a measure of  
13 cultural capital (*CulturalK*), the literature (e.g., Stainer and Frey, 2011) generally uses the  
14 area and population of the country. The idea is that the country's population reflects its  
15 potential to produce cultural goods, while in larger countries it should be easier to find a  
16 site worth including in the list. Furthermore, both measures are available for a large number  
17 of countries. Yet, as cultural heritage is a good originated in the past, historical proxies are  
18 more appropriate. We therefore also consider the historical population in the year 1500 and  
19 per capita GDP in the year 1820, from Maddison Historical Statistics (2020 release). The  
20 motivation is that the larger was the country's population in the past, the greater should be  
21 its historical human capital and therefore the cultural capital still available today. Likewise,  
22 the higher was GDP per capita in the past, the more resources a country could invest in the  
23 production of cultural capital. The drawback of historical proxies is that these variables are  
24 not available for all countries.<sup>11</sup> We must therefore distinguish between two types of  
25 countries: "high cultural capital countries" (HCK), for which historical data are available  
26 and "low cultural capital countries" (LCK), for which they are not. The idea behind this  
27 classification is that only more developed civilizations with a high level of human capital  
28 have been able to generate information about their historical GDP and population. The  
29 remaining countries are assigned a value of 0. To avoid any possibility of misrepresentation  
30 of reality, we test three specifications: one with *POP\_1500* and *GDP\_1820*, which  
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56 <sup>11</sup> As a matter of fact, the choice of these two baseline years is the outcome of a compromise between  
57 the number of countries that we want to keep in the sample and the distance in time that validates the idea  
58 of historical cultural capital. If we go further back in the Maddison historical statistics, too many countries  
59 would disappear or would be difficult to related with the currently existing countries. If we move closer in  
60 time, we would miss the periods when many countries generated their stock of cultural capital.  
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1 encompasses the entire sample and treats the lack of information as a sign of low level of  
2 cultural capital, attributing them a 0 value; a second with *POP\_1500hk* and *GDP\_1820hk*,  
3 which includes only high cultural capital countries and considers the missing information  
4 as data not available; and a last one, just for the subsample of LCK countries, which includes  
5 the current *Population*, since it is the only control variable always available for those  
6 countries.  
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13 To capture the effects of lobbying, we consider two types of variables: the country's  
14 membership in the selection Committee, and the money flows from each country to  
15 UNESCO. In particular, *Committee* is a cumulative variable equal to the total number of  
16 mandates the country had fulfilled until time  $t$  when it is a member of the selection  
17 Committee and 0 otherwise. This specification allows not only to capture the effects of the  
18 inclusion of the country in the Committee, but also those of its permanence in the selection  
19 process in terms of experience accumulated and connections established<sup>12</sup>. The other two  
20 proxies for lobbying are based on monetary flows: the first, *Expect\_contr* is the sum of  
21 compulsory and voluntary contributions, i.e., the country's total contributions to  
22 UNESCO<sup>13</sup>. As these contributions should have an effect only after they are budgeted, the  
23 variable is lagged one period. Second, to capture the entire contributive history of a country,  
24 we have computed the variable *Unpaid\_contr*. When a member country has paid all  
25 compulsory contributions, this variable is 0; otherwise, it is equal to the absolute value of  
26 the difference between the contributions due and those actually paid.<sup>14</sup> Just like *Expect\_*  
27 *contr*, *Unpaid\_contr* is lagged one period. The expected signs on these variables reflect the  
28 idea that lobbying is exerted only for marginal sites, namely, those of lower quality. Hence,  
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53 <sup>12</sup> We have constructed the dataset for *Committee* referring to official data available from the  
54 UNESCO website about each Committee Assembly.

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56 <sup>13</sup> Data for *Expect\_contr* are drawn from the UNESCO Statements of Compulsory and Voluntary  
57 Contribution to World Heritage Fund. They are expressed in US dollars for each country in PPP.

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59 <sup>14</sup> These data come from official documents of UNESCO (Statements of Compulsory and Voluntary  
60 Contribution to World Heritage Fund). In the case of countries that provide only voluntary contributions,  
61 *Unpaid\_contr* is set equal to 0 (unless they have not contributed at all).  
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1 the expected sign on *Committee* and on *Expect\_contr* should be negative, whereas that of  
2 *Unpaid\_contr* (which is a form of “negative lobbying”) should be positive.  
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5 Finally, we adopt the *Government Effectiveness Index* (variable *Gov\_eff* from the  
6 Worldwide Governance Indicators of the World Bank) to proxy the efficiency of the  
7 country’s bureaucracy. *Gov\_eff* captures the (perceptions of the) efficiency of the country’s  
8 public and civil services. These scores are aggregated into a single index, in units of a  
9 standard normal distribution, ranging from 0 to 1. As such, *Gov\_eff* is the best proxy  
10 available of the country’s ability to prepare a proposal for inclusion of a site into the WHL.  
11 Since our sample includes both developed and undeveloped countries, with very different  
12 levels of government efficiency, the discriminating power of this proxy should be  
13 adequate.<sup>15</sup>  
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25 Table 2 reports the correlation matrix between the variables, table 3 the descriptive  
26 statistics and table 4 summarizes the expected signs of the explanatory variables.  
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31 [Table 2, 3 and 4 about here]  
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34 All panel models are estimated using random effects. Intuitively, we cannot estimate a  
35 fixed effect model due to the presence of dummy variables or variables constant over time.  
36 In any event, the Lagrange multiplier test for the choice of the econometric model presented  
37 in table 10 supports the application of a random effect model.  
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## 47 5. Estimation of the baseline model 48 49 50 51

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52 <sup>15</sup> We expect the effect of *Gov\_eff* not to be the same for countries with high and low cultural capital,  
53 because the way in which the bureaucracy prepares the nomination might have little effect in low cultural  
54 capital countries, where the choice of sites is limited; but it might play a more important role in countries  
55 with a large amount of cultural capital of varying degrees of interest, where also low quality sites might be  
56 included in the WHL if properly presented. To capture this differential effect of the country’s administration,  
57 we first estimate *Gov\_eff* for high cultural capital countries, i.e. with *POP\_1500hk* and *GDP\_1820hk*, and  
58 secondly on the subsample containing just low cultural capital countries, controlling for area and  
59 population, since the historical data for those country are not available.  
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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

1 forces us to use current values of country area and population, as it is usually done in the  
2 literature, these variables never turn out statistically significant (model 4).  
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5 [Table 5 about here]  
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## 10 11 6. Robustness checks 12 13

14 The econometric issues discussed above require estimating a series of variants of the  
15 baseline model, to minimize the risk of spurious correlations or misspecifications of the  
16 model and/or inappropriate estimation techniques.  
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22 6.1. Alternative specifications for  $N_{it}$ . First, we verify whether the estimated results  
23 remain fundamentally the same when the explanatory variable of interest,  $N_{it}$ , is proxied by  
24 the alternative variable *Tenure*. The idea behind *Tenure* is that a longer membership should  
25 result in a greater number of sites. Proxying  $N_{it}$  by *Tenure* has the further advantage of  
26 avoiding risks of multicollinearity with the other covariates, all of which have a positive  
27 effect on the number of sites; *Tenure* instead is positively correlated with the number of sites  
28 but not with the other variables, as the correlation matrix of table 2 shows.  
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38 Table 6 report the results; they are quite similar to those already obtained in the baseline  
39 model. Once more, the estimated coefficients on *Tenure* are always negative and statistically  
40 significant in models from 5 to 7. As time goes by, countries that have ratified the UNESCO  
41 Convention earlier (and that are therefore likely to have more sites) include sites of lower  
42 quality in the list. This effect is stronger when only high cultural capital countries are  
43 considered. The estimated coefficients on the variables measuring lobbying, the quality of  
44 the public administration and the stock of cultural capital confirm the results already  
45 obtained with  $N_{it}$  proxied by  $Sites_{it-1}$ .  
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56 [Table 6 about here]  
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6.2. Disaggregating 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.<sup>16</sup>

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:

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<sup>16</sup> 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.

1 the year 1994, when there was a peak in the change of the wording of the definitions of  
2 criteria; the years 2001-03, when a new admittance procedure restricted the number of new  
3 sites to one per country and 30 in total every year; the year 2005, when it was introduced  
4 the possibility of mixed sites (partly natural and cultural) and the number of sites was re-  
5 expanded to two per country and 45 in total.<sup>17</sup>  
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11 Table 8 presents the results of the control of the stability of criteria over time. We  
12 organize the analysis in two steps; in models 13-15 we test whether any of the three beak-  
13 points has a direct effect on the quality of the sites; in models 16-18 we verify whether  
14 including the proxies for the number of sites modifies this result. In model 13 the dummy  
15 for the changes introduced in 1994 turns out negative and significant, which suggests that  
16 these changes apparently reduced the quality of the sites subsequently included in the list.  
17 Yet, once we control for the number of sites (model 16), the change of criteria of 1994 does  
18 not seem to be relevant, since the negative quantity-quality relationship subject of our study  
19 holds. In other words, we find evidence that the changes of the definitions of the criteria  
20 approved in 1994 did not refrain countries with more sites to have new ones of lower  
21 marginal quality being approved into the WHL. Interestingly, we observe an increase in the  
22 quality of sites between 2001 and 2003, as a consequence of the restrictions imposed on the  
23 number of nominations per country (models 14 and 17). Probably this restriction created an  
24 incentive to submit sites of higher quality, to minimize the possibility of receiving a rejection  
25 among the proposed sites. In a complementary way, following the relaxation in the  
26 UNESCO policy for sites nominations in 2005, we observe a widespread reduction of the  
27 average quality after that year, regardless of the number of sites that a country had (models  
28 15 and 18). The negative quantity-quality relationship is thus corroborated, because  
29 imposing a limitation on the number of sites that could be nominated seems to increase the  
30 quality of sites included in the list and viceversa. In other words, our hypothesis is valid in  
31 both directions.  
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58 <sup>17</sup> Alternatively, we perform an “unrestricted” test of the stability of the criteria by introducing a set  
59 of dummy variables that capture a series of five years intervals. The estimates do not change in a qualitative  
60 way. They are available upon request.  
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[Table 8 about here]

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6 6.4. Specification of the model. As a final robustness check we have estimated a cross-  
7 section model to exclude the possibility that our results depend on the model specification.  
8 Given the different structure of the dataset, we are obliged to estimate a second equation:  
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$$10 \quad Q_i = \beta_0 + \beta_1 N_i + \beta_2 CulturalK_i + \beta_3 Lobby_i + \beta_4 AVquality_i + u_i \quad (2)$$

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16 The dependent variable  $Q_i$  is the quality of a single site  $i$  whose value, just like in the  
17 analysis conducted so far, equals the number of criteria that the site satisfies. Having  
18 removed from the sample the sites excluded from the WHL, whose values would have been  
19 zero,  $Q_i$  is a positive integer with a lower bound equal to 1.  
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25 Like in the estimates of equation (1), we proxy the number of sites  $N$ , by  $Sites_{t-1}$  and  
26 *Tenure*; yet the cross section specification allows us also to include *Year*, i.e., the year a site  
27 is included in the WHL. If the sign of  $\frac{\partial Q}{\partial N}$  is negative, sites enlisted in more recent years  
28 should be of lower quality; hence the expected sign on *Year* is negative. As measures of  
29 cultural capital, we select *Area* and *Population* to keep the number of observations as large  
30 as possible; we include the same lobbying variables of the baseline model. Moreover, the  
31 focus on single sites of the cross-section specification eliminates the possibility to explain  
32 the evolution of the quality of the sites on a country basis. To limit such a drawback, we add  
33 the country average quality, in order to evaluate the marginal evolution of the quality of the  
34 sites. Making explicit the country average sites' quality in the specification of equation (2)  
35 also verifies possible problems of reverse causality that equation (1) might embed; the  
36 concern is that, just like the average quality of the sites inscribed in a certain year may  
37 depend on the number of sites already inscribed in the list, the number of sites inscribed in  
38 the list may also depend on the average quality of the sites a country already has in the  
39 WHL.  
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58 The cross-sectional specification of equation (2) has several additional advantages. First,  
59 it allows to keep more than one observation for every year, without the need to compute  
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1 country averages of the quality of the sites. Second, it rules out the problem of the missing  
2 values. Third, as the sample contains only positive integers, we can test our hypothesis  
3 using a count data model. Since  $Q$  is not over-dispersed and its mean and variance show  
4 quite similar values, we assume a Poisson distribution.<sup>18</sup> The descriptive statistics related to  
5 the cross-section dataset are shown in table 11.  
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11 Table 9 shows that changing the specification of the model from a panel to a cross-  
12 section, where single sites rather than country averages are considered, does not  
13 qualitatively change the results. In all the estimates  $Sites_{t-1}$  is negatively correlated with the  
14 quality of the sites and so is *Tenure*. In the cross-sectional model also the proxy *Year* has a  
15 negative and statistically significant coefficient. These results are especially important, since  
16 we are controlling for the lagged average quality of the sites, and still we find evidence of  
17 diminishing marginal quality. The results on the other explanatory variables remain  
18 basically unchanged.  
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28 [Tables 9, 10, 11 about here]  
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## 35 6. Conclusions 36 37

38 Our study uses a simple and straightforward definition of quality of the sites of the  
39 UNESCO WHL. The estimates based on this proxy lend empirical support to our main  
40 research question: as the number of sites that a country has in the WHL increases, their  
41 marginal quality decreases. In other words, since the stock of cultural and natural capital is  
42 fixed, new entries into the WHL appear to be of lower quality than earlier ones. This  
43 negative quantity-quality relationship is particularly evident for countries with more than  
44 10 sites. Quite importantly, this result seems robust after controlling for the stock of cultural  
45 capital, the lobbying power of the UNESCO member countries and the (rather semantic)  
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57 <sup>18</sup> We have also estimated the same specification with a linear regression on a normalized version of  
58 the dependent variable. The results, available upon request, do not qualitatively change from those reported  
59 in table 9.  
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1 changes in the criteria for the evaluation of quality that UNESCO has adopted during the  
2 1972-2018 time interval. Finally, this relationship shows up also in the opposite sense, as  
3 countries reacted by raising the average quality of their newly proposed sites in years when  
4 limitations on the number of sites that could be proposed became more stringent. The  
5 results are quite robust to changes in the estimating techniques and in the specification of  
6 the data.  
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14 This research, however, raises several new questions and scenarios for future research,  
15 as it deals with an issue, the assessment of quality that is at the same time important and  
16 difficult to handle both in cultural and in mainstream economics. A first topic that will have  
17 to be revisited in the literature on the UNESCO WHL in the light of our research is the role  
18 that rent seeking plays in the assignment of the new sites. Lobbying seems decisive in sites  
19 whose quality is barely sufficient to enter the list, contrary to the current consensus in  
20 literature, that countries always resort to rent seeking. Another open question is  
21 determining the precise number of sites beyond which the average quality of the whole  
22 WHL starts to decrease. A reduction of the average quality of the WHL would call into  
23 question the credibility and usefulness of the UNESCO policy to add more sites to the list.  
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Figure 1. Evolution of criteria over time

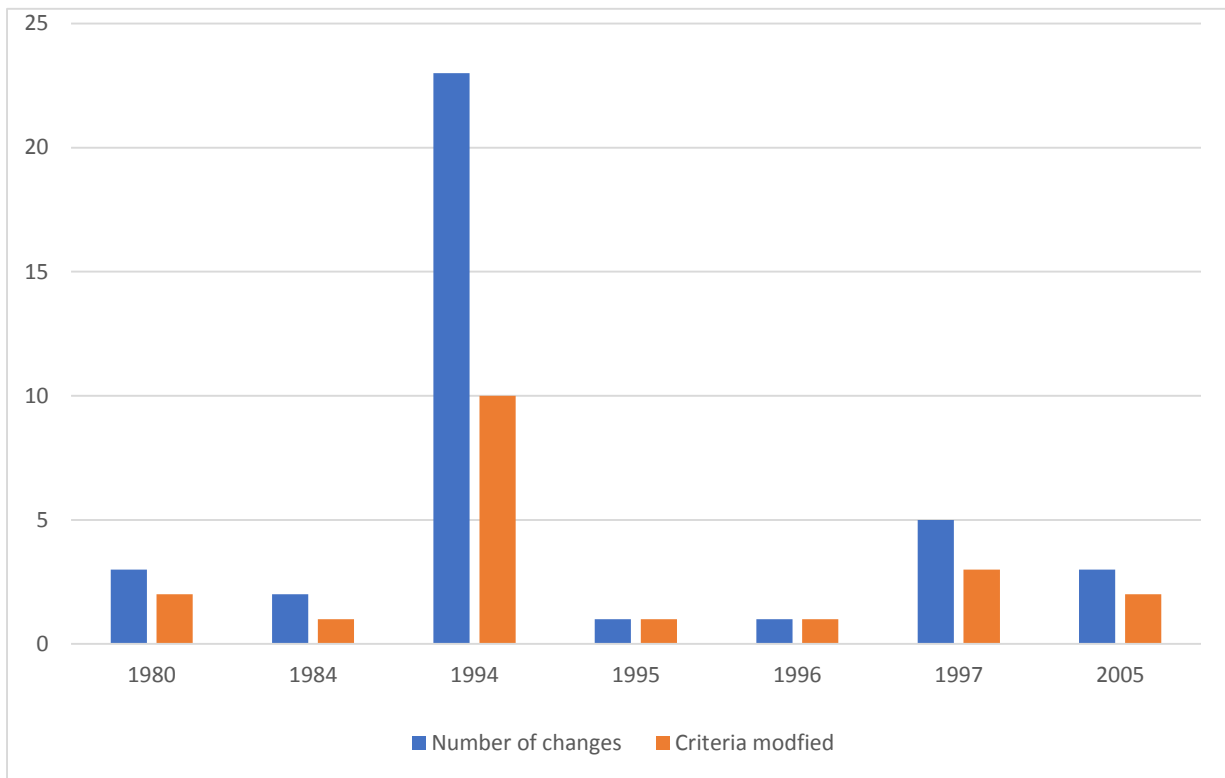


Figure 2. Mean quality of sites by UNESCO geographical area

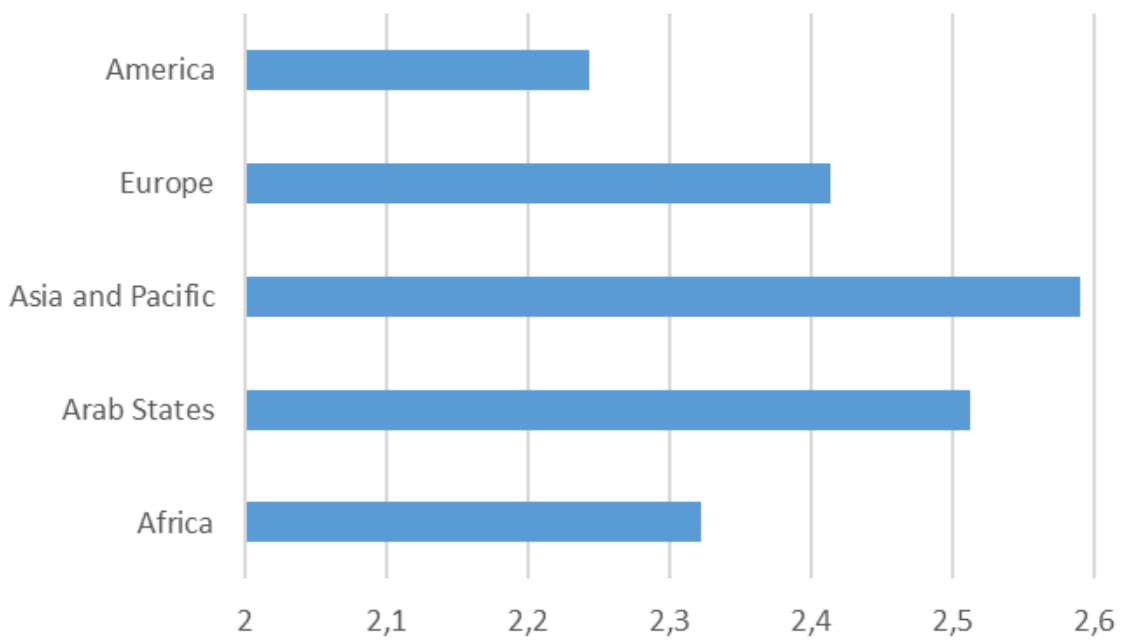


Figure 3. Correlation between quantity and quality of UNESCO sites

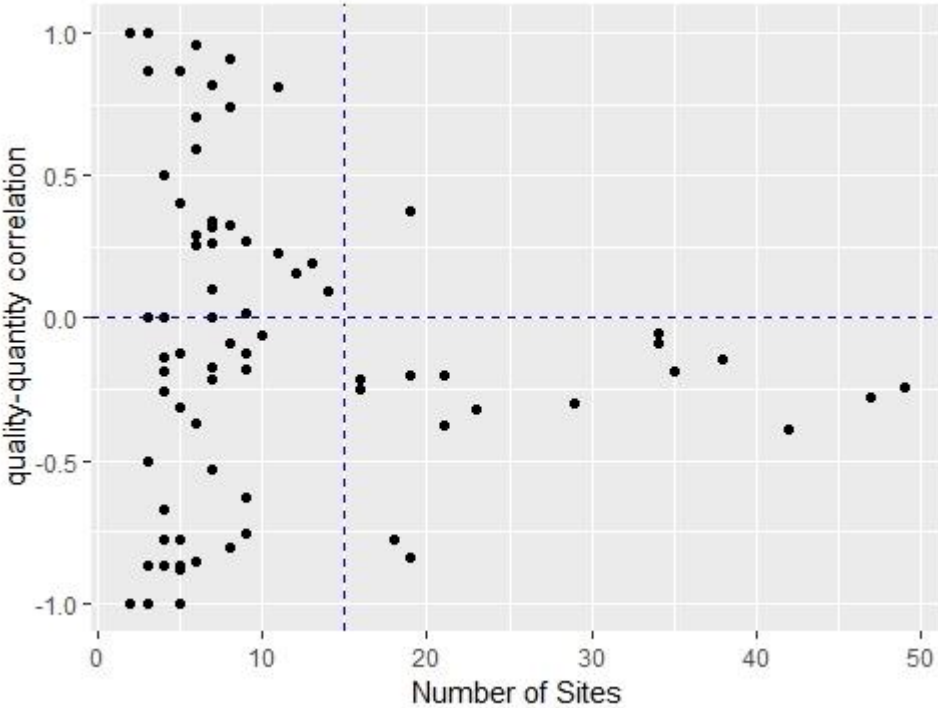


Table 1. Criteria for cultural and natural sites in 2018

N.	<i>Cultural Criteria</i>	<i>Value involved</i>
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.	<i>Natural Criteria</i>	<i>Value involved</i>
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

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

Table 3. Descriptive statistics

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



Table 4. Expected signs

<i>Variable</i>	<i>Expected sign</i>
<i>Sites<sub>t-1</sub></i>	Negative
<i>Tenure</i>	Negative
<i>Area</i>	Positive
<i>Population</i>	Positive
<i>POP_1500hk</i>	Positive
<i>GDP_1820hk</i>	Positive
<i>POP_1500</i>	Positive
<i>GDP_1820</i>	Positive
<i>Committe</i>	Negative
<i>Exp_contr</i>	Negative
<i>Unpaid</i>	Positive
<i>Gov_Eff</i>	Negative
<i>Change_94</i>	Not significant
<i>Change01_03</i>	Positive
<i>Change_05</i>	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
<i>Tenure</i>	-0.008144** (0.003632)	-0.01892*** (0.005025)	-0.02446*** (0.007711)	0.00358 (0.01)
<i>Committee</i>	0.003171 (0.03922)	-0.00267 (0.04811)	0.03854 (0.05259)	0.09598 (0.1007)
<i>Expect_contr</i>	0.0000003 (0.0000005)	0.0000005 (0.0000007)		-0.0000026 (0.000007)
<i>Unpaid_contr</i>	-0.0000003 (0.0000004)	-0.0000004 (0.0000008)	-0.0000003 (0.0000007)	-0.00000035 (0.0000006)
<i>Gov_Eff</i>			-2.5247*** (0.4992)	-0.3293 (0.5373)
<i>Pop 1500</i>	0.000006** (0.000003)			
<i>GDP 1820</i>	0.0001167 (0.000114)			
<i>Pop 1500hk</i>		0.0000054* (0.0000032)	0.0000012 (0.0000025)	
<i>GDP 1820hk</i>		-0.0001259 (0.0002591)	0.0006283** (0.0002714)	
<i>Area</i>	-0.00668 (0.00171)	-0.001261 (0.00281)	0.002122 (0.002589)	-0.000315 (0.004487)
<i>Population</i>				-0.00008158 (0.0004)
<i>Intercept</i>	2.3848*** (0.081)	2.8178*** (0.2663)	4.0507*** (0.3726)	2.3012*** (0.30835)
<i>Adj. R2</i>	0.055078	0.041979	0.15788	0.11389
<i>F-statistic</i>	5.4931***	2.5171**	5.4728***	3.35011***
<i>N</i>	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
<i>Sites<sub>it-1</sub></i>	-0.01943*** (0.00576)	-0.01784 (0.0264)	-0.01591* (0.0083)	-0.04298 (0.0362)
<i>Committee</i>	0.00483 (0.047)	-0.02551 (0.08044)	0.02026 (0.0515)	0.08092 (0.0974)
<i>Expect_contr</i>	0.00000055 (0.0000006)	-0.0000029 (0.0000052)		
<i>Unpaid_contr</i>	-0.0000005 (0.0000004)	0.0000003 (0.000006)	-0.0000006 (0.0000005)	-0.0000027 (0.0000068)
<i>Gov_Eff</i>			-1.31*** (0.3999)	-0.5024 (0.4058)
<i>POP1500</i>			0.0000059** (0.0000023)	0.0001467** (0.0000562)
<i>GDP1820</i>			0.000835*** (0.000311)	0.0000086 (0.00022)
<i>Area</i>	-0.003 (0.00205)	0.001197 (0.00937)	-0.001342 (0.00184)	0.0115 (0.0114)
<i>Population</i>	0.00007** (0.0000279)	0.0004** (0.000188)		
<i>Intercept</i>	2.6696*** (0.144)	2.2288*** (0.0842)	2.7134*** (0.285)	2.4615*** (0.2098)
<i>Adj. R<sup>2</sup></i>	0.029433	0.046893	0.11572	0.063214
<i>F-statistic</i>	1.9404*	3.3601***	3.65462***	2.54477**
<i>N</i>	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
<i>Sites<sub>t-1</sub></i>				-0.01334** (0.00564)	-0.01821*** (0.00505)	-0.01197** (0.00559)
<i>Committee</i>	0.001039 (0.0388)	-0.0021 (0.0383)	0.006724 (0.0388)	0.01189 (0.0389)	0.01482 (0.0383)	0.0151 (0.039)
<i>Expect_contr</i>	0.0000005 (0.0000005)	0.0000003 (0.0000005)	0.0000004 (0.0000005)	0.0000009* (0.0000005)	0.000001* (0.0000005)	0.0000009 (0.0000005)
<i>Unpaid_contr</i>	-0.0000003 (0.0000004)	-0.0000003 (0.0000004)	-0.0000004 (0.0000004)	-0.0000004 (0.0000004)	-0.0000004 (0.0000004)	-0.0000005 (0.0000004)
<i>Area</i>	-0.001708 (0.00178)	-0.001373 (0.00168)	-0.001595 (0.00181)	-0.001423 (0.00179)	-0.001233 (0.00174)	-0.001432 (0.00181)
<i>Population</i>	0.0000569** (0.0000237)	0.0000515* (0.0000223)	0.0000583** (0.0000244)	0.0000789*** (0.0000256)	0.000084*** (0.0000251)	0.0000785*** (0.00002615)
<i>Change_94</i>	-0.2** (0.0837)			-0.11 (0.092)		
<i>Change_01_03</i>		0.5418*** (0.129)			0.5824*** (0.0128)	
<i>Change_05</i>			-0.2591*** (0.0777)			-0.1875** (0.0844)
<i>Intercept</i>	2.4542*** (0.08)	2.2769*** (0.056)	2.4023*** (0.0626)	2.4296*** (0.081)	2.3223*** (0.0582)	2.4113*** (0.0626)
<i>Adj. R<sup>2</sup></i>	0.052281	0.059478	0.068338	0.066103	0.096811	0.078238
<i>F-statistic</i>	5.7238***	6.47493***	7.5729***	5.94148***	8.88314***	7.24583***
<i>N</i>	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
<i>Sites<sub>t-1</sub></i>	-0.0063** (0.0026)		
<i>Tenure</i>		-0.0051** (0.0022)"	
<i>Year</i>			-0.0051** (0.0021)
<i>Committee</i>	0.004 (0.0228)	0.0008 (0.0226)	-0.0048 (0.0225)
<i>Expect_contr</i>	0.0000002 (0.0000002)	0.0000001 (0.0000002)	0.0000004 (0.0000002)
<i>Unpaid_contr</i>	-0.0000001 (0.0000003)	-0.0000001 (0.0000002)	-0.0000001 (0.0000002)
<i>Area</i>	0.0004 (0.0008)	0.0006 (0.0008)	0.0004 (0.0008)
<i>Population</i>	0.000006 (0.000009)	0.000002 (0.000008)	-0.000006 (0.000008)
<i>AVquality</i>	0.4255*** (0.0469)	0.4275*** (0.0476)	0.4284*** (0.0478)
<i>Intercept</i>	-0.1281 (0.1184)	-0.0963 (0.1198)	10.0818** (4.1051)
<i>AIC</i>	2505.9	2506.1	2505.6
<i>N</i>	812	812	812

Table 10. Tests for random effect

<i>Lagrange Multiplier Test - Honda</i>	
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
<i>Lagrange Multiplier Test - Breusch-Pagan</i>	
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

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